PROJECT MANUAL

University Hospital
Emergency Department Expansion

150 Bergen Street
Newark, NJ

Prepared by
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Suite 400
Morristown, NJ 07960
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Addendum 1
October 30, 2023
Project Number 006.4764.000

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DOCUMENT 00 60 00 - PROJECT FORMS

PART 1 - GENERAL

1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:

1. The form of agreement and general conditions shall be as specified in and attached to the RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction.

a. The General Conditions for Project are specified in Document 00 72 00 and in the RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction.
b. Supplementary Conditions are specified in the RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction.

1.2 ADMINISTRATIVE FORMS

A. The form of agreement and general conditions shall be as specified in and attached to the RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction.

B. Copies of AIA standard forms may be obtained from the American Institute of Architects; http://www.aia.org/contractdocs/purchase/index.htm; docspurchases@aia.org; (800) 942-7732.

C. Pre-Construction Forms:

1. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."
2. Form of Certificate of Insurance: AIA Document G715, "Supplemental Attachment for ACORD Certificate of Insurance 25-S."

D. Information and Modification Forms: Attached at the end of this Section. Construction Management software generated forms may be substituted for those below provided the forms contain substantially the same information.

1. Submittal Transmittal. (Referenced in Section 013300)
2. Subcontractors and Major Material Suppliers List. (Referenced in Section 013300)
3. Requests for Interpretation (RFI). (Referenced in Section 012613)

4. Substitution Request. (Referenced in Section 012500)
5. Bulletin. (Referenced in Section 012600)
6. Change Order Form. (Referenced in Section 012600)
7. Punch List. (Referenced in Section 017700)
8. Certificate of Substantial Completion. (Referenced in Section 017700).
9. Standard Products Submittal Form (Referenced in Section 013300).

E. Payment Forms:

1. Schedule of Values Form: AIA Document G703, "Continuation Sheet."
2. Payment Application: AIA Document G702/703, "Application and Certificate for Payment and Continuation Sheet."
3. Form of Contractor's Affidavit: AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
4. Form of Affidavit of Release of Liens: AIA Document G706A, "Contractor's Affidavit of Payment of Release of Liens."

F. Waste Management Forms:

1. Waste Management Plan Summary. (Referenced in Section 017419)
2. Waste Management Report. (Referenced in Section 017419)

Embodied Carbon and Sustainable Design Forms:

3. Environmental Product Declaration (EPD) Reporting Form. (Reference in Section 018133) .

END OF DOCUMENT 00 60 00

Advancement of Construction Technology

SUBMITTAL TRANSMITTAL

Project: _____ Date: _____

_____ A/E Project Number: _____

TRANSMITTAL A To (Contractor): _____ Date: _____ Submittal No. _____

From (Subcontractor): _____ By: _____ ☐ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

☐ Submitted for review and approval
☐ Resubmitted for review and approval
☐ Complies with contract requirements
☐ Will be available to meet construction schedule
☐ A/E review time included in construction schedule
☐ Substitution involved - Substitution request attached
☐ If substitution involved, submission includes point-by-point comparative data or preliminary details
☐ Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL B To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

☐ Approved
☐ Approved as noted
☐ Revise / Resubmit
☐ Rejected / Resubmit

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL C To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____

From (A/E): _____ ☐ Other By: _____ Date Trnsmt'd by A/E: _____

☐ Approved
☐ Approved as noted
☐ Not subject to review
☐ No action required
☐ Revise / Resubmit
☐ Rejected / Resubmit
☐ Approved as noted / Resubmit
☐ Provide file copy with corrections identified
☐ Sepia copies only returned
☐ Point-by-point comparative data required to complete approval process
☐ Submission Incomplete / Resubmit

Other remarks on above submission: ☐ One copy retained by sender

TRANSMITTAL D To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ One copy retained by sender

September 1996
CSI Form 12.1A

Data Transfer Agreement

Entity Requesting Data ("Transferee")	**Transferee Contact Name**
Project	**Project Number**
Client	**Date**
	File 1DTA **This is page 1 of**

Transferee has asked Gensler to provide electronic copies of, or access to, certain drawings, specifications, or other documents, CAD data files, and/or building information models (collectively, "Data") prepared by Gensler and/or its consultants (collectively "Gensler") for the Project. Gensler agrees to provide Transferee with the requested Data, under the terms of this Data Transfer Agreement ("Agreement").

1. The transfer of the Data is not and shall not be deemed a sale. The Data are instruments of service. Gensler shall be deemed the Data's author and shall retain all proprietary rights, including any copyrights, embodied therein.

2. Transferee may transfer the Data to its contractors, subcontractors, suppliers, and consultants (collectively "Others"), provided Transferee requires the Others to be bound by this Agreement as if they were the Transferee in this Agreement. Transferee and Others may use the Data only for purposes related to the Projects.

3. Transferee acknowledges that anomalies and errors may occur when the Data is transferred electronically or used in an incompatible computer environment. Transferee solely accepts the risks associated with, and the responsibility for, any damages to hardware, software, computer systems, or networks related to the Data's transfer or use. Gensler shall have no responsibility to provide software or training to allow Transferee to use the Data.

4. Gensler shall have no duty to modify or update the Data. Gensler may retain an archival copy of the Data, which shall be conclusive proof and govern in any dispute over the Data's form or content.

5. Transferee agrees to indemnify, defend and hold Gensler, its officers, directors, shareholders, employees, agents, and consultants harmless from and against any and all claims, liabilities, suits, demands, losses, damages, costs, and expenses, including, but not limited to, reasonable attorneys' fees and all legal expenses and fees incurred through appeal, and all interest thereon, accruing to or resulting from any and all persons, firms or any other legal entities on account of any damages or losses to property or persons, including, but not limited to, injuries, death or economic losses, arising out of Transferee's or Others' use, reuse, transfer, or modification of the Data, except where a court or forum of competent jurisdiction determines that Gensler is solely liable for such damages or losses.

6. If Transferee fails to perform or observe any of the terms of this Agreement, Gensler may demand, and Transferee immediately shall return, the Data and any copies thereof.

7. To the extent the Data include building information models ("Models"), the parties agree to the following additional terms: (i) The Models are intended for the purpose of communicating design intent. While they may be helpful to illustrate conflicts or inconsistencies in the design, the Models may not detect all conflicts or inconsistencies. (ii) Any use of the Models for the purpose of generating quantity take-offs or cost estimates, or for fabrication, will be at the Transferee's sole risk. (iii) As with Gensler's other services and deliverables, the Models will be prepared using that degree of skill and care exercised by licensed professionals practicing in the same community, under the same or similar circumstances. The Models may contain, or be based upon, data or information provided by others. Gensler has relied upon such data or information as it consistent with this standard of care. (iv) Information contained in the Models will not be construed to dictate construction means or methods, which will remain the contractor's responsibility. (v) To the extent of any conflict between information contained in, or generated by, the Models and Gensler's drawings and specifications, the latter documents will prevail.

8. This Agreement shall be governed by the law of the location of Gensler's office, Insert city, state of Gensler's office.

9. In any legal proceeding to enforce this Agreement, the prevailing party shall be entitled to recover its reasonable attorneys' fees and costs of defense.

10. Unless otherwise explicitly agreed to in writing by the parties, this Agreement shall govern any and all data transfers to Transferee by Gensler.

Gensler Authorization by **Date Signed**

_____

Input Principal or Managing Principal's name here

Transferee Authorization by **Date Signed**

_____

Input Client signatory's name here

Advancement of Construction Technology

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____

_____

To (A/E): _____

_____

From (Contractor): _____

Date: _____

A/E Project Number: _____

Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐_____ ☐_____ ☐_____ ☐_____ ☐_____ ☐_____ ☐_____ ☐ File

July 1994
CSI Form 1.5A

Request for Interpretation

Gensler

Project	**RFI Number**	
To	**Date**	
Attention	**Project Number**	
From	**File**	6RFI
Issued By	**Drawing Sheet / Location**	
Subject	**Detail**	
Distribution	**Specifications Page Number**	
	This is page	1 of

Problem, Cause and Proposed Solution (attach sketches as necessary)

Effect on Schedule

Effect on Cost

Reply

Reply Needed by

Signature **Date**

Substitution Request

Gensler

Project		**Date**	
Project Location		**Project Number**	
General Contractor		**File**	6S
Prepared by		**This is page**	1 of

We certify that the following product is equal or superior to the specified product in appearance, durability, performance, and in every other respect, and we hereby submit it for your consideration as a substitute for the specified item for the above-mentioned project:

1. Specified Item **Section**

2. Proposed Substitution

3. Reason for Substitution

4. Costs (Provide a complete breakdown of costs, including the cost amount to be DEDUCTED from the Contract Sum if the proposed substitution is accepted. Include documentation for both materials and labor.)

5. Schedule (Describe substitution's affect on construction schedule)

6. Supporting Data

- **Cutsheets: Attach complete technical data, including laboratory tests, if applicable.**
- **Installation: Include complete information on changes to Drawings and/or Specifications describing the steps that the proposed substitution will require for its proper installation.**
- **Samples: Submit with request all necessary samples and substantiating data clearly marked to prove equal quality and performance to that which is specified.**

7. List ways in which the substitution affects dimensions shown on Drawings

8. List affects of proposed substitution on other trades

9. List ways in which proposed substitution will be affected by applicable code requirements and agency approval

10. List differences between proposed substitution and specified item

11. Manufacturer's warranties of the proposed and specified items are: ☐ **Same** ☐ **Different**

Explain:

12. List information on availability of maintenance service and source of replacement materials

13. Certification of, and Assumption of Liability for, Equivalent Performance

The undersigned certifies that the function, appearance and quality of the proposed substitution is equivalent or superior to the specified item and is in full compliance with the Contract Documents and applicable regulatory requirements.

Supplier		**Signature**	
Telephone No.		**Date**	

Signature must be by person authorized to legally bind his/her firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

General Contractor		**Signature**	
Telephone No.		**Date**	

Bulletin Number

Gensler

Project	**Date**
Project Location	**Architect's Project Number**
Owner/Client	**File** 6BL **This is page** 1 of
To	**Attention**
Address	
City	**State** **Zip Code**

Delivered via:

☐ **Messenger** ☐ **Hand carried** ☐ **Facsimile**
☐ **Express** ☐ **Pick-up** ☐ **E-mail Address**
☐ **Mail** ☐ **UPS** ☐ **Website Address**

This Bulletin Conveys to Contractor (Check one of the following five choices.):

☐ **Architect's Authorization for Minor Changes**
Architect recommends modifications to the Work as described below.

☐ **Architect's Clarification / Supplemental Instructions** (Use this Bulletin form in place of *Architect's Supplemental Instructions* form.)
Contractor shall carry out the Work in accordance with the following supplemental instructions.

☐ **Architect's Confirmation of a Field Order** (Use this Bulletin form in place of a *Field Order* form.)
This confirms Architect's verbal instructions to (individual's name) _____ on (date) _____, as described below.
Note: The above three choices are each subject to the following terms: The change(s), clarification(s) and/or confirmation(s) described below is/are issued in accordance with the Contract Documents, without change in Contract Sum and/or Time.

☐ **Architect's Request for Contractor's Proposal** (Use this Bulletin form in place of an *Estimate Request* form.)
Please submit an itemized proposal for changes in the Contract Sum and/or Time for proposed modifications to the Contract Documents described herein. Submit proposal **within** _____ **days** or notify the Architect in writing of the date on which you anticipate submitting your proposal. This is not a Change Order or a Construction Change Directive or a direction to proceed with the Work described in the proposed modifications.

☐ **Other:** As described below.

Attachments

Requested by

☐ Architect ☐ Owner ☐ Contractor ☐ Other (specify): _____

Issued by Gensler by	**Date Signed**
Issued by Owner by	**Date Signed**
☐ Required; Please return signed copy to Gensler ☐ Not Required	
Accepted by Contractor by	**Date Signed**
☐ Required; Please return signed copy to Gensler ☐ Not Required	

Distribution

Prepared by Gensler by	**Date Signed**

Instructions / Description / References / Dates

Begin text here…

Change Order Number

Gensler

Project		**Date**	
Project Location		**Project Number**	
Owner / Client		**File** 6CO	**This is page** 1 of
Contractor		**Contractor's Request / Quotation Number / Date**	
Change to Contract Sum:	Choose One:	**Change to Contract Time:**	
Original Contract Amount:	Choose One:	**Revised Contract Amount:**	Choose One:

☐ **See Change Order Summary for Revised Total Contract Amount and Time**

Reason for Change	**Requested by**	
Recommended for Approval by Gensler: by	**By** **Por**	**Date Signed**
Approved for Owner / Client	**By**	**Date Signed**
Approved for Contractor	**By**	**Date Signed**
Approved for Tenant (if applicable)	**By**	**Date Signed**

The above Change Order to the contract shall be effective upon signature by all applicable parties, in accordance with the Conditions of the Contract. The Contract Amount refers to the Contract Sum or guaranteed Maximum Cost in the Contract.

Distribution

Description / References / Costs / Dates

Begin text here . . .

Punch List

Gensler

Project	**Date of Observation**
Project Location	**Project Number**
List Number	**File** 6PL
	This is page 1 of

Present

Field review by Gensler disclosed the item(s) listed below, which is/are not in accordance with the Contract Documents. Contractor shall, upon receipt of this list, and before Gensler issues the Certificate of Substantial Completion, proceed promptly to complete and correct the item(s) and shall then submit a request for another field review by Gensler to determine Substantial Completion. This list supplements Contractor's Punch List and, unless otherwise noted, supersedes Gensler's previous list(s). Gensler will rely on this list as the approved record of matters discussed and conclusions reached, unless Contractor's written notice to the contrary is received by Gensler within seven calendar days of the date this list was issued.

Distribution

Prepared by	**Date Issued**

Space / Item Number / Descriptions / Observations

Certificate of Substantial Completion

Gensler

Project		**Project Number**	
Project Location		**Date Issued**	
Owner / Client		**File**	6SC
Contract Date		**This is Page**	1of
Date of Substantial Completion			

Date of Substantial Completion is applicable to	☐ **Entire Project**	☐ **Designated Portion of Project, as described below**		
Punch List	☐ **Attached**	☐ **Transmitted Separately**	☐ **None**	

The Work performed under the Contract for Construction has been reviewed and found, to Architect's best knowledge, information and belief, to be substantially complete as of the Date of Substantial Completion entered above. The Date of Substantial Completion is the date when the Work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents (including any approved change Orders) and all required final inspections and permits have been obtained so Owner can occupy or utilize the Work for its intended use, subject only to completion of minor items (Punch List).

The Work, or designated portion thereof shall include:

A list of items to be completed or corrected and the date(s) when such items are to be completed (Punch List) may be attached hereto or transmitted separately. This Certificate of Substantial Completion or omission of any item from the Punch List shall not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. The Architect shall not be responsible for any omission from, or other discrepancy on, the Punch List. Contractor agrees to complete or correct the items listed on the Punch List within days of the above date of Substantial Completion.

Warranties required under the Contract Documents shall commence on the Date of Substantial Completion, except for Punch List items and other incomplete work, warranties for which shall commence on the date such work is satisfactorily completed, unless otherwise agreed in writing by Owner and Contractor.

The Owner and Contractor shall fulfill and transfer responsibilities with regard to insurance, utilities, maintenance, damage, security, surety, and the like, in accordance with the Contract Documents or other written agreement between them.

The Architect has conducted no tests for, and made no determination of the presence or lack of asbestos or other hazardous or toxic substances or pollutants.

The Basic Services of the Architect shall end 30 days after the Date of Substantial Completion, unless otherwise stated in the Owner/Architect Agreement or agreed in writing.

Begin text here . . .

Architect	Gensler	**By**	**Date Signed**
Owner / Client		**By**	**Date Signed**

Certificate of Substantial Completion continued

Gensler

Project	Project Number
Project Location	2 of

Contractor	By	Date Signed

Waste Management Plan Summary

Gensler

(Submit after Award of Contract and prior to Start of Work)

Project Title:		
Contract or Work Order No.:		
Contractor's Name:		
Street Address:		
City:	State:	Zip:
Phone: ( )	Fax: ( )	
E-Mail Address:		
Prepared by: (Print Name)		

Date Submitted:		
Project Period:	From:	To:

Reuse, Recycling or Disposal Processes to Be Used

Describe the types of recycling processes or disposal activities that will be used for material generated in the project to achieve the required 80% diversion rate . Indicate the type of process or activity by number, types of materials, and estimated quantities that will be recycled or disposed in the sections below:

01 - Reuse of building materials or salvage items on site (i.e. crushed base or red clay brick)
02 - Salvaging building materials or salvage items at an off site salvage or re-use center (i.e. lighting, fixtures)
03 - Recycling source separated materials on site (i.e. crushing asphalt/concrete for reuse or grinding for mulch)
04 - Recycling source separated materials at an off site recycling center (i.e. scrap metal or green matls)
05 - Recycling commingled loads of C&D matls at an off site mixed debris recycling center or transfer station
06 - Recycling material as Alternative Daily Cover at landfills
07 - Delivery of soils or mixed inerts to an inert landfill for disposal (inert fill).
08 - Disposal at a landfill or transfer station.
09 - Other (please describe) _____

Types of Material to Be Generated

Use these codes to indicate the types of material that will be generated on the project

A = Asphalt	C = Concrete	M = Metals	I = Mixed Inert	G = Green Matls
D = Drywall	P/C=Paper/Cardboard	W/C = Wire/Cable	W = Wood	O = Other (describe)
M/C = Miscellaneous Construction Debris		R = Reuse/Salvage	S= Soils (Non Hazardous)	

Facilities Used: Provide Name of Facility and Location (City)

Total Truck Loads: Provide Number of Trucks Hauled from Site During Reporting Period

Total Quantities: If scales are available at sites, report in tons. If not, quantify by cubic yards. For salvage/reuse items, quantify by estimated weight (or units).

SECTION 1 - RE-USED/RECYCLED MATERIALS

Include all recycling activities for source separated or mixed material recycling centers where recycling will occur.

Type of Material	Type of Activity	Facility to Be Used / Location	Total Truck Loads	Total Quantities		
				Tons	Cubic Yd.	Other Wt.
a. Total Diversion						

SECTION 2 - DISPOSED MATERIALS						
Include all disposal activities for landfills, transfer stations, or inert landfills where no recycling will occur.						
Type of Material	Type of Activity	Facility to Be Used / Location	Total Truck Loads	Total Quantities		
				Tons	Cubic Yd.	Other Wt.
b. Total Disposal						

SECTION 3 - TOTAL MATERIALS GENERATED						
This section calculates the total materials to be generated during the project period (Reuse/Recycle + Disposal = Generation)						
				Tons	Cubic Yd.	Other Wt.
a. Total Reused/Recycled						
b. Total Disposed						
c. Total Generated						

SECTION 4 - CONTRACTOR'S LANDFILL DIVERSION RATE CALCULATION					
Add totals from Section 1 + Section 2					
	Tons	Cubic Yards	Other Wt.		
a. Materials Re-Used and Recycled					
b. Materials Disposed					
c. Total Materials Generated (a. + b. = c.)					
d. Landfill Diversion Rate (Tons Only)* (a / c)		Min. 80% Diversion Required			

** Use tons only to calculate recycling percentages: Tons Reused/Recycled/Tons Generated = % Recycled*

Contractor's Comments (Provide any additional information pertinent to planned reuse, recycling, or disposal activities):

Notes:

1. Suggested Conversion Factors: From Cubic Yards to Tons (Use when scales are not available)
   - Asphalt: 0.61 (ex. 1000 CY Asphalt = 610 tons. Applies to broken chunks of asphalt)
   - Concrete: 0.93 (ex. 1000 CY Concrete = 930 tons. Applies to broken chunks of concrete)
   - Gypsum Board Scrap: 0.20
   - Ferrous Metals: 0.22 (ex. 1000 CY Ferrous Metal = 220 tons)
   - Non-Ferrous Metals: 0.10 (ex. 1000 CY Non-Ferrous Metals = 100 tons)
   - Wood Scrap: 0.16

Waste Management Report

Gensler

(Submit with Each Progress Payment)

Project Title:		
Contract or Work Order No.:		
Contractor's Name:		
Street Address:		
City:	State:	Zip:
Phone: ( )	Fax: ( )	
E-Mail Address:		
Prepared by: (Print Name)		

Date Submitted:		
Project Period:	From:	To:

Reuse, Recycling or Disposal Processes to Be Used

Describe the types of recycling processes or disposal activities that will be used for material generated in the project to achieve the required 80% diversion rate . Indicate the type of process or activity by number, types of materials, and estimated quantities that will be recycled or disposed in the sections below:

01 - Reuse of building materials or salvage items on site (i.e. crushed base or red clay brick)
02 - Salvaging building materials or salvage items at an off site salvage or re-use center (i.e. lighting, fixtures)
03 - Recycling source separated materials on site (i.e. crushing asphalt/concrete for reuse or grinding for mulch)
04 - Recycling source separated materials at an off site recycling center (i.e. scrap metal or green matls)
05 - Recycling commingled loads of C&D matls at an off site mixed debris recycling center or transfer station
06 - Recycling material as Alternative Daily Cover at landfills
07 - Delivery of soils or mixed inerts to an inert landfill for disposal (inert fill).
08 - Disposal at a landfill or transfer station.
09 - Other (please describe) _____

Types of Material to Be Generated

Use these codes to indicate the types of material that will be generated on the project

A = Asphalt	C = Concrete	M = Metals	I = Mixed Inert	G = Green Matls
D = Drywall	P/C=Paper/Cardboard	W/C = Wire/Cable	W = Wood	O = Other (describe)
M/C = Miscellaneous Construction Debris		R = Reuse/Salvage	S= Soils (Non Hazardous)	

Facilities Used: Provide Name of Facility and Location (City)

Total Truck Loads: Provide Number of Trucks Hauled from Site During Reporting Period

Total Quantities: If scales are available at sites, report in tons. If not, quantify by cubic yards. For salvage/reuse items, quantify by estimated weight (or units).

SECTION 1 - RE-USED/RECYCLED MATERIALS

Include all recycling activities for source separated or mixed material recycling centers where recycling will occur.

Type of Material	Type of Activity	Facility to Be Used / Location	Total Truck Loads	Total Quantities		
				Tons	Cubic Yd.	Other Wt.
a. Total Diversion						

SECTION 2 - DISPOSED MATERIALS						
Include all disposal activities for landfills, transfer stations, or inert landfills where no recycling will occur.						
Type of Material	Type of Activity	Facility to Be Used / Location	Total Truck Loads	Total Quantities		
				Tons	Cubic Yd.	Other Wt.
b. Total Disposal						

SECTION 3 - TOTAL MATERIALS GENERATED						
This section calculates the total materials to be generated during the project period (Reuse/Recycle + Disposal = Generation)						
				Tons	Cubic Yd.	Other Wt.
a. Total Reused/Recycled						
b. Total Disposed						
c. Total Generated						

SECTION 4 - CONTRACTOR'S LANDFILL DIVERSION RATE CALCULATION					
Add totals from Section 1 + Section 2					
	Tons	Cubic Yards	Other Wt.		
a. Materials Re-Used and Recycled					
b. Materials Disposed					
c. Total Materials Generated (a. + b. = c.)					
d. Landfill Diversion Rate (Tons Only)* (a / c)		Min. 80% Diversion Required			

** Use tons only to calculate recycling percentages: Tons Reused/Recycled/Tons Generated = % Recycled*

Contractor's Comments (Provide any additional information pertinent to planned reuse, recycling, or disposal activities):

Notes:

1. Suggested Conversion Factors: From Cubic Yards to Tons (Use when scales are not available)
   - Asphalt: 0.61 (ex. 1000 CY Asphalt = 610 tons. Applies to broken chunks of asphalt)
   - Concrete: 0.93 (ex. 1000 CY Concrete = 930 tons. Applies to broken chunks of concrete)
   - Gypsum Board Scrap: 0.20
   - Ferrous Metals: 0.22 (ex. 1000 CY Ferrous Metal = 220 tons)
   - Non-Ferrous Metals: 0.10 (ex. 1000 CY Non-Ferrous Metals = 100 tons)
   - Wood Scrap: 0.16

Environmental Product Declaration Reporting Form

Gensler

Project Name		**Project Location**		
General Contractor		**Date**		
Subcontractor		**File**	6ER	**This is page** 1 of

The information below identifies the status of a Type III Environmental Product Declaration in accordance with ISO 14025 for the product(s) listed below.

Manufacturer	**Product**

☐ The product listed above has available one of the following Type III Environmental Product Declarations:

☐ Product-Specific Type III Environmental Product Declaration. **See attached.**

☐ Industry-Wide (Generic) Type III Environmental Product Declaration. **See attached.**

☐ A Type III Environmental Product Declaration is IN DEVELOPMENT for the product listed above and will be published by the provided date:

Date:

☐ A Type III Environmental Product Declaration is NOT AVAILABLE for the product at this time.

We certify that the following information is accurate to the best of our knowledge at the time of submission.

Contractor Signature	**Date**

DOCUMENT 00 72 00 - GENERAL CONDITIONS

PART 1 - GENERAL

A. General Conditions of the Contract for Construction, the AIA Document A101, "Standard Form of Agreement between Owner and Contractor, Stipulated Sum."RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction., are hereby made a part of the Contract Documents.

B. The Contractor is hereby specifically directed, as a condition of the Contract, to become acquainted with the Articles contained therein, and to notify and apprise all Subcontractors and other parties to the Contract of, and bind them to, its conditions.

C. No contractual adjustments shall be due as a result of failure on the part of the Contractor, Subcontractors or other parties to the Contract to be fully acquainted with the General Conditions.

D. The General Conditions of the Contract may be amended by Supplementary Conditions.

E. The provisions of the General and Supplementary Conditions, when included, and Division 01 "General Requirements," apply to the Work specified in each Section of the Specifications.

F. Where conflicts occur concerning the Architect's duties and responsibilities between the General Conditions and the Agreement between the Owner and Architect, the Agreement shall take precedence.

G. If not otherwise included in the Owner-Contractor Agreement or specifically included in the bidding documents, the Contractor shall obtain the Owner's insurance requirements prior to submitting a bid.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF DOCUMENT 00 72 00

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Work covered by Contract Documents.
2. Work under separate contracts.
3. Owner-furnished products.
4. Purchase contracts.
5. Miscellaneous provisions.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections and the RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction, apply to all Sections. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all.

1. In the event of a conflict among the Contract Documents, immediately notify the Architect for resolution.
2. Conflicts or discrepancies among the Contract Documents shall be resolved in the following order of priority:

a. Amendments and revisions (such as Change Orders and Bulletins) of later date take precedence over those of earlier date;
b. The Agreement;
c. Addenda of later date take precedence over those of earlier date;
d. The Supplementary Conditions;
e. The General Conditions;
f. Drawings and Specifications: Drawings govern Specifications for quantity and location. Specifications govern Drawings for quality and performance. In the event of ambiguity or conflicts, the greater quantity and the better quality shall govern.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Selective demolition of existing construction as indicated on Drawings.
2. Construction of interior tenant facilities within an existing building.

B. Sustainable Design: Project is designed to comply with the U.S. Green Building Council's "Leadership in Energy & Environmental Design (LEED) Rating System" certification level as specified in Section 018113 "Sustainable Design Requirements."

C. Type of Contract: Project will be constructed under a single prime contract with the addition of separate specialty contracts described below.

1.3 WORK UNDER SEPARATE CONTRACTS

A. General: Owner will award separate contracts for performance of certain construction activities at the Project site. The activities may occur prior to commencement of Work under this Contract, concurrent with the Work under this Contract, or as future work.

1. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts.
2. Coordinate the Work of this Contract with work performed under separate contracts.
3. Advise Owner of installation schedules and critical dates when Contractor's work is dependent on the installation of Work by others.

1.4 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.

B. Owner-Furnished Products: As indicated in a schedule on the Drawings.

1.5 PURCHASE CONTRACTS

A. General: Owner has negotiated purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise indicated.

1. Contractor's responsibilities are same as if Contractor had negotiated purchase contracts, including responsibility to renegotiate purchase and to execute final purchasing agreements.

B. Purchase Contracts: As indicated in a schedule on the Drawings.

1.6 MISCELLANEOUS PROVISIONS

A. Special Insurance: Contractor's Commercial General Liability insurance shall contain no exclusion that would deny coverage for any claim arising out of or contributed to by any fungus, mildew, mold, or resulting allergens. If such exclusion exists and cannot be removed by endorsement, Contractor shall submit proof of coverage for fungus, mildew, mold, or resulting allergens under a Pollution Legal Liability or Contractor's Pollution Liability policy.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 011300 - DELEGATED DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for portions of the Work the design of which is delegated to the Contractor.

1.2 REFERENCES

A. Abbreviations and Acronyms:

1. AHJ: Authority Having Jurisdiction.

B. Definitions:

1. Delegated: Means transferred by the Architect to the Contractor.
2. Design: Means the complete planning, arrangement, and coordination of a discrete portion of the work, along with its graphic and written communication, including determination and engineering of its organization and structure in response to aesthetic requirements, functional requirements, dimensional and geometric limits, and the arrangement, performance, and other criterion indicated in the Contract Documents.
3. Engineering Services: Means structural engineering services performed for the design, fabrication, and installation of systems, assemblies, and components similar in material, design, complexity and extent to that indicated for the delegated design portion of the Work.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Portions of the Contract Documents may delegate the design of discrete portions of the Work to the Contractor, or may otherwise specify "delegated design requirements" in individual specification Sections.

B. The Contractor is professionally liable for delegated design work, including design, engineering, and conformance to specified performance requirements.

C. Drawings of delegated design portions of the Work are diagrammatic; they do not identify or imply solutions to engineering aspects of the portions of the Work that are required to be designed by the Contractor, and are intended to only indicate:

1. The design intent of final profiles, shapes and forms of the specified materials;
2. Relationships between adjacent components of the Work;

3. Location, identification, dimension and size of components, assemblies, accessories, and other components of the Work; and
4. Schematic joining and attachment details and diagrams of fasteners and connections.

D. Specifications for delegated design portions of the Work are performance based, and establish the minimum qualities and performance criteria for materials, fabrications, products, systems, assemblies, and methods of execution.

E. The Architect reviews and determines whether or not the Contractor's proposed delegated designed work:

1. Conform to the design intent of the delegated design portion of the Work being reviewed;
2. Conform to the specified graphic and specification requirements, including subsequent modifications; and
3. Is appropriately integrated into the adjacent components of the Work and, where applicable, the overall design of the project.

F. In the event of a dispute regarding the Contractor's proposed delegated design solutions and the design intent of the Contract Documents, the decision of the Architect is final.

1.4 PROCEDURAL REQUIREMENTS

A. Design Requirements: Proposed delegated design solutions shall demonstrate conformance to the original design intent of the Contract Documents, as determined by the Architect.

1. Unless otherwise defined by the Contract Documents, the appearance of exposed elements, including member sizes, profiles, and alignment of components shall be within the dimensional limits and section profiles indicated, and consistent throughout the Project where the delegated design component of the Work is to be installed.
2. Deviation from the profiles, layouts, dimensional locations, or arrangements indicated is not permitted without prior written consent from the Architect.
3. Deviations from the specifications are not permitted without prior written consent from the Architect.
4. Contractor-proposed delegated design solutions that exactly follow the details indicated on the Drawings do not relieve the Contractor from liability for the design, fabrication, and performance of the delegated design portions of the Work.

B. Engineering Requirements: Engineer delegated design portions of the Work shall;

1. Meet or exceed the specified performance performance and quality requirements;
2. Conform to the dimensional and graphic requirements of the Drawings;
3. Satisfy the requirements of the AHJ; and
4. Provide structurally sound, leak-proof, non-corroding, and weather tight assemblies, as applicable, that accommodate, resist, distribute, or transfer, as applicable, the minimum specified in-service loads, and thermal, seismic, and wind sway, or other types of movement, without incipient or catastrophic failure.

C. Regulatory Requirements: Delegated design items shall be engineered in conformance with the International Building Code.

1.5 SUBMITTALS

A. General: Coordinate and process submittals for delegated design portions of Work in same manner as for other portions of Work.

B. Professional Engineer's qualifications.

C. Design Data: Submit structural engineering calculations demonstrating conformance to the requirements of the Contract Documents and of the AHJ.

1. Calculations must be legible and incorporate sufficient cross-references to shop drawings to make calculations readily understandable and reviewable.
2. At a minimum, structural calculations must contain:

    a. An analysis of framing members;
    b. Section property computations for framing members;
    c. An analysis of anchors, including anchors embedded in concrete; and
    d. The signature and seal of the professional structural engineer, licensed in the state of <**New Jersey**>, and responsible for their preparation.

3. Test reports are not an acceptable substitute for calculations.

1.6 QUALITY ASSURANCE

A. Professional Structural Engineer's Qualifications: Must be legally licensed or otherwise qualified to practice in the state of <**New Jersey**>. The engineer shall have not less than 10 consecutive years' experience providing engineering services for delegated design work similar in material, design, complexity, and extent to this Project, as determined by the Architect, and whose Work products have resulted in installations with a record of successful in-service performance.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials, fabrications, products, components, and accessories required for a complete installation, whether or not such items are indicated on the Drawings or in the Specifications.

B. Provide anchors, attachments, inserts, fasteners, clips, bracing, framework, and similar items as required to meet specified design and performance requirements, and to securely attach delegated design Work to adjacent supports, or to adjoining work, whether or not such items are indicated on the Drawings or in the Specifications.

PART 3 - EXECUTION

3.1 DESIGN

A. Unless otherwise indicated or specified, maintain the design intent and conform to the performance requirements indicated on the Drawings and in the Specifications, as determined by the Architect.

1. In the interest of fabrication or erection methods, minor dimensional changes and detailing adjustments to the original design communicated in the Contract Documents may become necessary.
2. Obtain written approval from the Architect for proposed changes and adjustments before procurement, fabrication, manufacture, assembly, or installation, as applicable.

B. Engage a qualified professional structural engineer to design connection details and determine fastener types and sizes.

1. Fasteners or connections may neither conflict with nor require revision to the finish profiles indicated or the supporting work.
2. Connections may not impose eccentric loading, nor induce twisting or warping to the supporting structure.
3. Connections must be designed to accommodate potential and actual misalignment of adjacent work within tolerances specified in other Sections.

3.2 DELEGATED DESIGN SCHEDULE

A. Section 054000 "Cold-Formed Metal Framing," for load-bearing and exterior non-load-bearing metal stud framing.

B. Section 055000 "Metal Fabrications," for metal items made from iron and steel, stainless steel, and non-ferrous metal shapes.

C. Section 055119 "Metal Grating Stairs," for metal grating stairs.

D. Section 055213 "Pipe and Tube Railings," for railings fabricated from aluminum, stainless steel, and steel pipe and tubing.

E. Section 055313 "Bar Gratings," for bar gratings.

F. Section 057000 "Decorative Metal," for Custom Fabrications from non-ferrous and ferrous metals.

G. Section 088100 "Glazing," for all glazing.

H. Section 092216 "Non-Structural Metal Framing," for light gauge metal framing of gypsum board, gypsum plaster, and portland cement plaster partitions and ceilings.

I. Section 095113 "Acoustical Panel Ceilings," for ceiling suspension systems.

J. Section 095133 "Acoustical Metal Pan Ceilings."

K. Section 095443 "Stretched Fabric Ceiling Systems."

L. Section 117300 "Patient Care Equipment," for ceiling-mounted patient-lift systems.

M. Section 149200 "Pneumatic Tube System" for support, design, coordination, and execution of installation of pneumatic tube systems.

END OF SECTION

SECTION 011400 - WORK RESTRICTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Existing utility interruptions.
2. Use of premises.
3. Occupancy requirements during construction.
4. Occupancy requirements prior to Substantial Completion.
5. Miscellaneous restrictions.

1.2 EXISTING UTILITY INTERRUPTIONS

A. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

1.3 USE OF PREMISES

A. Access: At all times, provide the Architect and the Owner's representatives, easy and safe access to the Work wherever it is in preparation and progress. Provide such access so Architect may perform its functions. Provide access to any testing agencies to perform required testing.

1. Coordination with Owner’s Separate Contractors: Provide access for Owner's separate contractors listed in Section 011000 "Summary" and coordinate schedule for the installation of their work.

B. Use of Site: Confine operations at the site to areas permitted by law, ordinances, permits, and the Contract Documents. Do not unreasonably encumber the Site with any materials or equipment. Coordinate loading on floor or roof with Architect and/or Structural Engineer to assure that no surfaces exceed carrying capacity.

1. Coordinate with Owner for secured storage within the building, if applicable.
2. Protect and maintain common areas of the building that are in the path of travel for construction personnel and used for transporting materials and equipment to and from the construction site.

C. On-Site Work Hours: Limit work in the existing building to normal business working hours, Monday through Friday, unless otherwise indicated.

1. Hours for Noise-Generating, Odor-Generating, and Dust-Generating Activities and Demolition: After business hours, or at such times as approved by the Owner.

a. Noise- and Odor-Generating activities include, but are not limited to, sprinkler work, hammering, nailing, and similar work, which may cause noise, dust, or odors, thereby disturbing occupants.

D. Landlord's or Property Manager's Rules: Conform at all times to the Landlord's and Property Manager's requirements for protection of plant, materials, equipment, and noise levels. A copy of the Landlord's or Property Manager's rules (tenant work letter or lease requirements) will be furnished from the Owner upon written request.

E. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

1. Schedule deliveries to minimize use of driveways and entrances.
2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
3. Do not block entrances, fire exits or lanes, or delivery routes.
4. Limit use of driveways and entrances to the following times:

a. Monday through Friday: 9 AM to 4 PM.
b. After Hours (When Approved by Owner : 7 PM to 10 PM, and anytime on Saturday.

F. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. Hours and/or elevator(s) may be restricted for material deliveries.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

G. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

H. Loading Dock Usage: Use loading dock for delivery of material to work areas and for the disposal of rubbish and waste materials. Maintain loading dock in a clean condition acceptable to Owner.

1. Schedule use of loading dock with Owner and Tenants to avoid disruption of building occupants' operations.
2. Do not store materials on loading dock.

1.4 OCCUPANCY REQUIREMENTS DURING CONSTRUCTION

A. Full Owner Occupancy: Owner will occupy the site during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.

1. Schedule use of premises for Work and coordinate construction operations with the Owner to allow for Owner occupancy.
2. Schedule use of premises for Work and coordinate construction operations with the Owner to allow for use of site and premises by the public.
3. Keep premises orderly, clean and with a minimum of obstruction and inconvenience to the tenants and the public.
4. Relocate any stored products that interfere with public access, operations of the Owner or separate contractor. If necessary, obtain and pay for additional storage or work areas needed for operations.
5. Limit use of premises to areas designated unless otherwise allowed in writing by the Owner.
6. Maintain all required exits at all times. Do not locate any materials in exit pathways.

1.5 OCCUPANCY REQUIREMENTS PRIOR TO SUBSTANTIAL COMPLETION

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of the site, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of incomplete portions of the Work, nor shall it relieve the Contractor of its responsibility for completion of the Work in accordance with the Contract Documents.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will provide, operate, and maintain mechanical and electrical systems serving occupied portions of the Work.

4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of the Work.

1.6 MISCELLANEOUS RESTRICTIONS

A. Noise, Dust, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to occupancy.

1. Notify Construction Manager not less than two days in advance of proposed disruptive operations.
2. Obtain Construction Manager's written permission before proceeding with disruptive operations.
3. Radios and music are not permitted.
4. On-site paging systems are not permitted.

B. Controlled Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.

C. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

D. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

E. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections and the RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.

C. Related Sections include the following:

1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.3 SELECTION AND PURCHASE

A. Within 30 days after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual cost and quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

1.8 CONTINGENCY ALLOWANCES

A. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

B. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

C. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.10 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Lump-Sum Allowance: Include the sum of $80,000 for additional floor preparation after flooring demolition that may be required by the resilient sheet flooring manufacturer.

1. This allowance includes material cost, receiving, handling, and installation, and Contractor overhead and profit.

END OF SECTION

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: 90 Minute Hollow Metal Frames and Doors with Vision Panels.

1. Base Bid 1A: Provide 90 minute Fire Rated Glass and Framing System (Door Type G) and 120 minute Fire Rated Glass Sidelite at C329A & C466 as specified in Section 084124 "Fire Rated Glass and Framing System", Section 088813 "Fire-Rated Glazing" and Section 087100 "Door Hardware."
2. Alternate 1B: Provide 90 minute Hollow Metal Frames and Doors with Vision Panels (Door Type E) at C329A & C466 as specified in Section 081113 "Hollow Metal Doors and Frames", Section 088813 "Fire-Rated Glazing" and Section 087100 "Door Hardware."

B. Alternate No. 2: Patient Treatment Rooms & Bays - Wall Protection

1. Base Bid 2A: Provide PR01 (Wall and Door Protection) up to 3'-2" A.F.F. on all 4 sides of the room where applicable. Refer to finish plans and elevations for more information. Refer to PR01 on finish schedule and as specified in Section 102600 "Wall and Door Protection".
2. Alternate 2B: Provide PL04_A (Architectural Woodwork, Phenolic Panel) up to 6'-0" A.F.F. at Patient Head Wall. Provide PL05_A (Architectural Woodwork, Phenolic Panel) up to 3'-2" A.F.F. at walls other than the Patient Head Wall. Provide MT03_A (Decorative Metal) trim cap tapered at 45 degrees. PL04_A & PL05_A to be attached via concealed anchor screws and silicone sealant. Provide (2) ¼" Vertical Reveals at each head wall to be coordinated at Issue For Construction. Refer to A-030.1 - Finish Schedule Alternates and as specified in Section 064023 "Architectural Woodwork" and Section 057000 "Decorative Metal".

C. Alternate No. 3: Clean Supply C18, Soiled Workroom C19, Equipment Room C23 & EVS C42 - Wall Protection

1. Base Bid 3A: Provide PR01 (Wall and Door Protection) up to 4'-2" A.F.F. on all 4 sides of the room where applicable. Refer to finish plans and elevations for more information. Refer to PR01 on finish schedule and as specified in Section 102600 "Wall and Door Protection".

2. Alternate 3B: Provide PL05_A (Architectural Woodwork, Phenolic Panel) up to 4'-2" A.F.F. on all 4 sides of the room where applicable. Provide MT03_A (Decorative Metal) trim cap tapered at 45 degrees. PL05_A to be attached via concealed anchor screws and silicone sealant. (¼") vertical joints to be coordinated at Issue For Construction. Refer to A-030.1 - Finish Schedule Alternates and as specified in Section 064023 "Architectural Woodwork" and Section 057000 "Decorative Metal".

D. Alternate No. 4: Med Prep C22 - Wall Protection

1. Base Bid 4A: Provide PR01 (Wall and Door Protection) up to 3'-2" A.F.F. on all 3 sides of the room other than the wall with millwork. PR01 to align with counter backsplash. Refer to finish plans and elevations for more information. Refer to PR01 on finish schedule and as specified in Section 102600 "Wall and Door Protection".
2. Alternate 4B: Provide PL05_A (Architectural Woodwork, Phenolic Panel) up to 3'-2" A.F.F. on all 3 sides of the room other than the wall with millwork. Provide MT03_A (Decorative Metal) trim cap tapered at 45 degrees. PL05_A to be attached via concealed anchor screws and silicone sealant. (¼") vertical joints to be coordinated at Issue For Construction. Refer to A-030.1 - Finish Schedule Alternates and as specified in Section 064023 "Architectural Woodwork" and Section 057000 "Decorative Metal".

E. Alternate No. 5: Nurse's Station C27 & C50 - Wall Protection

1. Base Bid 5A: Provide PR02 (Wall and Door Protection) up to 8" A.F.F. and PL02 (Architectural Woodwork) above up to counter SO01. Provide MT01 (Crash Rail) at base of Nurse's Stations. In equipment alcoves, provide PR02 (Wall and Door Protection) up to counter SO01. Refer to finish plans and elevations for more information. Refer to PR02 and PL02 on finish schedule and as specified in Section 102600 "Wall and Door Protection" and Section 064023 "Architectural Woodwork".
2. Alternate 5B: The outer fascia of the Nurse's Station will be SO02_A (Architectural Woodwork, Solid Surface) up to the countertop at SO01 (Architectural Woodwork, Solid Surface). In the equipment alcoves, the fascia is SO02_A (Architectural Woodwork, Solid Surface). The interior fascia of the Nurse's Station will be RB01_A (Resilient Base) up to 4" A.F.F. with PL06_A (Architectural Woodwork) up to the countertop SO01 (Architectural Woodwork, Solid Surface). No MT01 (Crash Rail) at base of Nurse's Station is required. Refer to A-030.1 - Finish Schedule Alternates and as specified in Section 064023 "Architectural Woodwork" and Section 057000 "Decorative Metal".

F. Alternate No. 6: Circulation & Equipment Alcoves C26 & C49 - Wall Protection

1. Base Bid 6A: Provide IB01 (Integral Cove Base) up to 4" A.F.F. with PR03 (Crash Rail + Wall Bumpers) and PT01 (Painted Wall). Refer to finish plans and elevations for more information. Refer to IB01, PR03 and PT01 on finish schedule and as specified in Section 102600 "Wall and Door Protection".

2. Alternate 6B: Provide RB01_A (Resilient Base) up to 4" A.F.F. with PL05_A (Architectural Woodwork) up to 3'-2" A.F.F. and to align with top of PR07_A (Crash/Handrail Combo). Wall to also receive PR10_A (Bumper Rail) at 8" A.F.F. Wall to be painted above PT01. Refer to A-030.1 - Finish Schedule Alternates and as specified in Section 064023 "Architectural Woodwork" and Section 102600 "Wall and Door Protection".

G. Alternate No. 7: Corner & End Guards – Typical

1. Base Bid 7A: Provide Flush Mounted PR04 (Corner Guards) and PR05 (End Guards) at all corner and end conditions per finish schedule and finish plans. Provide as specified in Section 102600 "Wall and Door Protection".
2. Alternate 7B: Provide Surface Mounted PR08_A (Stainless Steel Corner Guards) and PR009_A (Stainless Steel End Guards) at all corner and end conditions per finish schedule and finish plans. Provide as specified in Section 102600 "Wall and Door Protection".

H. Alternate No. 8: Toilet Room C06, C07, C24, C25, C34, C35, C36, C37, C43, & C328 - Flooring

1. Base Bid 8A: Provide TL03 (Tiling) for the flooring in all Toilet Rooms. Provide TB01 as the base in all Toilet Rooms. Provide Door Saddle at Resilient to Tile Floor Transition. Refer to finish plans, schedule and as specified in Section 093000 "Tiling".
2. Alternate 8B: Provide RF01_A (Resinous Flooring) for the flooring in all Toilet Rooms with IB04_A (Integral Cove Base) up to 4" A.F.F. Provide Door Saddle at RF01_A to RS01 (Resilient Sheet Flooring). Refer to A-030.1 - Finish Schedule Alternates and provide as specified in Section 096723 "Resinous Flooring".
3. Alternate 8C: Provide RF02_A (Resinous Flooring) for the flooring in all Toilet Rooms with IB05_A (Integral Cove Base) up to 4" A.F.F. Provide Door Saddle at RF02_A to RS01 (Resilient Sheet Flooring). Refer to A-030.1 - Finish Schedule Alternates and provide as specified in Section 096723 "Resinous Flooring".

I. Alternate No. 9: Toilet Room C06, C07, C24, C25, C34, C35, C36, C37, C43, & C328 - Wall Finish

1. Base Bid 9A: Provide TL01 & TL02 (Tiling) for wet walls only in all Toilet Rooms. Adjacent walls to be painted PT01 (Painting). Provide Schluter Strip at Tile and Inside Corners. Refer to finish plans, schedule and as specified in Section 093000 "Tiling" & Section 099123 "Interior Painting".
2. Alternate 9B: Provide SO03_A (Architectural Woodwork, Solid Surface) for wet walls only in all Toilet Rooms. Miter all edges of SO03_A. Adjacent Walls to be painted PT01 (Painting). Refer to A-030.1 - Finish Schedule Alternates and provide as specified in Section 064023 "Architectural Woodwork" for more information.
3. Alternate 9C: Provide SO03_A (Architectural Woodwork, Solid Surface) for all walls, full height, in all Toilet Rooms. Miter all edges of SO03_A. Refer to A-030.1 - Finish Schedule Alternates and provide as specified in Section 064023 "Architectural Woodwork" for more information.

END OF SECTION

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:

1. Section 012300 "Alternates" for products selected under an alternate.
2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
3. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use facsimile of "Substitution Request" form provided in Document 00 60 00 "Project Forms."
2. Documentation: Submit complete Substitution Request Form and the following, as applicable:

a. Certificates and qualification data, where applicable or requested.
b. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

c. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
d. Research reports evidencing compliance with building code in effect for Project, from ICC-ES and local regulations.
e. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
f. Contractor's assurance that proposed substitution will not cause schedule or coordination problems with adjacent materials and systems.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Bulletin for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce required results.
b. Requested substitution provides the same sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one trade or contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all trades and contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012613 - REQUESTS FOR INTERPRETATION (RFI)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections and the RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Requests for Interpretation.

1.3 DEFINITIONS

A. Requests for Interpretation (RFI): Contractor initiated written instrument related to the execution of the Work that is addressed to the Architect and Construction Manager. The RFI shall be used by the Contractor as the means to ask questions related to the Work; subject to the conditions contained within this Section.

1.4 ACTION SUBMITTALS

A. Requests for Interpretation: Include a detailed, legible description of an item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect and Construction Manager.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Reference to appropriate documents:

    a. Specification Section number and title and related paragraphs.
    b. Drawing number and detail references.
    c. Schedule.
    d. Bulletin number.
    e. Other Contract Documents, if any.

9. Field dimensions and conditions, as appropriate.
10. Contractor's Proposed Solution: Contractor shall show proposed solution; graphic, where appropriate. RFI that fails to include a proposed solution will be rejected, and returned with instructions to provide a proposed solution. If the Contractor's proposed solution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
11. Contractor's signature.
12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

B. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

1.5 INFORMATIONAL SUBMITTALS

A. RFI Log: Prepare, maintain, and submit a tabular log of RFI organized by the RFI number. Submit log weekly. Use software log that is part of Project Web site. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and Construction Manager.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and Construction Manager's response was received.

1.6 QUALITY ASSURANCE

A. Authorship: Prior to the commencement of the RFI process, designate a full time "RFI Manager" whose duties shall include the responsibility for enforcing the Request for Interpretation provisions of this Section, to maintain an up-to-date log of all RFI, advise the Architect and Construction Manager, in writing, of the status and disposition of all RFI at the progress meetings, and be a member of the Contractor's staff. The RFI Manager shall be experienced in administration and supervision of the type of Work indicated on the Contract Documents.

1. RFI Manager may be the Contractor's Job Superintendent.
2. Each RFI shall originate solely from the RFI Manager. An RFI submitted to the Architect and Construction Manager by an entity, or individual, other than the RFI Manager shall be returned to the Contractor.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Processing Time: Allow five working days for Architect's response for each RFI requiring review by a single discipline. Allow ten working days for Architet's response for each RFI requiring review by more than one discipline. RFIs received by Architect or Construction Manager Monday through Thursday after 3:00 p.m. will be considered as received the following business day. RFIs received by Architect or Construction Manager on Friday after 3:00 p.m. will be considered received the following Monday. These shall be the recorded RFI Receipt Dates listed in the RFI Log.

1. Allow additional time if coordination with other work is required. Architect and Construction Manager will advise Contractor when a RFI being processed must be delayed for coordination.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.

B. Architect's action on RFI that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Proposal Request according to Section 012600 "Contract Modification Procedures."

1. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 10 working days of receipt of the RFI response.

C. Frivolous RFI:

1. RFI shall not be used for the following:

    a. Request for approval of submittals.
    b. Request approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Request for adjustment in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Architect's actions on submittals.
    f. Requests for coordination information already indicated in the Contract Documents, or to transfer coordination responsibility from the Contractor to the Owner, Architect, or Construction Manager.
    g. Incomplete RFI or inaccurately prepared RFI.

2. The Owner reserves the right to assess the Contractor for the cost (based on time and materials) of a RFI response performed by the Architect or Construction Manager, and any of its consultants, which is deemed by the Owner and the Architect or Construction Manager as being frivolous or unnecessary.
3. Frivolous RFI shall be removed from the RFI log.

1.8 COORDINATION

A. Coordination: Coordinate preparation and processing of RFI with performance of construction activities.

1. Submit RFI with such promptness as to cause no delays in the Work. No adjustments of Contract Time or Contract Sum will be granted because of failure to have an RFI submitted with sufficient time to allow for the orderly processing of a response by the Architect and Construction Manager.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONTRACTOR'S ACTION

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, prepare and submit an RFI in the form specified.

B. Prior to submission of the RFI, coordinate the nature of the inquiry with the requirements of other Sections or trades as related thereto and responses to previous RFI.

C. Complete each blank on the RFI form.

D. In preparing each RFI, verify the applicable dimension(s), field conditions, Drawing requirements (small through large scale details), and/or Specification Section requirements pertaining thereto.

E. Each RFI shall be reviewed, and signed by the RFI Manager prior to transmitting to the Architect through the Construction Manager.

F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

A. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond.

1. Frivolous RFI will be returned without action.

B. RFI which fail to conform to requirements, (for example, is incomplete or contain numerous errors) shall be returned to the Contractor without a response. No adjustments for Contract Time or Contract Sum shall be granted for an RFI failing to conform to requirements.

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. PDF: Portable Document Format licensed by Adobe Systems.

D. Standard Product Submittals are defined as those product data and samples required by Technical Sections for commonly used products like ceiling tile, paints, floorings, carpet, etc. where the Contractor will be using the basis of design product included in the Technical Sections or a product common to the marketplace and known to the Architect. To streamline the Submittals, we are providing the opportunity for the Contractor to identify Standard Products and Samples and submit in groups of ten (10) by using the Standard Product Submittal Form in Section 006000 "Project Forms."

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required to be received by Architect according to construction schedule and in numerical order by CSI MasterFormat numbering. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect, and Construction Manager and additional time for handling and reviewing submittals required by those corrections.
   1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
   2. Submit concurrently with the first complete submittal of Contractor's construction schedule.

a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

3. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category (Action, informational, closeout).
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Architect's and Construction Manager's final release or approval.
   g. Scheduled date of fabrication.
4. Architect reserves the right to withhold 10 percent of each payment request, in addition to retainage fee if any, until the submittal schedule is received and accepted by the Architect.

B. Submittal Scheduling: Schedule submittals to avoid concurrent submittals to maximum extent possible. Where concurrent submittals cannot be avoided, adjust review time as required to allow for Architect's concurrent review.

C. Submittal Schedule Prioritization: Where submittal is concurrent with, or overlaps, submittals currently being reviewed, indicate priority of each outstanding submittal.

D. Submittal Schedule Approval: Architect's and Construction Manager's approval is required for Submittal Schedule.

E. Submittal Schedule Updating: Revise Submittal Schedule after each meeting or other activity where revisions have been recognized or made. Highlight all changes made to the Schedule. Issue updated schedule concurrently with report of each meeting.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data Drawings of the Contract Drawings will be furnished by Architect for Contractor's use in preparing Shop Drawings and Project record drawings.

1. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
2. Execute and submit the Data Transfer Release form provided by Architect's Project Manager. Do not distribute digital data drawing files prior to transmitting to Architect copies of Data Transfer Release signed by each entity requesting the files.

B. Environmental Product Declaration Reporting Forms: Provide EPD Reporting Forms for all materials used in Work.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Construction Manager's receipt of submittal. Architect will document on submittal the date of receipt. Submittals received by Construction Manager Monday through Thursday after 1:00 p.m. will be considered as received the following working day. Submittals received by Construction Manager on Friday after 1:00 p.m. will be considered as received the following Monday. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination. Delaying submittals to facilitate coordination between submittals shall not constitute a delay of the Work nor shall it be the basis for an extension of time.

    a. Resubmittal Review: Allow 10 working days for review of each resubmittal.
2. Sequential Review: Sequential review is a submittal that requires review by more than one design discipline. Where sequential review of submittals by Architect's consultants, Owner, or other parties is required, submittal schedule shall reflect sequential review. Allow fifteen (15) working days for initial review of each submittal requiring sequential review.

    a. Intermediate Submittal: If necessary, process it in same manner as initial submittal.
    b. Resubmittal Review: Allow 15 working days for review of each resubmittal.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.

a. Unique identifier, including revision number. Submittals shall be numbered with the Section number, followed by a dash, followed by a three-digit number, followed by a dash, and ending with a sequential submission number as indicated below. The numbering system shall be retained throughout all revisions.

1) Section Number: Section number where submittal is specified.
2) Three-Digit Number: Sequential number, beginning with "001," for each submittal transmitted to Architect for each Section.
3) Submission Number: Use "0" for initial submittal, "1" for first resubmittal, "2" for second resubmittal, and so forth.
4) Example: 061000-001-0 (Section 061000, first submission of the Section, initial submittal).

2. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and Construction Manager.
3. Scanned Copies: Legible scanned PDF files of paper originals are acceptable. Scanned submittals that are not legible will be rejected.
4. Sheet Orientation: Orient PDF sheets to a "Ready-to-Read" orientation with majority of text horizontal to the sheet with no additional adjustments or formatting required by the viewer.
5. File Security: Do not set any permissions on the file. Protected documents will not be accepted.
6. Transmittal Form for Electronic Submittals: Use PDF of completed Submittal Transmittal form in Document 00 60 00 "Project Forms."
7. Metadata: Include the following information in the electronic submittal file metadata:

a. Title: Project title
b. Author: Contractor's name.
c. Subject: Submittal type (product data, shop drawing, report, etc.)
d. Keywords: Number and title of appropriate Specification Section; manufacturer name; product name/model number.

8. File Size: Limit file size of each submittal as follows. Break larger PDF files into multiple packages where necessary to meet delivery restrictions. Identify split packages as "1 of #" and "2 of #" in the subject line.

a. Email Delivery: 2 Megabytes.
b. FTP Delivery: 100 Megabytes.

F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate document, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architectand Construction Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are stamped with Architect's action stamp marked "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED, and Construction Manager's approval notation.
4. Costs of compensation for Architect's additional services and expenses made necessary for review of submittals exceeding the limits set forth below shall be at the Contractor's expense.

    a. Reviews of Each Submittal: Two, including initial review.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals with Architect's action stamp marked "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS AS NOTED, and Construction Manager's approval notation.

K. The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been reviewed by Architect and returned to Contractor with Architect's action stamp marked "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS AS NOTED, and Construction Manager's approval notation.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project. Do not post zipped files.

    a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals via email as PDF electronic files. Do not submit zipped files.

a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

   a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

4. Systems Submittals: Identify submittals for systems such as fire alarms and fire protection systems, on the transmittal and act upon the system singularly as a combined submittal. If resubmission is required, resubmit entire system submittal.
5. For common use products such as ceiling tiles, flooring, carpet, etc., for which the team has familiarity, utilize Standard Products Submittal Form to submit as many as ten (10) products indicating that the Contractor will be using the basis of design product or recognized equivalent. Do not use this form for specialty items requiring detailed review. See the Standard Product Submittal Form in Section 006000 "Project Forms."

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

   a. Manufacturer's catalog cuts.
   b. Manufacturer's written recommendations.
   c. Manufacturer's product specifications.
   d. Manufacturer's installation instructions.
   e. Standard color charts.
   f. Standard product operating and maintenance manuals.
   g. Compliance with recognized trade association standards.
   h. Compliance with recognized testing agency standards.
   i. Application of testing agency labels and seals.
   j. Notation of coordination requirements.
   k. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

   a. Wiring diagrams showing factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Standard Product Submittals: Where the Contractor intends to provide the basis of design product or material using prototypical product data, the Contractor may streamline the process by identifying commonly available products and utilize the Standard Product Submittal Form to streamline the submittal process and reduce waste.

C. Environmental Product Declaration Reporting Forms. Provide EPD Reporting Forms for all materials used in the Work.

D. Shop Drawings: Prepare and submit Project-specific information, drawn accurately to scale. Do not reproduce, digitally or otherwise, the Contract Documents and submit as Shop Drawings. Do not use, copy or reproduce title blocks, dimensions, notes, keynotes, symbols schedules or details from Contract Drawings, digital or otherwise. Use of the Contract Drawings shall be limited to reproduction, digitally or otherwise, of the exterior wall layout, interior partition layout, grid lines, doors, and windows. Do not base Shop Drawings on standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Fabrication and installation drawings.
    c. Roughing-in and setting diagrams.
    d. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
    e. Shopwork manufacturing instructions.
    f. Templates and patterns.
    g. Schedules.
    h. Design calculations.
    i. Compliance with specified standards.
    j. Notation of coordination requirements.
    k. Notation of dimensions established by field measurement.
    l. Relationship and attachment to adjoining construction clearly indicated.
    m. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than size of Contract Drawings.
3. BIM File Incorporation: Construction Manager will incorporate Contractor's Shop Drawing files into Building Information Model established for Project.

    a. Prepare Shop Drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.
    b. Refer to Section 013100 "Project Management and Coordination" for requirements for coordination drawings.

E. Samples: Submit physical units of materials or products for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
3. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.
    f. Include same finish code designations as indicated on Drawings and Schedules.

4. Submit corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line.
    b. Architect, through Construction Manager, will return submittal with options selected.

7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples:

1) Submit three sets of Samples.
2) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
3) Submit at least three sets of paired units that show approximate limits of variations if variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample.

b. Architect and Construction Manager will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project record sample.

8. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:

a. Generic description of Sample.
b. Product name or name of manufacturer.
c. Sample source.

9. Standard Product Submittals: Where the Contractor intends to provide the basis of design product or material using prototypical product data and samples, the Contractor may streamline the process by identifying commonly available products and utilize the Standard Product Submittal Form to streamline the submittal process and reduce waste.
10. Photographs: Upon completion of the review, provide color photographs using a digital camera or cell phone for the project record. Photograph both sided of each actioned sample.

F. Material Safety Data Sheets: If requested by Owner, submit data sheets directly to Owner. Do not submit data sheets to Architect. Architect will not review data sheets and will not return them to Contractor.

G. Additional Submittals: Comply with requirements in other Division 01 Sections.

H. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

I. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

J. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

K. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

L. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

M. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

N. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. BIM File Incorporation: Construction Manager will incorporate delegated-design drawing and data files into Building Information Model established for Project.

1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, coordinated, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

A. General: Construction Manager will not review submittals that have not been properly transmitted, reviewed by Contractor, or do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Construction Manager will review, approve, and transmit to Architect, or return to Contractor for correction. Architect will review submittal approved by Construction Manager, make marks to indicate corrections or revisions required, and return it to Contractor through Construction Manager. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. "NO EXCEPTIONS TAKEN": No further review of Submittal required.
2. "MAKE CORRECTIONS AS NOTED. Resubmittal not required unless Contractor cannot comply with corrections noted.": Incorporate corrections in Work. If Contractor cannot comply with corrections as noted, revise to respond to exceptions and resubmit.
3. "REVISE AS NOTED AND RESUBMIT": Revise as noted and resubmit for further review.
4. "RESUBMIT PROPERLY Submittal not reviewed for reasons noted."
5. "NOT REVIEWED Submittal not required by Contract Documents.": Remove from submittal log.

6. "RECEIVED FOR CLIENT'S RECORD ONLY. Submittal not reviewed."

C. Informational Submittals: Construction Manager will review, approve, and transmit to Architect, or return to Contractor for correction. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.

E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

F. Submittals not required by the Contract Documents will not be reviewed and may be discarded or returned to the Contractor without action.

G. Substitution items received as product data, shop drawing, or sample submittals required by individual Sections will be returned to Contractor without review. Comply with requirements in Section 012500 "Substitution Procedures" for submission of substitution request.

H. Submittals will not be considered complete without the required LEED supporting documentation that is required for the submission of the Project to USGBC and LEED Criteria Worksheet.

1. Architect reserves the right to reject any submittal that is missing the required LEED-related documentation.
2. Adjustments to the Construction Schedule will not be allowed for failure of the Contractor to submit all required LEED-related documentation as part of the first submission, or in an otherwise timely manner.
3. Increase of the Contract Sum will not be allowed in order to meet the specified LEED-related requirements.

END OF SECTION

SECTION 013595 - GENERAL ACOUSTICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section defines terms used in the Contract Documents for spaces which have acoustic significance, and describes requirements that are to be met by all trades to meet the acoustic quality defined for the Project.

B. Any partition over STC 48 shall be considered "acoustically sensitive."

C. Contractor is responsible for meeting the specified noise levels to the extent indicated by the construction type indicated in the Contract Documents.

D. Related Work:

1. Section 098010 "Acoustic Accessories" for acoustical accessories.

1.2 DEFINITIONS

A. Acoustically Sensitive Areas:

1. An acoustically sensitive area is defined as an area of space which requires special construction considerations to meet acoustic, acoustic isolation, or noise and vibration control requirements.
2. The following are acoustically sensitive areas:

a. Demising walls.
b. Trash chutes.
c. Elevator shafts.
d. Mechanical/plumbing shafts.
e. Mechanical rooms, electrical and elevator equipment.
f. Toilet rooms.
g. Conference rooms.
h. Telephone rooms.
i. Imaging rooms.
j. Offices.
k. Patient suites.
l. Exam rooms.
m. Active "amenity" spaces, such as fitness facility.

B. Acoustic Volume:

1. An acoustic volume is defined as the overall volume of a room contained within an airtight and light-tight enclosure defined by the Drawings with walls carried from floor or slab below to the roof or slab above. The acoustic volume of a room includes any and all spaces contiguous to the typically visible portion of the room, including spaces located behind sound transparent material and those spaces not typically visible to the user.
2. The intent of the "acoustic volume" is to define an airtight and light-tight bounded space in which no sound may be transmitted into or out of using airborne paths. All penetrations through acoustic volume walls, floor slabs, and ceiling slabs shall be sealed to an airtight and light-tight seal with non-porous, heavy weight barriers and/or acoustical sealant. Airtight closure requirements include, but are not limited to, non-visible areas such as above soffits, curtain pockets, plena, conduit, pipe, duct or structural penetrations, chases and risers, wall/floor/ceiling deck abutments and similar conditions.
3. Penetrations in walls for air ducts, return air transfers, exhaust and/or other ventilation shall be treated to attenuate sound in the duct or transfer to maintain wall integrity.
4. Finish construction joints, electrical boxes and fixtures, cabinets, doors, access panels, windows, frames, and supports in such a way to minimize sound transmission. Back-to-back inset boxes or penetrations within same partition framing cavity are not permitted. Provide lintels, extra frames, blocking, escutcheons, grouting, gaskets, packing, sealant, dense putties, taping and filling as required to stop sound transmission.
5. All walls, operable partitions, doors, windows, slabs, and deck common to acoustically sensitive areas are acoustically isolated construction.
6. All walls common to acoustically sensitive areas which are shown in plan on the Drawings, are assumed to continue full height to an airtight and light-tight seal to the construction above. This condition applies to all walls, unless section drawings specifically restrict the extent of the wall systems with written notes directly referencing the acoustically sensitive area.
7. At any location where a gypsum board demising partition with multiple layers on one or both sides of framing intersect a demising building column furring or similar furring, the furring shall have as many layers of gypsum board as the greatest number of gypsum board layers on either side of the demising partition.
8. At locations where wall does not extend to deck or roof above, room ceiling becomes a component of the acoustic enclosure, subject to requirements and restrictions for walls.
9. A closure is considered "light-tight" if no light can be seen through the closure from a 100-watt light bulb held 3 feet (915 mm) from the opposite side of the barrier. The construction is considered airtight if the noise reduction as measured following ASTM E 366 performed 1 foot (305 mm) from the closure does not deviate by more than 3 decibels from the noise reduction measured 10 feet (3050 mm) from the closure.

C. Acoustically Isolated Construction:

1. Acoustically isolated construction is wall, floor, ceiling and other building components constructed using resilient and isolating materials for the purpose of limiting structure-borne noise transfer between noise producing and noise sensitive spaces.

2. Acoustically isolated construction includes resiliently supported slabs, resiliently supported wood floor systems, walls constructed on resiliently supported slabs, walls constructed on isolation mats, walls with resilient connections at slabs above, and resiliently suspended ceilings.
3. Acoustically isolated construction is accomplished by using resilient architectural acoustic isolation materials. The acoustic intent of the details is to avoid rigid connections across the entire extent of building components separated by resilient materials. Coordination is required by all trades.
4. Acoustically isolated installations of sound and vibration sources attached to or integrated with walls, such as video monitors, loudspeakers, exhaust fans, etc. are on resilient surface mountings in lieu of inset box or through-wall fixture mountings.

1.3 APPLICABLE REFERENCE STANDARDS

A. ASTM E 497 "Standard Practice for Installing Sound-Isolating Lightweight Partitions."

B. ASTM C 919 "Practice for Use of Sealants in Acoustical Applications."

1.4 PRODUCTS AND SYSTEMS

A. The Drawings show typical details for acoustically sensitive construction and assemblies.

B. Product substitutions or construction techniques not approved in writing by the Architect or acoustical consultant shall be repaired or replaced as necessary to meet the details indicated.

C. Defective or improperly installed materials shall be replaced or repaired as necessary to meet the construction details indicated.

D. Contractor shall not be responsible for acoustical performance that is constructed in compliance with approved details and the Contract Documents that do not meet the specified noise criteria.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. Noise Criteria: The noise levels will be measured by the acoustics consultant following Substantial Completion and as requested by the Owner, during the warranty period of the building and its equipment. The measurements will be taken at normal locations of people or audio microphones.

3.2 CONSTRUCTION REQUIREMENTS

A. Construct acoustically sensitive areas to meet the following general requirement:

1. All ductwork and mechanical systems within the acoustically sensitive area shall be free from rattles.
2. Mechanical equipment, ductwork, piping, conduits and other building systems hanger and stanchion supports shall be independent of partition framing and ceiling suspensions except where specifically intended and detailed in building construction documents.

B. Construct the acoustic volume of acoustically sensitive areas to meet the following requirements:

1. All penetrations through acoustic volume walls, floor slabs, and ceiling slabs shall be sealed to an airtight and light-tight seal with acoustical sealant.
2. All wall, floor, ceiling, slab, deck and other abutments of construction materials and systems shall be sealed to an airtight and light-tight enclosure. Make construction systems continuous and free of holes, openings, cracks, gaps and missing wall, floor or ceiling surfaces. This condition applies to all surfaces, including those which are not visible or are part of a technical space or plena.
3. Connections of door or window frames common to a wall within an acoustic volume shall be sealed to an airtight and light-tight seal using acoustical sealant. Partition or slab intersections with window or demountable wall or curtain wall mullions shall be sealed air and light-tight with gasket and/or caulking. Specific doors may be indicated to be acoustically gasketed to an airtight and light-tight seal. All doors in an acoustic volume will be free of louvers.

C. Acoustically Isolated Construction:

1. Conduits, pipes, ducts, structure, reinforcing bar and other building components which pass through or make contact with acoustically isolated construction shall not be rigidly attached to the acoustically isolated construction. Isolate all pipes, conduits, and ducts crossing acoustically isolated construction using referenced details.

3.3 TYPICAL CONSTRUCTION CONSIDERATIONS

A. The following is required, at a minimum, for all partitions, walls, floors and other construction designated as airtight:

1. Extend construction to a minimum of 1/8 inch (3 mm) and a maximum of 1/2 inch of adjacent construction to provide a suitable space for packing and sealing.
2. Cut openings in construction accurately for electrical boxes, piping, ductwork, and other penetrating elements. Leave enough space around such elements so they remain free of rigid connection to surrounding construction.

3. Where multiple layers of gypsum board are used, stagger all joints in adjacent layers a minimum of 16 inches. At joints or intersections, interleave gypsum board layers with intersecting wall layers, in lieu of butting all layers against surface of intersecting wall.
4. Apply all sealants in accordance with manufacturer's instructions.

3.4 FIELD QUALITY CONTROL

A. At Substantial Completion, or prior to the expiration of the Warranty period on the Project, the acoustics consultant will perform acoustic measurements to establish the background noise level, acoustic isolation, and room acoustics performance of the facility as indicated on the Contract Documents.

B. If it is found that the construction is not in accordance with the approved details and criteria, the Contractor shall be responsible for the costs associated with changes necessary to meet the criteria shown on the Drawings. Costs for additional acoustical testing shall be the responsibility of the Contractor.

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Mockups: Full-size physical assemblies that are constructed on-site, unless indicated otherwise. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

I. Professional Engineer: Engineer currently licensed to practice in the State of New Jersey.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Testing Agency and Inspection Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

E. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

F. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

G. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Fabricator Qualifications: A firm experienced and expert in producing products similar to those indicated for this Project and with a three-year record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a three-year record of successful in-service performance.

E. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a five-year record of successful in-service performance.

F. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

G. Professional Engineer Qualifications: A professional engineer who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

H. Testing Agency Qualifications: An NRTL, an NVLAP-accredited, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities..

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish specified in individual Sections, to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.
2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed, unless otherwise indicated.

J. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Provide room mockups of the following rooms:

1. Room Mockups of spaces requested by Owner.

1.6 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
7. Provide quality assurance and control services required due to changes in the Work proposed by or made by the Contractor.
8. Provide quality control services for Work done contrary to the Contract Documents, without prior notice, when so specified, or without proper supervision.
9. Overtime expenses and schedule delays accruing as a result of executing quality control services shall be the Contactor's responsibility and shall not be charged to the Owner.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents. Architect retains the right to require the use of a different testing agency for retesting ad reinspecting.

F. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify ArchitectConstruction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.
7. Attend Project progress meetings as requested by Construction Manager.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field-curing of test samples.
5. Delivery of samples to testing agencies or arranging for pick-up of test samples after normal business hours.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit schedule concurrently with Contractor's Construction Schedule as specified in Section 013200 "Construction Progress Documentation."

1. Distribution: Distribute schedule to Owner, Architect, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.7 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect through Construction Manager,with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.

2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager'sreference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

B. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."

C. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

D. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

E. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

F. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

G. "Provide": Furnish and install, complete and ready for the intended use.

H. "As Required": As required by regulatory bodies, by referenced standards, by existing conditions, by generally accepted construction practice or by the Contract Documents. In the event of ambiguity or conflicts, the most stringent requirements shall apply.

I. "By Others" refers to work that is not a part of the Contract.

J. "NIC": "Not in Contract" means the work or the item indicated is not a part of the Contract and will be provided by the Owner.

K. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings.

1.2 STANDARDS, REGULATIONS AND CODES

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

D. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

1. AA; Aluminum Association (The); www.aluminum.org.
2. AAADM; American Association of Automatic Door Manufacturers; www.aaadm.com.
3. AABC; Associated Air Balance Council; www.aabc.com.
4. AAMA; American Architectural Manufacturers Association; www.aamanet.org.
5. AASHTO; American Association of State Highway and Transportation Officials; www.transportation.org.
6. AATCC; American Association of Textile Chemists and Colorists; www.aatcc.org.
7. ABMA; American Bearing Manufacturers Association; www.americanbearings.org.
8. ACI; American Concrete Institute; (Formerly: ACI International); www.concrete.org.
9. ADC; Air Diffusion Council; www.flexibleduct.org.
10. AEIC; Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA; American Forest & Paper Association; www.afandpa.org.
12. AGA; American Gas Association; www.aga.org.
13. AGC; Associated General Contractors of America (The); www.agc.org.
14. AHA; American Hardboard Association; http://domensino.com/AHA.
15. AHAM; Association of Home Appliance Manufacturers; www.aham.org.
16. AHRI; Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
17. AIA; American Institute of Architects (The); www.aia.org.
18. AISC; American Institute of Steel Construction; www.aisc.org.
19. AISI; American Iron and Steel Institute; www.steel.org.
20. AITC; American Institute of Timber Construction; www.aitc-glulam.org.
21. ALSC; American Lumber Standard Committee, Incorporated; www.alsc.org.
22. AMCA; Air Movement and Control Association International, Inc.; www.amca.org.
23. ANSI; American National Standards Institute; www.ansi.org.

24. APA; The Engineered Wood Association; www.apawood.org.
25. APA; Architectural Precast Association; www.archprecast.org.
26. APWA; American Public Works Association; www.apwa.net.
27. ARI; Air-Conditioning & Refrigeration Institute; (See AHRI).
28. ARI; American Refrigeration Institute; (See AHRI).
29. ASA; Acoustical Society of America; www.acousticalsociety.org.
30. ASC; Adhesive and Sealant Council (The); www.ascouncil.org.
31. ASCA; Architectural Spray Coaters Association.
32. ASHRAE; American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
33. ASME; ASME International; (American Society of Mechanical Engineers); www.asme.org.
34. ASPE; American Society of Plumbing Engineers; www.aspe.org.
35. ASSE; American Society of Safety Engineers (The); www.asse.org.
36. ASSE; American Society of Sanitary Engineering; www.asse-plumbing.org.
37. ASTM; ASTM International; (American Society for Testing and Materials International); www.astm.org.
38. ATIS; Alliance for Telecommunications Industry Solutions; www.atis.org.
39. ASCI; Association of the Wall and Ceiling Industry; www.awci.org.
40. AWI; Architectural Woodwork Institute; www.awinet.org.
41. AWMAC; Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
42. AWPA; American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
43. AWS; American Welding Society; www.aws.org.
44. AWWA; American Water Works Association; www.awwa.org.
45. BHMA; Builders Hardware Manufacturers Association; www.buildershardware.com.
46. BIA; Brick Industry Association (The); www.gobrick.com.
47. BICSI; BICSI, Inc.; www.bicsi.org.
48. BIFMA; BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
49. BISSC; Baking Industry Sanitation Standards Committee; www.bissc.org.
50. CCC; Carpet Cushion Council; www.carpetcushion.org.
51. CCFSS; Center for Cold-formed Steel Structures; www.ccfssonline.org.
52. CDA; Copper Development Association; www.copper.org.
53. CEA; Canadian Electricity Association; www.electricity.ca.
54. CEA; Consumer Electronics Association; www.ce.org.
55. CFFA; Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
56. CFI; International Certified Floorcovering Installers Association; www.cfi-installers.org.
57. CFSEI; Cold-Formed Steel Engineers Institute; www.cfsei.org.
58. CIMA; Cellulose Insulation Manufacturers Association; www.cellulose.org.
59. CISCA; Ceilings & Interior Systems Construction Association; www.cisca.org.
60. CISPI; Cast Iron Soil Pipe Institute; www.cispi.org.
61. CPA; Composite Panel Association; www.pbmdf.com.
62. CRI; Carpet and Rug Institute (The); www.carpet-rug.org.
63. CRSI; Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA; Canadian Standards Association; www.csa.ca.

65. CSA; CSA International; (Formerly: IAS; International Approval Services); www.csa-international.org.
66. CSI; Construction Specifications Institute (The); www.csinet.org.
67. CTI; Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC; Composite Wood Council; (See CPA).
69. DASMA; Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI; Door and Hardware Institute; www.dhi.org.
71. ECA; Electronic Components Association; (See ECIA).
72. ECAMA; Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA; Electronic Components Industry Association; www.eciaonline.org
74. EIA; Electronic Industries Alliance; (See TIA).
75. EIMA; EIFS Industry Members Association; www.eima.com.
76. EJMA; Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. ESD; ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA; Entertainment Services and Technology Association; (See PLASA).
79. EVO; Efficiency Valuation Organization; www.evo-world.org.
80. FM Approvals; FM Approvals LLC; www.fmglobal.com.
81. FM Global; FM Global; (Formerly: FMG; FM Global); www.fmglobal.com.
82. FRSA; Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
83. FSA; Fluid Sealing Association; www.fluidsealing.com.
84. FSC; Forest Stewardship Council U.S.; www.fscus.org.
85. GA; Gypsum Association; www.gypsum.org.
86. GANA; Glass Association of North America; www.glasswebsite.com.
87. GBCI; Green Building Certification Institute; www.gbci.org.
88. GS; Green Seal; www.greenseal.org.
89. GTA; Glass Tempering Division of Glass Association of North America; (see GANA).
90. HI; Hydraulic Institute; www.pumps.org.
91. HI/GAMA; Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
92. HMMA; Hollow Metal Manufacturers Association; (See NAAMM).
93. HPVA; Hardwood Plywood & Veneer Association; www.hpva.org.
94. HPW; H. P. White Laboratory, Inc.; www.hpwhite.com.
95. IAPSC; International Association of Professional Security Consultants; www.iapsc.org.
96. IAS; International Accreditation Service; www.iasonline.org.
97. IAS; International Approval Services; (See CSA).
98. ICBO; International Conference of Building Officials; (See ICC).
99. ICC; International Code Council; www.iccsafe.org.
100. ICEA; Insulated Cable Engineers Association, Inc.; www.icea.net.
101. ICPA; International Cast Polymer Alliance; www.icpa-hq.org.
102. ICRI; International Concrete Repair Institute, Inc.; www.icri.org.
103. IEC; International Electrotechnical Commission; www.iec.ch.
104. IEEE; Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
105. IES; Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
106. IESNA; Illuminating Engineering Society of North America; (See IES).
107. IEST; Institute of Environmental Sciences and Technology; www.iest.org.
108. IGCC; Insulating Glass Certification Council; www.igcc.org.

109. IGMA; Insulating Glass Manufacturers Alliance; www.igmaonline.org.
110. ILI; Indiana Limestone Institute of America, Inc.; www.iliai.com.
111. Intertek; Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
112. ISA; International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
113. ISAS; Instrumentation, Systems, and Automation Society (The); (See ISA).
114. ISFA; International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
115. ISO; International Organization for Standardization; www.iso.org.
116. ISSFA; International Solid Surface Fabricators Association; (See ISFA).
117. ITU; International Telecommunication Union; www.itu.int/home.
118. KCMA; Kitchen Cabinet Manufacturers Association; www.kcma.org.
119. LMA; Laminating Materials Association; (See CPA).
120. MCA; Metal Construction Association; www.metalconstruction.org.
121. MFMA; Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
122. MFMA; Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA; Material Handling Industry of America; www.mhia.org.
124. MIA; Marble Institute of America; www.marble-institute.com.
125. MIA; Masonry Institute of America; www.masonryinstitute.org.
126. MMPA; Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
127. MPI; Master Painters Institute; www.paintinfo.com.
128. MSS; Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
129. NAAMM; National Association of Architectural Metal Manufacturers; www.naamm.org.
130. NACE; NACE International; (National Association of Corrosion Engineers International); www.nace.org.
131. NADCA; National Air Duct Cleaners Association; www.nadca.com.
132. NAIMA; North American Insulation Manufacturers Association; www.naima.org.
133. NBGQA; National Building Granite Quarries Association, Inc.; www.nbgqa.com.
134. NCMA; National Concrete Masonry Association; www.ncma.org.
135. NCTA; National Cable & Telecommunications Association; www.ncta.com.
136. NEBB; National Environmental Balancing Bureau; www.nebb.org.
137. NECA; National Electrical Contractors Association; www.necanet.org.
138. NeLMA; Northeastern Lumber Manufacturers Association; www.nelma.org.
139. NEMA; National Electrical Manufacturers Association; www.nema.org.
140. NETA; InterNational Electrical Testing Association; www.netaworld.org.
141. NFPA; NFPA; (National Fire Protection Association); www.nfpa.org.
142. NFPA; NFPA International; (See NFPA).
143. NFRC; National Fenestration Rating Council; www.nfrc.org.
144. NGA; National Glass Association; www.glass.org.
145. NHLA; National Hardwood Lumber Association; www.nhla.com.
146. NLGA; National Lumber Grades Authority; www.nlga.org.
147. NOFMA; National Oak Flooring Manufacturers Association; (See NWFA).
148. NOMMA; National Ornamental & Miscellaneous Metals Association; www.nomma.org.
149. NRMCA; National Ready Mixed Concrete Association; www.nrmca.org.

150. NSF; NSF International; (National Sanitation Foundation International); www.nsf.org.
151. NSPE; National Society of Professional Engineers; www.nspe.org.
152. NSSGA; National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA; National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA; National Wood Flooring Association; www.nwfa.org.
155. PCA; Portland Cement Association; www.cement.org.
156. PDCA; Painting and Decorating Contractors of America; www.pdca.com.
157. PDI; Plumbing & Drainage Institute; www.pdionline.org.
158. PLASA; PLASA; (Formerly: ESTA; Entertainment Services and Technology Association); www.plasa.org.
159. RCSC; Research Council on Structural Connections; www.boltcouncil.org.
160. RFCI; Resilient Floor Covering Institute; www.rfci.com.
161. RIS; Redwood Inspection Service; www.redwoodinspection.com.
162. RMA; Rubber Manufacturers Association; www.rma.org.
163. SCTE; Society of Cable Telecommunications Engineers; www.scte.org.
164. SDI; Steel Deck Institute; www.sdi.org.
165. SDI; Steel Door Institute; www.steeldoor.org.
166. SEFA; Scientific Equipment and Furniture Association; www.sefalabs.com.
167. SEI/ASCE; Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
168. SGCC; Safety Glazing Certification Council; www.sgcc.org.
169. SIA; Security Industry Association; www.siaonline.org.
170. SJI; Steel Joist Institute; www.steeljoist.org.
171. SMA; Screen Manufacturers Association; www.smainfo.org.
172. SMACNA; Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
173. SMPTE; Society of Motion Picture and Television Engineers; www.smpte.org.
174. SPFA; Spray Polyurethane Foam Alliance; www.sprayfoam.org.
175. SPIB; Southern Pine Inspection Bureau; www.spib.org.
176. SSINA; Specialty Steel Industry of North America; www.ssina.com.
177. SSMA; Steel Stud Manufacturers Association; www.ssma.com.
178. SSPC; SSPC: The Society for Protective Coatings; www.sspc.org.
179. SWI; Steel Window Institute; www.steelwindows.com.
180. SWPA; Submersible Wastewater Pump Association; www.swpa.org.
181. SWRI; Sealant, Waterproofing, and Restoration Institute; www.swrionline.org.
182. TCNA; Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
183. TEMA; Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
184. TIA; Telecommunications Industry Association; (Formerly: TIA/EIA; Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA; Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS; The Masonry Society; www.masonrysociety.org.
187. TPI; Truss Plate Institute; www.tpinst.org.
188. UFAC; Upholstered Furniture Action Council; www.ufac.org.
189. UL; Underwriters Laboratories Inc.; www.ul.com.

190. UNI; Uni-Bell PVC Pipe Association; www.uni-bell.org.
191. USGBC; U.S. Green Building Council; www.usgbc.org.
192. USITT; United States Institute for Theatre Technology, Inc.; www.usitt.org.
193. WASTEC; Waste Equipment Technology Association; www.wastec.org.
194. WCLIB; West Coast Lumber Inspection Bureau; www.wclib.org.
195. WCMA; Window Covering Manufacturers Association; www.wcmanet.org.
196. WDMA; Window & Door Manufacturers Association; www.wdma.com.
197. WI; Woodwork Institute; (Formerly: WIC; Woodwork Institute of California); www.wicnet.org.
198. WMMPA; Wood Moulding & Millwork Producers Association; (See MMPA).
199. WPA; Western Wood Products Association; www.wwpa.org.

E. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

1. DIN; Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO; International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC; International Code Council; www.iccsafe.org.
4. ICC-ES; ICC Evaluation Service, LLC; www.icc-es.org.

F. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

1. CPSC; Consumer Product Safety Commission; www.cpsc.gov.
2. DOC; Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
3. DOE; Department of Energy; www.energy.gov.
4. EPA; Environmental Protection Agency; www.epa.gov.
5. OSHA; Occupational Safety & Health Administration; www.osha.gov.
6. USDA; Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
7. USDA; Department of Agriculture; Rural Utilities Service; www.usda.gov.
8. USDJ; Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
9. USPS; United States Postal Service; www.usps.com.

G. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

1. ADAAG; Americans with Disabilities Act; Accessibility Guidelines for Buildings and Facilities; www.access-board.gov.
2. CFR; Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
3. FS; Federal Specification; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.

4. USATBCB; U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

H. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

1. BSC; California Building Standards Commission; www.bsc.ca.gov.
2. Cal/EPA; California Environmental Protection Agency; www.calepa.ca.gov.
3. Cal/OSHA; California Division of Occupational Safety and Health; www.dir.ca.gov/DOSH/dosh1.htm.
4. Cal/Tran; California Department of Transportation; www.dot.ca.gov.
5. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
6. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
7. CDHS; California Department of Health Services; (See CDPH).
8. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
9. CEC; California Energy Commission; www.energy.ca.gov.
10. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
11. DGS; California Department of General Services; www.dgs.ca.gov.
12. DSA; California Division of State Architect; www.dsa.dgs.ca.gov.
13. OSF; California Office of the State Fire Marshal; www.osfm.fire.ca.gov.
14. OSHPD; California Office of Statewide Health Planning and Development; www.oshpd.ca.gov.
15. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
16. TFS; Texas Forest Service; Forest Resource Development and Sustainable Forestry; http://txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014600 - SEISMIC DESIGN REQUIREMENTS FOR NONSTRUCTURAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the seismic bracing of components of the building that are "nonstructural," meaning that these components are not part of the structural support of the building itself.

B. The requirements of this Section shall apply to architectural, mechanical, electrical, plumbing, fire protection, and elevator systems as specified in Table 1 of this Section. This Section includes seismic design requirements for nonstructural components including, but not limited to, the following:

1. Components subject to compliance with this section include, but are not limited to, the following:

    a. Mechanical equipment and conveyances.
    b. Electrical equipment and conveyances.
    c. Alarms and fire suppression systems.
    d. Communication systems.
    e. Partitions.
    f. Suspended ceilings.
    g. Interior fall arrest system.

2. Components Exempt from the Requirements of this Section:

    a. Suspended components or systems weighing 20 pounds or less.
    b. Wall mounted components weighing 200 pounds or less.
    c. Wall, floor or roof mounted equipment located 4 feet or less above the floor or roof level and weighing 400 pounds or less.

C. Related Sections:

1. Divisions 03 through 11 and 14.
2. Divisions 21, 22, 23 – Mechanical.
3. Divisions 26, 27, 28 – Electrical.

1.2 INFORMATIONAL SUBMITTALS

A. General: In addition to submittals required by individual specification Sections, provide stamped and signed Drawings and calculations with the requirements of this Section for any affected system.

1. FM Submittals:

    a. Structural calculations.
    b. Additional copies of shop drawings if the individual Specification Sections require them.

1.3 DESIGN RESPONSIBILITY

A. General: Where shown on the Drawings, details establish basic dimensions, profiles, sightlines, and appearance. Design seismic bracing and support systems and anchorages to withstand their own weights, loads due to pressure and suction of wind, seismic forces, thermal stresses, and building movement.

B. Design Engineer: Where seismic design is required by this Section, employ a registered structural engineer, licensed in the State where the Project is located, to design all structural elements of the seismic bracing system. This Engineer shall prepare, stamp, and sign required structural drawings and calculations.

C. Modifications: Minor dimension and profile adjustments to those shown may be made in the interests of fabrication or erection methods or techniques, and the ability of the design to satisfy the performance requirements, provided the visual design concept (general profile and shape, location of components, and dimension points) are maintained and such adjustments are approved by the Architect and Owner's Representative at time of shop drawing review.

1.4 REFERENCE STANDARDS

A. International Building Code (IBC) Section 1613 .1 and ASCE 7 American Society of Civil Engineers "Minimum Design Loads for Buildings and Other Structures," Section 13, shall define the minimum requirements for seismic design of nonstructural systems.

B. In some cases, this Section requires a higher level of seismic performance than that required by the referenced standards. The higher level shall prevail.

1.5 DEFINITIONS

A. Component: A part or element of an architectural, electrical, or mechanical nonstructural system.

B. Support: Those structural members, assemblies of members, or manufactured elements, including braces, frames, legs, lugs, snubbers, hangers, saddles, or struts, which transmit loads between the nonstructural components and the structure.

C. Attachment: Means by which components and their supports are secured or connected to the seismic force resisting system of the structure. Such attachments include anchor bolts, welded connections, and mechanical fasteners.

D. Performance Class: Classification used to identify nonstructural systems and components that are required to function for life safety purposes after an earthquake, contain hazardous materials, are needed for continued operation of the facility, or require substantial time to repair following an earthquake.

1. Note: The term Performance Class is not defined by the IBC or ASCE 7. The term is presented here as a tool to communicate nonstructural seismic design requirements.

E. Ductile Piping: Piping systems constructed with steel, aluminum, or copper.

F. Nonductile Piping: Piping and tubing systems constructed with plastic, cast iron, glass, or ceramics.

G. The building is assigned to Occupancy Category IV (reference IBC Table 1604.5) and Seismic Design Category D.

H. Performance Class for Nonstructural Systems:

1. Critical (C) for systems and components required to function for life safety purposes after an earthquake, systems and components containing hazardous materials, systems and components that are needed for continued operation of the facility, and other systems and components that the Owner has designated to be critical. Specific critical systems and components shall be as follows:

a. Required to Function for Life Safety Purposes:

1) Fire protection systems.
2) Fire alarm system.
3) Emergency lighting fixtures and low voltage devices mounted in suspended ceilings.

b. Hazardous Materials:

1) Generator fuel.
2) Natural gas.

c. Needed for Continued Operation of the Facility:

1) Walls and partitions that support other critical components.
2) Ceilings.
3) Access flooring.
4) Casework with sinks.
5) Elevators (specially designated elevators).

6) Air handling units.
7) Exhaust fans.
8) Pressurization fans.
9) Booster, sump, and heating water pumps.
10) Elevator machine room cooling equipment.
11) Constant volume terminal units.
12) Cold water piping.
13) Hot water piping.
14) Hot water circulation piping.
15) Deionized water piping.
16) Sanitary waste and vent piping.
17) Rain leader piping.
18) Heating water piping.
19) Process chilled water piping.
20) Steam piping.
21) Condensate piping.
22) Rupture relief vent.
23) Uninterruptable Power Supply units (UPS).
24) Emergency power unit substations (15 KV and 5KV systems).
25) Emergency 15 KV and 5KV equipment and cabling/wiring.
26) Complete emergency distribution system to branch circuit level (lighting, power and LV systems).
27) Lighting for and related to the helistop.
28) Equipment racks in MDF and IDF rooms.
29) Overhead paging system.
30) Two-way radio communication system.
31) Conduit runs for critical components.
32) Cable tray.

d. Owner Designated:

1) Normal power unit substations (15 KV systems).
2) Normal 15 KV equipment and cabling/wiring.
3) Normal distribution system from source to distribution panelboard level for portions serving patient care areas.
4) Normal lighting fixtures and low voltage devices mounted in suspended ceilings.
5) Normal distribution system from source to 480 volt unit substation level.
6) Connections to select cooking and refrigeration equipment.

e. Not Critical (NC) for all other nonstructural systems and components.

I. Component Importance Factor (I_p) for nonstructural systems and components shall be per Table 1 of this Section.

J. Design earthquake spectral response coefficients: S_{DS} = 0.771, S_{D1} = 0.376.

1.6 SEISMIC DESIGN REQUIREMENTS FOR NONSTRUCTURAL SYSTEMS

A. The seismic design requirements for each nonstructural system shall be as specified in Table 1 below.

B. Seismic forces (F_p) and displacements (D_p) shall be calculated in accordance with ASCE 7 Section 13.3. Equations 13.3-1 through 13.3-3 shall not be used; instead, Equation 13.3-4 shall be used at all levels with $a_i A_x$ taken equal to 0.5. Components attached to two adjacent floors within the same structure shall accommodate the following relative lateral displacements: 3 inches at or below Level 5; 2.5 inches above Level 5. Components attached to two adjacent structures shall accommodate relative lateral displacement in any direction equal to the size of the seismic joint provided.

TABLE 1

Nonstructural System	Performance Class (Component Importance Factor, I_p)	Seismic Design Required?		Comments
		Component	Support and Attachment	
Architectural Systems:				
Nonstructural Walls and Partitions	NC (1.0)	Yes	Yes	
	C (1.5)	Yes	Yes	
2 Ceilings	NC (1.0)	No	Yes	
	C (1.5)	No	Yes	
Access flooring	NC (1.0)	Yes	Yes	
	C (1.5)	Yes	Yes	
Casework	NC (1.0)	No	Yes	
	C (1.5)	No	Yes	
Medical Equipment	NC (1.0)	No	Yes	
	C (1.5)	No	Yes	
Audio-Visual Equipment	NC (1.0)	No	Yes	
Mechanical and Electrical Systems:				
General Mechanical Equipment (Components)	NC (1.0)	No	Yes	Seismic design of support and attachment is not required for components that: have flexible connections to associated ductwork, piping, and conduit, are mounted no more than 4 feet above floor, and weigh no more than 400 pounds or have flexible connections to

TABLE 1				
Nonstructural System	Performance Class (Component Importance Factor, I_p)	Seismic Design Required?		Comments
		Component	Support and Attachment	
				associated ductwork, piping, and conduit, and weigh no more than 20 pounds (for distribution systems, no more than 5 lb/ft)
	C (1.5)	Yes (note 1)	Yes	
General Electrical Equipment (Components)	NC (1.0)	No	Yes	Seismic design of support and attachment is not required for components that: have flexible connections to associated ductwork, piping, and conduit, are mounted no more than 4 feet above floor, and weigh no more than 400 pounds or have flexible connections to associated ductwork, piping, and conduit, and weigh no more than 20 pounds (for distribution systems, no more than 5 lb/ft)
	C (1.5)	Yes (note 1)	Yes	
Piping Systems	NC (1.0)	No	Yes	Seismic design of support and attachment is not required for: Piping supported by rod hangers, where hangers in the pipe run are no more than 12 inches long from top of pipe to supporting structure, hangers are detailed to avoid bending of the hangers and their attachments, and provisions are made for piping to accommodate the expected

TABLE 1				
Nonstructural System	Performance Class (Component Importance Factor, I_p)	Seismic Design Required?		Comments
		Component	Support and Attachment	
				deflections. or Ductile piping systems having a nominal pipe size of no more than 3 inches.
	C (1.5)	Yes	Yes	Component design shall consider the allowable stress for pipe materials defined by ASCE 7-05 Section 13 .6 .11. Seismic design of support and attachment is not required for: Piping supported by rod hangers, where hangers in the pipe run are no more than 12 inches long from top of pipe to supporting structure, hangers are detailed to avoid bending of the hangers and their attachments, and provisions are made for piping to accommodate the expected deflections. or Ductile piping systems having a nominal pipe size of no more than 1 inch.
Fire Protection Alarm and Sprinkler System	C (1.5)	No	Yes	Design shall be in accordance with NFPA 13-07.
HVAC and Duct Systems	NC (1.0)	No	Yes	Seismic design of support and attachment is not required for: HVAC ducts suspended from hangers no more than 12 inches long, detailed to avoid significant bending of the hangers and their attachments

TABLE 1				
Nonstructural System	Performance Class (Component Importance Factor, I_p)	Seismic Design Required?		Comments
		Component	Support and Attachment	
				or Duct systems having a cross sectional area of no more than 6 square feet.
	C (1.5)	Yes	Yes	Component design shall consider the duct material strength and method of connection between sections. Seismic design of support and attachment is not required for: HVAC ducts suspended from hangers no more than 12 inches long, detailed to avoid significant bending of the hangers and their attachments or Duct systems having a cross sectional area of no more than 6 square feet.
Conduit and Cable Tray	NC (1.0)	No	Yes	Seismic design of support and attachment is not required for conduit systems that weigh no more than 5 lb/ft.
	C (1.5)	No	Yes	
Elevators	NC (1.0)	No	Yes	
	C (1.5)	No	Yes	
Notes:				

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

A. Sewer, Water, and Electric Power Service: Utility services from Owner's existing systems are available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction purposes.

1.3 QUALITY ASSURANCE

A. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and local building code.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. HVAC Equipment: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.

B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION AND USE

A. Toilet and Drinking Water Facilities: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

1. Maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.

D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing Work, isolate the HVAC system in area where Work is to be performed according to coordination drawings.

    a. Disconnect supply and return ductwork in Work area from HVAC systems servicing occupied areas.
    b. Maintain negative air pressure within Work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited Work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
4. Provide for one entrance to be used for construction personnel and materials.

E. Ventilation and Humidity Control: Provide adequate ventilation in enclosed areas throughout construction period required to: facilitate progress of Work; to protect Work and products against dampness and heat and cold; to prevent moisture condensation on surfaces; to provide suitable ambient temperatures for installation and curing of finish materials; to provide adequate ventilating; to meet health regulations for safe working environment; and, to prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction. Provide local exhaust ventilating to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas. Dispose of exhaust materials in manner that will not result in harmful exposure to persons or property. Provide ventilating operations at all times personnel occupy an area, when subject to hazardous accumulations of harmful elements. Continue operation of ventilating system for as long as required after cessation of Work to ensure removal of harmful elements.

1. In the event that the Owner accepts the Contractor's use of the permanent ventilation and air conditioning systems for the balance of the Work, provide and maintain temporary filters to adequately filter air being distributed through the ductwork and air handling units to the supply outlets; disposable filter shall be placed in front of all exhaust registers to keep construction dirt out of exhaust ductwork.

F. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

1. Do not overload existing electric power service.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions if existing lighting is not sufficient.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. All temporary equipment and wiring for temporary lighting shall be in accordance with the applicable provisions of the governing codes and regulations, the NEC, NEMA, UL, and OSHA standards. Install temporary service to comply with NFPA 70.
3. Maintain temporary lighting to give safe working conditions, continuous service, and so as not to pose a threat to the Owner's property.

H. Telephone Service: Provide temporary telephone service throughout construction period. Long distance calls shall be paid for by the party making the call. A pay phone is not acceptable.

1. Provide superintendent with cellular telephone. A cellular phone is not acceptable as the only phone on the Project.
2. Post numbers for emergency services, the Owner, the Architect, and other parties critical to the work over all project telephones.

I. Internet Service: Provide computer with high-speed, broadband connection (examples: Business Class DSL, Multiple T1, Metro Ethernet), including router, equipped with hardware firewall; providing minimum 1Mbps upload and 1 Mbps download speeds for superintendent's use in sending and receiving e-mail.

3.2 SUPPORT FACILITIES INSTALLATION

A. Project Signs: No Project identification signs or advertisements will be permitted on the Project site. Provide warning signs as required to inform tenants, public, and construction personnel of possible dangers.

B. Construction Aids: Provide all items, such as lifting devices, scaffolding, staging, platforms, runways, ladders; and temporary flooring, as required by the various trades for the proper execution and protection of the Work. Provide such construction aids with proper guys, bracing, guards, railings and other safety devices as required by the governing authorities and OSHA.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, finishes and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

D. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.

E. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241 and all applicable Federal, state and local codes and regulations; manage fire-prevention program.

F. Security: Provide and maintain provisions for closing and locking the site to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

G. Moisture-Protection: Avoid trapping water in finished Work. Document visible signs of mold that may appear during construction. Prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Comply with manufacturers' written instructions for temperature, relative humidity, and exposure to water limits.

3.4 TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Drawings and general provisions of the Contract, including General [and Supplementary] Conditions and other Division 01 Specification Sections including General and Supplementary Conditions and other Division 01 Specification Sections and the RFP, UH-P24-006-Attachment A, Agreement between Owner and Contractor for a Lump Sum and Attachment B, General Conditions of the Contract for Construction, apply to this Section.

1. Refer to Section 3.9 of the RFP, UH-P24-006, Attachment A, Agreement between Owner and Contractor for a Lump Sum for more information.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

D. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

1.3 QUALITY ASSURANCE

A. General: All bids shall be based on the products required in the Contract Documents.

B. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
4. Protect stored products from damage and liquids from freezing.

1.5 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. Components, materials, or parts required to be supplied in quantity within a Section shall be of the same manufacture, shall be interchangeable, and shall be the same with regard to function, texture, pattern, and color.

B. Except for building equipment in service areas, no manufacturers' labels or name plates shall be visible on any component, unless required by local authorities having jurisdiction.

2.2 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements.

4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.

C. Visual Matching Specification: Where Specifications require matching an established Sample, provide a product that complies with requirements and matches sample specified. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.3 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including the following:

1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work. Cutting in this sense does not include demolition.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.3 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of utilities and construction indicated as existing are not guaranteed. Before beginning Work, investigate and verify the existence and location of mechanical and electrical systems, and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 012613 "Requests for Interpretation (RFI)."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to existing conditions. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. General: The Work to be performed under the Contract Documents shall be laid out solely by the Contractor. Provide and pay for all construction layout work required for the Project. Under no circumstances will the Architect assume any responsibilities for laying out the Work.

1. Establish benchmarks and control points to set lines and levels as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated. Where indicated to remain exposed, arrange overhead systems in an orderly manner.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011400 "Work Restrictions."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill. Avoid cutting steel reinforcement.

    a. Locate steel reinforcement using Ground Penetrating Radar or Ferroscan prior to cutting or drilling reinforced concrete and masonry. If existing steel reinforcement is in proposed cut or hole location, contact Architect before proceeding with the Work.

4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 017340 - RENOVATION DESIGN GUIDELINES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general procedural and design requirements applying to all of the alterations and renovation work of the Project. Because of the size and scope of the Project, not every instance of a deviation from shown details can be described; this Section governs overall design intent for renovation work and alterations work.

B. Datum lines are shown on the Drawings; locations of new items are based on datum information shown.

C. Related Requirements:

1. Section 017300 "Execution" for additional requirements for patching existing construction.

1.2 DESIGN GUIDELINES, GENERAL

A. Exterior Windows: The design intent is to match the existing profiles and dimensions at all exterior openings on the Project. For all new window and door openings, all profiles are required to match existing profiles and to match each other.

B. Where new materials are intended to match existing materials either to complete an existing installation, or extend an existing installation. The degree of acceptable color match between materials will be solely the decision of the Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In locations of patching and extending existing materials, provide the same material as exists on the building in the immediately adjacent area.

C. Procedure for Patching Existing Roofing and Waterproofing Assemblies:

1. Use Owner's attic stock if available.

2. If no attic stock is available for use, verify existing material type and manufacturer. Procure compatible new material from the same manufacturer for patching work.
3. If warranty is in place, perform patching to meet all manufacturer requirements for warranty repair and maintenance. Provide manufacturer observation if required for warranty maintenance by material manufacturer.
4. Cut back existing material to area of sound bond and make seams between new and old material at an unstressed location, or in location recommended by membrane/coating manufacturer.

D. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

E. Primers and Coatings: Comply with requirements in Section 099123 "Interior Painting."

2.2 CONCRETE PATCHING AND REPAIR

A. Refer to Structural Drawings for structural concrete repair.

B. Patching Mortar, General:

1. Only use patching mortars that are recommended by manufacturer for each applicable horizontal, vertical, or overhead use orientation.
2. Color and Aggregate Texture: Provide patching mortar and aggregates of colors and sizes necessary to produce patching mortar that matches existing, adjacent, exposed concrete.
3. Coarse Aggregate for Patching Mortar: ASTM C 33, washed aggregate, Size No. 8, Class 5S. Add to patching-mortar mix only as permitted by patching-mortar manufacturer.

C. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A Shore durometer hardness of at least 80 according to ASTM D 2240.

2.3 ROUGH CARPENTRY

A. For items of dimension lumber size, provide Construction or No. 2 Grade lumber of any species.

B. For board stock, provide lumber with 15 percent maximum moisture content and the following species and grades:

1. Western Woods, Construction or No. 2 Common Grade; WCLIB or WWPA.

C. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

D. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

2.4 MISCELLANEOUS METAL ITEMS

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Where deviations between existing conditions and conditions shown on the Drawings materially affect the Work, provide a written report of the existing conditions. Include the following

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

B. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from repair and maintenance work.

C. Existing Drains: Prior to the start of Work in an area with a floor drain, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin Work in an area until the drainage system is in working order.

D. Locate areas of deteriorated or delaminated concrete using hammer or chain-drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries. At columns and walls make boundaries level and plumb unless otherwise indicated.

3.2 GENERAL REQUIREMENTS

A. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

3.3 NEW WALL CONSTRUCTION

A. Existing Conditions: The degree of plumb; out of line or other wall deviations may not be shown or indicated on the Drawings or in all locations. New walls are shown as level in two planes. New studs will not necessarily be attached directly to the existing concrete walls. Adjust location of runners and studs to provide straight walls in locations shown on the Drawings.

1. Deviations less than 1/2 inch from required location may be shimmed.
2. Deviations of 1/2 to 1 inch from required location; shim using metal channels.
3. Deviations greater than 1 inch from required location: clarify intent with Architect.

3.4 CONFLICTS BETWEEN MATERIAL LOCATIONS

A. If multiple systems must occupy the same space and the Drawings do not resolve the conflict, use the following guidelines for locating utilities in plenum or wall spaces. The items are listed in order of priority:

1. Ceiling framing.
2. Fire sprinkler runs and slopes.
3. Gravity piping, roof drains, and plumbing wastelines.
4. Mechanical ductwork (including flanges, supports and insulation).
5. Pressure piping.
6. Electrical conduits and cable trays.
7. Light fixtures and clear space around lights.
8. Flex duct for registers and grilles.
9. Electrical J-boxes for exit signs and smoke detectors.

3.5 FLOOR LEVELING

A. Grind down high spots and fill low spots to provide typical 1/4 inch in 10 feet floor levelness. In selected areas, hydraulic cement will be used to achieve levelness of 1/8 inch in 10 feet or greater when required for equipment or installation of finish materials.

3.6 WATERPROOFING MEMBRANES AND OTHER WEATHER BARRIERS

A. Where waterproofing membranes are not being entirely removed and replaced by the new construction, observe the following precautions:

1. Verify compatibility of the new material with the existing material. If existing material is still under warranty, provide for full time observation by the appropriate product representative and whatever procedures are necessary for warranty maintenance.
2. Cut back surface material sufficiently to provide a minimum 3 inch overlap between new waterproofing and existing waterproofing.
3. If new proposed material is not compatible with existing material, inform Architect, who will select an alternative material for application in that location.

END OF SECTION

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for waste reduction, including salvaging, recycling, and disposing of nonhazardous waste.

1.2 ALTERNATES

A. Refer to Section 012300 "Alternates" for description of Work affected by Work in this Section.

1.3 DEFINITIONS

A. Construction Waste: Building improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Hazardous Materials: Construction and demolition debris that are regulated for disposal by local, city, county, state, or Federal authorities.

E. Reclamation Materials: Construction and demolition debris that meets the requirements of a product manufacturer's reclamation program where the debris is removed and prepared for shipping to a manufacturer's facility for reuse in producing new products.

F. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

G. Recyclable Materials: Construction and demolition debris that can be recovered and processed into new products or materials. Recyclable materials include, but are not limited to, the following:

1. Metals: Ferrous (iron, steel, stainless steel, galvanized steel) and non-ferrous (copper, brass, bronze, aluminum) types and containers made from metals such as pails, buckets and beverage cans. Paint cans shall be cleaned to qualify.

2. Concrete.
3. Brick.
4. Gypsum wallboard.
5. Paper products such as generated from field office activities and clean corrugated packaging cardboard.
6. Wood products, including untreated dimensional lumber, plywood, oriented strand board, hardboard, particleboard and crates and pallets made from wood products.
7. Carpet and padding.
8. Plastics and containers made from plastics such as pails, buckets, and beverage bottles.
9. Glass: Glass beverage containers, window and mirror glass.
10. Asphaltic concrete paving.
11. Clean and uncontaminated, excavated soils not intended for other on-site use.
12. Stumps and trees removed as a part of land clearing operations.

H. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

I. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. Achieve end-of-Project rates for diverting from landfill 50 percent by weight of total non-hazardous solid waste generated by the Work. Use all reasonable and legal means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling, reclamation, and salvage of materials.

B. Practice efficient waste management in the use of materials in the course of the Work. Reduce waste by minimizing factors that contribute to waste and achieve the most efficient use of resources and materials; uses water efficiently; avoids practices such as over-packaging, improper storage, ordering errors, poor planning, breakage, mishandling and contamination

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Management Reports: Concurrent with each Application for Payment, submit report. Use "Waste Management Report" form in Document 00 60 00 "Project Forms."

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct preconstruction conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Use "Waste Management Plan Summary" form in Section 006000 "Project Forms." Include estimated quantities and assumptions for estimates.

C. Waste Management Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Reclamation Programs: Research and prepare a plan to work with manufacturers who have programs to receive used materials. Known reclamation programs are available from, but not limited to, the following manufacturers:

1. Carpet:

a. ReEntryProgram by Interface.
b. Antron, Invista.
c. CON-tinuum by Constantine & Covanta.

d. Local carpet and carpet cushion reclamation centers may be found on http://www.carpetrecovery.org/

2. Ceiling Panels: Armstrong World Industries, Inc.
3. Resilient Flooring: ReUse Program by Tarkett.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Waste management coordinator may have other duties on site.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches or more.

3.2 RECYCLING WASTE AND RECLAMATION

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from nonrecyclable waste materials, trash, and debris.

1. Designate separate on-site areas for recyclable waste and nonrecyclable materials, trash and debris. Locate each area in order that non-recyclable debris will not contaminate materials to be reused or recycled. Provide appropriately marked containers or bins for controlling waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Maintain the facilities in an orderly condition.
3. Cut all items to lengths and sizes to fit within the containers or bins provided.
4. Where there is sufficient quantity of a specific recyclable debris item (for example; salvaged metal doors and frames or duct work), make arrangements for items to be bundled, banded or tied, and stack in a designated location for a special pick-up.
5. Separate construction and demolition debris at the project site by the following method:

    a. Co-Mingled Method: Place all recyclable construction and demolition debris into containers or bins and transport to a recycling facility where recyclable and salvageable materials are removed, sorted, and processed. Co-mingled waste hauler shall provide the documentation required by the USGBC to achieve the specified waste diversion requirement. When using this method it is imperative to prevent paints or liquids from contaminating materials that are otherwise considered recyclable.

E. Reclamation: Provide on-site operations to remove reclamation materials and package or palletize in accordance with manufacturer's reclamation program requirements.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Do not dispose waste materials in building trash dumpster.

END OF SECTION

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items (Punch List): Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Project Record Documents:

1. Record Drawings.
2. Record Specifications.
3. Record product data.
4. Miscellaneous record submittals.

D. Operation and maintenance manual(s).

E. Warranties.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Submittals Prior to Substantial Completion: Complete the following a minimum of 5 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Prepare and submit a list of incomplete items (punch list), indicating the value of items on the list, and reasons why the Work is not complete.
2. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, final certifications, and similar documents.
3. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
4. Prepare and submit Project Record Documents, operation and maintenance manuals, and similar final record information.
5. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Construction Manager's signature for receipt of submittals.

6. Submit test/adjust/balance records.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

B. Procedures Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Complete final cleaning requirements.
6. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
7. Obtain written review of closeout documents pertinent to LEED commissioning by the Commissioning Authority. The Commissioning Plan enumerates documents required at the time of Substantial Completion.

C. Inspection: Submit a written request for inspection for Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment.
2. Submit copy of Contractor's original Substantial Completion inspection list with Architect's annotations of items to be completed or corrected (punch list), endorsed and dated by Architect. Copy shall be certified by Contractor and state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection for acceptance a minimum of 5 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect and Construction Manager.
d. Name of Contractor.
e. Page number.

B. Submit list of incomplete items in MS Excel electronic file and three paper copies. Architect, through Construction Manager, will return annotated electronic file.

1.8 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up record prints.

a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later, and the locations of those items that need to be located for servicing.
b. Accurately record information in a readily understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
d. Mark record prints completely and accurately.
e. Mark important additional information that was either shown schematically or omitted from original Drawings.
f. Note Change Order numbers, alternate numbers, and similar identification where applicable.

C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Clearly mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Note related Change Orders, Record Drawings, and Product Data, where applicable.

D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Drawings, where applicable.

E. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections such as tests and inspections, and inspections by authorities having jurisdiction. Bind or file miscellaneous records and identify each, ready for continued use and reference.

F. LEED-Related Submittals: Include LEED-related submittal information in Project Record Documents. Submittals would address all items related to a product's, a material's and/or a system's compliance with requirements for documenting compliance with LEED credits, including, but not limited to:

1. Recycled content.
2. VOC off-gassing quantities.
3. FSC certification.
4. Place of manufacture/assembly.
5. Commissioning activities.

1.9 OPERATION AND MAINTENANCE MANUALS

A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data:

    a. Emergency instructions and procedures.
    b. System, subsystem, and equipment descriptions, including operating standards.
    c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
    d. Description of controls and sequence of operations.
    e. Piping diagrams.
    f. Noise and vibration adjustments.
    g. Effective energy utilization.

2. Maintenance Data:

    a. Manufacturer's information, including list of spare parts.

b. Name, address, and telephone number of Installer or supplier.
c. Maintenance procedures.
d. Maintenance and service schedules for preventive and routine maintenance.
e. Maintenance record forms.
f. Sources of spare parts and maintenance materials.
g. Copies of maintenance service agreements.
h. Copies of warranties and bonds.
i. Cleaning.
j. Control sequence.
k. Fuels, lubricants, tool, and other related items.
l. Identification systems.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

    a. Remove tools, construction equipment, machinery, and surplus material from Project site.
    b. Clean exposed hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
    c. Remove debris and surface dust from limited access spaces, including plenums, shafts, and similar spaces.
    d. Sweep concrete floors broom clean in unoccupied spaces.
    e. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    f. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    g. Remove labels that are not meant to be permanent.
    h. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    i. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    j. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    k. Clean ducts, blowers, and coils if units were operated without filters during construction.
    l. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in lighting fixtures to comply with requirements for new fixtures.
    m. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
    b. Do not paint over labels for fire resistive joints.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 018133 - SUSTAINABLE DESIGN REQUIREMENTS - EMBODIED CARBON

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Related Requirements:

1. Environmental Product Declarations Reporting Form (00 60 00 "Project Forms").
2. Individual sections with embodied carbon submittal requirements.

1.2 SUMMARY

A. Section includes general requirements and procedures for compliance with the Project's embodied carbon design goals, including the reduction of embodied carbon associated with select material types.

1.3 DEFINITIONS AND STANDARDS

A. Embodied carbon is the amount of carbon dioxide equivalents resulting from the production, shipping, installation, use and disposal of a material.

B. Environmental Product Declaration (EPD) is a standardized way of reporting the environmental impact of a product or system, including but not limited to embodied carbon. Products with EPDs in accordance with ISO 14025, ISO 21930, or EN 15804 can report a product's Global Warming Potential.

C. Global Warming Potential (GWP) is the calculated value for tracking embodied carbon and is the amount of equivalent metric tons of carbon dioxide emitted as a result of the life-cycle of a material. GWP is reported by an EPD or LCA, and can be reported as total value, by subtotal value for each life-cycle stage, or by individual life-cycle modules:

1. Production Stage (modules A1-A3): GWP reported for this stage, also known as "cradle-to-gate," includes raw material supply (A1), transport of raw materials to the production site (A2), and manufacturing (A3).

D. Life-Cycle Assessment (LCA) is a standardized way of quantifying the environmental impact of a product or system, including but not limited to embodied carbon. LCAs must be conducted in accordance with ISO 14044, and report a product's Global Warming Potential.

1.4 STANDARDS

A. ISO 14044 Environmental Management Life Cycle Assessment.

B. ISO 14025 Environmental Labels and Declarations.

1.5 COORDINATION

A. Monthly Embodied Carbon Coordination Meetings: Conduct monthly embodied carbon coordination meetings to review Embodied Carbon Progress Reports.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site. Review embodied carbon requirements. Review action plans and documentation requirements.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Embodied Carbon Documentation:

1. Compile and review all documentation required to support the Project's embodied carbon tracking goals.

    a. Collect and compile all required EPDs for products requiring embodied carbon documentation.
    b. Track and submit to Owner upon substantial completion the total GWP values and total Production Stage GWP values (A1-A3) for products requiring embodied carbon documentation.

1.8 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals:

1. Embodied Carbon Documentation:

    a. The EPD Reporting Form included in Section 006000 "Project Forms" is required for product category listed below. If a system is specified, each product in the system must be counted separately.
    b. Provide the Product-Specific or Industry-Wide Type III EPD in compliance with ISO 14025 or LCA for each product specified, with specific emphasis on the following product categories:

1) Gypsum board.
2) Interior non-structural metal framing.
3) Insulation.

c. For products in which an EPD or LCA is not available, provide a dated written confirmation on manufacturer's letterhead that an EPD or LCA is not available for the product at time of product submission.

B. Qualification Data: For Embodied Carbon coordinator.

C. Embodied Carbon Materials Preliminary Action Plan: Within 14 days of date established for commencement of the Work, identify products anticipated to be submitted.

1. Embodied Carbon Tracking: Use either LEED v4.1 BPDO Calculator available at usgbc.org or LEED v4.1 Low-Emitting Materials Calculator available at usgbc.org for embodied carbon tracking.

a. Identify products anticipated to be submitted under each embodied carbon tracking product category and estimated quantities (volume, units, or area as applicable).

D. Embodied Carbon Materials Progress Reports: Concurrent with each monthly embodied carbon coordination meeting, submit the following reports comparing actual construction and purchasing activities with preliminary action plans:

1. Sustainable Materials Action Plan updates.

a. Include updated Embodied Carbon Tracker.

E. Embodied Carbon Close-Out Reports: Upon substantial completion, submit to the Owner and Architect the following completed calculators with supporting documentation.

1. Embodied Carbon Tracking calculator.

1.9 QUALITY ASSURANCE

A. Embodied Carbon Coordinator: Engage an experienced professional to coordinate the embodied carbon tracking and documentation. The embodied carbon coordinator may also serve as a sustainable design coordinator, a waste management coordinator, and indoor air quality coordinator if required by the Project.

1. Embodied Carbon Coordinator shall facilitate all Monthly Embodied Carbon Coordination Meetings and compile all Embodied Carbon Progress Reports.
2. Embodied Carbon Coordinator is responsible for embodied carbon tracking and compiling product documentation to be provided to the Owner at Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 011000 "Summary" for use of the premises and phasing and Owner occupancy requirements.
2. Section 011400 "Work Restrictions" for restrictions on use of the premises due to Owner or tenant occupancy.
3. Section 013200 "Construction Progress Documentation" for preconstruction photographs taken before selective demolition.
4. Section 015000 "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
5. Section 017300 "Execution" for cutting and patching procedures.
6. Section 017419 "Construction Waste Management and Disposal" for disposal of demolished materials.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

C. Materials to be reused remain the property of the Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.
2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Qualification Data: For refrigerant recovery technician.

C. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for dust control and for noise control. Indicate proposed locations and construction of barriers.

D. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's Building Manager's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator, stairs, entrances, and loading docks.

5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

E. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

F. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

H. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.

2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

C. Sustainable Design Requirements for Building Reuse:
1. Maintain the existing building structure, envelope, and interior nonstructural elements of a historic building or contributing building in a historic district. Do not demolish such existing construction beyond indicated limits.
2. Maintain the existing building structure, envelope, and interior nonstructural elements of an abandoned or blighted building. Do not demolish such existing construction beyond indicated limits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. If available, review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video and templates.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 011400 "Work Restrictions."

B. Existing Services/Systems to be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor. Provide minimum 48 hours' notice when requesting shut-off.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

    a. Piping to be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    c. Equipment to be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
    h. Fire Suppression System Partial or Complete Removal: Arrange for bypass of area to be removed so that overall building fire suppression system remains in operation. If continuous operation is not possible, coordinate with local Fire authorities; maintain firewatch during removal operations and until system can be restored to working order. Maintain fire extinguishers on the site.
    i. Where existing concrete ceilings and soffits are to be left exposed, remove existing mechanical, electrical, and plumbing elements indicated to be removed or abandoned. In addition, cut ceiling suspension devices flush with the exposed surface of the slabs and soffits.

C. Ballasts: If ballast is not labeled "No PCBs," or if the label is illegible, contact a ballast recycler for disposal.

D. Mercury-Containing Devices: Mercury-containing devices include thermostats, silent switches, mechanical switches and relays or contacts. Dispose of these devices with an appropriate recycler.

E. Nickel-Cadmium and Lead-Acid Batteries: Exit signs, emergency lighting units, alarm systems, smoke detectors and carbon-monoxide detectors may contain nickel-cadmium or lead-acid. Arrange with an appropriate recycler for disposal.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations, and for duration required by Authorities Having Jurisdiction hours after completion of flame cutting operations and other "hot work" as defined by NFPA 51B.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
8. When cutting concrete, masonry, wallboard and any other dust-producing materials, provide temporary barriers to prevent spread of dust into the rest of the building. Provide filters for mechanical systems and air ducts.
9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Covering and Glued-down carpets: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Carpets, Carpet Tile, Acoustical Ceiling Panel and Tiles: Divert carpeting and ceiling tiles from local landfills. Remove and recycle products using Armstrong Reclamation Carpet/Tile Guidelines.

B. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

C. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Refer to Section 017300 "Execution" for progress cleaning.

3.9 SELECTIVE DEMOLITION SCHEDULE

A. Refer to Drawings.

END OF SECTION

SECTION 033053 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section specifies cast-in-place concrete for interior locations.

1.2 ACTION SUBMITTALS

A. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product types in this Section:

    a. Vapor Retarder.
    b. Ready-Mix Concrete.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Design Mixes: Submit concrete mix design at least 3 weeks prior to beginning of cast-in-place concrete Work.

C. Qualification Data: Submit qualification data for Installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer, acceptable to the Architect, with not less than five years' experience, who has completed concrete work on not less than three projects which were similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

C. Standards: Comply with ACI 301, "Specification for Structural Concrete," and ACI 318, "Building Code Requirements for Structural Concrete," except as modified by the requirements of the Contract Documents.

D. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Portland Cement.
2. Steel Reinforcement: Steel Dowels.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site in manufacturer's original unopened containers. Store materials in a dry, well ventilated space.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Formwork: Furnish formwork for smooth-form finish, and formwork accessories according to ACI 301, Article 2.2 "Products."

2.2 STEEL REINFORCEMENT

A. Steel Dowels: ASTM A 615/A 615M, Grade 60, deformed, #4 bars unless otherwise shown.

B. Plain-Steel Welded Wire Fabric: 6 x 6-W2.9 x W2.9, complying with ASTM A 1064/A 1064M, and fabricated from as-drawn steel wire into flat sheets.

2.3 CONCRETE MATERIALS

A. Regional Materials: Concrete shall be manufactured within 100 miles of Project site from aggregates and cementitious materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

B. Portland Cement: ASTM C 150, Type I, II, or III.

C. Normal-Weight Aggregates: ASTM C 33, uniformly graded, with coarse aggregates not exceeding 3/4 inch nominal size.

D. Water: Potable.

2.4 RELATED MATERIALS

A. Vapor Retarder: ASTM E 1745, Class A, B, or C, except with maximum perm rating of 0.04.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Reef Industries, Inc.; Griffolyn Type-65.
b. Stego Industries, LLC; Stego Wrap (Class C Vapor Retarder).

B. Vapor Retarder: ASTM E 1745, Class A or B, except with maximum perm rating of 0.03 Perms per ASTM E 96; one of the following:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Reef Industries; Griffolyn Type 85.
b. Stego Industries, LLC; Stego Wrap Class A Vapor Retarder.

C. Vapor Retarder Tapes: High density polyethylene types with pressure sensitive adhesive or double sided mastic tapes, minimum 4 inches wide.

D. Pipe Boot Material: Field, or factory, fabricated boots manufactured from vapor barrier materials.

E. Granular Fill: Clean crushed stone or gravel, complying with ASTM C 33, Size 57. Free of organic materials, cinders, trash and rubble.

F. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752 cork.

G. Bonding Agent: ASTM C 1059/C 1059M, Type I (Redispersable), specifically restricted for use in interior work not subject to water immersion or high humidity, one of the following polyvinyl acetate based products:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dayton Superior Corp.; Superior Concrete Bonder.
b. Euclid Chemical Co.; Euco Weld.
c. Larsen Products Corp.; Weld-Crete.
d. L&M Construction Chemicals, Inc.; Everweld.

2.5 CURING MATERIALS

A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

B. Water: Potable.

C. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 CONCRETE MIXES

A. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

B. Design concrete mixtures to comply with ACI 211.1.

C. Prepare mixes with a 28 day compressive strength of 4000 psi, and 4 inch slump.

2.7 CONCRETE MIXING

A. General: Either ready mix or site mix concrete at Contractor's option.

B. Ready-Mixed Concrete: Comply with ASTM C 94/C 94M.

C. Project-Site Mixing: Mix on watertight platforms. Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer. Excessive mixing requiring the addition of water to preserve the required consistency will not be permitted. Mix concrete to a consistency that can be readily placed without segregation.

PART 3 - EXECUTION

3.1 FORMWORK

A. General: Design, construct, erect, shore, brace, and maintain formwork according to ACI 347R. Fabricate forms to conform to the lines, dimensions and shapes of concrete shown providing for projections as required. Make forms clean and free of foreign material before placing concrete.

B. Preparation of Form Surfaces: Use non-staining mineral oil or form lacquer.

C. Dowels: Predrill holes into existing concrete, spaced 32 inches o.c. unless otherwise shown, and slightly oversized to receive dowels. Insert dowels into holes prior to placing concrete.

D. Apply bonding agent to existing concrete surfaces that are to receive new concrete.

3.2 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting wire mesh reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.3 CONCRETE PLACEMENT

A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete. Comply with ACI 309 for concrete consolidation.

B. Curbs: Place concrete into curb forms. Strike off top surfaces of all curbs true and level. Trowel smooth with steel trowel.

3.4 FINISHING UNFORMED SURFACES

A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: Apply scratch finish to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finish, unless otherwise indicated.

C. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied, sheet waterproofing, or sand-bed terrazzo.

D. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system. Consolidate concrete surface by hand-troweling operation, free of trowel marks, uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied floor covering system.

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

3.5 TOLERANCES

A. Comply with ACI 117.

3.6 CONCRETE PROTECTION AND CURING

A. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

B. Curing Methods: Cure unformed concrete for at least seven days by moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.7 FORM REMOVAL

A. Do not remove forms until the concrete has thoroughly hardened and has attained sufficient strength to support its own weight without bulging.

3.8 REPAIRS

A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION

SECTION 035416 - HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hydraulic-cement-based, polymer-modified, self-leveling underlayment for application below interior floor coverings.

1.2 COORDINATION

A. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product type in this Section:

    a. Hydraulic Cement Underlayment.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Qualification Data: For Installer.

C. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.

D. Field Test Results: Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

E. Preconstruction Test Reports: Prior to the installation of the underlayment, provide test results indicating slab moisture vapor emission meets the requirements of the finish flooring manufacturer in accordance with ASTM F 2170.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer who is approved by manufacturer and factory trained for application of underlayment products required for this Project.

B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

1. Place hydraulic-cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. IIC-Rated Assemblies: For IIC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 492 and classified according to ASTM E 989 by an independent testing agency.

2.2 HYDRAULIC-CEMENT-BASED UNDERLAYMENTS

A. Hydraulic Cement Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thickness of 1/4 inch and that can be feathered at edges to match adjacent floor elevations.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. ARDEX GmbH; K-15 Self-Leveling Underlayment Concrete.
    b. BASF, Master Builders Solutions; MasterTop 111SL.
    c. L&M Construction Chemicals, Inc.; Levelex.
    d. MAPEI Corporation; Ultraplan 1 Plus.

2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
3. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.
4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.

1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

C. Water: Potable and at a temperature of not more than 70 deg F.

D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
1. VOC Content: Provide coating with VOC content of 100 g/L or less.

E. Corrosion-Resistant Coating: Recommended in writing by underlayment manufacturer for metal substrates.
1. VOC Content: Provide coating with VOC content of 100 g/L or less.

F. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance.

1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.

B. Provide clean, dry, neutral-pH substrate for underlayment application.

1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
2. Fill substrate voids to prevent underlayment from leaking.

C. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond. Do not use solvents.

1. Moisture Testing: Perform tests recommended by flooring manufacturer, but not less stringent than one of the following:

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

2. Alkalinity and Adhesion Testing: Perform tests recommended by flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.

D. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces according to manufacturer's written instructions.

E. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

A. General: Mix and apply underlayment components according to manufacturer's written instructions.

1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
2. Coordinate application of components to provide optimum adhesion to substrate and between coats.
3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply underlayment to produce uniform, level surface.

1. Apply a final layer without aggregate to product surface.
2. Feather edges to match adjacent floor elevations.

D. Use the straightedge method test, ACI 117 to verify that there is no more than 1/4 inch deviation in flatness in a 10 foot span.

1. Finish surfaces to the following tolerances for suspended slabs, according to ASTM E 1155, for a randomly trafficked floor surface:

a. Specified Overall Values (SOV):

1) Flatness: F_F 30.
2) Levelness: F_L 20.

b. Minimum Local Values (MLV):

1) Flatness: F_F 24.
2) Levelness: F_L 15.

2. Apply a final layer without aggregate to product surface.
3. Feather edges to match adjacent floor elevations.

E. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

F. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

G. Apply surface sealer at rate recommended by manufacturer.

H. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 FIELD QUALITY CONTROL

A. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

3.5 PROTECTION

A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cold-formed metal framing.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.

D. Shop Drawings: Submit shop drawings of cold formed metal framing work. Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining Work. Plans and elevations shall be submitted at not less than 1/8" = 1'-0" scale, details of sections and connections shall be shown at not less than 1-1/2" = 1'-0" scale.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product type in this Section:

    a. Non-structural steel studs.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Structural Calculations: Submit, for information only, copies of structural calculations indicating complete compliance with the specified performance requirements. Calculations shall be prepared, signed and sealed by a Professional Engineer registered in the state wherein the work is to be erected.

C. Mill Certificates: Submit mill certificates signed by steel sheet producer or test reports from a qualified independent testing agency indicating steel sheet complies with requirements.

D. Welding Certificates: Submit copies of certificates for welding procedures and personnel.

E. Product Test Reports: Submit product test reports from a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:

1. Expansion anchors.
2. Mechanical fasteners.
3. Vertical deflection clips.
4. Tie-down clips.
5. Lateral drift clips.

F. Research/Evaluation Reports: Submit evidence of cold-formed metal framing's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

G. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed cold-formed metal framing on a minimum of three projects similar in material, design, and extent to that indicated for this Project in the last 10 years that have a record of successful in-service performance.

B. Mill certificates signed by steel sheet producer or test reports from a qualified independent testing agency.

C. Standards: Comply with the applicable provisions and recommendations of the following standards below, where standards conflict the more stringent shall apply:

1. AISI Specifications: Comply with AISI S100 "North American Specification for the Design of Cold-Formed Steel Structural Members" and AISI S200 "North American Standard for Cold-Formed Steel Framing - General Provisions" for calculating structural characteristics of cold-formed metal framing:
2. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

D. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by GA File Numbers in GA-600, "Fire Resistance Design Manual," or by design designations from UL's "Fire Resistance Directory" or from the listings of another testing agency.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Provide cold-formed metal framing meeting or exceeding the following performance requirements:

1. Structural Properties:

a. Lateral Loads: The cold-formed metal framing work, shall be designed, fabricated and installed to withstand the maximum inward and outward lateral load of 5 lbf/sq. ft..
b. Seismic Loads: As required by ASCE 7.
c. Deflection Limitations:

1) Deflections: Base calculations for the following deflections upon the combination of maximum direct lateral loads, and building deflections. The deflection of framing members in a direction normal to the plane of the wall when subjected to the lateral loads specified above shall not exceed the following:

a) Framing members supporting stone cladding: 1/720 of their clear span.
b) Framing members supporting cement plaster assemblies: 1/600 of their clear span.
c) Framing members supporting brick veneer assemblies: 1/600 of their clear span.
d) Framing members supporting metal panel cladding: 1/360 of their clear span.

d. Dead Loads:

1) Limit deflections of metal members spanning door openings to 1/300. The clearance between the member and an operable door shall be no less than 1/16 inch.

B. Building Frame Movement: Design, fabricate and install cold formed metal framing to withstand building movements including loading deflections, shrinkage, creep and similar movements. Building frame deflections, shrinkage, creep and other movements are available from the structural engineer.

2.2 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60, AZ50, or GF30.

C. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

D. Wall Framing: Manufacturer's standard steel studs, of web depths indicated, with stiffened flanges, complying with ASTM C 955, and as follows:

1. Minimum Uncoated-Steel Thickness: 0.0329 inch.
2. Flange Width: 1-5/8 inches.
3. Track: Manufacturer's standard U-shaped steel track, unpunched, with straight flanges, complying with ASTM C 955, and minimum uncoated-steel thickness matching steel studs.

    a. Flange Width: Size to accommodate deflection of primary structure. Primary structure deflections are available from the structural engineer.

2.3 ACCESSORIES AND MISCELLANEOUS MATERIALS

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.2 INSTALLATION

A. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to AISI S200, manufacturer's written recommendations, and requirements in this Section.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
3. Install framing members in one-piece lengths.
4. Install temporary bracing and supports to secure framing and support loads comparable in magnitude to those for which structure was designed.
5. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

B. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of finishing materials.

C. Non-Load-Bearing Wall Installation: Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure. Space studs as indicated; set plumb, align, and fasten both flanges of studs to track, unless otherwise indicated.

1. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
2. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 54 inches apart. Fasten at each stud intersection.
3. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

D. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

END OF SECTION

PART 1 - SECTION 055000 - METAL FABRICATIONS

PART 2 - GENERAL

2.1 SUMMARY

A. Section includes metal fabrications and includes, but is not limited to, the following types of fabrications:

1. Supports for counter tops and vanities.
2. Aluminum framed entrance and storefront framing.
3. Tube framing for partial height walls.
4. Miscellaneous framing and supports.

B. Related Requirements:

1. Section 057000 "Decorative Metal" for decorative metal made from shapes and bars.
2. Section 092216 "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring wall-mounted products.

2.2 ACTION SUBMITTALS

A. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

B. Shop Drawings: Submit shop drawings including plans, elevations, sections, details of installation, and attachments to other Work.

1. Include plans and elevations at not less than 1" to 1'-0" scale, and include details of sections and connections at not less than 3" to 1'-0" scale.

2.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product types in this Section:

a. Steel.
b. Aluminum Extrusions.
c. Non-metallic, nonshrink grout.

d. Concrete Fill.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Delegated-Design Submittal: For installed products indicated to comply with performance requirements, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

2.4 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project for a minimum of 5 years, with a record of successful in-service performance, with sufficient production capacity to produce required units without causing delay in the Work.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal fabrications that are similar to those indicated for this Project in material, design, and extent.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

D. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

2.5 FIELD CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

PART 3 - PRODUCTS

3.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal fabrications indicated below.

B. Structural Performance:

1. Countertop and Vanity Framing: Provide countertop and vanity framing capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections, or of exhibiting excessive deflections in any of the components making up the countertops and vanities:

    a. All deadloads.
    b. 500 pound live load placed on the countertop and vanity.
    c. Deflection at Midspan:

        1) Stone or Quartz Simulated Stone: L/720 times span or 1/8 inch, whichever is less.
        2) Solid Surfacing: L/360 times span or 1/4 inch, whichever is less.

2. Tube Framing for Partial Height Walls: Provide tube framing for partial height walls capable of withstanding a deflection not to exceed L/720 of the wall height when subjected to a positive and negative pressure of 5 psf.
3. Other Overhead Anchored Fabrications: Fabricate and install framing as required to sustain imposed loads and to limit deflections to L/720 between hangers.
4. Support Framing for decorative items: Provide framing for partial height items, full height items, floor to ceiling anchored items, and other items within 48 inches of the floor should be capable of withstanding a deflection not to exceed L/720 of the height when subjected to a positive and negative pressure of 5 psf.

3.2 METALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, blemishes, or roughness.

B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

C. Ferrous Metals:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500/A 500M, or hot-formed steel tubing complying with ASTM A 501/A 501M.
3. Steel Pipe: ASTM A 53/A 53M, Type S - Seamless, Grade A suitable for close coiling or cold bending, standard weight (Schedule 40) minimum, unless otherwise indicated or required to satisfy performance requirements, black finish.
4. Slotted Channel Framing: Cold-formed metal channels with continuous slot and with flanged edges returned toward web complying with MFMA-4 and fabricated from steel complying with ASTM A 1011/A 1011M. Width, depth, and metal thickness as required to suit performance requirements.
5. Iron Castings: ASTM A 47, Grade 32510 malleable iron or ASTM A 48, Class 30, gray iron.
6. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

3.3 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer and compatible with finish paint systems indicated.

1. 94-258 Series Multi-Prime Fast Dry 2.8 VOC Universal Metal Primer; Pittsburgh Paints.
2. B50 Z Kem Kromik Universal Primer Fast Dry; Sherwin-Williams Co.
3. Series 37H Phenolic Alkyd Primer Chem-Prime; Tnemec.

3.4 MISCELLANEOUS MATERIALS

A. Fasteners: Zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, of type, grade, and class required by application indicated.

B. Nonshrink, Nonmetallic Grout: ASTM C 1107/C 1107M, factory-packaged, nonstaining, noncorrosive, nongaseous grout.

3.5 FABRICATION

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

1. Welded connections may be used where bolted connections are shown.

B. Shear and punch metals cleanly and accurately. Remove burrs.

C. Weld corners and seams continuously along entire line of contact. Use full penetration welds. Use materials and methods that minimize distortion and develop strength of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous. Make up threaded connections tight so that threads are entirely concealed.

E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices and fasteners to secure metal fabrications rigidly in place and to support indicated loads.

F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

G. Miscellaneous Framing and Supports: Provide steel framing and supports indicated and as necessary to complete the Work and which are not a part of the structural framework to comply with performance requirements.

1. Fabricate units from structural steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
2. Overhead Supports for Entrance and Storefront Framing: Fabricate supports from continuous steel shapes with attached bearing plates, anchors, and braces. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
3. Countertop Framing: Fabricate countertop framing, using steel shapes and plates, and cold finished mild steel bars at exposed conditions, for support framing and plywood, to the thicknesses, sizes and shapes shown, and as required to produce work of adequate strength and durability. Use proven details of fabrication, as required to achieve proper assembly and alignment of the various components of the Work.

3.6 FINISHES

A. Finish metal fabrications after assembly. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Shop prime ferrous-metal items.

1. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces by removing oil, grease, and similar contaminants in accordance with SSPC -SP 1 "Solvent Cleaning," followed with SSPC-SP 3, "Power Tool Cleaning."
2. Apply a minimum of one coat of shop primer to uncoated surfaces of metal fabrications, except those to be field welded, and those to be embedded in sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 4 - EXECUTION

4.1 INSTALLATION

A. General: Provide anchorage devices and fasteners for securing metal fabrications to in-place construction. Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true. Drill holes for bolts to the exact diameter of the bolt. Provide screws threaded full length to the screw head.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Quality of Workmanship:

    a. At concealed connections: No improvement from mill finish, except preparation necessary for priming is required. Welds are not required to be ground.
    b. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness , pits, mill marks, nicks, or scratches shows after finishing and contour of welded surface matches that of adjacent surface. Defects and distortions shall not be visible to the eye nor show through painted or polished surfaces.

D. Touchup surfaces and finishes after erection. For materials exposed to view in the finished Project, clean field welds, bolted connections, and abraded areas and touchup paint with the same material as used for shop painting.

E. Touchup surfaces and finishes after erection. For materials exposed to view in the finished Project, clean field welds, bolted connections, and abraded areas and touchup paint witha flat primer less than 50 g/Lcompatible with shop applied primer.

END OF SECTION

SECTION 055119 - METAL GRATING STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal grating stairs.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs.

1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
2. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.

D. Schedule installation of railings and guards so wall attachments are made only to completed walls.

1. Do not support railings and guards temporarily by any means that do not satisfy structural performance requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For metal grating stairs and the following:

1. Gratings.
2. Shop primer products.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

2. Environmental Product Declaration (EPD): For each product.
3. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
4. Environmental Product Declaration: For each product.
5. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each regional material.
6. Third-Party Certifications: For each product.
7. Third-Party Certified Life Cycle Assessment: For each product.
8. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.

D. Delegated Design Submittal: For stairs, railings, and guards, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the State of New Jersey in which Project is located.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.

2. Protect steel members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

    a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs, railings, and guards, including attachment to building construction.

B. Structural Performance of Stairs: Metal stairs withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360.

C. Seismic Performance of Stairs: Metal stairs withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 METALS

A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

D. Steel Bars for Grating Treads: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

E. Steel Wire Rod for Grating Crossbars: ASTM A510/A510M.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

F. Aluminum Bars for Grating Treads: ASTM B221 extruded aluminum, alloys as follows:

1. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
2. 6061-T1, for grating crossbars.
3. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

G. Provide galvanized finish for exterior installations and where indicated.

H. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

I. Cast-Abrasive Nosings: Cast iron, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.3 FASTENERS

A. General: Provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5 where built into exterior walls.

1. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with AWS requirements.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior exterior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, railings, guards, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs, railings, and guards in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.

2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish # 3 - Partially dressed weld with spatter removed.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that are exposed to weather in a manner to exclude water.
4. Provide weep holes where water may accumulate internally.

2.6 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Industrial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of steel channels.

a. Stringer Size: As required to comply with "Performance Requirements" Article.
b. Provide closures for exposed ends of channel stringers.
c. Finish: Galvanized.

2. Construct platforms and tread supports of steel plate headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.

a. Provide closures for exposed ends of channel framing.
b. Finish: Galvanized.

3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.

C. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."

1. Fabricate treads and platforms from welded steel grating with 1-1/4-by-3/16-inch bearing bars at 15/16 inch o.c. and crossbars at 4 inches o.c.
2. Fabricate treads and platforms from welded steel grating with openings in gratings no more than 1/2 inch in least dimension.

    a. Surface: Plain.
    b. Finish: Shop primed.

3. Fabricate grating treads with rolled-steel floor plate nosing and with steel angle or steel plate carrier at each end for stringer connections.

    a. Secure treads to stringers with bolts.

4. Fabricate grating platforms with nosing matching that on grating treads.

    a. Secure grating to platform framing by welding.

D. Risers: Open.

E. Toe Plates: Provide toe plates around openings and at edge of open-sided floors and platforms, and at open ends and open back edges of treads.

1. Material and Finish: Steel plate to match finish of other steel items.
2. Fabricate to dimensions and details indicated.

2.7 FABRICATION OF STAIR RAILINGS AND GUARDS

A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."

2.8 FINISHES

A. Finish metal stairs after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.

1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF METAL STAIRS

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

B. Install metal stairs by welding stair framing to steel structure.

3.3 REPAIR

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking for anchoring railings.
2. Section 092216 "Non-Structural Metal Framing" for metal backing for anchoring railings.

1.2 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. For installed products indicated to comply with performance requirements and design criteria, submit shop drawings signed and sealed by the qualified professional engineer responsible for their preparation.

D. Samples: Submit samples for each type of exposed finish required, prepared on components indicated below and of same thickness and metal indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1. 6-inch- long sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.

E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product types in this Section:

a. Steel.
b. Stainless Steel.
c. Aluminum Extrusions.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: A firm experienced in producing handrails and railings similar to those indicated for this Project for a minimum of 5 years, with a record of successful in-service performance, with sufficient production capacity to produce required units without causing delay in the work.

1. Employ only experienced tradesmen for both fabrication and installation, who are capable of producing work of the highest standards of quality in the industry.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.

C. Source Limitations: Obtain each type of railing from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to the following as applicable:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code--Aluminum."
3. AWS D1.3/D1.3M, "Structural Welding Code--Sheet Steel."
4. AWS D1.6/D1.6M, "Structural Welding Code--Stainless Steel."

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with pipe and tube railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Steel: 72 percent of minimum yield strength.

C. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Deflection Criteria: The larger deflections at the top from either the horizontal live loads shall be the lesser of 3/4-inchor h/90 for cantilever elements, and h/175 for simple span elements, where h is the distance from the floor level to the top of guardrail. Applied loads shall be allowable stress design loads.

D. Regulatory Requirements: Comply with the requirements of Part 1910 of the Occupational Safety and Health Standards (OSHA), the American Disabilities Act (ADA), and local regulatory requirements as applicable to stairs, handrails and the protection of openings; where regulatory requirements conflict the more stringent shall apply.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without pitting, seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes where exposed to view on finished units.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.3 STEEL AND IRON

A. General: Provide steel and iron (ferrous metal) in the form indicated, complying with the following requirements.

B. Pipe: ASTM A 53/A 53M, Type S - Seamless, Grade A, suitable for close coiling or cold bending, Standard Weight (Schedule 40) minimum, unless another grade and weight are required to suit performance requirements.

1. Black finish, unless otherwise indicated.

C. Tubing: ASTM A 500 (cold formed) Grade A or ASTM A 513, unless otherwise indicated or required to satisfy the performance requirements.

D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

1. Welded Headed Studs: AWS D1.1 (Type A or B as selected by fabricator), ASTM A 108 Grades 1010 through 1020 inclusive and bearing the minimum mechanical properties for studs as selected by fabricator to suit performance requirements.

E. Cold Finished Steel Bars: ASTM A 108, grade as selected by fabricator.

F. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.4 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of complying with the performance requirements.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."

C. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

1. 94-258 Series Multi-Prime Fast Dry 2.8 VOC Universal Metal Primer; Pittsburgh Paints.
2. B50 Z Kem Kromik Universal Primer Fast Dry; Sherwin-Williams Co.
3. Series 37H Phenolic Alkyd Primer Chem-Prime; Tnemec.

D. Intermediate Coats and Topcoats: Provide products that comply with Section 099123 "Interior Painting."

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to comply with the performance requirements.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Shear, cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings. Weld connections continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

J. Form changes in direction as indicated on the Drawings.

K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.8 STEEL AND IRON FINISHES

A. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces by removing oil, grease, and similar contaminants in accordance with SSPC-SP 1 "Solvent Cleaning," followed with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." Surface preparation shall be done after fabrication and immediately prior to shop painting. Apply shop coat of paint within 4 hours after cleaning and before rust bloom occurs.

C. Primer Application: Apply shop primer to prepared surfaces of railings, except those to be field welded, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint edges, corners, crevices, bolts, and welds.
2. Dry Film Thickness of Primer: 2.5 to 3.0 mils, dry film thickness. Apply paint thoroughly and evenly to dry surfaces, free from holidays and pinholes, in accordance with manufacturers directions

D. Do not deliver primed railing work until primer has dried.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required to meet or exceed the performance requirements.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 ANCHORING POSTS

A. Anchor posts to steel by welding directly to steel supporting members.

3.4 ATTACHING RAILINGS

A. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."

3.6 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 055313 - BAR GRATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal bar gratings.
2. Grating frames and supports.

B. Related Requirements:

1. Section 055119 "Metal Grating Stairs" for grating treads and landings of steel-framed stairs.
2. Section 055213 "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Clips and anchorage devices for gratings.
2. Paint products.

B. Shop Drawings:

1. Include plans, sections, and attachment details.
2. Signed and sealed by the qualified professional engineer responsible for their preparation.

C. Delegated Design Submittals: For gratings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
3. Environmental Product Declaration (EPD): For each product.
4. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
5. Third-Party Certifications: For each product.

6. Third-Party Certified Life Cycle Assessment: For each product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.

B. Mill Certificates: Signed by manufacturers of stainless steel certifying that products furnished comply with requirements.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

D. Welding certificates.

E. Delegated design engineer qualifications.

1.4 QUALITY ASSURANCE

A. Delegated Design Engineer Qualifications: A professional engineer who is legally qualified to practice in New Jersey where Project is located and who is experienced in providing engineering services of the type indicated.

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.2/D1.2M.
3. AWS D1.3/D1.3M.
4. AWS D1.6/D1.6M.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design gratings.

B. Structural Performance: Gratings to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Walkways and Elevated Platforms Other Than Exits: Uniform load of 60 lbf/sq. ft..
2. Walkways and Elevated Platforms Used as Exits: Uniform load of 100 lbf/sq. ft..
3. Limit deflection to L/360 or 1/4 inch, whichever is less.

C. Seismic Performance: Gratings to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. Component Importance Factor: 1.5.

2.2 METAL BAR GRATINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. All American Grating.
2. BarnettBates Corporation.
3. Borden Metal Products (Canada) Limited.
4. Fisher & Ludlow; a NUCOR Company.
5. Grating Pacific, Inc.
6. Grupo Metelmex, S.A. de C.V.
7. Harsco Industrial IKG, a division of Harsco Corporation.
8. MLP Steel Company; Laurel Steel Products Division.
9. Neenah Foundry Company.
10. Ohio Gratings, Inc.
11. Ross Technology Company.
12. Seidelhuber Metal Products; Brodhead Steel.

B. Metal Bar Grating Standards: Comply with NAAMM MBG 531.

C. Welded Steel Grating:

1. Bearing Bar Spacing: 15/16 inch o.c.
2. Bearing Bar Depth: As required to comply with structural performance requirements.
3. Bearing Bar Thickness: As required to comply with structural performance requirements.
4. Crossbar Spacing: 2 inches o.c.
5. Grating Mark: As indicated.
6. Traffic Surface: As indicated.
7. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.

2.3 GRATING FRAMES AND SUPPORTS

A. Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, fabricate from same basic metal as gratings.
2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

B. Galvanize steel frames and supports in the following locations:

1. Exterior.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563, and, where indicated, flat washers.

C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, nuts, and, where indicated, flat washers; ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group 1.

D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563, and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

E. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.6 FERROUS METALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Steel Bars for Bar Gratings: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.

D. Wire Rod for Bar Grating Crossbars: ASTM A510/A510M.

E. Uncoated Steel Sheet: ASTM A1011/A1011M, structural steel, Grade 30.

F. Galvanized-Steel Sheet: ASTM A653/A653M, structural quality, Grade 33, with G90 coating.

G. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A240/A240M, Type 304.

H. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.

2.7 FABRICATION

A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
2. Fabricate toeplates for attaching in the field.
3. Toeplate Height: 4 inches unless otherwise indicated.

G. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.

1. Provide no fewer than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.
2. Provide no fewer than four saddle clips for each grating section containing rectangular bearing bars 3/16 inch or less in thickness and spaced 15/16 inch or more o.c., with each clip designed and fabricated to fit over two bearing bars.
3. Provide no fewer than four weld lugs for each grating section containing rectangular bearing bars 3/16 inch or less in thickness and spaced less than 15/16 inch o.c., with each lug shop welded to three or more bearing bars. Interrupt intermediate bearing bars as necessary for fasteners securing grating to supports.
4. Furnish threaded bolts with nuts and washers for securing grating to supports.
5. Furnish self-drilling fasteners with washers for securing grating to supports.
6. Furnish galvanized malleable-iron flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Kee Safety, Inc.
        2) Lindapter International.
        3) LNA Solutions, a Kee Safety company.

H. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.

I. Do not notch bearing bars at supports to maintain elevation.

2.8 STEEL FINISHES

A. Finish gratings, frames, and supports after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

D. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Attach toeplates to gratings by welding at locations indicated.

F. Field Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

G. Corrosion Protection: With a heavy coat of bituminous paint, coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals.

3.2 INSTALLATION OF METAL BAR GRATINGS

A. Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.

C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 REPAIR

A. Repair of Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 057000 - DECORATIVE METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass Channels.
2. Foot Railings.
3. Wall panels.
4. Decorative metal trim.
5. Decorative mechanical grilles and frames.
6. Metal reveals.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for non-decorative metal fabrications.

1.2 COORDINATION

A. Coordinate installation of anchorages for decorative metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including finishing materials.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Show fabrication and installation details for decorative metal.

1. Include plans, elevations, component details, and attachments to other work.
2. Indicate materials and profiles of each decorative metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of linear shapes.

2. Samples of welded joints showing quality of workmanship and color matching of materials.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.
2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Qualification Data: For qualified fabricator and finisher.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing decorative metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Installer Qualifications: Fabricator of products.

C. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

E. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store decorative metal in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

B. Deliver and store cast-metal products in wooden crates surrounded by sufficient packing material to ensure that products will not be cracked or otherwise damaged.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with decorative metal by field measurements before fabrication and indicate measurements on shop drawings.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.2 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.

B. Extruded Bars and Shapes: ASTM B 221, Alloy 6063-T5/T52.

C. Extruded Structural Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.

D. Drawn Seamless Tubing: ASTM B 210 or ASTM B 483/B 483M, Alloy 6063-T832.

E. Plate and Sheet: ASTM B 209, Alloy 3003-H14 easily formed and is commonly used for general sheet metal work.

2.3 STAINLESS STEEL

A. Tubing: ASTM A 554, Grade MT 304.

B. Pipe: ASTM A 312/A 312M, Grade TP 304.

C. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.

D. Bars and Shapes: ASTM A 276, Type 304.

2.4 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:

1. Aluminum Items: Type 304 stainless-steel fasteners.
2. Stainless-Steel Items: Type 304 stainless-steel fasteners.
3. Uncoated-Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed, Type 304 stainless-steel fasteners where exposed.
4. Class Fe/Zn 25 for electrodeposited zinc coating.
5. Dissimilar Metals: Type 304 stainless-steel fasteners.

B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.

C. Provide concealed fasteners for interconnecting components and for attaching decorative metal items to other work unless otherwise indicated.

1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

E. Post-Installed Anchors: Torque-controlled expansion type or chemical type.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 unless otherwise indicated.
2. Material for Locations Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Cleaner: Provide a liquid emulsifiable alkaline soak cleaner suitable for metal surfaces. Basis-of-Design Product: E-Kleen 111; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

C. Deoxidizer/Activator: Provide a mixture or dry, granular, free-flowing acid salts which, when dissolved in water, are used to deoxidize and activate metal surfaces prior to plating or chemical conversion finishing. Basis-of-Design Product: E-Pik 211; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

D. Gloss Acrylic Lacquer: Provide a lacquer sealer designed to produce a hard, dry, clear finish. Basis-of-Design Product: E-Tec 520; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

E. Wax Emulsion Corrosion Inhibitors: Provide a wax emulsion sealer designed to produce a hard, dry, clear medium gloss finish. Basis-of-Design Product: E-Tec 521-B; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

F. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."

G. Intermediate Coats and Topcoats for Steel: Provide products that comply with Section 099123 "Interior Painting."

2.6 FABRICATION, GENERAL

A. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

B. Make up wire-rope assemblies in the shop to field-measured dimensions with fittings machine swaged. Minimize amount of turnbuckle take-up used for dimensional adjustment so maximum amount is available for tensioning wire ropes. Tag wire-rope assemblies and fittings to identify installation locations and orientations for coordinated installation.

C. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

E. Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

F. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

G. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.

H. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.

I. Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.

1. Where welding cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.

2.7 GLASS CHANNELS

A. Product as selected by Architect.

B. Finish: Refer to Aluminum Finishes within this Section.

2.8 FOOT RAILINGS

A. Product as selected by Architect.

B. Finish: Refer to Aluminum Finishes within this Section.

2.9 DECORATIVE METAL TRIM

A. Fabricate from stainless-steel shapes, sheet or plate of thickness, size, and pattern indicated. Roll, press, and grind metal to flatten and to remove burrs and deformations. Miter corners and connect with concealed splice plates.

2.10 DECORATIVE MECHANICAL GRILLES AND FRAMES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. (Basis of Design) Construction Specialties, Inc.; Vert-A-Cade 301 Architectural Screen

2. Architectural Grille; Division of Giumenta Corporation.
3. Beaux-Artes.
4. Harrington & King Perforating Company, Inc.

5. Reggio Register Company, Inc.
6. Register & Grille Mfg. Co., Inc.

B. Provide decorative metal grille, structural supports and accessories as recommended by Manufacturer. Materials, sizes, depths, arrangements, and material thickness to be as indicated or as required for optimal performance with respect to strength, durability, and uniform appearance.

C. Decorative Metal Grille to be mechanically assembled using stainless steel or aluminum fasteners.

D. Include supports, anchorage, and accessories as recommended by Manufacturer for complete assembly.

2.11 METAL REVEALS

A. Fabricate metal reveals for wood paneling from 3/4-by-3/4-by-0.025-inch brake-formed, stainless-steel channels. Drill for mounting screws 6 inches from ends of channels and not more than 24 inches o.c. Locate mounting screws at same heights for all channels. Provide hex-socket, wafer-head screws for mounting reveals.

2.12 FINISHES, GENERAL

A. Decorative metal finishes are designated with Item Code MT# in the Finish Schedule and on the Drawings.

B. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.13 ALUMINUM FINISHES MT##

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.14 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.

C. Directional Satin Finish: No. 4.

D. Dull Satin Finish: No. 6.

E. Reflective, Directional Polish: No. 7.

F. Mirrorlike Reflective, Nondirectional Polish: No. 8.

G. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.

B. Perform cutting, drilling, and fitting required to install decorative metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.

C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.

D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

E. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.

F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.

1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.

G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in "Fabrication, General" Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

H. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 INSTALLING DECORATIVE METAL TRIM

A. Assemble trim and complete fabrication at Project site to the extent that it was not completed in the shop.

B. Install trim level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

C. Scribe and cut trim to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

D. Anchor trim to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners. Use fine finishing screws for exposed fastening, countersunk and filled flush with trim using filler matching finish of items being installed.

E. Install with minimum number of joints possible, using full-length pieces (from maximum length of material available) to greatest extent possible. Do not use pieces less than 96 inches long except where shorter single-length pieces are necessary.

3.3 INSTALLING METAL REVEALS AT WOOD PANELING

A. Install metal reveals between wood panels as paneling is installed. Secure to wood grounds with specified screws.

3.4 INSTALLING DECORATIVE MECHANICAL GRILLES AND FRAMES

A. Mount decorative grilles at heights and in positions indicated, adjusting ductwork to be centered on grilles if any.

1. Secure to framing and blocking with specified fasteners.
2. Coordinate with Contract Drawings for more information.

3.5 INSTALLING GLASS CHANNELS

A. Install glass channels per manufacturer's instructions and requirements.

3.6 INSTALLING FOOT RAILINGS

A. Install foot railings per manufacturer's instructions and requirements.

3.7 CLEANING AND PROTECTION

A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

B. Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.

C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

D. Protect finishes of decorative metal from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.

E. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes miscellaneous carpentry.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of process and factory-fabricated product indicated.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that materials comply with requirements.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals:

1. Completed Environmental Product Declaration Reporting Form for the following product type in this Section:

a. Fire-Retardant Treated Plywood.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

C. Fire Performance Characteristics: Provide materials identical to those tested for the following fire performance characteristics per ASTM test methods indicated by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify treated lumber with classification marking of inspecting and testing organization in the form of separable paper label or, where required by authorities having jurisdiction, of imprint on lumber surfaces that will be concealed from view after installation.

1. Surface Burning Characteristics for Concealed Blocking, Furring, and Door Subframing: Not exceeding a flame spread of 25, and smoke developed of 50 when tested per ASTM E 84 for 30 minutes.

D. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Softwood Lumber.
2. Softwood Plywood.
3. Moisture-Resistant MDF.
4. Fire-Rated MDF.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels; for lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Regional Materials: Dimension lumber, except treated materials, shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

B. Certified Wood: Lumber and plywood shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-00 and FSC STD-40-004.

C. Lumber: Comply with DOC PS 20 "American Softwood Lumber Standard" and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

D. Wood Panels:

1. Plywood: Comply with DOC PS 1 "Construction and Industrial Plywood" for plywood panels. Use exterior grade for panels in wet conditions.
2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Provide chemical fire retardant process tested and labeled by UL with flame spread and smoke developed ratings of 25 or less. Comply with performance requirements in AWPA U1, Use Category UCFA as a minimum for pressure treatment. Size wood before treatment so that minimum cutting will be required after treatment. Kiln dry lumber to a maximum 19 percent moisture content, kiln dry plywood to a maximum 15 percent moisture content, after treatment. Treat indicated items and the following:

1. Wood members required to be treated by Building Code having jurisdiction at the site and wood members specified as fire-retardant-treated.

B. Identify fire-retardant-treated wood with appropriate classification marking of UL.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.4 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber for support or attachment of other construction, including blocking, nailers, and similar members.

B. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Western Woods; WCLIB or WWPA, No. 2 Grade.

2.5 PANEL PRODUCTS

A. Concealed Plywood for Countertop Underlayment:

1. APA Exterior sheathing, manufactured with no added urea-formaldehyde, in thickness as indicated but not less than 3/4 inch.

    a. Roseburg Forest Products; Oregon Plywood 2 softwood plywood sheathing.
    b. Roy O. Martin Lumber Company, Limited Partnership (MARTCO), Plywood Division; exterior softwood plywood sheathing.
    c. Potlatch Forest Products Corporation, Forest Products Div., exterior softwood plywood sheathing.

B. Medium-Density Fiberboard (Moisture Resistant): A sustainable, moisture-resistant, medium density fiberboard (MDF) panel manufactured from minimum 92 percent preconsumer recycled wood fiber complying with ANSI A208.2, Grade 155, having a minimum 48 pcf density except that minimum for screw holding capacity on face shall be 325 pounds; an ASTM E 84 Class C flame spread rating, minimum 3/4 inch thick, edged and faced as specified, fabricated with binder containing no added urea formaldehyde.

1. Roseburg Forest Products; NAUF FSC Certified Medex.

C. Telephone, Data, Security, Stretched Fabric Wall System Artwork Blocking, Mirror,and Electrical Equipment Backing Panels:

1. APA, Exposure 1, C-C Plugged, fire-retardant treated, manufactured with no added urea-formaldehyde, in thickness indicated or, if not indicated, not less than 15/32 inch thick.

D. Medium-Density Fiberboard (fire rated): A sustainable, fire rated, medium density fiberboard (MDF) panel manufactured from minimum 82 percent recycled wood fiber complying with ANSI A208.2, Grade 130, having a minimum 48 pcf density except that minimum for screw holding capacity on face shall be 250 poundsan ASTM E 84 Class A flame spread rating, minimum 3/4 inch thick, edged and faced as specified, fabricated with binder containing no added urea formaldehyde.

1. Roseburg Forest Products; NAUF FSC Certified Medite FR.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

B. Power-Driven Fasteners: NES NER-272.

C. Nails, Wire, Brads, and Staples: Select material, type, size, and finish required for each use.

1. ASTM F 1667 for driven fasteners such as nails, spikes and staples.
2. ASTM F 547 for nails used with wood and wood based products.

D. Wood Screws: Select material, type, size, and finish required for each use. Comply with ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

C. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 PANEL PRODUCT INSTALLATION

A. General: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," and local utility requirements, if any, for plywood backing panels utilized as indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Countertop Underlayment: Bolt to miscellaneous steel framing.
2. Plywood Backing Panels: Secure to wall using proper fastening devices for substrates encountered spaced 12 inches on center maximum at perimeter 1/2 inch from corners and three rows of 3 fasteners each in the backerboard field. Countersink fasteners flush with plywood surface. Butt adjacent panels without lapping.

END OF SECTION

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes interior architectural woodwork:

1. Plastic-laminate cabinets.
2. Plastic-laminate countertops.
3. Solid-surfacing material countertops.
4. Quartz-surfacing material countertops.
5. Closet and utility shelving.
6. High pressure decorative laminate panels.
7. Solid surface walls.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for concealed countertop supports.
2. Section 057000 "Decorative Metal" for metal trim.
3. Section 061053 "Miscellaneous Rough Carpentry" for concealed blocking for millwork items.
4. Section 079200 "Joint Sealants" for joint sealants.
5. Section 096723 "Resinous Flooring" for resinous flooring.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each material and product specified and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

1. Cabinet hardware and accessories.
2. Finishing materials and processes.
3. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Submit shop drawings showing locations of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components. Elevations shall be drawn at a scale of not less than 1/2" = 1'-0" . Details shall be drawn at a scale of not less than 3" = 1'-0" .

1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
2. Show locations and sizes of cutouts and holes for plumbing, electrical, computer and telephone equipment and other items installed in architectural woodwork.
3. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

D. Samples: Submit samples of the following:

1. Solid-surfacing materials, 6 inches square.
2. Cabinet Locks: Three samples of each type.
3. Metal Trim Shapes: Three samples of each type and finish, 12 inches long.
4. Submit samples of each type of door specified showing construction and finishes selected. Samples shall be 12 inch by 12 inch corner section.
5. Submit samples of stainless steel glass rosette cap assemblies in each finish specified.
6. Glass and Acrylic Panels: 12 inches by 12 inches of each type specified.
7. Solid Laminate (Trespa) Flat Panels: Submit three 12 inch by 12 inch sample sets containing a minimum of 2 or more samples of solid laminate panel products, for each finish specified and demonstrating the proposed full range of appearance characteristics to be expected in completed work.
8. Solid Laminate (Trespa) Panel Corner Construction Samples: Submit three minimum 18 inches wide by 18 inches deep by 24 inches high, samples demonstrating the outside corner construction of solid laminate panels. Show vertical-edge corner construction, top, and bottom construction. Include fasteners, reveals and trim closures.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.
2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Instructions: Submit maintenance instructions for all countertop materials. Where countertop materials are recommended to be protected with hot pads, provide manufacturers recommended hot pad product properly sized for the hot equipment designed to be placed thereon.

1.5 QUALITY ASSURANCE

A. Single-Source Manufacturing and Installation Responsibility: Engage a qualified Manufacturer - acceptable to the Architect - to assume undivided responsibility for woodwork specified in this Section, including fabrication, finishing, and installation. The manufacturer shall have a minimum of 15 years successful experience in the custom fabrication and installation of architectural woodwork comparable to that shown and specified, be a member of the AWI, maintain an organized quality control program, perform its own in-house veneer lay-up work, and who retains facilities with sufficient capacity and quality to produce the required architectural woodwork without causing delay to the Project.

B. Quality Standard: Fabricate and install all architectural woodwork in accordance with the applicable requirements of Architectural Woodwork Standards, 2nd edition, published jointly by AWI, AWMAC, and WI, unless more stringent requirements are specified or shown.

C. Fire Performance Characteristics: Provide materials identical to those tested for the following fire performance characteristics per ASTM test methods indicated by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify treated lumber with classification marking of inspecting and testing organization in the form of separable paper label or, where required by authorities having jurisdiction, of imprint on lumber surfaces that will be concealed from view after installation.

1. Surface Burning Characteristics for Concealed Blocking, Furring, and Door Subframing: Not exceeding a flame spread of 25, and smoke developed of 50 when tested per ASTM E 84 for 30 minutes.
2. The fire performance finish requirements for all exposed interior wall and ceiling woodwork (including the paneling but not limited to paneling) substrates in fully sprinklered spaces shall be as follows which has been taken from the IBC 2021, Table 803.9. Footnotes to Table 803.9 that are pertinent to the project are also made a part of this specification.

Use Group	Interior Exit Stairways, Exit Ramps, and Exit Passageways	Corridors and Enclosures for Exit Access Stairways, and Exit Access Ramps	Rooms and Enclosed Spaces
A-1, and A-2	Class B	Class B	Class C
A-3	Class B	Class B	Class C
B, E, M, R-1	Class B	Class C	Class C
S	Class C	Class C	Class C

Class B: Flame spread 26-75, smoke developed 0-450 when tested in accordance with ASTM E 84.
Class C: Flame spread 76-200, smoke developed 0-450 when tested in accordance with ASTM E 84.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration. Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify actual dimensions of other construction by accurate field measurements before fabrication of woodwork; and indicate measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on shop drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

1.9 PREINSTALLATION COORDINATION MEETING

A. Meet at the Project site, prior to installation of architectural woodwork, to review the substrate preparation, installation and coordination with other trades, special details and conditions, and other topics related to the architectural woodwork. The preinstallation meeting shall include the Architect, the Contractor, architectural woodworker, and any subcontractors affected by the architectural woodwork installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of the AWS quality standard for each type of woodwork and quality grade specified.

B. Lumber Standards: Comply with applicable provisions for grading and workmanship of AWS Architectural Woodwork Standards, Section 3, and the requirements shown and specified; where standards conflict the more stringent shall apply. Provide lumber surfaced 4 sides (S4S) and fabricated to profiles shown. All lumber shall be kiln dried to the moisture content indicated in AWS, Section 2.

1. Furring, Blocking, Shims: No. 1 Common; Southern Pine.

C. Wood Panel Products:

1. Medium-Density Fiberboard (non-moisture resistant): A medium density fiberboard (MDF) panel manufactured from wood fiber complying with ANSI A208.2, Grade 155, having a minimum 47 pcf density except that minimum for screw holding capacity on face and edge shall be 275 poundsand 225 poundsrespectively; an ASTM E 84 minimum Class C flame spread rating, minimum 3/4 inches (19 mm) thick, edged and faced as specified, fabricated with binder containing no added formaldehyde.

    a. Roseburg Forest Products; FSC Certified Medite II.
    b. Arauco North America; Trupan Standard MDF.
    c. Uniboard, Canada; Uniboard NU Green MR 50 NAF MDF.

2. Medium-Density Fiberboard (moisture resistant): A moisture-resistant, medium density fiberboard (MDF) panel manufactured from wood fiber complying with ANSI A208.2, Grade 155, having a minimum 48 pcf density except that minimum for screw holding capacity on face and edge shall be 275 poundsand 225 poundsrespectively; an ASTM E 84 Class C flame spread rating, minimum 3/4 inches thick, edged and faced as specified, fabricated with binder containing no added formaldehyde.

    a. Roseburg Forest Products; FSC Certified Medex.
    b. Arauco North America; Moisture Resistant Trupan.
    c. Uniboard, Canada; Uniboard NU Green MR50 MDF.

3. Medium-Density Fiberboard (fire rated): A fire rated, medium density fiberboard (MDF) panel manufactured from wood fiber complying with ANSI A208.2, Grade 130, having a minimum 50 pcf density except that minimum for screw holding capacity on face and edge shall be 250 poundsand 200 poundsrespectively; an ASTM E 84 Class A flame spread rating and a smoke developed index of not more than 200, minimum 3/4 inches thick, edged and faced as specified, fabricated with binder containing no added formaldehyde.

    a. Roseburg Forest Products; FSC Certified Medite FR.
    b. Arauco North America; Trupan Fire Rated MDF.
    c. Uniboard, Canada; Uniboard NU Green FR MDF Fire Resistant.

4. Medium Density Particleboard: A medium density particleboard (MDP) panel manufactured from wood residuals complying with ANSI A208.1, Grade M-2 with a minimum 45 pcf density except that minimum for screw holding capacity on face and edge shall be 250 poundsand 180 poundsrespectively, an ASTM E 84 minimum Class C flame spread rating; minimum 3/4 inches thick, edged and faced as specified and manufactured with binder containing no added formaldehyde.

    a. Roseburg Forest Products; Skyblend.
    b. Arauco North America; Duraflake Standard.
    c. Uniboard, Canada; Uniboard NU Green 2.

D. High-Pressure Decorative Laminate (PL##): Complying with NEMA LD 3 for Horizontal General Purpose Grade (HGS) typically and Vertical General Purpose Grade (VGS) where specified. Nominal thickness for HGS and VGS laminates to be 0.048 inches +/-0.005 inches and 0.028 inches +/- 0.004 inches, respectively. Where high pressure decorative laminate is indicated to be faced with aluminum, provide aluminum sheet goods specifically made for laminating to vertical MDF and particleboard substrates in sheet thickness of 0.025 inches +/- 0.002 inches.

1. Types: As indicated in the Finish Schedule on the Drawings.

    a. Provide factory applied protective peel coat to prevent surface damage during fabrication and handling of aluminum faced decorative laminates. Remove protective peel coat after installation in accordance with the manufacturer's recommendations. If the film is left in place after installation, exposure to direct sunlight for a prolonged period may cause a paste residue and create other problems.

2. Backing Sheets: Non-decorative, high pressure laminate, NEMA LD3, Grade, types and thickness to match face sheets and equalize pull.

E. Solid-Surfacing Material (SO##): Provide material that meets or exceeds ISFA-2-01 performance standards, consisting of reacted monomers and resins, mineral fillers and pigments and manufactured in sheets of specific thicknesses. Solid surfacing material shall be solid, non-porous, homogeneous, hygienic, renewable, and, when applicable, may feature inconspicuous hygienic seams. Solid surfacing material shall be free from conspicuous internal strengthening fibers.

1. Types: As indicated in the Finish Schedule on the Drawings.

F. Adhesives, General: Use only low emitting VOC adhesives that leave no glue lines on finished surfaces of architectural woodwork. Do not use adhesives that contain urea formaldehyde.

1. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

    a. Wood Glues: 30 g/L.
    b. Contact Adhesives: 80 g/L.

G. Solid Laminate: Solid composite panels fabricated of material specifically designed for casework. All panel surfaces shall be electron beam cured to prevent damage from cleansing agents such as graffiti removers. Surfaces shall offer protection against 10 percent hydrochloric acid, 10 percent phosphoric acid, 30 percent hydrogen peroxide, 25 percent caustic soda, 100 percent paint thinner and 100 percent methyl ethyl ketone without functional or aesthetic damage to the surface. All surfaces and edges shall be non-porous.

1. Core: Solid black.
2. Physical Properties:

    a. Modulus of elasticity: 1,500,000-psi minimum.
    b. Shear strength: 2000-psi minimum.
    c. Compressive strength: 24,000-psi minimum.
    d. Weight: 93 lbs. per cubic foot maximum.
    e. Tensile strength: 13,000-psi minimum.
    f. Flexural strength: 16,000-psi minimum.
    g. Surface Impact Resistance: 9 lb.
    h. Scratch Resistance: 0.8 lb.
    i. Specific Gravity: 87 lbs. per cubic foot, minimum.
    j. Dimensional Stability: 0.03 in/ft, maximum.
    k. Water Absorption: 3 percent by weight, maximum.

3. Thickness, Products and Manufacturer: Trespa North America, Inc. subsidiary of Trespa International BV, Netherlands; Trespa Virtuon, thickness, colors and surface texture as indicated in the Finish Schedule on the Drawings.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where indicated, use materials impregnated with fire-retardant chemical formulations indicated by a pressure process or other means acceptable to authorities having jurisdiction to produce products with fire-test-response characteristics specified.

1. Do not use treated material that does not comply with requirements of referenced woodworking standard. Do not use twisted, warped, bowed, discolored, or otherwise damaged or defective lumber or panel products.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
3. Treat only door subframing, blocking and furring items.

B. Fire-Retardant-Treated Lumber: Materials impregnated with fire-retardant chemical formulations to comply with AWPA U1, Use Category UCFA. Kiln-dry material after treatment to levels required for untreated woodwork.

C. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture and complying with fire-test-response characteristics specified.

D. Fire-Retardant Fiberboard: ANSI A208.2 medium-density fiberboard panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture and complying with fire-test-response characteristics specified.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials for a complete installation of architectural woodwork, except for items specified in Section 087100 "Door Hardware."

B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.

C. Frameless Concealed Hinges for Cabinet Doors (European Type): Concealed all-metal furniture hinges adaptable or engineered for 35 mm hinge cup boring pattern, with minimum 155 degree opening angle, three-dimensional hinge having adjustments located in the steel hinge arm, steel or die-cast zinc hinge cups, mounting plates, and plastic insertion dowels to receive hinge screws. Automatic soft closing shall engage only in the last 10 degrees of swing. All hinge pins and linkages shall be hardened. Complying with BHMA A156.9, B01602. Bright nickel finish (US15).

1. Hinge Quantity: Provide hinge quantity as recommended by hinge manufacturer based on cabinet door width, weight, thickness, door material, and hinge cup selection.
2. Metal Furniture Hinge Products and Manufacturers: One of the following:

a. Basis of Design: Grass Tiomos Series; Grass America, Inc.; Kernersville, NC.
b. Blumotion Series; Blum USA; Stanley, NC.
c. Salice; Silencia Series 200.

D. Hidden Gate Hinges: Full mortised, invisible hinges and specifically manufactured for door thickness indicated and fabricated from high strength plated brass or steel, heavy duty zinc alloy or brass castings, and non-removable riveted hinge pins. Each hinge shall be engineered for smooth performance with laminated link construction supplemented by anti-friction materials that reduce friction for smooth, free hinge operation. Complying with BHMA A156.9, B01501.

1. Hinge Quantity: Provide hinge quantity as recommended by hinge manufacturer based on cabinet door width, weight, thickness, door material, and hinge cup selection.
2. Metal Furniture Hinge Products and Manufacturers: One of the following:

a. Basis of Design: "Soss" Hinges; Universal Industrial Products Company, Pioneer, OH.
b. Vici Hinges 341.25.xxx; Hafele America; Archdale, NC.
c. Soss Hinge 341.07.xxx; Hafele America Co.; Archdale, NC.

E. Piano Hinges: Continuous type, satin finished stainless steel and complying with BHMA A156.9, B51491.

F. Wire Pulls: Back mounted, 4 inches long, 3/8 inches in diameter fabricated from satin finished stainless steel (US32D), complying with BHMA A156.9, B52011, unless otherwise indicated.

1.
2. Richelieu Contemporary Metal Pull (8160)

a. 3 25/32" center to center
b. Brushed Nickel

G. Catches: Magnetic, complying with BHMA A156.9, B03141 for single doors and B03161 for double doors.

1. For Single Doors:One of the following:

a. CD41 Single Magnetic Cabinet Catch; Stanley Commercial Hardware.
b. 900; Rockwood Manufacturing Company, Rockwood, PA.
c. 246.94.701 housing x 246.94.702 counterpiece; Hafele America Co. Archdale, NC.

2. For Double Doors: One of the following:

a. 901; Rockwood Manufacturing Company.
b. CD45 Double Magnetic Cabinet Catch; Stanley Commercial Hardware.

H. Cabinet Shelf Rests: Nickel plated brass or steel, or stainless steel, minimum 6 mm diameter shelf support pegs in sockets, complying with BHMA A156.9, B04013. One of the following:

1. Hafele 282.01.701 x 282.50.704; Hafele America, Co.
2. K-10S with K-2 Sleeve; Brusso, Inc.
3. 331 Series Flat Top Shelf Support Pin with 325 Series Insert Grommet; Knape and Vogt.

I. Closet Rods and Flanges: 1-5/16 inches diameter, satin finished chrome plated steel or satin finished stainless steel with matching end flanges.

J. Adjustable Shelf Standards and Brackets for Wall-Hung Open-Shelving:

1. Standards: Model No. 87 ANO Extra Heavy Duty 87-187 Series; 24 inch lengths as indicated, by Knape and Vogt.
2. Brackets: Model No. 186 LL ANO for 8- and 10-inch deep shelves by Knape and Vogt.
3. Shelf Rests: Model No. 210 ANO End Rest and Model No. 211 ANO Center Rest with Model No. 129 RUB Rubber Cushions.

K. Drawer Slides:

1. Pencil Drawer Slides: Similar to Accuride 2006 having 3/4 extension carburized steel ball bearing, side mounting, 45 pound capacity medium duty load rating, cold rolled steel slide members and ball retainers, bright electro zinc plate finish.
2. Drawers less than 4 inches deep: Similar to Accuride 3832EC "Easy Close" having full extension carburized steel ball bearing, side mounting, 100 pound capacity medium duty load rating, cold rolled steel slide members and ball retainers, cushioned in and outstops, detent-in, progressive action, positive stop, bright electro zinc plate finish.
3. Drawers greater than 4 inches but less than 8 inches deep: Similar to Accuride 3832EC "Easy Close" having full extension carburized steel ball bearing, side mounting, 100 pound capacity medium duty load rating, cold rolled steel slide members and ball retainers, cushioned in and outstops, detent-in, progressive action, positive stop, bright electro zinc plate finish.
4. Drawers greater than 8 inches deep: Similar to Accuride 3634EC "Easy Close" having full extension carburized steel ball bearing, rail mounting, 150 pound capacity heavy duty load rating, cold rolled steel slide members and ball retainers, cushioned in and outstops, detent-in, progressive action, positive stop, bright electro zinc plate finish.
5. Refuse Cabinets: Similar to Accuride 3600-201 having full extension carburized steel ball bearing, bottom mounting, 175 pound capacity heavy duty load rating, cold rolled steel slide members and ball retainers, cushioned in and outstops, progressive action, positive stop, bright electro zinc plate finish.
6. Accuride International, S.A. de C.V., Mexicali, B.C., C.P. 21395 Mexico.

L. Flipper Door Slides: For vertically mounted retracting cabinet doors up to 75 pounds and 72 inches tall, Model No. 1432, black color, with hinge carrier strip by Accuride, Inc.

M. Silencers: Provide rubber silencers on jamb and/or head and sill strike areas of all cabinet doors and drawers, 2 for paired doors, and 3 for single doors. Silencers shall be approximately 1/4-inch diameter, color compatible with adjacent finish.

N. Aluminum Slides for Sliding Glass Doors: Heavy duty track assembly consisting of upper guide, shoe-H bar, lower track and rollers; clear anodized finish:

1. No. D123A by C. R. Laurence Company, Inc.

O. Door and Drawer Locks: All cabinet doors and drawers shall be furnished with locks. Finish exposed portions of locks to match cabinet pull finish. Furnish 2 keys with each lock and key all locks inside one room alike and provide masterkey for all locks in Project.

1. Drawers: Provide one of the following lock assemblies:

a. Cam lock similar to Hafele 235.10.261, 1-3/16 inch cylinder length, chrome plated, with straight and offset cams; Hafele America, Co., Archdale, NC.
b. Cam lock similar to CompX Type 170 Thick Panel Lock x LP-700 lock plug, satin nickel finish, with surface-mounted strike plate SP-100; CompX Timberline, Neenah, WI.

2. Single Doors: Provide one of the following lock assemblies:

a. Latch lock similar to Olympus 998/999 Series x 999-Strike, chrome plated, sized to fit opening; Olympus Lock, Inc., Lynnwood, WA.
b. Deadbolt similar to CompX CB-281 cylinder body x LP-700 lock plug, satin nickel finish, with surface-mounted strike plate SP-100; CompX Timberline, Neenah, WI.

3. Pairs of Doors: Provide the following:

a. At inactive leaf, Furniture bolt similar to Hafele 252.02.644, polished chrome, with strike 251.60.703; Hafele America, Co.
b. At active leaf, provide Single Door lock assembly.

P. Grommets for Cable Passage through Countertops: 2-inch OD, to receive plastic laminate, metal grommets and matching metal caps with slot for wire passage.

1. Product: Subject to compliance with requirements, provide "EDP Flip-Top 2-1/2" hole series" by Doug Mockett and Co., Inc.

Q. Exposed Hardware Finishes: Unless otherwise specified above, or on the Drawings, all exposed portions of the woodwork hardware shall comply with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

R. Stainless Steel Trim: Custom fabricate stainless steel trim shapes to the sizes, shapes and profiles shown from the following materials. Provide in standard commercial tempers and hardness, as required for fabrication, strength and durability from Type 304 alloy. Form exposed work true to line and level, with flush surfaces and accurate angles. Ease exposed edges to a radius of approximately 1/32 inch radius, unless otherwise shown. Miter exposed corner joints and machine fit to a hairline joint. All sheet goods shall be provided finished one side only. Finish designation shown on the Drawings are NAAMM nomenclature.

1. Sheet and Plate: ASTM A 666.
2. Bar Stock: ASTM A 276.
3. Pipe: ASTM A 312, Grade TP 304.
4. Tubing: ASTM A 554, Grade MT 304.
5. Rosettes for Capping Brushed Stainless Steel Standoffs at Glass Tops: Custom fabricate rosettes from satin finished stainless steel materials. All fasteners shall be concealed. Fastener for joining rosette assemblies shall be of a type, design, and size as recommended by the glazier for the application shown and specified. Isolate glass from stainless steel using clear plastic cushions sized to fit under the rosettes.

    a. Gyford Standoff Systems.
    b. Forms & Surfaces.

S. Stainless Steel Trim Finish: Provide the following mechanical finish to the exposed surfaces of the fabricated work to the extent indicated (NAAMM nomenclature), with texture and reflectivity as required to match the Architect's sample.

1. No. 4 (bright directional polish).

T. Steel Reinforcing: Carbon steel shapes, tubes and plates complying with ASTM A 36 (shapes and plates), and ASTM A 500 or A 501 (for tubes).

1. Shop Primer for Concealed Steel Reinforcing: Provide fast curing, lead and chromate free, universal modified alkyd primer complying with performance requirements in FS TT-P-664.
2. Electrodes for Concealed Steel Reinforcing: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded.

U. Undercabinet Light Fixtures: Approximately 0.59 inch high by 1.38 inch wide surface mounted continuous undercabinet LED task light. Task lighting shall have end butted, fixture to fixture, ganging with concealed wiring. Provide each ganged section of light fixtures with a single dimmer switch that, when activated, will switch the entire ganged section of light fixtures to either "on" or "off", and also offers dimming from full capacity to 5 percent capacity.

1. Basis-of-Design Manufacturer and Fixture: Workrite Ergonomics Inc.; Ciglio 2 Series undercabinet lighting, (800) 959-9675. Other manufacturers will be considered subject to Architect's acceptance.

2. All light fixture components shall be UL Approved and Listed for the applications indicated. Provide 65W, 24V transformer to connect to 120 VAC electrical voltage. Provide NEC acceptable wiring, and conduits if required, from light fixtures complete with 3 prong connector for plugging into outlet strips or power receptacles.
3. Lamp Type and Wattage: Each fixture shall include evenly spaced LED lamps with a color temperature of 3100 degrees Kelvin and a CRI of 83; length as required to suit applications shown.

V. Door Hardware: At full sized doors, provide door hardware as scheduled under Section 087100 "Door Hardware."

W. Hanging (Zee Clip) Strips: Extruded aluminum zee type interlocking clips; type, size and quantity for the condition of use.

X. Brushed Aluminum Trim Shapes: Custom fabricate aluminum trim shapes to the sizes, shapes and profiles shown from the following materials. Provide in standard commercial tempers and hardness, as required for fabrication, strength and durability. Form exposed work true to line and level, with flush surfaces and accurate angles. Miter exposed corner joints and machine fit to a hairline joint. Finish designations are NAAMM nomenclature.

1. Plate: Alloy 5005 and ASTM B 209.
2. Bar Stock: ASTM B 211.
3. Extrusions: Alloy 6063 and ASTM B 221.
4. Aluminum Trim Finishes: Provide the following finishes to the exposed surfaces of the fabricated work to the extent indicated (NAAMM nomenclature), with texture and reflectivity as required to match the Architect's sample.

    a. Class II, Clear Anodic Finish: Complying with AA-M10M32A31 for an Architectural Class II, medium satin, clear natural anodized finish.

Y. Screws: Select material, type, size, and finish required for each use. Comply with ASME B18.6.1.

Z. Nails, Wire, Brads, and Staples: Select material, type, size, and finish required for each use.

1. ASTM F 1667 for driven fasteners such as nails, spikes and staples.
2. ASTM F 547 for nails used with wood and wood based products.

AA. Anchors: Select material, type, size, and finish required by each substrate for secure anchorage. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

BB. Blind Splines: Specialty devices, as required for tight butt joining, types and size as recommended by woodwork fabricator.

CC. Covercaps: Where mortises of fastener heads, or draw downs are exposed (blind holes) in finished work, provide black plastic covercaps.

2.4 FABRICATION, GENERAL

A. General: Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to the maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting. The width of scribe and filler panels shall not exceed 1/2 inch, or 1/2 inch clear dimension from adjacent wall to outside face of cabinet door in a 90 degree position, whichever is greater.

1. Interior Woodwork Grade: Custom complying with the referenced quality standard.

B. Fabricate woodwork to dimensions, profiles, and details indicated.

1. Reinforcing shown is minimum. Provide additional steel and lumber reinforcing as required to sustain imposed loads and to ensure a rigid assembly.
2. Exposed surfaces shall be free from dents, tool marks, warpage, buckle, glue and open joints, or other defects affecting serviceability or appearance. Accurately fit all joints, corners and miters. Conceal all fasteners. Make threaded connections up tight so that threads are entirely concealed.

C. Shop cut openings to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.
2. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.5 PLASTIC LAMINATE COUNTERTOPS

A. General: Comply with AWS Section 11 and as follows.

B. High-Pressure Decorative Laminate Grade: HGS.

C. Colors, Patterns, and Finishes: As indicated on the Drawings and in the Finish Schedule.

D. Edge Treatment: Same as laminate cladding on horizontal surfaces unless otherwise indicated.

E. Core Material at Sinks: Particleboard or exterior-grade plywood.

2.6 SOLID SURFACING COUNTERTOPS

A. General: Comply with AWS Section 11 and as follows.

B. Solid-Surfacing-Material Thickness: 1/2 inch.

C. Colors, Patterns, and Finishes: As indicated on the Drawings and in the Finish Schedule.

D. Factory fabricate components to achieve required shapes, sizes, and profiles shown, without cracks, spalling, pits, surface porosity, chipped areas, or blisters.

1. Form all tops in one piece lengths. Provide adhesively bonded backsplashes and aprons in heights indicated. Form edges to profiles shown. If required, use 2 sheets of countertop sheet material laminated together using manufacturer's standard adhesive to form edges. Laminated sections shall be in close contact throughout. Adhesive stains will not be permitted.
2. Provide separate 6 inch high end splashes.
3. Countertops shall be factory cored for plumbing fittings provided under Division 22 Plumbing or as indicated on the Drawings.

E. Radius corners and edges. Provide 1/8 inch radius.

F. Finish exposed surfaces by trimming and grinding smooth.

2.7 CLOSET AND UTILITY SHELVING

A. General: Comply with AWS Section 10 and as follows.

B. Shelf Material: Medium density fiberboard where indicated to be painted; medium density particle board where indicated for plastic laminate or melamine veneer.

C. Cleats: 3/4-inch solid lumber or thermoset decorative panel.

D. Finishes: As shown and scheduled on the Drawings.

2.8 SHOP FINISHING

A. Production finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Exposed Surfaces:

1. Plastic Laminate Finish: Gluing of plastic laminate surfacing materials shall be by the hot plate method, glued surfaces shall be in close contact throughout. Glue stains shall not be permitted.
2. Solid Surfacing Finish: As scheduled.

C. Unexposed Wood Finish: Shop-applied alkyd type primer-sealer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming before installation.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with requirements of the AWS for the same grade specified in this Section for type of woodwork involved.

1. Install woodwork level, plumb, true, with no distortions, and with no variations in flushness of adjoining surfaces. Shim as required with concealed shims.
2. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

B. Anchor woodwork to blocking built in or directly attached to substrates. Secure to blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

C. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets without sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches on center with No. 10 wafer-head screws sized for 1-inch penetration into wood blocking, or hanging strips or with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

D. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Caulk space between backsplash and wall with silicone sanitary sealant specified in Section 079200 "Joint Sealants."
2. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
3. Secure backsplashes to tops with concealed metal brackets at 16 inches on center and to walls with adhesive.

E. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips, by blind nailing on backup strips, splined connection strips, and associated trim and framing. Do not use face fastening, unless otherwise indicated. Space panels so that reveals are parallel and of widths indicated.

F. Built-In Desks and Credenzas: Install without distortion so that doors, and drawers, fit openings properly and are accurately aligned. Adjust hardware to center doors, and drawers, in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.

1. Anchor glass tops securely to supporting framing as indicated on the shop drawings.

G. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean woodwork on exposed and semiexposed surfaces. Touchup shop-applied finishes to restore damaged or soiled areas.

1. Anodized aluminum surfaces shall be cleaned with warm water and mild soaps such as those used for hands or dishes. Do NOT use cleaners that contain abrasives, acids or alkalis, as they will mar the surface. Do NOT clean metal face with solvents, paint thinner or adhesive remover. After washing, always wipe the surface completely dry with a soft, clean cloth. Stubborn stains may be removed with a thin, clean oil and dry cloth.
2. Man-made stone top surfaces shall be cleaned with soap and water followed with a clean water rinse.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer, that ensures that woodwork will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 070150.19 - PREPARATION FOR REROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of This Section Includes:

1. Partial roof tear-off.
2. Temporary roofing.
3. Roof re-cover preparation.

B. Related Requirements:

1. Section 011000 "Summary" for use of premises and for phasing requirements.
2. Section 015000 "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for reroofing preparation.

1.2 DEFINITIONS

A. Full Roof Tear-off: Removal of existing roofing system down to existing roof deck.

B. OSB: Oriented strand board.

C. Partial Roof Tear-off: Removal of selected components and accessories from existing roofing system.

D. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

E. Roof Re-Cover Preparation: Existing roofing system is to remain and be prepared for new roof installed over it.

F. EPDM: Ethylene Propylene Diene Terpolymer.

1.3 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting removal Work, conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing tear-off, including, but not limited to, the following:

    a. Reroofing preparation, including roofing system manufacturer's written instructions.
    b. Temporary protection requirements for existing roofing system components that are to remain.
    c. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
    d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
    e. Existing roof deck conditions requiring Architect notification.
    f. Existing roof deck removal procedures and Owner notifications.
    g. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
    h. Structural loading limitations of roof deck during reroofing.
    i. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
    j. HVAC shutdown and sealing of air intakes.
    k. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.
    l. Asbestos removal and discovery of asbestos-containing materials.
    m. Governing regulations and requirements for insurance and certificates if applicable.
    n. Existing conditions that may require Architect notification before proceeding.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Temporary Roofing Submittal: Product data and description of temporary roofing system.

1. If temporary roof remains in place, include surface preparation requirements needed to receive permanent roof, and submit a letter from roofing manufacturer stating acceptance of the temporary roof and that its inclusion does not adversely affect the new roofing system's resistance to fire and wind or specified special warranty.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1. Include certificate that Installer is approved by warrantor of existing roofing system.
2. Include certificate that Installer is licensed to perform asbestos abatement.

B. Field Test Reports: Fastener pull-out test report.

C. Photographs or Video: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations.

1. Submit before Work begins.

D. Landfill Records: Indicate receipt and acceptance of demolished roofing materials and hazardous wastes, such as asbestos-containing materials, by a landfill facility licensed to accept them.

1.6 CLOSEOUT SUBMITTALS

A. Certified statement stating that existing roof warranty has not been affected by Work performed under this Section.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Approved by warrantor of existing roofing system to work on existing roofing and licensed to perform asbestos abatement in the state or jurisdiction where Project is located.

B. Regulatory Requirements:

1. Comply with governing EPA notification regulations before beginning roofing removal.
2. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.8 FIELD CONDITIONS

A. Existing Roofing System: EPDM roofing.

B. Owner will occupy portions of building immediately below reroofing area.

1. Conduct reroofing so Owner's operations are not disrupted.
2. Provide Owner with not less than 72 hours' written notice of activities that may affect Owner's operations.
3. Coordinate work activities daily with Owner so Owner has adequate advance notice to place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
4. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area.

a. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.

C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.

D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

E. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

1. A roof moisture survey of existing roofing system is available for Contractor's reference.
2. The results of an analysis of test cores from existing roofing system are available for Contractor's reference.
3. Construction Drawings and Project Manual for existing roofing system are provided for Contractor's convenience and information, but they are not a warranty of existing conditions. They are intended to supplement rather than serve in lieu of Contractor's own investigations. Contractor is responsible for conclusions derived from existing documents.

F. Limit construction loads on existing roof areas to remain, and existing roof areas scheduled to be reroofed to loads per engineer for rooftop equipment wheel loads and for uniformly distributed loads.

G. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

1. Remove only as much roofing in one day as can be made watertight in the same day.

H. Hazardous Materials:

1. It is not expected that hazardous materials, such as asbestos-containing materials, will be encountered in the Work.

    a. Hazardous materials will be removed by Owner before start of the Work.
    b. Existing roof will be left no less watertight than before removal.

2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

    a. Hazardous materials will be removed by Owner under a separate contract.

3. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

    a. Hazardous material remediation is specified elsewhere in the Contract Documents.
    b. Do not disturb hazardous materials or items suspected of containing hazardous materials except according to procedures specified elsewhere in the Contract Documents.

c. Coordinate reroofing preparation with hazardous material remediation to prevent water from entering existing roofing system or building.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during reroofing, by methods and with materials so as not to void existing roofing system warranty issued by existing warranted roof system.

1. Notify warrantor before proceeding with the Work.
2. Notify warrantor of existing roofing system on completion of reroofing, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect.

a. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 TEMPORARY PROTECTION MATERIALS

A. EPS Insulation: ASTM C578.

B. Plywood: DOC PS 1, Grade CD, Exposure 1.

C. OSB: DOC PS 2, Exposure 1.

2.2 TEMPORARY ROOFING MATERIALS

A. Design and selection of materials for temporary roofing are Contractor's responsibilities.

B. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft..

C. Base Sheet: ASTM D4601/D4601M, Type II, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet.

D. Glass-Fiber Felts: ASTM D2178/D2178M, Type IV, asphalt-impregnated, glass-fiber felt.

E. Asphalt Primer: ASTM D41/D41M.

F. Roofing Asphalt: ASTM D312/D312M, Type III or IV.

G. Base Sheet Fasteners: Capped head, factory-coated steel fasteners, listed in FM Approvals' RoofNav.

2.3 INFILL AND REPLACEMENT MATERIALS

A. Use infill materials matching existing roofing system materials unless otherwise indicated.

2.4 AUXILIARY REROOFING MATERIALS

A. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing and new roofing system.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Protect existing roofing system that is not to be reroofed.
2. Loosely lay 1-inch- minimum thick, EPS insulation over existing roofing in areas not to be reroofed.

    a. Loosely lay 15/32-inch plywood or OSB panels over EPS. Extend EPS past edges of plywood or OSB panels a minimum of 1 inch.

3. Limit traffic and material storage to areas of existing roofing that have been protected.
4. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
5. Comply with requirements of existing roof system manufacturer's warranty requirements.

B. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.

C. Shut off rooftop utilities and service piping before beginning the Work.

D. Test existing roof drains to verify that they are not blocked or restricted.

1. Immediately notify Architect of any blockages or restrictions.

E. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work.

1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

F. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

G. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.

1. Prevent debris from entering or blocking roof drains and conductors.

a. Use roof-drain plugs specifically designed for this purpose.
b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

2. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding.

a. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

A. Notify Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.

B. Lower removed roofing materials to ground and onto lower roof levels, using dust-tight chutes or other acceptable means of removing materials from roof areas.

C. Remove aggregate ballast from roofing. Store aggregate ballast for reuse in manner not to exceed structural loading limitations of roof deck.

D. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing using a power broom.

E. Remove pavers and accessories from roofing.

1. Store and protect pavers and accessories for reuse in manner not to exceed structural loading limitations of roof deck.
2. Discard cracked pavers.

F. Remove ballast, protection mat, and EPS insulation from protected roofing membrane.

1. Discard EPS insulation that is damaged or exceeds 8 lb/cu. ft..
2. Store EPS insulation for reuse and protect it from physical damage.
3. Store ballast for reuse in manner not to exceed structural loading limitations of roof deck.

G. Partial Roof Tear-off: Where indicated on Drawings, remove existing roofing down to existing cover board and immediately check for presence of moisture.

1. Owner will engage a qualified testing agency to perform the following test:

    a. Coordinate with Owner's testing agency to schedule times for tests and inspections immediately after removal.

2. Survey exposed substrate that is to remain using infrared color thermography according to ASTM C1153.

    a. Prepare survey report of initial scan indicating locations of entrapped moisture, if any, and area calculations of locations of entrapped moisture.

3. Survey exposed substrate that is to remain using electrical capacitance/impedance testing according to ASTM D7954/D7954M.

    a. Prepare survey report indicating locations of entrapped moisture, if any, and area calculations of locations of entrapped moisture.

4. Survey exposed substrate that is to remain using nuclear hydrogen detection testing according to SPRI/RCI NT-1.

    a. Prepare survey report indicating locations of entrapped moisture, if any, and area calculations of locations of entrapped moisture.

5. Remove wet or damp materials below existing roofing and above deck as directed by Architect.

    a. Removal is paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

6. Inspect wood blocking, curbs, and nailers for deterioration and damage.

    a. If wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.
    b. Removal is paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

7. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry.

    a. Remove unadhered bitumen, unadhered felts, and wet felts.

8. Remove excess asphalt from steel deck that is exposed by removal of wet or damp materials.

    a. A maximum of 15 lb/100 sq. ft. of asphalt is permitted to remain on steel decks.

9. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

A. Inspect deck after tear-off of roofing system.

B. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Architect.

1. Do not proceed with installation until directed by Architect.

C. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect.

1. Do not proceed with installation until directed by Architect.

D. Provide additional deck securement as indicated on Drawings.

E. Replace steel deck as indicated on Drawings.

F. Replace steel deck as directed by Architect.

1. Deck replacement will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

G. Prepare and paint steel deck surface.

1. Painting and preparation for painting is specified in Section 099113 "Exterior Painting."

H. Replace plywood roof sheathing as indicated on Drawings.

I. Replace plywood roof sheathing as directed by Architect.

1. Roof sheathing replacement will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

3.4 INFILL MATERIALS INSTALLATION

A. Immediately after roof tear-off, and inspection and repair, if needed, of deck, fill in tear-off areas to match existing roofing system construction.

1. Installation of infill materials is specified in Section 075323 "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing."
2. Installation of wood blocking, curbs, and nailers is specified in Section 061000 "Rough Carpentry."

B. Install new roofing patch over roof infill area.

1. If new roofing is installed the same day tear-off is made, roofing patch is not required.

3.5 TEMPORARY ROOFING

A. Install approved temporary roofing over area to be reroofed.

B. Install temporary roofing over area to be reroofed.

1. Mechanically fasten base sheet and install a glass-fiber felt, lapping each sheet 19 inches over preceding sheet.
2. Embed glass-fiber felt in a solid mopping of hot roofing asphalt applied within equiviscous temperature range.
3. Glaze-coat completed surface with hot roofing asphalt.

C. Remove temporary roofing before installing new roofing.

D. Prepare temporary roof to receive new roofing by patching and repairing temporary roofing.

1. Restore temporary roofing to watertight condition.
2. Obtain approval for temporary roof substrate from roofing manufacturer and Architect before installing new roof.

3.6 ROOF RE-COVER PREPARATION

A. Remove blisters, ridges, buckles, mechanically attached roofing fastener buttons projecting above roofing, and other substrate irregularities from existing roofing that inhibit new recover boards from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Scarify surface of sprayed polyurethane foam as necessary to achieve a sufficiently uniform plane to receive new recover boards.
3. Broom clean existing substrate.
4. Coordinate with Owner's inspector to schedule times for tests and inspections.
5. Verify that existing substrate is dry.

    a. Spot check substrates with an electrical capacitance moisture-detection meter.

6. Remove materials that are wet or damp.

    a. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

B. Remove blisters, ridges, buckles, mechanically attached roofing fastener buttons projecting above roofing, and other substrate irregularities from existing roofing that inhibit new roofing from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Shave surface of sprayed polyurethane foam as necessary to achieve a sufficiently uniform plane to receive new roofing.
3. Broom clean existing substrate.
4. Coordinate with Owner's inspector to schedule times for tests and inspections.
5. Verify that existing substrate is dry before proceeding with installation.

    a. Spot check substrates with an electrical capacitance moisture-detection meter.

6. Remove materials that are wet and damp.

    a. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

C. Remove blisters and areas of roofing not fully adhered.

D. Remove mechanically attached roofing fastener buttons projecting above roofing and othersubstrate irregularities that inhibit new recover boards from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Clean substrate of contaminants, such as dirt, debris, oil, and grease, that can affect adhesion of coated foamed roofing.
3. Power vacuum the existing roof surface.

    a. If recommended by foam manufacturer, prime dried surface at recommended rate with recommended primer.

4. Scarify surface of coated polyurethane roofing as necessary to achieve a suitable substrate for new roofing.
5. Provide additional uplift securement for existing roofing system with new screws and plates applied to each roof zone.

6. Verify that surface is dry by pressing litmus paper to surface areas most likely to retain moisture, such as shaded areas and low spots.

    a. If paper changes color, surface is too wet to apply foam.

7. Build up isolated low spots on existing roofing with sprayed foam specified in Section 075700 "Coated Foamed Roofing" to prevent ponding.

3.7 BASE FLASHING REMOVAL

A. Remove existing base flashings.

1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.

B. Do not damage metal counterflashings that are to remain.

1. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish as existing.

C. Inspect parapet sheathing, wood blocking, curbs, and nailers for deterioration and damage.

1. If parapet sheathing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

D. Remove existing parapet sheathing and replace with new parapet sheathing to comply with Section 061600 "Sheathing."

1. If parapet framing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

E. When directed by Architect, replace parapet framing, wood blocking, curbs, and nailers to comply with Section 061000 "Rough Carpentry."

3.8 FASTENER PULL-OUT TESTING

A. Retain independent testing and inspecting agency to conduct fastener pull-out tests according to SPRI FX-1, and submit test report to Architect and roofing manufacturer before installing new roofing system.

1. Obtain roofing manufacturer's approval to proceed with specified fastening pattern.

a. Roofing manufacturer may furnish revised fastening pattern commensurate with pull-out test results.

3.9 DISPOSAL

A. Collect demolished materials and place in containers.

1. Promptly dispose of demolished materials.
2. Do not allow demolished materials to accumulate on-site.
3. Storage or sale of demolished items or materials on-site is not permitted.

B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION

SECTION 078100 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cementitious sprayed fire-resistive materials.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Submit shop drawings showing extent of sprayed fire-resistive material for each construction and fire-resistance rating, applicable fire-resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction, and minimum thicknesses.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product type in this Section:

    a. Cementitious Sprayed Fire-Resistive Material.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Test Reports: Submit reports of required testing.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as having the necessary experience staff, and training to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its sprayed fire-resistive materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.

B. Fire-Test-Response Characteristics: Where indicated, provide products identical to those tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."
2. Identify products with appropriate markings of applicable testing and inspecting agency.

C. Pre-Installation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Contractor, installer and independent testing agency shall attend a pre-installation conference to review the substrates for acceptability, method of application, applied thicknesses, and testing and inspection procedures.

D. Regulatory Requirements: Conform to the applicable building code requirements of the authorities having jurisdiction. Products, execution, and the thickness spray fire resistive materials shall conform to the applicable code requirements for the required fire resistance ratings.

1. UL Degree of Restraint: Unrestrained.

1.5 FIELD CONDITIONS

A. Ventilation: Ventilate spaces during and after application of sprayed fire-resistive material. Provide a minimum of 4 air changes per hour until fire resistive material cures by the following:

1. Using natural means.
2. When natural means are inadequate, provide forced-air circulation at a rate of 4 air exchanges per hour.

B. Sequence and coordinate application of sprayed fire-resistive materials with related work.

1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
2. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.

3. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
4. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, tested and corrections have been made to defective applications.

1.6 WARRANTY

A. Special Warranty: Submit a written warranty, signed by Contractor and by Installer, agreeing to repair or replace sprayed fire-resistive materials that fail in materials or workmanship within two years from date of Substantial Completion. Failures include, but are not limited to, the following:

1. Failures include, but are not limited to, cracking, flaking, or eroding by air or weather, in excess of specified requirements; peeling; and delaminating of sprayed fire-resistive materials from substrates due to defective materials and workmanship.
2. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. VOC Content: For field applications, coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Primers, Sealers, and Undercoaters: 100 g/L.

B. Cement shall be made with recycled products and comply with the following standards:
1. Portland cement shall meet ASTM C 150.
2. Blended hydraulic cement shall meet ASTM C 595.
3. Other Hydraulic Cements shall meet ASTM C 1157.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. General: Provide manufacturer's standard products complying with requirements indicated for material composition and physical properties representative of installed products.

B. Subject to compliance with requirements, provide products by one of the following:

1. Cementitious (Gypsum) Sprayed Fire-Resistive Material for interior locations, concealed conditions, for buildings up to 420 feet tall:

    a. GCP Applied Technologies (Grace, W. R. & Co., Construction Products Div.); Monokote Type MK-10/HB.
    b. Isolatek International Corp., Cafco Products; Cafco 300 HS.
    c. Carboline Company; Southwest Type 5MD.

C. Material Composition: Cementitious sprayed fire-resistive material consisting of factory-mixed, dry formulation of gypsum or portland cement binders and lightweight, asbestos free, mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.

D. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:

1. Dry Density: 15 lbs./cu. ft. typically, and for buildings greater than 420 feet tall, provide 18 lbs./cu. ft., for average and individual densities regardless of density indicated in referenced fire-resistance design, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605/E 605M.
2. Thickness: Provide minimum average thickness required for each fire-resistance design indicated according to ASTM E 605/E 605M.
3. Bond Strength: [430 lbf/sq. ft.] [1000 lbf/sq. ft.] minimum per ASTM E 736/E 736M:

    a. If surfaces of structural steel receiving sprayed fire-resistive material are primed or otherwise painted for coating materials, perform series of bond tests specified in UL's "Fire Resistance Directory." Provide bond strength indicated in referenced UL fire-resistance criteria.

4. Air Erosion: Maximum weight loss of 0.001 g/sq. ft. in 24 hours per ASTM E 859.
5. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

    a. Flame-Spread Index: 10 or less.
    b. Smoke-Developed Index: 0.

6. Fungal Resistance: No observed growth on specimens for a minimum of 28 days per ASTM G 21.

2.3 AUXILIARY FIRE-RESISTIVE MATERIALS

A. General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire-resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of sprayed fire-resistive material.

C. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistance designs indicated and fire-resistive material manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.

D. Water: Potable. Provide water with sufficient pressure and volume to meet the fireproofing application schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates, areas, and conditions, with Installer and representative of the testing laboratory present, to determine whether they are in satisfactory condition to receive sprayed fire-resistive material and to verify the following:

1. Substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fire-resistive materials with substrates under conditions of normal use or fire exposure.
2. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.

B. Prior to application of fireproofing to steel beams and decks, verify that placement of concrete fill on floor and roof decks has been completed.

C. Do not proceed with installation of fire resistive materials until unsatisfactory conditions have been corrected.

D. Clean substrates of substances that could impair bond of fire-resistive material, including dirt, oil, grease, release agents, rolling compounds, loose mill scale, and incompatible primers, paints, and other foreign substances which may impair proper adhesion of fireproofing to substrate.

E. Metal Lathing: Where required by rated assembly and bond, install metal lath, as required, to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer. Attach lathing accessories where indicated or required for secure attachment to substrate.

F. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.

G. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

H. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by sprayed fire-resistive material manufacturer, install body of fire-resistive covering in a single course.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to verify the adequacy of the Contractor's quality control of the sprayed-fire resistive materials work.

1. The independent testing and inspection agency will promptly submit weekly test results to the Contractor and Architect in the form required under ASTM E 605/E 605M and E 736. The reports shall clearly indicate the location of each test, the test result at that location, and whether or not the tested fire resistive materials at each test location complies with the Contract Documents.

B. Testing and Inspection: Testing and inspection of completed applications of sprayed fire-resistive material shall be conducted as the work progresses. Each thickness, density and bond strength test location shall be selected at random by the testing and inspection agency. Do not proceed with application of sprayed fire-resistive material for the next area until test results for previously completed applications of sprayed fire-resistive material show compliance with requirements.

1. Testing and inspection of the sprayed fire resistive material shall comply with the statutory requirements of New York City Special Inspections Program for Spray-On Fireproofing and for the requirements of the component materials and installation.
2. Visual Inspection:

a. Prior to Application: Visually inspect all surfaces intended to receive sprayed fire resistive materials prior to its installation for conformance with the requirements of the Contract Documents.

b. After Application: Visually inspect all surfaces that received sprayed fire resistive materials, including patched areas, for conformance with the requirements of the Contract Documents. Cracks in the fireproofing which expose the fireproofed substrate will not be permitted.
c. Final Inspection: After the work of adjacent trades has been completed, but before sprayed structural elements are enclosed, conduct a final visual inspection of sprayed-fire resistive materials work.

3. Thickness Testing:

a. Thickness for Floor and Roof Deck Assemblies: For each 1000 sq. ft. area, or partial area, on each floor, make four random tests for thickness per ASTM E 605/E 605M. Thickness measurements shall be selected from a square area 12 inches by 12 inches in size. For fluted decks a minimum of four measurements shall be made, located symmetrically within the square area including one each of the following: valley, crest and sides. The average of the measurements shall be reported.
b. Thickness for Beams, Girders, Joists, Trusses and Columns: One test for beams, girders, joists or trusses, and one test for columns, per 25 percent of structural members per floor per ASTM E 605/E 605M.

1) At beams and girders thickness measurements shall be made at nine locations around the beam or girder at each end of a 12 inch length.
2) At joists and trusses, thickness measurements shall be made at seven locations around the joist or truss at each end of a 12 inch length.
3) At wide flange columns, thickness measurements shall be made at twelve locations around the column at each end of a 12 inch length.
4) At hollow structural section and pipe columns, thickness measurements shall be made at a minimum of four locations around the column at each end of a 12 inch length.

4. Density Testing: For each 2,500 sq. ft. area, or partial area, on each floor, test one protected beam, one protected girder, one protected truss, one protected column, and one protected deck surface per ASTM E 605/E 605M.
5. Cohesion-Adhesion (Bond Strength) Testing: For each 2,500 sq. ft. area, or partial area, on each floor, test one protected beam, one protected girder, one protected truss, one protected column, and one protected deck surface, for cohesion and adhesion per ASTM E 736/E 736M.
6. Compatibility and Adhesion Testing: Test primers and other coatings which have been applied to surfaces which are to be protected by sprayed firm resistive materials to confirm that they are compatible with, and can be adhered to by, sprayed fire-resistive material. Determine compatibility and adhesion according to the following requirements:

a. Testing for bond per ASTM E 736/E 736M and requirements in UL's "Fire Resistance Directory" for coating materials. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.

b. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers or coatings to be incompatible with, or incapable of being adhered to by, sprayed fire-resistive material.

7. Where testing and inspection reveals applications of sprayed fire-resistive material are not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.

C. Apply additional sprayed fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.

D. Remove and replace, at Contractor's expense, including costs of delays to the work caused by removal and replacement, sprayed fire-resistive material where test results indicate that they do not comply with specified requirements for both cohesion and adhesion and for density.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3 CLEANING, PROTECTING, AND REPAIR

A. Cleaning: Immediately after completing spraying operations in each confinable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces.

B. Cure exposed cementitious-sprayed fire-resistive material according to product manufacturers' written recommendations to prevent premature drying.

C. Protect sprayed fire-resistive material, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at time of Substantial Completion.

D. Coordinate application of sprayed fire-resistive material with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect sprayed fire-resistive material and patch any damaged or removed areas prior to covering by other construction.

END OF SECTION

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:

1. Floors.
2. Roofs.
3. Walls and partitions.
4. Smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of through penetration firestop system product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Through-Penetration Firestopping Schedule: Submit a Through-Penetration Firestopping Schedule indicating the type of through-penetration firestop system to be installed for each penetration. Indicate each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of testing and inspection agency acceptable to the authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

    a. Engineering judgment shall include both project name and contractor's name who will install firestop system as described in document

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.
2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified or licensed, by firestop system manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its firestop system materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.

1. The installer must have no less than 3 years of experience with fire stop installation.

B. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1. The installer must have no less than 3 years of experience with fire stop installation.

C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Architect, Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

    a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

        1) UL in its "Fire Resistance Directory."
        2) Intertek Group in its "Directory of Listed Building Products."

3) FM Approval in its "Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

1. Sealant shall have a VOC content of 250 g/L or less.

F. Provide non-hardening resilient firestop material at penetrations, sleeves and passthroughs in acoustic construction assemblies.

1. Acceptable Products:

a. Specified Technologies, Inc.; Elastomeric Sealant ES100
b. Johns Manville; Firetemp CI Caulk.
c. 3M; Fire Barrier 2001 Silicone RTV Foam.
d. Hilti; Flexible Firestop Sealant CP 606.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

K. Gypsum Products: The use of gypsum products for through-penetration firestopping is strictly prohibited.

2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without damaging substrate or disturbing firestop system's seal with substrates.

3.3 INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and installations comply with requirements.

3.5 IDENTIFICATION

A. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

B. Identify fire-resistance-rated construction (including walls, shaft enclosures, partitions, and smoke barriers) with signs or stenciling permanently installed above suspended ceilings, below accessible flooring assemblies, attic spaces, or in other concealed spaces. The lettering shall be 3 inches in height and spaced 12 feet (3658 mm) on center:

1. The words ____-HOUR FIRE AND/OR SMOKE BARRIER WALL - PROTECT ALL PENETRATIONS."

a. Replace blank with actual fire-resistance rating.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire-resistive joint systems for the following:

1. Floor-to-floor joints.
2. Floor-to-wall joints.
3. Head-of-wall joints.
4. Bottom of wall joints.
5. Wall-to-wall joints.
6. Joints at exterior curtain-wall/floor intersections.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Fire-resistive Joint Systems Schedule: Submit a Fire-resistive Joint Systems Schedule indicating the types of fire resistive joint system to be installed and the relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular fire-resistive joint system, submit illustration, with modifications marked, approved by the fire resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

    a. Engineering judgment shall include both project name and contractor's name who will install fire-resistive joint system as described in document.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.
2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Product Certificates: Signed by manufacturers of fire resistive joint system products certifying that products furnished comply with requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified or licensed by the fire resistive joint system manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its fire resistive joint system materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.

1. The installer must have no less than 3 years of experience with fire resistive joint system installation.

B. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet.

B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide fire resistive joint systems in acoustic and fire rated fire resistive joint assemblies.

1. Specified Technologies, Inc. Elastomeric Sealant ES100.
2. Johns Manville Firetemp CI Caulk.
3. 3M Fire Barrier 2001 Silicone RTV Foam.
4. Hilti FS One Max.
5. Sika; Sikacryl - 620 Fire.
6. Master Building Solutions; MasterFlame JS110.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

    a. Joint firestopping systems shall bear classification marking of a qualified testing agency.

        1) UL in its "Fire Resistance Directory."
        2) Intertek Group in its "Directory of Listed Building Products."

2.3 JOINT FIRESTOPPING

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Gypsum Products: The use of gypsum products for joint firestopping is strictly prohibited.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.

1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E 2307.

1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

D. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.

1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1. Sealant shall have a VOC content of 250 g/L or less.

2.4 FILL MATERIALS

A. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

C. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

D. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of Work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.3 INSTALLATION

A. General: Install joint firestopping systems to comply with Part 2 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or joint firestopping system is damaged or removed because of testing, repair or replace joint firestopping system to comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and inspecting agency has approved installed fire-resistive joint systems.

3.5 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each joint sealant product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Samples: Submit samples for each exposed joint sealant product indicated.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers. Store and handle materials in compliance with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: Not more than 250 g/L.
2. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
3. Sealant Primers for Porous Substrates: Not more than 775 g/L.

B. Colors: For fully concealed joints, provide the manufacturer's standard color of sealant which has the best overall performance characteristics for the application shown. For exposed joints, the Architect will select colors from the manufacturer's standard colors.

2.2 JOINT SEALANTS

A. Butt Glazing Sealant: Comply with ASTM C 920, Type S, Grade NS, Class 50; use NT, G, and A, black color unless otherwise indicated.

1. Products and Manufacturers: Provide one of the following:

a. DOWSIL 795; Dow Chemical Company.
b. Spectrem 2; Tremco, an RPM Co.
c. Silpruf SCS 2000; Momentive.
d. Sika, Sikasil WS 295.

B. Sealants for Contact with Food: Comply with 21 CFR 177.2600, NSF Standard 51 or USDA for use in meat and poultry processing plants, and ASTM C 920 for Type S, Grade NS, Class 25, Use NT.

1. Dow Chemical Company; 786 Silicone Sealant.
2. Pecora Corporation; 898 NST Sanitary Mildew Resistant Sealant.

C. Mildew-Resistant Silicone Sealant (use for joints at plumbing fixtures, toilet room countertops and vanities): Complying with ASTM C 920, Type S (single component), Grade NS (non-sag), class 25, Use NT (non-traffic), Substrate uses G, A, and O; and containing a fungicide for mildew resistance; white color.

1. Products: Provide one of the following:

a. Dow Chemical Company; 786 Silicone Sealant.
b. Momentive; Sanitary SCS 1700.
c. Pecora Corporation; 898 NST Sanitary Mildew Resistant Sealant.
d. Tremco, an RPM Co.; Tremsil 200 Sanitary.

D. Two-Part Polyurethane Sealant for Paving Applications:

1. For Paving Applications with Slopes not Exceeding 5% (Self Leveling): ASTM C 920, Type M, Grade P, Class 25; use T (except with a Shore A hardness of 35 or greater) and I (Class 1 or 2) for water immersion; and abrasion resistant; one of the following:

a. Pecora Corporation; Urexpan NR-200.
b. Tremco, an RPM Co.; Vulkem, 445SSL.
c. Sika; Sikaflex 2c SL.

E. Latex Sealant: Complying with ASTM C 834, Type OP (opaque sealants):

1. Products: Provide one of the following:

a. Pecora Corporation; AC-20 + Silicone.

b. DAP Products Inc.; Alex Plus Acrylic Latex Caulk Plus Silicone.
c. MBCC Group Master Builders Solutions (formally BASF); MasterSeal NP 520.
d. Tremco, an RPM Co.; Tremflex 834.

2.3 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: One of the following preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding backings of flexible plastic foam complying with ASTM C 1330, and of type indicated below. Select shape and density of cylindrical sealant backings in consultation with the manufacturer for proper performance in specific condition of use in each case.

1. Type C: Closed-cell polyethylene foam material with a surface skin, which is nonabsorbent to liquid water and gas, non-outgassing in unruptured state; one of the following:

a. HBR Closed Cell Backer Rod; Nomaco, Inc.
b. MasterSeal 920; BASF Master Builders.
c. Mile High Foam, Backer Rod Mfg., Inc.

2.4 MISCELLANEOUS MATERIALS

A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

B. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and which will not stain nor mar the finish of surfaces adjacent to joints to which it is applied.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with the recommendations of joint sealant manufacturer and the following requirements:

1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), existing joint sealants, oil, grease, water, and surface dirt.
2. Clean concrete, masonry, unglazed surfaces of tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean metal, glass, porcelain enamel, glazed surfaces of tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

C. Installation of Sealant Backings: Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

D. Installation of Sealants: Install sealants so they directly contact and fully wet joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform, concave shaped beads, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint.

F. Cleaning: Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.2 JOINT SEALANT SCHEDULE

A. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

1. Control and Expansion Joints on Exposed Interior Surfaces of Exterior Walls: Latex sealant.
2. Perimeter Joints of Exterior Openings Where Indicated: Latex sealant.
3. Vertical Control and Expansion Joints in Stone and Tile Surfaces: Latex sealant.
4. Horizontal Control and Expansion Joints in Stone and Tile Flooring Surfaces: Two-Part Polyurethane Sealant for Paving Applications.

5. Vertical Control Joints on Exposed Surfaces of Interior Unit Masonry and Concrete Walls and Partitions: Latex sealant.
6. Joints on Underside of Precast Beams and Planks: Latex sealant.
7. Perimeter Joints between Interior Wall Surfaces and Frames of Interior Doors, Windows, and Elevator Entrances: Latex sealant.
8. Perimeter Joints between Scalloped, Bent, or Warped Interior Wallboard Surfaces and Straight Trim: Latex Sealant.
9. Joints between Plumbing Fixtures and Adjoining Walls, Floors, and Counters: Mildew resistant silicone sealant.
10. Joints between Glass, and between Glass and Adjacent Substrates: Butt glazing sealant.

END OF SECTION

SECTION 079219 - ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical joint sealants.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for elastomeric, latex, and butyl-rubber-based joint sealants for nonacoustical applications.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Acoustical joint sealants.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants, showing full range of available colors for each product exposed to view.

C. Samples for Verification: For each type and color of acoustical joint sealant required.

1. Size: 1/2-inch- wide sealant joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Acoustical Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

E. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.3 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Product Test Reports: For each type of acoustical joint sealant, for tests performed by qualified testing agency.

B. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Manufacturers' special warranties.
2. Installer's special warranties.

1.5 WARRANTY

A. Installer's Special Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Manufacturer's Special Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: <**Two**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACOUSTICAL JOINT SEALANTS

A. Acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies in accordance with ASTM E90.

1. Sealant shall have a VOC content of 250 g/L or less.

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Accumetric LLC.
    b. DAP Products Inc.
    c. Everkem Diversified Products, Inc.
    d. Franklin International.
    e. GE Construction Sealants; Momentive Performance Materials Inc.
    f. Grabber Construction Products, Inc.
    g. Hilti, Inc.
    h. OSI Sealants; Henkel Corporation.
    i. Pecora Corporation.
    j. Specified Technologies, Inc.

2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.

C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. OSI Sealants; Henkel Corporation.
    b. Pecora Corporation.
    c. Tremco Incorporated.
    d. USG Corporation.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by acoustical joint-sealant manufacturer where required for adhesion of sealant to joint substrates.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where recommended by acoustical joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written instructions for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Hollow metal doors and frames.
2. The integration of a security system into the hollow metal door and frame work is required. The Contractor shall be responsible for the total and complete coordination of the security system components into the Work.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each product indicated. Include material descriptions, core descriptions, label compliance, sound and fire-resistance ratings, and finishes for each type of door and frame specified.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Submit door and frame schedule using same reference designations indicated on Drawings. Include opening size(s), handing of doors, frame throat dimensions, details of each frame type, elevations of door design types, details of construction, location and installation requirements of door hardware and reinforcements, hardware group numbers, details of joints and connections, fire label requirements including fire rating time duration, maximum temperature rise requirements, and smoke label requirements.

1. Indicate routing of electrical conduit and dimensions and locations of cutouts in doors and frames to accept electric hardware devices.

D. Construction Samples: Submit approximately 18 by 24 inches construction samples representing the required construction of doors and frames for Project.

1. Doors: Show vertical-edge, top, and bottom construction; insulation; face stiffeners; and hinge and other applied hardware reinforcement. Include glazing stops if applicable.
2. Welded Frames: Show profile, welded corner joint, welded hinge reinforcement, dust-cover boxes, floor and wall anchors, stops, and silencers. Include glazing stops if applicable.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product types in this Section:

    a. Full-Glazed Stile and Rail Doors.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Certificate of Compliance for Fire Rated Doors: Provide copies of Certificate of Compliance for all fire rated door assemblies, all smoke and draft control door assemblies, and all temperature rise rated door assemblies.

C. Oversize Construction Certification: For door assemblies required to be fire rated and exceeding limitations of labeled assemblies, submit certification of a testing agency acceptable to authorities having jurisdiction that each door and frame assembly has been constructed to comply with design, materials, and construction equivalent to requirements for labeled construction.

1.4 QUALITY ASSURANCE

A. Hollow Metal Door and Frame Standard: Comply with the applicable provisions and recommendations of the following publications by Hollow Metal Manufacturers Association (HMMA) Div. of National Association of Architectural Metal Manufacturers (NAAMM), unless more stringent requirements are indicated in the Contract Documents:

1. HMMA "Hollow Metal Manual."
2. HMMA 861 "Guide Specifications for Commercial Hollow Metal Doors and Frames."

B. Manufacturer Qualifications: A firm experienced in manufacturing hollow metal doors and frames similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Interior Hollow Metal Doors.
2. Welded Frames.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palleted, wrapped, or crated to provide protection during transit and Project site storage.

B. Inspect doors and frames, on delivery, for damage. Tool marks, rust, blemishes, and other damage on exposed surfaces will not be acceptable. Remove and replace damaged items as directed by Architect. Store doors and frames at building site in a dry location, off the ground, and in such a manner as to prevent deterioration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 or UL 10C "Standard for Positive Pressure Fire Tests of Door Assemblies." Fire classification labels at all doors with fire ratings greater than 20 minutes shall indicate the temperature rise developed on the unexposed surface of the door after the first 30 minutes of fire exposure.

1. Provide metal labels permanently fastened on each door which is within the size limitations established by the labeling authority having jurisdiction.
2. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.
3. Positive Pressure Rated Door Assemblies: Where indicated provide positive pressure rated fire rated door assemblies. Sizes and configurations as shown on the drawings. Installed door assemblies shall be in accordance with door manufacturer's certified assemblies.

    a. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

B. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257 or UL 9.

C. Smoke-Control Door Assemblies: Provide assemblies with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide doors and frames by one of the following:

1. Hollow Metal Doors and Frames:

    a. Ceco Door Products; an Assa Abloy Group Company.
    b. Curries Company; an Assa Abloy Group Company.
    c. Steelcraft; an Allegion PLC Company.

2.3 MATERIALS

A. Specified Gage Thickness: All specified gauge thicknesses are manufacturer's standard gauge.

B. Hot-Rolled Steel Sheets: ASTM A 1011/A 1011M, CS (commercial steel), Type B, free of scale, pitting, or surface defects; pickled and oiled.

C. Cold-Rolled Steel Sheets: ASTM A 1008/A 1008M, CS (commercial steel), Type B; free from scale, pitting, coil breaks, surface blemishes, buckles, waves, or other defects, exposed (matte) dull finish, suitable for exposed applications.

D. Inserts, Bolts, and Fasteners: Galvanized steel.

1. Expansion Bolts and Shields: FS FF-S-325, Group III, Type 1 or 2.
2. Machine Screws: FS FF-S-92, carbon steel, Type III cross recessed, design I or II recess, style 2C flat head.

E. Filler: Sound deadening and heat retarding mineral fiber insulating material.

F. Glass and Glazing: Refer to Section 088000 "Glazing."

2.4 DOORS

A. General: Provide flush-design doors, 1-3/4 inches thick, of seamless hollow construction, unless otherwise indicated. Construct doors with sheets joined at their vertical edges by continuous welding the full height of the door, or joined at vertical edges by 1 inch spot welds 6 inches on center, or intermittently welded seams. Voids between spot and intermediate welds shall be epoxy edge filled. Grind and finish all welds and edge fills flush to result in invisible seams on the door faces or vertical door edges.

1. Visible joints or seams around glazed panel inserts are permitted.
2. For single-acting swing doors, bevel both vertical edges 1/8 inch in 2 inches.
3. For double-acting swing doors, round vertical edges with 2-1/8 inch radius.

B. Interior Door Core Construction: Doors shall be stiffened by continuous vertically formed steel sections which, upon assembly, shall span the full thickness of the interior space between door faces. These stiffeners shall be 20 gauge not more than 6 inches apart and spot welded to face sheets a maximum of 5 inches o.c. Place filler between stiffeners for full height of door.

C. Fire Door Cores: A continuous mineral fiberboard core permanently bonded to the inside face of the outer face sheet unless otherwise required to provide fire-protection and temperature-rise ratings indicated.

D. Astragals: As required by NFPA 80 to provide fire ratings indicated.

E. Top and Bottom Channels: Spot weld metal channels, having a thickness of not less than thickness of face sheet, not more than 6 inches on center to face sheets.

1. Reinforce tops and bottoms of doors with inverted horizontal channels of same material as face sheet so flanges of channels are even with bottom and top edges of face sheets.

F. Hardware Reinforcement: Fabricate reinforcing from the same material as door to comply with the following. Offset reinforcement so that faces of mortised hardware items are flush with door surfaces.

1. Hinges and Pivots: 7 gage thick by 1-1/2 incheswide by 9 inches.
2. Lock Front, Strike, and Flushbolt Reinforcements: 12 gage thick by size as required by hardware manufacturer.
3. Lock Reinforcement Units: 14 gage thick by size as required by hardware manufacturer.
4. Closer Reinforcements: 12 gage thick one piece channel by size as required by hardware manufacturer.
5. Other Hardware Reinforcements: As required for adequate strength and anchorage.
6. In lieu of reinforcement specified, hardware manufacturer's recommended reinforcing units may be used.
7. Exit Device Reinforcements: 12 gauge thick by 10 inches high by 4 inches wide centered on exit device case body, unless otherwise recommended by exit device manufacturer.

G. Electrical Requirements: Make provisions for installation of electrical items specified elsewhere; arrange so wiring can be readily removed and replaced.

1. Provide all cutouts and reinforcements required for hollow metal doors to accept security system components.
2. Doors with Electric Hinges and Pivots: Provide with metal conduit or raceway to permit wiring from electric hinge or pivot to other electric door hardware.

a. Hinge Location: Center for doors less than 90 inches tall or second hinge from door bottom for doors greater than 90 inches; top or bottom electric hinge locations shall not be permitted.

H. Interior Hollow Metal Doors:

1. Typical Interior Doors: Flush design with 16 gauge thick cold-rolled stretcher-leveled steel face sheets and other metal components from hot- or cold-rolled steel sheets.
2. Extra Heavy Use Doors: Flush design with 14 gage thick cold-rolled, stretcher-leveled steel face sheets and other metal components from hot- or cold-rolled steel sheets. Provide only where indicated.

2.5 FULL GLAZED STILE AND RAIL DOORS

A. Form doors with stiles and rails of continuous steel channels, fabricated from not lighter than 16 gage thick cold rolled steel, welded together to form a rigid tubular frame. Door corners shall be mitered and butted. Mitered joints shall be internally reinforced, welded, and ground smooth such that no miter joints appear on the door faces. Intermediate rails shall be butted and internally welded to door stiles. Continuously weld all joints for the full height of the door, with no visible seams on their faces, horizontal, or vertical edges, and all welds ground and finished flush.

2.6 WELDED FRAMES

A. Fabricate hollow metal frames, formed to profiles indicated, with full 5/8 inch stops, and of the following minimum thicknesses.

1. For interior use, form frames from cold-rolled steel sheet of the following thicknesses:

a. Openings up to and including 48 Inches Wide: 16 gage.
b. Openings more than 48 Inches Wide: 14 gage.

2. Frame heads at all masonry openings shall be formed to extend to the lowest CMU horizontal mortar joint.

B. Provide frames either saw mitered and full (continuously) profile welded, or machine mitered and full (continuously) profile welded, on back side at frame corners and stops with edges straight and true. Grind welds smooth and flush on exposed surfaces.

C. Hardware Reinforcement: Fabricate reinforcements from same material as frame to comply with the following. Offset reinforcement so that faces of mortised hardware items are flush with surface of the frame.

1. Hinges and Pivots: 7 gage thick by 1-1/4 inches wide by 10 inches.
2. Strike, Surface Mounted Hold Open Arms, and Flushbolt Reinforcements: 12 gage thick by size as required by hardware manufacturer.
3. Closer Reinforcements: 12 gage thick one piece channel by size as required by hardware manufacturer.
4. Other Hardware Reinforcements: As required for adequate strength and anchorage.

D. Electrical Requirements: Make provisions for installation of electrical items specified elsewhere; arrange so wiring can be readily removed and replaced.

1. Provide all cutouts and reinforcements required for hollow metal frames to accept security system components.
2. Frames with Electric Hinges and Pivots: Provide welded on UL listed back boxes with metal conduit or raceway to permit wiring from electric hinge or pivot to other electric door hardware.

    a. Hinge Location: Center for doors less than 90 inches tall or second hinge from door bottom for doors greater than 90 inches; top or bottom electric hinge locations shall not be permitted.

E. Mullions and Transom Bars for Sidelights, Transoms, and Borrowed Light Frames: Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.

F. Jamb Anchors: Locate jamb anchors above hinges and directly opposite on strike jamb as required to secure frames to adjacent construction. At metal stud partitions locate the additional jamb anchor below the top hinge.

1. Metal-Stud Partitions: Metal channel stud zee anchor sized to match stud width, welded to back of frames, formed of same material and gauge thickness as frame. Provide at least the number of anchors for each jamb according to the following heights:

    a. Three anchors per jamb up to 60 inches in height.
    b. Four anchors per jamb from 60 to 90 inches in height.
    c. Five anchors per jamb from 90 to 96 inches in height.
    d. One additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.

G. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of same material as frame, 12 gage thick, and punched with two holes to receive two 0.375 inch fasteners. Where floor fill or setting beds occur support frame by adjustable floor anchors bolted to the structural substrate. Terminate bottom of frames at finish floor surface. Weld floor anchors to frames with at least 4 spot welds per anchor.

H. Head Strut Supports: Provide 3/8-by-2-inch vertical steel struts extending from top of frame at each jamb to supporting construction above. Bend top of struts to provide flush contact for securing to supporting construction above by bolting, welding, or other suitable anchorage. Provide adjustable wedged or bolted anchorage to frame jamb members to permit height adjustment during installation. Adapt jamb anchors at struts to permit adjustment.

I. Head Reinforcement: For frames more than 48 inches wide in masonry wall openings, provide continuous steel channel or angle stiffener, 12 gage thick for full width of opening, welded to back of frame at head. Head reinforcements shall not be used as a lintel or load bearing member for masonry.

J. Spreader Bars: Provide removable spreader bar across bottom of frames to serve as bracing during shipment and handling and to hold frames in proper position do not tack weld bars to frames.

K. Door Silencer Holes: Drill strike jamb stop to receive three silencers on single door frames and for two silencers on double door frames. Insert plastic plugs in holes to keep holes clear during installation.

L. Plaster, Mortar and Grout Guards and Removable Access Plates: Provide minimum 26 gauge thick guards or dust-cover boxes of same material as frame, welded to frame at back of hardware cutouts to close off interior of openings and prevent mortar or other materials from obstructing hardware and hardware fastener installation and hardware operation. Provide removable access plates in the heads of frames to receive overhead concealed door closers.

2.7 STOPS AND MOLDINGS

A. Provide continuous stops and moldings around glazed panels where indicated.

B. Form fixed stops and moldings integral with frame, on the exterior (non-secured) side of the frame.

C. Provide removable stops and moldings formed of 20 gage thick steel sheets matching hollow metal frames. Secure with countersunk oval head machine screws spaced uniformly not more than 12 inches on center. Form corners with butted or mitered hairline joints.

D. Coordinate rabbet width between fixed and removable stops with type of glass or panel and type of installation indicated.

2.8 FABRICATION

A. Fabricate doors and frames rigid, neat in appearance, and free of defects, warp, wave, and buckle. Accurately form metal to sizes and profiles indicated. Accurately machine, file, and fit exposed connections with hairline joints. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

B. Exposed Fasteners: Provide countersunk flat heads for exposed screws and bolts, unless otherwise indicated.

C. Hardware Preparation: Prepare doors and frames to receive hardware, including cutouts, reinforcement, mortising, drilling, and tapping, according to final hardware schedule and templates provided by hardware supplier. Secure reinforcement by spot welding. Comply with applicable requirements of ANSI/BHMA A156.115 and A156.115W specifications for door and frame preparation for hardware. Factory reinforce doors and frames to receive surface-applied hardware. Factory drill and tap for surface-applied hardware, except at pushplates and kickplates provide reinforcing only.

1. Locate hardware as indicated on the drawings or in Section 087100 "Door Hardware" or, if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."

2.9 STEEL SHEET FINISHES

A. General: Clean, treat and prime surfaces of fabricated hollow metal door and frame work, inside and out, whether exposed or concealed in the construction.

B. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale, shavings, filings, and rust, if present, complying with SSPC-SP 3, "Power Tool Cleaning."

C. Factory Priming for Field-Painted Finish: Apply shop primer immediately after surface preparation and pretreatment. Apply a sufficient number of coats, baked on, to obtain uniformly smooth exposed surfaces. Touchup surfaces having runs, smears, or bare spots.

1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, corrosion-inhibiting, lead- and chromate-free, universal primer complying with ANSI A250.10 acceptance criteria; compatible with substrate and field-applied finish paint system indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install doors and frames according to the referenced standards, the Architect reviewed shop drawings, and manufacturer's written recommendations and installation instructions.

B. Frames: Install frames where indicated. Extend frame anchorages below fills and finishes. Coordinate the installation of built-in anchors for wall and partition construction as required with other work.

1. Welded Frames:

a. Set masonry anchorage devices where required for securing frames to in-place concrete or masonry construction.

1) Set anchorage devices opposite each anchor location as specified and anchorage device manufacturer's written instructions. Leave drilled holes rough, not reamed, and free of dust and debris.

b. Placing Frames: Remove temporary spreader bars prior to installation of the frames. Set frames accurately in position; plumb; align, and brace securely until permanent anchors are set.

1) At concrete or masonry construction, set frames and secure in place with machine screws and masonry anchorage devices. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
2) Anchor bottom of frames to floors through floor anchors with threaded fasteners.
3) Field splice only at approved locations indicated on the shop drawings. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
4) Remove spreader bars only after frames are properly set and secured.

2. At fire-rated openings, install frames according to NFPA 80.
3. Existing Frames (Salvaged from Alteration Work): Install salvaged existing frames in locations indicated.

C. Doors:

1. Non-Fire Rated Doors: Fit non-fire-rated doors accurately in their respective frames, with the following clearances:

a. Jambs and Head: 3/32 inch.
b. Meeting Edges, Pairs of Doors: 1/8 inch.

c. Bottom: 3/8 inch, if no threshold or carpet.
d. Bottom: 1/8 inch, at threshold or carpet.

2. Fire-Rated Doors: Install with clearances as specified in NFPA 80.
3. Smoke Control Doors: Install according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat or oval head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches on center from each corner.

E. Apply hardware in accordance with hardware manufacturer's instructions and Section 087100 "Door Hardware." Drill and tap for machine screws as required. Do not use self tapping sheet metal screws. Adjust door installation to provide uniform clearance at head and jambs, and to contact stops uniformly. Adjust hardware items just prior to final inspection. Leave work in complete and proper operating condition.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items just before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

1. Finish Painting: Refer to Section 099123 "Interior Painting."

C. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise defective.

D. Institute protective measures required throughout the remainder of the construction period to ensure that hollow metal doors and frames will be without damage or deterioration, at time of Substantial Completion.

END OF SECTION

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes access doors and frames.

1.2 COORDINATION

A. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and where shown on the drawings, and indicate on schedule specified in "Submittals" Article.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of access door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product type in this Section:

    a. Access doors and frames.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items with concealed framing, suspension systems, piping, ductwork, and other construction. Show the following:

1. Method of attaching door frames to surrounding construction.
2. Ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim.

C. Schedule: Provide complete door and frame schedule, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain access doors of each type for entire project from one source from a single manufacturer.

B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 and that are labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction per test method indicated.

1. Vertical Access Doors: NFPA 252 or UL 10B.

C. Size and Location Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.2 ACCESS DOORS AND FRAMES

A. Flush, Insulated, Fire-Rated Access Doors and Trimless Frames : Fabricated from steel sheet.

1. Locations: Gypsum board wall surfaces indicated to be fire rated.
2. Fire-Resistance Rating: One and one-half hours.
3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.

4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal.
5. Frame: Sheet metal with drywall bead.
6. Hinges: Continuous piano hinge.
7. Automatic Closer: Spring type.
8. Latch: Self-latching bolt operated by knurled knob with interior release.
9. Products: One of the following:

    a. Acudor Products, Inc.; FW-5050-DW Fire Rated for Drywall - Insulated.
    b. Larsen's Industries, Inc.; L-FRAP.
    c. Milcor; Style UFR-DW.
    d. Nystrom, Inc.; IW Series.

B. Flush Access Typical Doors and Trimless Frames for Vertical Surfaces : Fabricated from steel sheet.

1. Locations: Gypsum board wall surfaces.
2. Door: Minimum 14 gauge 0.067 inch thick sheet metal, set flush with surrounding finish surfaces.
3. Frame: Minimum 16 gauge 0.053 inch thick sheet metal with drywall bead.
4. Hinges: Continuous concealed type.
5. Latch: Flush, screwdriver- operated cam latch of number required to hold door in flush, smooth plane when closed.
6. Products: One of the following:

    a. Acudor Products, Inc.; DW-5040 Flush for Drywall.
    b. Larsen's Industries, Inc.; Model L-DWC.
    c. Milcor; Style DW.
    d. Nystrom, Inc.; NW Series.

C. Flush Access Typical Doors and Trimless Frames for Horizontal Surfaces: Fabricated from glass fiber reinforced gypsum.

1. Locations: Gypsum board ceiling surfaces.
2. Door: Minimum 1/8 inch thick glass fiber reinforced gypsum, with square corners, set flush with surrounding gypsum wallboard finish surfaces.
3. Frame: Minimum 1/8 inch thick glass fiber reinforced gypsum, with tapered square edge.
4. Hinges and Latch: None, lay-in manual push up type.
5. Products: One of the following:

    a. Acudor Products, Inc.: GFRG-S Ceiling Access Panel.
    b. IntexForms, Inc.: Lift & Shift Access Panel Square Door Corners.
    c. UP Ceilings: Square Corner, Lift and Shift Panels.

D. Flush Access Doors and Frames with Exposed Trim : Fabricated from steel sheet.

1. Locations: Ceramic-tile wall surfaces.
2. Door: Minimum 14 gauge thick sheet metal, set flush with exposed face flange of frame.

3. Frame: Minimum 16 gauge thick sheet metal with 1-inch- wide, surface-mounted trim.
4. Hinges: Continuous piano hinge.
5. Latch: Flush, screwdriver-operated cam latch of number required to hold door in flush, smooth plane when closed.
6. Products: One of the following:

    a. Acudor Products, Inc.; UF-5000 Universal Flush Access Door.
    b. Larsen's Industries, Inc.; Model L-MPG.
    c. Milcor; Style M.
    d. Nystrom, Inc.; NT Series.

2.3 FABRICATION

A. General: Provide access door assemblies manufactured as integral units ready for installation.

B. Steel Access Doors: Fabricate units of continuous welded steel construction. Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Provide special sized access doors where required or requested.

C. Glass Fiber Reinforced Gypsum Doors: Fabricate units of monolithic glass fiber reinforced gypsum construction having a shell thickness of between 1/8 to 3/16 inch and weighing approximately 2 pounds per square foot. Edges of doors shall be rabbetted to overlap and rest on the frame.

1. Provide special sized access doors where required or requested.

D. Frames:

1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame for steel frames.
2. Provide trimless carbon steel frames with drywall bead for installation in gypsum wallboard assembly, furnish perforated frames with drywall bead, securely attached to perimeter of frames, in size to suit thickness of gypsum panels indicated. Provide mounting holes in frames to attach frames to metal framing in drywall construction.
3. Provide trimless glass fiber reinforced frames with tapered edges for taping and joint compound installation into gypsum wallboard ceiling assembly, in size to suit thickness of gypsum panels used.

2.4 CARBON STEEL FINISHES

A. Surface Preparation: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

B. Apply shop primer to uncoated surfaces of metal fabrications. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's instructions for installation of access doors. Coordinate installation with work of other trades.

B. Advise installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

C. Install access doors flush with adjacent finish surfaces or recessed to receive finish material.

D. Adjust doors and hardware after installation for proper operation.

E. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 084124 - FIRE RATED GLASS AND FRAMING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire rated door and framing systems for installation as (choose one or more as applicable) full vision fire rated doors in interior openings.

1.2 DEFINITIONS

A. Manufacturer: A firm that produces primary glass, fabricated glass or framing as defined in referenced glazing publications.

1.3 SUBMITTALS

A. Product Data:

1. Technical Information: Submit latest edition of manufacturer’s product data providing product descriptions, technical data, Underwriters Laboratories, Inc. listings and installation instructions.

B. Shop Drawings:

1. Include plans, elevations and details of product showing component dimensions; framed opening requirements, dimensions, tolerances, and attachment to structure

C. Hardware schedule: list of manufacture supplied hardware and verification of cylinder size complying with Section 087100 "Door Hardware".

D. Samples : For following products:

1. Glass sample-as provided by manufacturer
2. Sample of frame
3. Verification of sample of selected finish

E. Glazing Schedule: Use same designations indicated on drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

F. Warranties: Submit manufacturer’s warranty.

G. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements.

1. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to

1. International Accreditation Service for a Type A Third-Party Inspection Body (Field Services ICC-ES Third-Party Inspections Standard Operating Procedures, 00-BL-S0400 and S0401)
2. International Accreditation Service for Testing Body-Building Materials and Systems

a. Fire Testing

1) ASTM Standards E 119
2) CPSC Standards 16 CFR 1201
3) NFPA Standards 251, 252, 257
4) UL Standards 9, 10B, 10C, 1784, UL Subject 63
5) BS 476; Part 22: 1987
6) EN 1634-1
7) CAN Standards S 101, S 104, S 106

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

C. Source Limitations for Glazing Accessories: Obtain framing system, glazing and glazing accessories from one source for each product and installation method indicated.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 252. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.

E. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 251. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.

F. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.

G. Regulatory Requirements: Comply with provisions of the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," as follows:

    a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
    b. Door Closers: Comply with the following maximum opening-force requirements indicated:

        1) Accessible doors no more than 5 lbf push or pull force
        2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction

2. Compliance with this standard requires auto openers to be added to the opening due to the weight of the doors. Coordinate the addition of auto-openers with the Division 8 section "Door Hardware" or other section containing these devices. Verify that the Authority Having Jurisdiction is using NFPA 101 and/or IBC and which edition dates of both as a requirement for the facility. NFPA 101: Comply with the following for means of egress doors:

    a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    b. Door Closers: Not more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.

3. IBC 2012 Chapter 10 Means of Egress: Comply with the following for means of egress doors:

    a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    b. Door Closers: Not more than 30 lbf to set door in motion and not more than 15 lbf o open door to minimum required width.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle under provisions specified by manufacturer.

1.6 PROJECT CONDITIONS

A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner coordinate planned measurements with the work of other sections.

1. Note whether field or planned dimensions were used in the creation of the shop drawings.

B. Coordinate the work of this section with others effected including but not limited to: other interior and/or exterior envelope components and door hardware beyond that provided by this section

1.7 WARRANTY

A. Provide the Fireframes® Designer Series standard five-year manufacturer warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - FIRE RATED DOOR ASSEMBLYAND WINDOW

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Basis of Design: TGP.

a. Glass Material: Pilkington Pyrostop® fire-rated glazing as fabricated and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail sales@fireglass.com, web site http://www.fireglass.com.

b. Frame System: “Fireframes® Designer Series by TGP” fire-rated steel frame system as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail sales@fireglass.com web site http://www.fireglass.com.

c. Doors: "“Fireframes® Designer Series by TGP” fire-rated die-rolled steel profile doors as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail sales@fireglass.com web site http://www.fireglass.com.

d. Substitutions: Substitutions for Glazing Material,Frame System, and Doors not permitted.

2. Alternate: SAFTI First, Inc.: "GPX Architectural Series by SAFTI First, Inc."

a. Glass Material: Superlite® II-XL (90-120 minute) fire-rated glazing as fabricated and distributed by SAFTI First, Safety And Fire Technology Inc., 100 N Hill Drive #13, Brisbane, CA 94005.
b. Frame System:GPX Architectural Series (90-120 minute) fire-rated framing as fabricated and distributed by SAFTI First, Safety And Fire Technology Inc., 100 N Hill Drive #13, Brisbane, CA 94005.
c. Doors: GPX Architectural Series (90 minute) fire-rated doors as fabricated and distributed by SAFTI First, Safety And Fire Technology Inc., 100 N Hill Drive #13, Brisbane, CA 94005.
d. Substitutions: Substitutions for Glazing Material, Frame System, and Doors not permitted.

2.2 PERFORMANCE REQUIREMENTS

A. Fire Rating Requirements

1. Duration -- Doors: Capable of providing a fire rating for 90 minutes.

a. When glazed with Pilkington Pyrostop (60-90 minutes) glazing products, doors meet the maximum transmitted temperature rise of not more than 450 degrees Fahrenheit (250 degrees Celsius) at the end of 30 minutes of the standard fire test exposure.

2. Duration-- Window Assembly: Capable of providing a fire rating for 120 minutes.

B. Delegated design: For the performance requirements listed below requiring structural design provide data, calculations and drawings signed and sealed by an engineer licensed in the state of New Jersey where the project is located.

C. Design Requirements:

1. Dimensions – Door and Framing:

a. Door framing face dimension: 1 15/16-inch.
b. Depth of door framing: 1 15/16-inch.
c. Door style face dimension: 3 1/8-inch.
d. Door cross rail (if applicable) face: 3 9/16-inch.
e. Depth of stile, header, sill and cross rail: 1 15/16-inch

2. Dimensions -- Window Assembly:

a. Perimeter framing face dimension: 2 3/4-inch at head, sill and jamb.
b. Horizontal and/or vertical mullions: 3 9/16-inch on the face.
c. Depth of perimeter and mullion: 1 15/16-inch.

3. Construction: Narrow-profile, roll-formed steel architectural grade specialty fire doors. Conventional break-shape type hollow metal steel fire-rated doors will not be considered an acceptable substitute for the Fireframes Designer Series doors specified in this section as they do not conform to the project design intent and/or aesthetic and quality standards.

    a. Knock down frames are not permitted.

D. Structural Performance

1. Design and size the system to withstand structural forces placed upon it without damage or permanent set when tested in accordance with ASTM E330 using load 1.5 times the design wind loads and of 10 seconds in duration.
2. Positive wind load: as indicated on the drawings
3. Negative wind Load:as indicated on the drawings
4. Member deflection: Limit deflection of the edge of the glass normal to the plane of the glass to [flexure limit of glass][1/175 of the glass edge length or ¾ inch, whichever is less][of any framing member
5. Accommodate movement between storefront and adjoining systems

E. Air infiltration: Provide systems that allow a maximum air leakage through fixed glazed openings of 0.06 cfm/sq. ft. of area when tested per ASTM E 283 at a static air differential of [1.57] [6.24] lbf/sq ft

F. Water Penetration

1. Under Static pressure, provide systems that do not show uncontrolled water leakage when tested according to ASTM E 331 under static pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
2. Under Dynamic pressure, provide systems that do not show uncontrolled water leakage when tested according to AAMA 501.1 under static pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

2.3 MATERIALS - GLASS

A. Fire Rated Glazing: ASTM C 1036 and ASTM C 1048; composed of specially tempered glazing material.

B. Thickness of Glazing Material:

1. 3/4” – 1-9/16” Pilkington Pyrostop®

C. Approximate Visible Transmission: Varies with thickness (approximate range 88 percent).

D. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory (UL® only), fire rating period, safety glazing standards, and date of manufacture.

E. Performance: Glass must be rated to stop fire from either direction and must meet all testing requirements including the required hose-stream test (where fire-rating exceeds 20 minutes).

2.4 MATERIALS – STEEL FRAMES AND DOORS

A. Steel Framing System including 90-minute rated doors, 120 -minute rated windows.

1. Frame: Steel profiled formed tubing.
2. Fasteners: As recommended by manufacturer
3. Glazing Accessories: calcium silicate setting blocks.
4. Glazing Compounds:

    a. Pilkington Pyrostop®: Approved closed cell PVC tape, Fibrefrax, or pure silicone sealant. Glaze FireLite® panels that exceed 1,393 sq. inches for 90-minute ratings with “Kerafix 2000” glazing tape supplied by manufacturer.

        1) When glazed with Pilkington Pyrostop (60-90 minutes) glazing products, doors meet the maximum transmitted temperature rise of not more than 450 degrees Fahrenheit (250 degrees Celsius) at the end of 30 minutes of the standard fire test exposure.

B. Fire-Rated Narrow Profile 90-minute rated doors.

1. Material: Steel.
2. Hardware: As recommended by manufacturer.
3. Glazing Accessories: calcium silicate setting blocks.
4. Glazing Compounds:

    a. Pilkington Pyrostop fire-resistive-rated glass, comprised of Pilkington Optiwhite Glass and clear intumescent layers.

2.5 FABRICATION

A. Furnish frame assemblies pre-welded.

1. When necessary, splice frames too large for shop fabrication or shipping or to fit in available building openings.
2. Fit with suitable fasteners.
3. Knock-down frames are not permitted

B. Furnish interior frame assemblies “K-D” (or welded upon request).

1. When necessary, splice frames too large for shop fabrication or shipping or to fit in available building openings.
2. Fit with suitable fasteners.

3. Knock-down door perimeter frames are not permitted

C. Field glaze door and frame assemblies.

D. Factory prepare steel door assemblies and install all hardware.

E. Fabrication Dimensions: Fabricate to fire-rated field dimensions.

F. Obtain approved shop drawings prior to fabrication.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish frames after assembly.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

2.7 POWDERCOAT FINISHES

A. Finish after fabrication.

B. Appearance of Finished Work:Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

C. Interior and Exterior Steel Finishes (Note: this finish is suitable for exterior exposed portions of the wall systems, including extruded aluminum covers).

1. Powder-Coat Finish: Polyester Super Durable powder coating which meets AAMA 2604 for chalking and fading. Apply manufacturer's standard powder coating finish system applied to factory-assembled frames before shipping, complying with manufacturer's recommended instructions for surface preparation including pretreatment, application, and minimum dry film thickness.
2. Color and Gloss: Match Architect's sample - MT02.
3. Acceptable Manufacturers:

    a. Tiger Drylac
    b. Additional manufacturers as approved by TGP

2.8 DOOR HARDWARE

A. Furnish hardware with 90 minute fire door by the manufacturer.

B. Select hardware from door manufacturer's standard recommended and approved hardware groups as specified in Division 8 Section – Door Hardware.

C. Provide power assisted hardware for use at any door that cannot meet the opening force(s) required by code noted in Part I above.

1. High energy, power-operated doors must meet the requirements of ANSI/BHMA A156.10 and power-assisted low energy doors must comply with ANSI/BHMA 156.19

D. Operating hardware for Fireframes® Designer Series **Single Inswing Doors with Mortise Locking**. Coordinate with Auto Operators. Each to have the following.

	Item	Description	Manufacturer	Finish *
3	Hanging Devices	Weld on Pivots	Technical Glass Products	PTM
1	Lever Trim	Narrow Escutcheon Lever Trim Set DSR2NN#-P6-yyy-630	Technical Glass Products	630
1	Mortise Lock	Mortise lock with panic function	Technical Glass Products	630
1	Cylinder	European Profile Schlage C Keyway	Technical Glass Products	626
1	Closing Devices	TS 93 Surface Applied Closer	Dorma	689
1	Auto door Bottom	420APKL Smoke Seal	Pemko	MA
1	Weather Seal	Perimeter Gasket	Technical Glass Products	
	Balance of hardware by others			

E. Operating hardware for Fireframes® Designer Series **Active-Active Pair of Doors Outswing with Exit Device**. Each pair to have the following.

	Item	Description	Manufacturer	Finish *
6	Hanging Devices	Weld on Pivots	Technical Glass Products	PTM
2	Exit Device	3547A-F Concealed	Von Duprin	626
2	Lever Trim	360 L Rectangular Lever Handle	Von Duprin	626
1	Cylinder	ANSI Mortise Schlage C Keyway	Technical Glass Products	626
2	Closing Devices	TS 93 Surface Applied Closer	Dorma	689
2	Auto door Bottoms	420APKL Smoke Seal	Pemko	MA
1	Auxiliary Fire Latch	Used with exit device with no bottom rod	Technical Glass Products	630
1	Weather Seal	Perimeter Gasket	Technical Glass Products	
	Balance of hardware by others			

* FINISH LEGEND:
PTM Painted to match frame
MA Mill Finish Aluminum

1. Aluminum Paint

2. Satin Stainless Steel

2.9 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-milthickness per coat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and members to which the work of this section attaches or adjoins prior to frame installation.

B. Provide openings plumb, square and within allowable tolerances.

1. Provide 3/8 inch shim space at all walls

C. Notify Architect of any conditions which jeopardize the integrity of the proposed fire wall / door system.

D. Do not proceed until such conditions are corrected.

3.2 INSTALLATION

A. See Fireframes Designer Series Installation Manual

3.3 REPAIR AND TOUCH UP

A. Limited to minor repair of small scratches. Use only manufacturer’s recommended products.

1. Such repairs shall match original finish for quality or material and view.

B. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged.

3.4 ADJUSTING

A. Adjust door function and hardware for smooth operation. Coordinate with other hardware suppliers for function and use of any other attached hardware.

3.5 PROTECTION AND CLEANING

A. Protect glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

1. Do not clean with astringent cleaners. Use a clean “grit free” cloth and a small amount of mild soap and water or mild detergent.
2. Do not use any of the following:

    a. Steam jets
    b. Abrasives
    c. Strong acidic or alkaline detergents, or surface-reactive agents
    d. Detergents not recommended in writing by the manufacturer
    e. Do not use any detergent above 77 degrees F
    f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.
    g. Metal or hard parts of cleaning equipment must not touch the glass surface

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION

SECTION 084243 - INTENSIVE CARE UNIT/CRITICAL CARE UNIT (ICU/CCU) ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes manually operated, intensive care unit/critical care unit (ICU/CCU) entrances for individual special-care rooms.

1.3 COORDINATION

A. Recesses: Coordinate sizes and locations of recesses in concrete floors for recessed tracks. Concrete, reinforcement, and formwork requirements are specified elsewhere.

B. Templates: Distribute for doors, frames, and other work specified to be factory prepared for installing ICU/CCU entrances.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each configuration of ICU/CCU entrance indicated.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
3. Environmental Product Declaration: For each product.

4. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each regional material.
5. Environmental Product Declaration: For each product.

C. Shop Drawings: For each ICU/CCU installation.

1. Include plans, elevations, sections, hardware mounting heights, and attachment details.

D. Samples for Initial Selection: For units with factory-applied color and metal-cladding finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For manufacturer's warranties.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings to receive ICU/CCU entrances by field measurements before fabrication. Coordinate in field rough openings in order to meet the required clear door width.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of ICU/CCU entrances that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Faulty operation of hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer agrees to repair finishes or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain ICU/CCU entrances from single source from single manufacturer. Subject to compliance with requirements, provide the basis of design product or a comparable product from an alternate manufacturer that meets the performance requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Opening Force: Not more than 5 lbf to fully open door.

B. Air Leakage: Entrance assemblies for smoke control and pressurized rooms shall be listed and labeled for smoke and draft control by qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and having maximum air leakage according to NFPA 105 unless otherwise indicated.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 SLIDING ICU/CCU ENTRANCE ASSEMBLIES

A. General: Provide manufacturer's factory-glazed ICU/CCU entrances indicated including door leaves, sidelites, framing, headers, carrier assemblies, roller tracks, and accessories required for a complete installation.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. VersaMax 2.0 Touchless Besam Entrance Solutions; ASSA ABLOY. - Basis of Design
b. DORMA USA, Inc.

c. Gildor, Inc.
d. Horton Automatics; a division of Overhead Door Corporation.
e. KM Systems, Inc.
f. NABCO Entrances, Inc.
g. record-usa.
h. Stanley Access Technologies.
i. Tormax Technologies, Inc.

B. Breakaway Hardware: Release hardware that allows indicated panels to swing out in direction of egress to full 90 degrees from closed door position.

1. Maximum Force to Open Panel: 50 lbf.
2. Release Position: Sliding door fully open.

C. Sliding ICU/CCU Entrance (Door Type H):

1. Performance: Standard assembly.

a. Alarm Interface: Equip entrance with electromagnet closer that closes door when alarm is triggered.

2. Configuration: Single-sliding two-panel door, with one operable leaf and sidelite; with breakaway hardware for sliding leaf and sidelite.
3. Configuration: Single-sliding single-panel door, with one operable leaf and no sidelite; with breakaway hardware for sliding leaf only.
4. Configuration: Single-telescoping three-panel door, with two operable leaves and one sidelite; with breakaway hardware for sliding leaves and sidelite.
5. Mounting: Between jambs for Configuration 1 & 3.
6. Mounting: Surface for Configuration 2
7. Floor Track Configuration: No track across sliding-door opening and at sidelites (trackless).
8. Stile Design: Narrow stile; 2-1/8-inch nominal width.
9. Rail Design: 3-1/2-inch nominal height.
10. Muntin Bars: On doors and sidelites.
11. Glazing Stops and Gaskets: Beveled.
12. Glazing: Clear tempered.
13. Finish framing, door(s), sidelite(s), and header with Class I, clear anodic finish
    a. Provide Anti-Microbial finish on all exposed surfaces including door pulls, door extrusions, rails and header. Finish must permanently suppress the growth of bacteria, algae, fungus, mold and mildew. Coating to be EPA registered resulting in a safe and non-toxic finish..

2.4 COMPONENTS

A. Framing and Transom Members: Extruded aluminum, minimum 0.125 inch thick and reinforced as required to support imposed loads.

1. Nominal Size: 1-3/4 by 4-1/2 inches .

2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch wall thickness.

B. Stile and Rail Doors: 1-3/4-inch- thick, glazed doors with minimum 0.125-inch- thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie rods that span full length of top and bottom rails.

1. Glazing Stops and Gaskets: Snap-on, extruded-aluminum stops and preformed gaskets for glazing indicated.
2. Muntin Bars: Horizontal tubular rail member for each door; match stile design.

C. Sidelites: 1-3/4-inch- deep sidelites with minimum 0.125-inch- thick, extruded-aluminum tubular stile and rail members matching door design and finish.

1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
2. Muntin Bars: Horizontal tubular rail member for each sidelite; match stile design.

D. Glazing: As specified in Section 088000 "Glazing."

E. Headers: Fabricated from minimum 0.125-inch- thick, extruded aluminum, and extending full width of ICU/CCU entrance units to conceal carrier assemblies and roller tracks. Provide hinged or removable access panels for service and adjustment. Secure panels to prevent unauthorized access.

1. Capacity: Capable of supporting doors up to 100 lb per leaf over spans up to 14 feet without intermediate supports.
2. Provide sag rods for spans exceeding 14 feet.

F. Carrier Assemblies and Overhead Roller Tracks: Assembly that allows vertical adjustment; consisting of nylon- or polyoxymethylene (POM)-covered, ball-bearing-center steel wheels operating on a continuous roller track or of ball-bearing-center steel wheels operating on a nylon- or POM-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly. Provide minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.

G. Brackets and Reinforcements: High-strength aluminum with nonstaining, nonferrous shims for aligning system components.

H. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 HARDWARE

A. General: Provide units in sizes and types recommended by ICU/CCU entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish.

B. Closer: BHMA A156.4, Grade 1, fully concealed spring closer, sized according to manufacturer's recommendations for door size, adjustable to comply with requirements for opening force.

C. Limit Arm: Provide to control doors and panels in the swing mode. Swing not to exceed 90 degrees.

D. Pulls: Recessed units on both sides of each operable door. Pulls on sliding doors to be exposed and usable from both sides when sliding doors are in fully open position.

E. Positive Latch: BHMA A156.5, Grade 1, manufacturer's standard latch and strike with lever handles on each side of swinging door panels. Manual flush bolt latch at each swing-out sidelite.

F. Deadlocks: Operated by exterior cylinder and interior thumb turn.

1. Deadbolts: Laminated-steel hook, mortise type, BHMA A156.5, Grade 1.
2. Cylinders: As specified in Section 087100 "Door Hardware.".

    a. Keying: Integrate into building master key system, and key all cylinders alike.
    b. Keys: Two for each cylinder.

G. Weather Stripping: Replaceable components.

1. Compression Type: ASTM D2000, molded neoprene or ASTM D2287, molded PVC.
2. Sliding Type: AAMA 701/702, wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

H. Weather Sweeps: Nylon brush sweep mounted to underside of door bottom.

2.6 FABRICATION

A. General: Factory fabricate ICU/CCU entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.

1. Fabricate aluminum components before finishing.
2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match framing.

    a. Where fasteners are subject to loosening or turning out from structural movements or vibration, use self-locking devices.
    b. Reinforce members as required to receive fastener threads.

4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

B. Framing: Provide ICU/CCU entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Fabricate tubular and channel frame assemblies with welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support required loads.
2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
3. Form profiles that are straight and free of defects or deformations.
4. Provide components with concealed fasteners and anchor and connection devices.
5. Fabricate components with accurately fitted joints, with ends coped or mitered to produce hairline joints free of burrs and distortion.
6. Provide anchorage and alignment brackets for concealed support of assembly from the building structure.

C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

D. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."

E. Factory Glazing: Install glazing at the factory.

F. Hardware: Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.

1. Provide sliding weather stripping, mortised into door, at perimeter of sliding surfaces and breakaway sidelites.

G. Electrical Grounding: Fabricate ICU/CCU entrances to be internally grounded, complying with requirements of authorities having jurisdiction.

2.7 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
2. Sheet and Plate: ASTM B209.

B. Sealants and Joint Fillers: As specified in Section 079200 "Joint Sealants."

C. Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout complying with ASTM C1107/C1107M; of consistency suitable for application.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

1. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.

B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.10 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: ASTM A480/480A. Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.
4. Mirrorlike Reflective, Nondirectional Polish: No. 8.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power and grounding systems to verify actual locations of electrical connections before automatic entrance installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install automatic entrances according to manufacturer's written instructions, including wiring and connection to the building's power supply.

1. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
2. Where aluminum contacts dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
3. Where aluminum contacts concrete or masonry, protect against corrosion by painting contact surfaces with bituminous coating.

B. Install ICU/CCU entrances plumb, true in alignment with established lines and grades, and without warp or rack of framing members and doors. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
3. Level recesses for recessed floor tracks using shrinkage-resistant grout.
4. Air Leakage: Install entrance assemblies for smoke-control and pressurized roomsaccording to NFPA 105 and as indicated.

C. Sealants: Comply with requirements in Section 079200 "Joint Sealants" for installing sealants, fillers, and gaskets.

1. Set framing members, floor tracks, and flashings in full sealant bed.
2. Seal perimeter of framing members with sealant.

D. Grounding: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.3 ADJUSTING

A. Adjust operating hardware and moving parts to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust force to open door panels.

C. Test grounding system for compliance with requirements of authorities having jurisdiction.

D. Adjust smoke-control and pressurized-entrance doors for tight closure.

3.4 CLEANING AND PROTECTION

A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

B. Comply with requirements in Section 088000 "Glazing" for cleaning and protecting glass.

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes door hardware.

B. Related Requirements:

1. Section 08 11 13 “Hollow Metal Doors and Frames”.
2. Section 08 31 13 “Access Doors and Frame”.
3. Section 08 41 13 “Aluminum-Framed Entrances and Storefronts”.
4. Section 08 42 29 “Automatic Entrances”.

1.2 PREINSTALLATION MEETINGS

A. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." **Review methods and procedures related to electrified door hardware including, but not limited to, the following:**

1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
2. Review sequence of operation for each type of electrified door hardware.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review required testing, inspecting, and certifying procedures.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data including installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit shop drawings with details of electrified door hardware, indicating the following:

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Include the following:

   a. System schematic.
   b. Point-to-point wiring diagram.
   c. Riser diagram.
   d. Elevation of each door controlled by electrified hardware.

2. Detail interface between electrified door hardware and fire alarm, access control, security, and building control system.

C. Samples: Submit samples of exposed door hardware for each type indicated below, in specified finish. Tag with full description for coordination with the Door Hardware Schedule.

1. Door Hardware: As follows:

   a. Locks and latches.
   b. Operating trim.
   c. Wall stops.
   d. Floor stops.
   e. Magnetic latches.
   f. Coat hooks.

2. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

D. Door Hardware Schedule: Submit door hardware schedule prepared by or under the supervision of door hardware supplier. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware. The Architect's review of schedule shall neither be construed as a complete check nor shall it relieve the Contractor of responsibility for errors, deviations, or omissions from the specified requirements to provide complete door hardware for the project.

1. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.

   a. Organize door hardware sets in same order as in the Door Hardware Schedule.

2. Content: Include the following information:

   a. Hardware designation code, Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware. Supply templates to door and frame manufacturer(s) to enable proper and accurate sizing and locations of cutouts for hardware. Detail conditions requiring custom extended lip strikes, or other special or custom conditions.
g. Door and frame sizes and materials.

h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

1) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

E. Keying Schedule: Submit keying schedule prepared by or under the supervision of supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificate: Submit certification from the card access control system manufacturer that the installer has been factory trained and certified to install its card reader/locksets.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: Submit maintenance data for each type of door hardware. Include final hardware and keying schedule.

B. Warranties: Submit special warranties specified in this Section.

C. Fire-Rated Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Maintenance Tools: Furnish a complete set of specialized tools for Owner's continued adjustment, maintenance, removal, and replacement of door hardware.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1. All entry card reader/locksets shall be installed by a factory authorized installer who has installed card access control system reader/locksets for at least three projects of similar size over the last five years which were similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance. The installer's forces shall have been certified by the card access control system manufacturer to install the card/reader locksets.
2. All entry card reader/lockset door batteries shall be replaced at the time of Substantial Completion.

B. Supplier Qualifications: Door hardware supplier, who has completed a minimum of three (3) projects over the last 5 years which were similar in material, design and extent to that indicated for the Project - as determined by the Architect - and which have resulted in construction with a record of successful in service performance, and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Electrified Door Hardware Supplier Qualifications: An experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.

    a. Engineering Responsibility: Prepare data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

2. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

1. Electrified Door Hardware Qualifications: Experienced in providing consulting services for electrified door hardware installations.

D. Source Limitations: Obtain each type of door hardware from a single manufacturer, unless otherwise indicated.

E. Regulatory Requirements: Comply with the following:

1. Provide hardware items complying with the applicable provisions for accessibility and usability by the disabled and handicapped in compliance with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1, FED-STD-795, "Uniform Federal Accessibility Standards,"
2. NFPA 101: Comply with applicable provisions for means of egress doors.
3. Electrified Door Hardware: Listed and classified by Underwriters Laboratories, Inc. or by a testing agency acceptable to authorities having jurisdiction, as suitable for the purpose indicated.

F. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by Underwriters Laboratories, Inc. for fire ratings indicated, based on testing according to NFPA 252. Provide only door hardware items that are identical to items tested by UL for the types and sizes of doors required. In case of conflict between type of hardware specified and type required for accessibility or fire protection, furnish type required by NFPA and UL. Doors indicated in fire rated partitions and walls shall be positive latching and self-closing, with smoke gaskets where required by applicable codes.

1. Wherever exit device hardware is required on doors, comply with UL 305. Furnish hardware to door manufacturer for installation at factory. Provide supplementary label, "Fire Exit Hardware," on each exit device to certify that panic hardware has been panic load tested with door.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

1.9 COORDINATION

A. Templates: Furnish templates and door hardware schedules, coordinated for the application of door hardware items with door and frame details, to door opening fabricators and trades performing door opening work to permit the preparation of doors and frames to receive the specified door hardware. Where the door hardware item scheduled is not adaptable to the finished size of door opening members requiring door hardware, submit an item having a similar operation and quality to the Architect for review. Each door hardware item shall be fabricated to templates.

B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to, power supplies, fire alarm system and detection devices, access control system, security system, building control system.

C. Fire Rated Door Hardware: Where hardware is to be installed on fire-rated entrances, provide Hardware manufacture’s written instructions for coordination with door manufacture and verification that the selected hardware will comply with fire rating requirements.

1.10 WARRANTY

A. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Faulty operation of door hardware.
2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

B. Warranty Period for Electromagnetic Locks: Five years from date of Substantial Completion.

C. Warranty Period for Manual Closers: Ten years from date of Substantial Completion.

D. Warranty Period for Concealed Floor Closers: Five years from date of Substantial Completion.

E. Warranty Period for Exit Devices: Five years from date of Substantial Completion.

F. Warranty Period for Other Hardware: Two years from date of Substantial Completion.

G. Warranty for Mortised Mechanical Lock and Latchsets: Ten years from date of Substantial Completion.

H. Warranty for Heavy Duty Cylindrical Mechanical Lock and Latchsets: Seven years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 **(H): HANGING**

A. (HB): BUTT HINGE

1. General:

a. Hinge Quantity: Provide hinge quantity as recommended by hinge manufacturer based on door width, weight, thickness, door material, and hinge cup selection.

1) Installer shall coordinate with door hardware manufacture for hinge capacity and verify with door weight and dimensions.

b. General Hinge and Pivot Characteristics: Where door jamb or trim projects to such an extent that the width of leaf specified will not allow the door to clear such frame or trim, furnish hinges and pivots with leaves of sufficient width to clear. Hinges and pivots shall be template hinges conforming to BHMA A156.1 and in accordance with door and frame material requirements.

c. Butt Hinge Quantity: Provide the following, unless otherwise indicated:

1) Two Hinges: For doors with heights up to and including 60 inches (1524 mm).
2) Three Hinges: For doors with heights of greater than 60 inches (1524 mm) to and including 90 inches (2286 mm).
3) Four Hinges: For doors with heights greater than 90 inches (2286 mm) to and including 120 inches (3048 mm).
4) Provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).

d. Butt Hinge Sizes: 4-1/2 inches (114 mm) high by 4 inches (102 mm) or 4-1/2 inches (114 mm) wide for doors up to and including 36 inches (914 mm) in width; 5 inches (127 mm) high by 4 inches (102 mm) or 4-1/2 inches (114 mm) wide for doors greater than 36 inches (914 mm) in width.

1) Hinge Characteristics: Full mortise type with hospital hinge tip. All butt hinges are to have non-rising pins for interior hinges and all exterior butt hinges are to be made of non-ferrous base metal and have non-removable

pins (NRP). Provide only steel bodied butt and pivot hinges at labeled doors. All butt hinges shall be furnished with button tips. Provide heavy weight, ball bearing, hinges at doors 40 inches (1016 mm) and greater in width.

e. Electrified Functions for Hinges and Pivots: Furnish fully concealed circuit, tamper resistant, wired hinges and pivots at doors requiring power transfer or door monitoring from jamb to door. All electrified hinges and pivots shall be rated for the in-rush amperage of the door mounted device being electrified.

f. Fasteners: Package all hinges and pivots with machine and wood screws as required by door and frame construction.

2. (HBS): Butt Hinge, Standard Weight
3. (HBH): Butt Hinge Heavy Weight

a. HBH01 - Heavy Weight, Ball Bearing, 5 Knuckle, Steel: Complying with BHMA A156.1 A8111, one of the following:

1) BB5004; Bommer Industries, Inc., Landrum, SC (BI).
2) BB1168; Hager Companies (HAG).
3) T4A3786; McKinney Products Company (MCK).
4) FBB168; Stanley Commercial Hardware (STH).
5) 55BB1HW; Ives (IVS).

b. HBH02 - Heavy Weight, Ball Bearing, 5 Knuckle, Stainless Steel: Complying with BHMA A156.1 A5111, one of the following:

1) BB5006; Bommer Industries, Inc., Landrum, SC (BI).
2) BB1199; Hager Companies (HAG).
3) T4A3386-32D; McKinney Products Company (MCK).
4) FBB199 (US32D); Stanley Commercial Hardware (STH).
5) 5BB1HW Stainless Steel; Ives (IVS).

4. (EHBS): Electric Prepped Butt Hinge **Set,** Standard Weight. **Provide one (1) electric prepped hinge for the set from one of the following:**

a. EHBS02 - Standard Weight, Ball Bearing, 5 Knuckle, Stainless Steel, Concealed Electric 24V, 8 Wire: Complying with BHMA A156.1 A5112; provide one of the following:

1) BB5062 (ETW08); Bommer Industries, Inc., Landrum, SC (BI).
2) BB1191 x ETW-8; Hager Companies (HAG).
3) TA2314 x CC-8; McKinney Products Company (MCK).
4) CEFBB179-58; Stanley Commercial Hardware (STH).
5) 5BB1 x TW8 Stainless Steel; Ives (IVS).

5. (EHBH): Electric Prepped Butt Hinge Heavy Weight

a. EHBH01 Heavy Weight, Ball Bearing, 5 Knuckle, Steel, Concealed Electric 24V, 8 Wire: Complying with BHMA A156.1 A8111, one of the following:

1) BB5064 (ETW08); Bommer Industries, Inc., Landrum, SC (BI).
2) BB1168 x ETW-8; Hager Companies (HAG).
3) T4A3786 x CC-8; McKinney Products Company (MCK).
4) CEFBB168-58; Stanley Commercial Hardware (STH).

5) 5BB1HW x TW8; Ives (IVS).

B. (HP): PIVOT HINGES

1. General:
   a. Hinge Quantity: Provide hinge quantity as recommended by hinge manufacturer based on door width, weight, thickness, door material, and hinge cup selection.
      1) Installer shall coordinate with door hardware manufacture for hinge capacity and verify with door weight and dimensions.
   b. General Pivot Hinge Characteristics: Where door jamb or trim projects to such an extent that the width of leaf specified will not allow the door to clear such frame or trim, furnish hinges and pivots with leaves of sufficient width to clear. Hinges and pivots shall be template hinges conforming to BHMA A156.1 and in accordance with door and frame material requirements.
   c. Electrified Functions for Hinges and Pivots: Furnish fully concealed circuit, tamper resistant, wired hinges and pivots at doors requiring power transfer or door monitoring from jamb to door. All electrified hinges and pivots shall be rated for the in-rush amperage of the door mounted device being electrified.
   d. Fasteners: Package all hinges and pivots with machine and wood screws as required by door and frame construction.
2. (HPC): Center Pivots
   a. HPC01- Center Pivots: Mortised mounted, non-handed, center pivot set with sealed bearings for protection against weather and debris and composed of a head mounted top pivot and floor mounted bottom pivot. Furnish with extended spindles. Complying with BHMA A156.4 C07032.
      1) 0370 Center Hung Pivot Set; Architectural Builders Hardware Mfg., Inc. (ABH).
      2) Model 370 Center Hung Pivot Set; Rixson-Firemark, Inc. (RIX).
      3) 7255 Pivot Set; Ives (IVS).
      4) Model 370 Center Hung Pivot less standard top pivot x 345 Top Pivot; Rixson-Firemark, Inc. (RIX).
3. Type HSP01: Pocket Door Hardware: Provide complete sets consisting of header assembly, pair of split studs, door hanger plates, bumper, ball bearing door hanger assembly with provision for horizontal and vertical adjustments, door guides, floor plates, end brackets, and complying with BHMA 156.14. Cut studs to lengths as required.
   a. Johnson Hardware: Pocket Door system.

2.2 (S): SECURING

A. (SC): CYLINDERS AND KEYING

1. (SCK): CYLINDER CORES AND KEYING

a. General: Provide Standard cylinder core systems, unless Interchangeable core system is requested by the Owner.

1) Construction Core: Provide construction core in locks during construction and as may be necessary for security or as may be requested by the Owner. Upon completion of the construction phase, construction keyed cylinders shall be voided mechanically without the removal of the cylinders from the locks. All construction keyed cylinders shall be individually keyed as required and subject to a single master key.

2) Keying System: Final keying to determine lock cylinders, keyed alike sets, level of keying, master key groups, grandmaster keying system shall be as directed by the Owner. Supplier and Contractor shall meet with the Owner and obtain final instructions in writing. Provide two nickel silver keys for each lock, and six keys for each grandmaster and masterkey system. Provide two blank keys for each lock for the Owner's convenience in making additional keys.

3) Key Control System: Furnish a key control system of the type specified. Furnish complete accessories including key gathering envelopes, labels, reserve pattern key tags with self-locking key clips, key receipt forms, key receipt holders, 3-way visible card index, temporary key markers and permanent key markers.

a) Model 1205-D; Lund Equipment Co., Inc.
b) Aristocrat AWC 450-S; Telkee, Inc.

b. SCK02: Interchangeable Core Cylinder Bodies: Full faced cylinders with square shouldered (not tapered) compression rings, standard threaded. Provide **construction core** for installation into all locks.

1) 1100 Series Flexible Head Mortise Cylinder; Corbin Russwin Architectural Hardware (CR).
2) 6300/7300 Series Adjustable Front Cylinder; Sargent Manufacturing Company (SGT).
3) FSIC system by Schlage Lock Company (SCH).

B. (SL): LOCKS AND LATCHES

1. (SLM): Mortise Lock and Latch Sets: Heavy duty, commercial, mortise bodies complying with BHMA A156.13 Series 1000, Grade 1, with throughbolted lever trim. Furnish mortise type, field reversible without disassembly, field multifunctional without opening lock cases, lock and latch sets with 1 or 2 piece anti-friction deadlocking stainless steel latchbolts having a minimum 3/4 inch (19 mm) throw, 2-3/4 inches (70 mm) backset, and UL listed for 3 hour doors. All lock and latch sets, to be furnished complete with heavy 0.109 inch (2.77 mm) (12 gage)wrought steel zinc dichromate or chrome plated case, trim, adjustable beveled square cornered armored fronts, and cold forged steel or stainless steel hubs. Conceal fastenings, washers and bushings. Provide wrought, or black plastic, box strikes for each lock and latch set. Provide brass, bronze or stainless steel strikes with curved lips of sufficient length to protect frames. Provide solid forged or cast levers with wrought roses. Where lock functions are scheduled provide non-handed guard bolt and stainless steel deadbolt with a minimum 1 inch (25 mm) throw. Refer to other section for electro mechanical mortise lock and latch set, Type ESLM.

a. Strikes for Locks and Latches: All strikes for locks and latches shall be provided by the lock and latch manufacturer unless otherwise specified or scheduled, refer to Article 'Locks and Latches.'

b. Strikes on Rabbeted Doors: Provide special rabbeted front and strike on locksets for rabbeted meeting stiles.

c. Manufacturers:

1) Sargent 8200 Series; Sargent Manufacturing Company (SGT). Provide handed ANSI 4-7/8 inch curved lip strikes die punched to match bolts provided with latchset functions only, provide non-handed standard curve lip strikes 82-0110 for all other functions.

a) Turnlever: unless otherwise indicated or selected by the Architect from manufacture's full range of options, provide **MD** Design with 130KB Thumbturn.

2) Corbin-Russwin ML2000 Series; Corbin Russwin Architectural Hardware (CR). Provide handed ANSI 4-7/8" curved lip strikes die punched to match bolts provided with latchset functions only 340L62 (RH) and 340L63 (LH), provide handed standard curve lip strikes for all other functions 340L60 (RH) and 340L61 (LH).

a) Turn lever: unless otherwise indicated or selected by the Architect from manufacture's full range of options, **provide Museo Line – Georgia 102** Design x 519F10

3) Schlage L9000 Series; Schlage Lock Company (SCH). Provide handed ANSI 4-7/8 inch curved lip strikes die punched to match bolts provided with latchset functions only (Part No. XL11-820/XL11-821), provide non-handed standard curve lip strikes for all other functions 10-072.

a) Turn lever: unless otherwise indicated or selected by the Architect from manufacture's full range of options, provide **LAT Latitude Design** x A Rose x 09-905.

d. Functions:

1)

2) SLM26 Institutional Privacy. ANSI F26. Latch bolt operated by lever from either side except when outside lever is locked by turn inside. Latch bolt by key outside with override of turn inside when manually held in locked position. Operating inside lever or closing door unlocks outside lever. Auxiliary dead latch. (Keyed Latchbolt Locksets, Single Cylinder). **Provide occupancy/status indicator.**

e. (ESLM): Electro Mechanical Mortised Lock and Latch Set

1) ESLM01: Electric Heavy Duty, Commercial, Mortise Bodies; Same as Type SLM (provide with trim and lever matching mechanical locksets). In addition, where electro-mechanical mortise lockset are scheduled provide transformers properly sized for conversion of power supply to the power characteristics of the electromechanical locksets. Provide request to exit (REX) monitoring feature. Provide fail safe or fail secure function as specified on door schedule remarks. **Coordinate with security hardware for access systems, including card readers, keypads, or other activation devices**.

a) Sargent 8200 Series: Where electro-mechanical locksets are scheduled provide 8270 Series with trim matching mechanical locksets.
b) Corbin-Russwin ML2000 Series: Where electro-mechanical locksets are scheduled provide ML20900ECL Series with trim matching mechanical locksets.
c) Schlage L9000 Series. Where electro-mechanical locksets are scheduled provide L9909x Series with trim matching mechanical locksets.

2. (SDS): Self Latching

a. SDS01 Self-Latching Flush Bolt Assemblies for Metal Fire Doors: BHMA A156.3, Type 27; one of the following:

1) No. 845 (805 top bolt x 840 automatic bottom bolt); Door Controls International (DCI).
2) FB51P (FB51T constant latching top bolt x FB31B automatic bottom bolt; Ives (IVS).
3) 3820 (3820 x 3810); Trimco (Triangle Brass Manufacturing Company, Inc.) (TBM).
4) 2845 automatic flush bolt x constant self-latching top bolt; Rockwood Manufacturing Company (RM).
5) 2845 automatic flush bolt x constant self-latching top bolt; Rockwood Manufacturing Company (RM).

2.3 (O): OPERATING

A. (OC): CLOSERS

1. (OCS): Surface Mounted Type

a. OCS01: Surface-Mounted Cast-Iron Closers: Closers shall be certified by ETL laboratories and the manufacturer to a minimum of 8,000,000 cycles and meet BHMA A156.4, Grade 1. Closers used in conjunction with overhead stops and holders shall be templated and coordinated to function properly. Properly detail closers to meet application requirements by providing drop plates, brackets, etc. to meet application and installation requirements as indicated. Comply with manufacturer's recommendations for size of door closer depending on size of door, stack pressure conditions, exposure to weather, and anticipated frequency of use. Closers shall have adjustable spring power, full rack and pinion, independent closing speed and latch regulating V-slotted valves, fully hydraulic with a high strength cast iron cylinder and solid forged steel arms, bore diameter of 1-1/2 inches (38.1 mm), pinion shaft diameter of 5/8 inches (15.87 mm), adjustable back check, cushion and built-in stop feature where scheduled, hold open arms where scheduled, delayed action where scheduled, arm finish to match closer cover finish scheduled. Provide metal covers of clean line design with plated or primed for paint finish as scheduled and that require removal in order to make adjustments to closer.

1) 4110/4010; LCN Closers (LCN); Parallel arms

2) 281; Sargent Manufacturing Company (SGT); Parallel arms
3) PR-9500-M/R-9500-M; Norton (NO).

2. (EOCS): Electromagnetic Overhead Surface Closers, Surface Mounted.

a. EOCS01: Electromagnetic Overhead Surface Closers: Closers shall meet BHMA A156.15 and NFPA 101. Properly detail closers to meet application requirements by providing drop plates, brackets, etc. to meet application and installation requirements as indicated. Comply with manufacturer's recommendations for size of door closer depending on size of door, stack pressure conditions, and anticipated frequency of use. Arm and track finish to match closer cover finish scheduled. Provide metal covers of clean line design with plated or primed for paint finish as scheduled and that require removal in order to make adjustments to closer. Furnish closers for 24 V AC/DC voltage.

1) Sentronic 4040SE; LCN Closers (LCN).

B. (OS): STOPS AND HOLDERS

1. General:

a. Floor Stops: Cast half dome design with rubber bumper, finish as scheduled. Provide manufacturer's standard riser heights as required for carpeted areas in conjunction with the floor bumpers scheduled. Unless otherwise scheduled, provide floor stops at each door leaf where partition construction does not allow the door to swing greater than 90 degrees.
b. Wall Stops: Cast disc type with concave rubber bumper, having a minimum 2-1/8 inch (54 mm) diameter base with nominal 1 inch (25 mm) projection and concealed attachment to substrate. Unless otherwise scheduled, provide wall stops at each door leaf where partition construction does not allow the door to swing greater than 90 degrees.
c. Electromagnetic Door Hold Opens for Labeled Fire and Smoke Door Assemblies: Provide each electromagnetic door hold open with fail-safe operation, concealed wiring, door mounted contact plates with concealed mounting fasteners, shims, extensions, and installed approximately 6 inches in from lock edge of door. Comply with BHMA A156.15 for wall mounted single unit, water resistant floor mounted single unit, water resistant floor mounted double unit for back to back mounting to the extent indicated. Coordinate voltage and current characteristics with power supplied to holders, in addition coordinate with fire detectors and interface with fire alarm system.

2. (OSS): Stops
a. OSS09: Wall stop for Attachment to Gypsum Wallboard: Complying with BHMA A156.16, Type L12251 or L12101.

1) WS402CCV; H.B. Ives (IVS).
2) 1270WV; Trimco (Triangle Brass Manufacturing Company, Inc.) (TBM).

3. (OSH): Holders

a. OSH01: Concealed Overhead Door Holders: Heavy duty, concealed mounting, full mortised, bronze bodied, slide track design, with heavy shock absorber spring providing 5 to 7 degree compression before deadstop, non-metal slide and shock blocks, 110 degree maximum opening, complying with BHMA A156.8 Type

C11511 for hold open and Type C11541 for stop function. Provide stop, or hold open, functions as scheduled.

1) 1000 Series; Architectural Builders Hardware Mfg., Inc. (ABH).
2) 100 Series; Glynn-Johnson (GJ).
3) Checkmate Heavy Duty 1 Series; Rixson-Firemark, Inc. (RIX).

4. (EOSH): Electromagnetic Holders

a. EOSH01: Wall Mounted Single Unit – Low Profile:

1) Model 989; Rixson-Firemark, Inc. (RIX).
2) Model 2400L; Architectural Builders Hardware Mfg., Inc. (ABH).

b. EOSH02: Wall Mounted Single Unit – High Profile: Provide door holder assemblies with a total projection to clear hardware and trim projections.

1) Model 990 Series; Rixson-Firemark, Inc. (RIX).
2) Model 2400; Architectural Builders Hardware Mfg., Inc. (ABH).

C. (OE): EXIT DEVICES

1. General:

a. Exit Devices: Exit devices and exit device accessories shall conform to BHMA A156.3, Grade 1. Trim shall be wrought construction and commercial plain design with straight, beveled or smoothly rounded sides, corners and edges. Keyed devices shall be furnished less cylinders. Cylinders shall be as herein specified keyed to building system.

b. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

c. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

d. Outside Trim: Match design for locksets and latchsets, unless otherwise indicated.

2. (OEP): Panic Exit Device
a. OEP14 – Standard, Concealed Rod ,(non-wood door)

1) Von Duprin 9847/9947 Concealed Vertical Rod Touch Bar Exit Device; Allegion

2) Sargent MD8600 & NB-MD8600 Concealed Vertical Rod Exit Device for Metal Doors *(provide a different number for aluminum doors)*

2.4 (M): MISCELLANEOUS

A. (MK): KICK /ARMOR PLATES

1. (MKP): Kick and Armor Plates

a. Furnish kick and armor plates sized 2 inches (51 mm) less than door width when located on push side of door and 1 inch (24.5 mm) less than door width when indicated on the pull side of door. Furnish kickplates 12 inches (305 mm) high, furnish armor plates 48 inches (1219 mm) high unless otherwise indicated. Provide protective plates with cutouts for locks, louvers and windows to the extent indicated. Mount protective plates flush with bottom of door.

b. MKP01: Kick and Armor Plates: Fabricate protection plates from minimum 0.050 inch (1.3 mm) thick stainless steel, beveled top and 2 sides (B3E), square corners, complying with BHMA A156.6, and fastened with oval head Phillips fasteners countersunk into plate surface. Coordinate finish of plate with Architect.

1) Series 8400; Ives (IVS).
2) K1050 Doorplate Series; Rockwood Manufacturing Company (RM)
3) KA050-2 Armor Plate and KOO50 for Kickplates; Trimco (Triangle Brass Manufacturing Company, Inc.) (TBM).

B. (MC): COORDINATORS

1. (MCO): Coordinators

a. MCO01,Tubular Coordinators and Filler Bars: UL listed for use on labeled doors and complying with BHMA A156.3, Type 21A. Provide with filler piece of length as required to close the header area and mounting brackets at stop mounted hardware. Furnish extenders at active leaf levers where required to clear overlapping astragals on doors installed with pocket pivot hinges or jambs with deep jamb stops.

1) No. 600 Series x Filler Bar; Door Controls International (DCI).
2) COR Series Coordinators x FL filler; Ives (IVS).

b. MCO02, Coordinator Brackets: UL listed for use on labeled doors and complying with BHMA A156.3, Type 21B. Minimum 7 inch (178 mm) projection.

1) No. 500 Coordinator; Door Controls International (DCI).
2) CORG7; Ives (IVS).

c. MCO03: Carry Open Bars: UL listed for use on labeled doors and complying with BHMA A156.3, Type 21. Provide carry-open bars for inactive leaves of pairs of doors, unless automatic or self-latching bolts are used.

1) No. CB Carry Bar; Door Controls International (DCI).
2) CB1 Carry Bar; Ives (IVS).

C. (MA): ASTRAGALS

1. (MAS): Astragals

a. MAS01: Astragals: UL listed for use on labeled doors, surface applied continuous extruded aluminum minimum 7/8 inch wide retaining EPDM gaskets for installation on both sides of all meeting stiles of doors:

1) 125NA; National Guard Products, Inc. (NGP).
2) 305CN; Pemko Manufacturing Co., Inc. (PEM).

D. (MS): SILENCERS

1. (MSM): Silencers for Metal Doors

   a. MSM01, Silencers for Metal Door Frames: BHMA A156.16, Type L03011; grey rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame, specifically designed to form an air pocket to absorb shock and reduce noise of door closing. Provide two silencers for each pair of doors, three silencers for each single door.

      1) 8S; Door Controls International (DCI).
      2) SR64; H. B. Ives (IVS).
      3) 1229A; Trimco (Triangle Brass Manufacturing Company, Inc.)(TBM).
      4) 608; Rockwood Manufacturing Company (RM)

2. (MSA): Silencers for Aluminum Doors

   a. MSA01: Silencers for Aluminum Door Frames: Refer to Section 08 12 16 "Interior Aluminum Frames."

E. (MG): DOOR GASKETING

1. (MGM): Mortised Type

   a. MGM01: Continuous extruded aluminum housing 1-3/8 by 3/4 inch (35 by 19.05 mm) retaining closed cell sponge neoprene gasket and snap on cover to conceal fasteners; finish as scheduled. Zero 470A modified.

   b. MGM03: Continuous extruded aluminum track 5/32 by 13/32 inch with pile weather-stripping insert to seal gaps up to 3/16". Sweep shall be installed at both vertical jambs of door leaf in the door opening.

      1) 369; Pemko

F. (MT): THRESHOLDS

1. Manufactures:

   a. Pemko
   b. Hager Companies
   c. National Guard Products

2. (MTI): Interior Type

   a. MTI03: 1/2 inch (13 mm) high by 5 inch (127 mm) wide extruded aluminum panic threshold with resilient bumper gasket.

      1) 477S; Hager Companies (HAG).
      2) 950; National Guard Products, Inc. (NGP).
      3) S257AV; Reese Enterprises, Inc. (RE).
      4) 566A; Zero International, Inc. (ZRO).

G. (MO): OTHER TYPES

1. (MOH): Other Hardware Types

   a. MOH07; Coat Hooks: Surface-Mounted coat hook, stainless steel, minimum 1-1/8 by 1-1/8 by 1-1/8 inch (28.6 by 28.6 by 28.6 mm) projection.

      1) B-9542; Bobrick

b. MOH08; Double-lipped Strike: Strike with rescue stop and inset for mortise lock without deadbolt complying with ANSI A1882.

1) SCRM4590 with ABH4590; Architectural Builders Hardware Mfg., Inc. (ABH)
2) DLS-2 with ES-1; Stanley Commercial Hardware (STH).

2.5 FABRICATION

A. Manufacturer's Nameplate: Provide each door hardware item without exposed manufacturers' labels, names, or designs.

B. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips oval-head screws with finished heads to match surface of door hardware item being attached. Machine screws and expansion shields shall be used for attaching hardware to concrete and masonry. Use throughbolts for renovation work only where existing door blocking and reinforcements are unknown.

C. Concealed Fasteners: All new doors and door frames have been specified with adequate blocking and reinforcement provisions to eliminate exposed throughbolting of hardware items. Doors installed with exposed throughbolts will be rejected and replaced by the Contractor at no cost to the Owner. Where through bolts are used on existing doors provide sleeves for each through bolt.

2.6 FINISHES

A. Standard: Comply with BHMA A156.18.

B. Appearance of Finished Work: Finishes of the same designation, that come from two or more sources, shall match when the items are viewed at arm's length and approximately 24 inches (610 mm) apart. Unless otherwise scheduled, match each hardware item in a single hardware set with the scheduled latch or lock set finish. Painting of BHMA 600 (USP) surfaces is required and is specified under Section 09 91 23 "Interior Painting."

C. Designations: The abbreviations used to schedule hardware finishes are generally BHMA (Federal Standards where indicated in parenthesis) designations. Comply with base material and finish requirements indicated by the following:
1. BHMA 630 (US32D): Satin stainless steel.
2. Alum.: Aluminum.

D. All door hardware exposed to view shall be BHMA **630**or . Aluminum doors with exposed door hardware to view shall be BHMA Alum.

PART 3 - EXECUTION

3.1 PREPARATION

A. Hardware for fire door assemblies shall be installed in accordance with NFPA 80. Hardware for smoke and draft control door assemblies shall be installed in accordance with NFPA 105. Install hardware for non-labeled and non-smoke and draft door assemblies in accordance with BHMA A156.115for steel doors and frames, and BHMA A156.115-W series for wood doors, and hardware manufacturer's installation instructions for doors and frames fabricated from other than steel or wood.

B. All modifications to fire doors and frame for electric and mortised hardware shall be made by the respective door and frame manufacturers.

C. Smoke Seals at S Labeled Door Assemblies: Provide and install smoke seals at S labeled doors in accordance with door manufacturer's instructions.

3.2 INSTALLATION

1. Mounting Heights: Mount door hardware units at the following heights, unless specifically indicated on the Drawings or required to comply with governing regulations:

2. Locks and Latches: 38 inches (956 mm) to center of lever from finish floor.
3. Door Pulls: 44 inches (1118 mm) from finish floor to center of grip. Pull bases centered on door stiles, unless otherwise indicated.
4. Butt Hinges: 10 inches (254 mm) to bottom of lowest hinge from finish floor; 5 inches (127 mm) to top of upper hinge from top of door; space intermediate hinges equally between lower and upper hinges.

5. Exit Devices: 40 inches (1016 mm) from finish floor to center of touch bar. 38 inches (965 mm) from finish floor to center of cross bar.
6. Coat Hooks: 48 inches (1200 mm) from finish floor to center of coat hook.
7. Install each door hardware item to comply with manufacturer's written instructions. Install overhead surface closers for maximum degree of opening obtainable. Place on room side of corridor doors, stair side of stair doors, secondary corridor side of doors between corridors. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be finished, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
8. All wall stops shall be installed with reinforced blocking in wallboard construction. Drywall anchors are not an acceptable means of reinforcement/blocking. Provide intermediate steel plates or channel reinforcement backing at wall stops mounted in wallboard construction.
9. Do not install permanent key cylinders in locks until the time of preliminary acceptance by the Owner. At the time of preliminary acceptance, and in the presence of the Owner's representative, permanent key all lock cylinders. Record and file all keys in the key control system specified, and turn system over to Owner for sole possession and control.
10. Key control storage system shall be installed where directed by the Owner.

11. Thresholds: Thresholds shall be secured with a minimum of 3 fasteners per single door width and 6 fasteners per double door width with a maximum spacing of 12 inches (305 mm). Minimum screw size shall be No. 10 length, dependent on job conditions, with a minimum of 3/4 inch (19 mm) thread engagement into the floor or anchoring device used. Screw heads to be countersunk and flush with face of threshold. Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants." Once installed thresholds shall not rock or cause noise when walked on.

3.3 FIELD QUALITY CONTROL

1. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
2. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.4 ADJUSTING

1. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every hardware component. Replace hardware components that cannot be adjusted to operate as intended. Adjust door control devices to compensate for building stack pressures, final operation of forced air mechanical equipment and to comply with referenced accessibility requirements.

2. Test each electrical hardware item to determine if devices are properly functioning. Wiring shall be tested for correct voltage, current carrying capacity, and proper grounding. Stray voltages in wiring shall be eliminated.
3. Coordinate with electrical installation for interface and connection with life safety and security systems.

4. Fire-Rated Door Assembly Testing: Upon completion of the installation, test each fire door assembly in the project to confirm proper operation of its closing device and that it meets all criteria of a fire door assembly as per NFPA 80 2007 Edition. The inspection of the fire doors is to be performed by individuals with knowledge and understanding of the operation components of the type of door being subjected to testing and who are either credentialed as an Architectural Hardware Consultant (AHC) or as a Fire Door Annual Inspector (FDAI). A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The record shall list each fire door assembly throughout the project, and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation. Clean hardware components as necessary to restore proper finish. Provide protection during the progress of the work and

maintain conditions that ensure door hardware is in perfect working order and without damage or deterioration at time of Substantial Completion.

3.6 OPENINGS SCHEDULE

Refer to Openings Schedule on Drawings.

END OF SECTION 08 71 00

SECTION 087113 - POWER DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Low-energy door operators for swinging doors.

1.2 DEFINITIONS

A. AAADM: American Association of Automatic Door Manufacturers.

B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.

C. Double-Egress (Doors): A pair of doors that simultaneously swing, with the two doors moving in opposite directions with no mullion between them.

D. Double-Swing (Doors): A pair of doors that swing, with the two doors moving in opposite directions with a mullion between them; each door functioning as a single-swing door.

E. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.

F. For automatic door terminology, see BHMA A156.19 for definitions of terms.

1.3 COORDINATION

A. Coordinate sizes and locations of recesses in concrete floors for recessed control mats that control power door operators. Concrete, reinforcement, and formwork requirements are specified elsewhere.

B. Templates: Distribute for doors, frames, and other work specified to be factory prepared and reinforced for installing power door operators.

C. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.

D. Electrical System Roughing-in: Coordinate layout and installation of power door operators with connections to the following:

1. Power supplies.

2. Access-control system.
3. Remote activation devices.
4. Remote monitoring systems.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for power door operators.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For power door operators.

1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Indicate locations of activation and safety devices.
4. Include diagrams for power, signal, and control wiring.
5. Include plans, elevations, sections, and attachment details for guide rails.

C. Samples: For each exposed product and for each color and texture specified, manufacturer's standard size.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of power door operator. For each operator for fire-rated door assemblies, certify that operator is listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for use on types and sizes of labeled fire doors required.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For power door operators, safety devices, and control systems, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation and maintenance of units required for this Project and who employs a Certified Inspector.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

B. Certified Inspector Qualifications: Certified by AAADM.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of power door operators that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty or sporadic operation of power door operator, including controls.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Basis of Design: SW200 or SW200i-OHC: Besam Entrance Solutions; an ASSA ABLOY Group Company.
2. Door Motion Technologies, Inc.
3. DORMA USA, Inc.
4. Falcon; an Allegion Brand.
5. Hager Companies.

6. Horton Automatics; a division of Overhead Door Corporation.
7. Hunter Automatics, DITEC Entrematic Group.
8. KM Systems, Inc.
9. LCN; an Allegion brand.
10. NABCO Entrances, Inc.
11. record-usa.
12. SARGENT Manufacturing Company; ASSA ABLOY.
13. Stanley Access Technologies.

B. Source Limitations: Obtain power door operators, including activation and safety devices, from single source from single manufacturer.

2.2 POWER DOOR OPERATORS, GENERAL

A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and in accordance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.

1. Emergency Breakaway: Where indicated for center-pivoted doors, provide emergency breakaway feature for reverse swing of doors. Equip system to discontinue power to power door operator when door is in emergency breakaway position, to return door to closed position after breakaway, and to automatically reset.
2. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation, including spring closing when power is off.

C. Hinges: See Section 087100 "Door Hardware" for hinge type for each door that door operator shall accommodate.

D. Housing for Overhead Concealed Operators: Fabricated from minimum 0.125-inch- thick, extruded or formed aluminum and extending full width of door opening, including door jambs, to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

E. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch- thick, extruded or formed aluminum; manufacturer's standard width; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.

F. Brackets and Reinforcements: Fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.

G. Fire-Door Package: Consisting of UL-listed latch mechanism, power-reset box, and caution signage for fire-rated doors. Latch mechanism shall allow door to swing free during automatic operation; when fire is detected, latch actuator shall cause exit hardware to latch when door closes. Provide latch actuators with fail-secure design.

H. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 LOW-ENERGY DOOR OPERATORS FOR SWINGING DOORS

A. Standard: BHMA A156.19.

B. Performance Requirements:

1. Opening Force if Power Fails: Not more than 15 lbf required to release latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
2. Entrapment-Prevention Force: Not more than 15 lbf required to prevent stopped door from closing or opening.

C. Configuration, Single: Operator to control single swinging door.

1. Traffic Pattern: One way.
2. Operator Mounting: Overhead concealed.

D. Configuration, Pair: Operator to control pair of swinging doors.

1. Traffic Pattern: One way and/or Double egress.
2. Operator Mounting: Overhead concealed.

E. Operation: Power opening and power-assisted spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.

F. Operating System: Electromechanical.

G. Microprocessor Control Unit: Solid-state controller.

H. Features:

1. Adjustable openingandclosing speed.
2. Adjustable openingandclosing force.
3. Adjustable backcheck.
4. Adjustable hold-open time from zero to 30 seconds.
5. Adjustable time delay.

6. Adjustable acceleration.
7. Obstruction recycle.
8. On-off/hold-open switch to control electric power to operator.

I. Activation Device: Push-plate switch and/or Touchless switch to activate door operator.

J. Exposed Finish: Class I, clear anodic finish.

2.4 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: ASTM B221.
2. Sheet: ASTM B209.

B. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness, in manufacturer's standard thickness.

C. Expanded Aluminum Mesh: Expanded and flattened aluminum sheet in accordance with the geometry of ASTM F1267.

D. Polycarbonate Sheet: ASTM C1349, Appendix X1, Type II, coated, mar-resistant, UV-stabilized polycarbonate with coating on both surfaces.

E. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 CONTROLS

A. General: Provide controls, including activation and safety devices, in accordance with BHMA standards; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.

B. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.

1. Configuration:

a. Square push plate with 4-by-4-inch junction box.

1) Mounting: 3'-2" A.F.F. with Recess mounted, semiflush in wall.

2. Push-Plate Material: Stainless steel as selected by Architect from manufacturer's full range.

3. Message: International symbol of accessibility and "Push to Open."

C. Touchless Switch: Hands-free activation door-control switch with flat motion sensor face-plate with contrasting-colored, engraved message.

1. Configuration: 4.56-by-4.56-inch (double gang) square face plate.

a. Mounting: 3'-2" A.F.F. with Recess mounted in wall.

2. Face-Plate Material: Stainless steel.
3. Message: International symbol of accessibility and "Wave to Open" and wave symbol.

D. Wireless or Remote Radio-Control Switch: Radio-control system consisting of header-mounted receiver and wall-mounted transmitter switch.

1. Wall-Mounted Transmitter Switch: One red-button, momentary-contact actuator enclosed in 4-by-4-inch junction box. Provide blue plastic cover engraved with "Press Button to Open" in white text and with international symbol of accessibility.

E. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.6 ACCESSORIES

A. Signage: As required by cited BHMA standard for type of door and its operation.

1. Application Process: Operator manufacturer's standard process.
2. Provide sign materials with instructions for field application when operators are installed.

2.7 FABRICATION

A. Factory fabricate power door operators to comply with indicated standards.

B. Form aluminum shapes before finishing.

C. Fabricate exterior components to drain condensation and water-passing joints within operator enclosure to the exterior.

D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.

E. Provide metal cladding, completely covering visible surfaces before shipment to Project site. Fabricate cladding with concealed fasteners and connection devices, with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion, and with allowance for thermal expansion at exterior doors.

2.8 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary, protective covering before shipping.

B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, and other conditions affecting performance of power door operators.

B. Examine roughing-in for electrical systems to verify actual locations of power connections before power door operator installation.

C. Verify that full-height finger guards are installed at each door with pivot hinges, where door has a clearance at hinge side greater than 1/4 inch and less than 3/4 inch with door in any position.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install power door operators in accordance with manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.

1. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
2. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.

B. Controls: Install activation and safety devices in accordance with manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel. Connect control wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Access-Control System: Connect operators to access-control system as specified in Section 281500 "Access Control Hardware Devices."

D. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

E. Guide Rails: Install in accordance with BHMA A156.10, including Appendix A and manufacturer's written instructions unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

A. Certified Inspector: Owner will engage a Certified Inspector to test and inspect components, assemblies, and installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Test and inspect each power door operator installation, using AAADM inspection forms, to determine compliance of installed systems with applicable BHMA standards.

C. Power door operators will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust power door operators to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.

B. After completing installation of power door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.

C. Readjust power door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

D. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain power door operators.

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Glazed entrances.
4. Interior borrowed lites.

B. Refer to 081216 - Interior Aluminum Doors and Frames for requirements applicable to single subcontract responsibility for glazing.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each glass product and glazing material indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Samples: Label samples to indicate product, characteristics, and locations in the Work. Furnish samples of the following:

1. Except for clear glass, submit samples of each glass type specified, in the form of 12 inch square Samples.
2. Submit samples of each glass type specified where production run varies and defects are expected.
3. Submit samples of applied film adhered to clear glass, in the form of 12 inch square samples.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Manufacturer Certificates: Submit a letter from glass manufacturer certifying that he has reviewed the glazing details proposed for the Project, including the use of gaskets and sealants, and that each product to be furnished is recommended for the application shown.

C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. Material Certificates: Submit glass treatment certificates signed by manufacturer of the heat-soaked glass products certifying that products furnished comply with requirements.

D. Warranties: Submit special warranties specified in this Section.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: Submit maintenance data for each applied glass film to be installed or applied, including recommendations and instructions for cleaning, maintenance, removal, and replacement of same.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

C. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

D. Safety Glass: Comply with the applicable requirements of the laws, codes, ordinances and regulations of Federal and Municipal authorities having jurisdiction; wherever requirements conflict, the more stringent shall be required. Obtain approvals from all such authorities. As a minimum, provide Category II complying with testing requirements in 16 CFR 1201 (Consumer Product Safety Commission "Safety Standard for Architectural Glazing Materials," as published in the Code of Federal Regulations) and ANSI Z97.1 for Category A performance.

1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction. Locate permanent markings in one corner, and in the same location, of each glass lite in accordance with the requirements of the SGCC labeling guidelines. Markings shall have a nominal size of no greater than 1-inch in diameter, and be located with glass edge clearances, at the corner, by not more than 3/4-inch up and 3/4-inch over.

E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual" and "Laminated Glass Design Guide."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials.

1.7 WARRANTY

A. Manufacturer's Special Warranty on Ceramic Frit Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those coated-glass units whose coatings flake, peel, or crack within the specified warranty period indicated below. Upon notification of such deterioration within the warranty period furnish replacement glass units for those glass units whose coatings have flaked, peeled, or cracked at the convenience of the Owner.

1. Warranty Period: Five years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Written warranty, made out to Owner and signed by laminated-glass manufacturer agreeing to furnish replacements for laminated-glass units that develop edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those specified within the warranty period indicated below. Upon notification of such deterioration within the warranty period, furnish replacement glass units for those glass units having edge separation, delamination, and blemishes at the convenience of the Owner.

1. Warranty Period: Five years from date of Substantial Completion.

C. Heat Soaked Tempered Glass Special Warranty: Executed by the Contractor, manufacturer and the glass installer agreeing to replace glass units that spontaneously break as a result of Nickel Sulfide (NiS) inclusions within the specified warranty period without material or labor charges to the Owner.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Refer to Finish Schedule on the Drawings for the extent of glass types and locations. Confirm the levels of heat treatment required for each glass type scheduled as contained in Articles "Performance Requirements" and "Quality Assurance."

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide and install glazing systems capable of withstanding impact loads without failure of any kind, including loss or breakage of glass, failure of seal or gaskets, exudation of glazing sealants, and excessive deterioration of glazing materials.

B. Glass Design: Glass thicknesses and heat treatments indicated are minimum requirements. Glazing details shown are for convenience of detailing only and are to be confirmed by the Contractor relative to cited standards and final framing details.

1. At hollow metal framed, and interior aluminum door and frame openings, provide glass thickness such that the center of glass deflection at a full lateral pressure of 5 psf in a direction normal to the plane of the wall shall not exceed 1/2 inch . Confirm glass thicknesses and heat treatments, as required to meet the performance requirements.
2. Confirm glass thicknesses and heat treatments, as required to meet the performance and testing requirements specified in Section 081216 - Interior Aluminum Doors and Frames.

2.3 PRIMARY FLOAT GLASS

A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); Class 1, ultra clear low iron with visible light transmission of not less than 91 percent as indicated in Finish Schedule on the Drawings.

1. Ultra Clear, Low Iron Glass: Where indicated in the schedules clear, low iron glass shall mean low iron products as follows:

a. AGC Asahi Glass Co. Ltd.; Krystal Klear.
b. Guardian Industries Corp.; UltraWhite.
c. Pilkington North America; Optiwhite.
d. Vitro S.A.B. de C.V.; Starphire.

2.4 LAMINATED GLASS

A. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, including those in the Glass Schedule.

B. Interlayer: Minimum 0.060 inch thick polyvinyl butyral (PVB) sheet or ionoplast sheet interlayer material with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

1. All interlayer furnished for the Project shall have been manufactured by one of the following:

    a. Eastman Chemical Company.
    b. Kuraray.

C. Laminating Process: Prior to laminating, cut glass to required sizes and profiles as determined by accurate measurement of openings to be glazed, making allowance for required edge clearances. Cut and process edges in accordance with glass manufacturer's recommendations. Do not cut or treat edges in the field. Fabricate laminated glass to produce glass free of scuff vinyl markings, handprints, tag residue, and foreign substances such as lint, hair, vinyl shavings in the central glass area and the outer 20 percent area when viewed from a distance of 39 inches and 10 feet , respectively. Handprints, tag residue, scuff vinyl markings and foreign substances must be separated by more than 12 inches if not detectable at less than the viewing distances. Delaminations, blow ins, short interlayers, and air or gas pockets shall not be permitted in the central glass area. In the outer 20 percent area, delamination will not be permitted; blow-ins, air or gas pockets, and short interlayers shall be limited to a maximum dimension of 3/32 inch in diameter, 3/32 inch in diameter, and 1/16 inch long, respectively. Laminate units as follows:

1. Laminate lites with interlayer in autoclave with heat plus pressure.

2.5 FIRE-RATED GLAZING PRODUCTS

A. Laminated Ceramic Glazing Material: Two lites of clear ceramic glazing material laminated together to produce a laminated lite of minimum 5/16 inch nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft. ; and as follows:

1. Fire-Protection Rating: As indicated for the assembly in which the glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Polished on both surfaces, transparent.
3. Product: Provide one of the following:

    a. "FireLite Plus"; Nippon Electric Glass Co., Ltd. and distributed by Technical Glass Products.

b. Schott Pyran Platinum L; McGrory Glass.
c. Keralite FR-L; Vetrotech.

2.6 GLAZING SEALANTS

A. Gasket, Blocking, and Spacer Wet Glazing Materials: Silicone, compatible with and adherent to each material it will be in contact with, as recommended by the manufacturer to fulfill performance requirements.

1. VOC Content: For architectural sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Provide structural glazing sealants and sealant primers, having not more than 100 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Butt Glazing Sealants: Refer to Section 079200 "Joint Sealants" for butt glazing sealant.

C. Glazing Sealant for Fire-Resistive Glazing Products: Identical to product used in test assembly to obtain fire-protection rating.

1. VOC Content: Provide architectural glazing sealants and sealant primers having not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 GLAZING GASKETS

A. Dense Compression Gaskets: Continuous extruded EPDM with cross-sectional profile, physical properties, and tolerances as recommended by the glass manufacturer, and as required to comply with the performance requirements specified and shown, all in compliance with the applicable provisions of ASTM C 864, Option II.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces and wet glazing materials contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: EPDM complying with ASTM C 864 (Option II), blocks, 85 +/- 5 Shore A durometer hardness, 1/16 inch less than the channel width, and length based on the face area the glass unit to be supported in accordance with GANA standards and glass manufacturer recommendations but not less than 4 inches .

D. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.9 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

1. Edge and Surface Conditions: Comply with the recommendations of AAMA "Structural Properties of Glass" for "clean-cut" edges, except comply with manufacturer's recommendations when they are at variance therewith.
2. Exposed Glass Edges and Surface Condition: All edges shall be flat with an arrissed edge profile (small bevel of uniform width not exceeding 1/16 inch at an angle of approximately 45 degrees to the surface of the glass) with a polished (surface is reflective in appearance similar to the major surface of the glass) surface.

B. Cutting: Do not nip glass edges. Edges may be wheel cut or sawed and seamed at manufacturer's option. For glass to be cut at site, provide glass 2 inches larger than required in both dimensions, so as to facilitate cutting of clean cut edges without the necessity of seaming or nipping. Do not cut, seam, nip or abrade heat-treated glass.

C. Etching: Clean glass surfaces of all oil, grease, and any other deleterious substances that might affect the Work. Etch glass. Etched areas of glass to appear light white in a density and color as acceptable to the Architect. Seal acid-etched glass surfaces with glass sealer (Skyline Etch Sealer; Skyline Design, Chicago, IL).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine glass framing, with glazier and glass framing erector present, for compliance with the following:

1. Compliance with the specified manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Minimum required face or edge clearances.
3. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing stops, glazing channels, and rabbets which will be in contact with the glazing materials immediately before glazing. Remove coatings which might fail in adhesion or interfere with bond of sealants. Comply with manufacturer's instructions for final wiping of surfaces immediately before application of primers. Wipe metal surfaces with IPA (isopropyl alcohol).

1. Prime surfaces to receive glazing compounds. When priming, comply with wet glazing manufacturer's recommendations.

B. Inspect each glass unit immediately before installation. Do not install any units which are improperly sized or have damaged edges, scratches or abrasion, or other evidence of damage. Remove labels from glass immediately after installation.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

1. All glass units shall be installed in accordance with the glass manufacturer's recommendations.

a. Butt Glazed Interior Monolithic Glass Units: Mask the surfaces on both sides of the joints to be glazed. Provide wood dowel, with a diameter of at least three times that of the joint width, wrapped in polyethylene tape, and firmly taped to interior face of glass unit to be glazed to act as a backup during glazing operation. Place glazing sealant and tool face of sealant slightly concave using extreme care not to chip or otherwise abrade corners of glass. Allow sealant to fully cure before removing dowel.

B. Glazing channel dimensions as indicated on Drawings. Provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to surfaces indicated to receive glazing materials.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless more stringent requirements are recommended by glass manufacturer.

1. For Glass Units Less Than 72 Inches : Locate setting blocks at sill one-quarter of the width in from each end of the glass unless otherwise recommended by the glass manufacturer.
2. For Glass Units 72 Inches or Greater: Locate setting blocks at sill one-eighth of the width in from each end of the glass, but not less than 6 inches , unless otherwise recommended by the glass manufacturer.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Set glass lites with uniform pattern, draw, bow, and similar characteristics, producing the greatest possible degree of uniformity in appearance on the entire wall elevation.

1. Set glass units with void between edge of units and glazing channel.

H. Where wedge-shaped gaskets are driven into one side of channel to pressurize gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

I. Miter cut gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away.

3.4 PROTECTION AND CLEANING

A. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way and from any source, including natural causes, accidents, and vandalism.

B. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass and film as recommended by glass and film manufacturer.

END OF SECTION

SECTION 088813 - FIRE-RATED GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection-rated glazing.
2. Fire-resistance-rated glazing.

1.2 DEFINITIONS

A. Fire-Protection-Rated Glazing: Glazing in rated doors and openings up to 45 minutes, limited in size, and not capable of blocking radiant heat.

B. Fire-Resistance-Rated Glazing: Glazing that prevents spread of fire and smoke and radiant heat; used in rated wall and door applications 60 minutes and above without size limitations.

C. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

D. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
3. Environmental Product Declaration (EPD): For each product.
4. Third-Party Certifications: For each product.
5. Third-Party Certified Life-Cycle Assessment: For each product.

6. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
7. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
8. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
9. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each regional material.

C. Glass Samples: For each type of glass product; approximately 6 inches square.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and glass testing agency.

B. Product Certificates: For each type of glass and glazing product.

1. Certification not required for glazing materials bearing manufacturer's permanent label designating type of glass, provided labels represent a quality-control program involving a Nationally Recognized Testing Laboratory (NRTL) acceptable to authorities having jurisdiction.

C. Product Test Listings: From an acceptable NRTL, indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

D. Sample warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the NGA's Certified Glass Installer Program.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during remainder of construction period.

1.9 WARRANTY

A. Manufacturer's Special Warranty on Fire-Protection-Rated Tempered Glass: Manufacturer agrees to replace units that deteriorate within specified warranty period.

1. Deterioration of tempered glass is defined as defects developed from normal use not attributed to glass breakage or to maintaining and cleaning tempered glass contrary to manufacturer's written instructions.

a. Defects are not to exceed those allowed by referenced tempered glass standard.

2. Warranty Period: Five years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Surface-Laminated Monolithic Ceramic Glazing: Manufacturer agrees to replace defective glazing within specified warranty period. Surface-laminated monolithic ceramic glazing defects are defined as edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced surface-laminated standard.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Glass: For each glass type, obtain from single source from single manufacturer.

B. Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems to withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label indicates manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.4 GLASS PRODUCTS

A. Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Low-Iron Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.

C. Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Laminated Glass: ASTM C1172 and EN 12543-6. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer unless fire-protection or fire-resistance rating is based on another product.
2. Interlayer Thickness: Provide thickness as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.5 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing in accordance with NFPA 257 or UL 9, including hose-stream test, and complies with NFPA 80.

1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes to be exempt from hose-stream test.

B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label indicates manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether glazing has passed hose-stream test; whether glazing meets 450 deg F temperature-rise limitation; and fire-resistance rating in minutes.

C. Fire-Protection-Rated Tempered Glass: Provide 90 minute and 120 minute glass per manufacturer's -mm thickness; fire- protection-rated tempered glass; complying with 16 CFR 1201, Category II.

1. Basis-of-Design Product: Subject to compliance with requirements, provide McGrory Glass, Inc.; FireDefend 20 fire-rated glass or comparable product by one of the following:

a. Technical Glass Products.
b. Vetrotech Saint-Gobain.

D. Fire-Protection-Rated Monolithic or Single-Glazed Laminated Glass for Doors and Protected Openings: 19-mm thickness; low-iron fire-protection-rated glass; complying with 16 CFR 1201, Category II. UL- or ITS-listed and tested in accordance with NFPA 252 for fire-rated doors and NFPA 257 for protected openings with hose-stream testing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide McGrory Glass, Inc.; Pyrobel 45 fire-rated glass or comparable product by one of the following:

a. SAFTI FIRST Fire Rated Glazing Solutions.

E. Fire-Protection-Rated Single-Glazed Laminated Glass for Doors Only: 3/4-inch thickness; clear, fire-protection glass; complying with 16 CFR 1201, Category II. UL- or ITS- listed and tested in accordance with NFPA 252 for fire-rated doors with hose-stream testing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide McGrory Glass, Inc.; Pyrobel 45 fire-rated glass or comparable product by one of the following:

a. .

F. Fire-Protection-Rated Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 5- mm thickness; faced on one surface with a clear glazing film; complying with 16 CFR 1201, Category II.

1. Basis-of-Design Product: Subject to compliance with requirements, provide McGrory Glass, Inc.; Pyran Platinum F fire-rated glass or comparable product by one of the following:

a. Schott North America, Inc.
b. Vetrotech Saint-Gobain.

G. Fire-Protection-Rated Laminated Ceramic Glazing: Laminated glass made from two plies of clear, ceramic glass; 8-mm total thickness; complying with 16 CFR 1201, Category II.

1. Basis-of-Design Product: Subject to compliance with requirements, provide McGrory Glass, Inc.; Pyran Platinum ML fire-rated glass or comparable product by one of the following:

a. Schott North America, Inc.
b. Vetrotech Saint-Gobain.

H. Fire-Protection-Rated Laminated Glass with Intumescent Interlayer: Laminated glass made from multiple plies of uncoated, low-iron float glass; with intumescent interlayers; complying with 16 CFR 1201, Category II.

1. Basis-of-Design Product: Subject to compliance with requirements, provide McGrory Glass, Inc.; Pyrobel fire-rated glass or comparable product by one of the following:

a. AGC Glass.
b. Pilkington North America.

2.6 FIRE-RESISTANCE-RATED GLAZING

A. Fire-Resistance-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-resistance ratings indicated, based on testing in accordance with ASTM E119 or UL 263.

B. Fire-Resistance-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label indicates manufacturer's name, test standard, that glazing is approved for use in walls, and fire-resistance rating in minutes.

C. Fire-Resistance-Rated Framing and Doors: Fire-resistance-rated glazing with 60-, 90-, and 120-minute ratings requires framing and doors from glass supplier, tested as an assembly complying with ASTM E119 or UL 263.

D. Fire-Resistance-Rated Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, low-iron float glass; with intumescent interlayers; complying with 16 CFR 1201, Category II.

1. Basis-of-Design Product: Subject to compliance with requirements, provide McGrory Glass, Inc.; Pyrobel fire-rated glass or comparable product by one of the following:

   a. AGC Glass.
   b. Pilkington North America.

2.7 GLAZING ACCESSORIES

A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.

B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. GE Construction Sealants; Momentive Performance Materials Inc.
   b. The Dow Chemical Company.
   c. Tremco Incorporated.

2. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.

C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on one or both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

E. Setting Blocks: Glazing manufacturer to provide setting blocks, if unavailable in standard retail channels, in accordance with manufacturer's written installation instructions.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

C. Perimeter Insulation for Fire-Resistance-Rated Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.

B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 FIRE-PROTECTION-RATED GLAZING SCHEDULE

A. Glass Type: 20-minute fire-protection-rated glazing without hose-stream test; fire-protection-rated tempered glass .

B. Glass Type: 45-minute fire-protection-rated glazing; fire-protection-rated monolithic glass.

C. Glass Type: 90-minute fire-protection-rated glazing with 450 deg F temperature-rise limitation in rated doors only, with a maximum vision area of 100 sq. in.; fire-protection-rated monolithic glass.

3.9 FIRE-RESISTANCE-RATED GLAZING SCHEDULE

A. Glass Type: 120-minute fire-resistance-rated glazing complying with ASTM E119 or UL 263 in a tested assembly of glass and framing with 250 deg F temperature-rise limitation; 450 deg F temperature-rise limitation for door vision areas; fire-resistance-rated laminated glass with intumescent interlayers.

END OF SECTION

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes non-structural metal framing assemblies.

1.2 PRE-INSTALLATION MEETING

A. Preconstruction Conference: Prior to start of the non-structural metal framing work, and at the Contractor's direction, meet at Project site and review the installation procedures and coordination with other work. Meeting shall include Contractor, Architect and major material manufacturer as well as the Installer and other subcontractors whose work must be coordinated with the non-structural metal framing and the gypsum wallboard work.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data for each product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Samples: Submit full size samples in 12 inch long lengths for each exposed trim accessory indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product types in this Section:

    a. Steel Suspended Ceiling Framing: Carrying and Furring Channels.
    b. Steel Partition and Soffit Framing: Double-Runner System.
    c. Steel Partition and Soffit Framing: Deflection Track.
    d. Steel Partition and Soffit Framing: Firestop Track.
    e. Steel Partition and Soffit Framing: Cold-Rolled Channel Bridging.
    f. Steel Partition and Soffit Framing: Hat-Shaped Rigid Furring Channels.
    g. Steel Partition and Soffit Framing: Resilient Furring Channels.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For non-structural metal framing assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."

B. Sound Transmission Characteristics: For non-structural metal framing faced with gypsum wallboard materials and having STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

C. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Steel Suspended Ceiling Framing: Grid Suspension System for Interior Ceilings.
2. Steel Suspended Ceiling Framing: Studs and Runners.
3. Wood Blocking and Concealed Plywood.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.7 FIELD CONDITIONS

A. Comply with ASTM C 754 requirements or wallboard material manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. General: For fire rated assemblies, provide materials, including accessories and fasteners produced by one manufacturer, or, when products of more than one manufacturer are used in a rated system, they shall be acceptable to authorities having jurisdiction.

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.2 PERFORMANCE REQUIREMENTS

A. Gypsum Board Assembly Deflections:

1. Typical Walls: Wall assemblies shall be constructed for deflection not to exceed 1/240 of the wall height when subjected to a positive and negative pressure of 5 psf.
2. Walls with Tile Finish: Wall assemblies to receive tile finishes shall be constructed for deflection not to exceed 1/360 of the wall height when subjected to a positive and negative pressure of 5 psf.
3. Walls with Stone Tile Finish: Wall assemblies to receive stone tile finishes shall be constructed for deflection not to exceed 1/720 of the wall height when subjected to a positive and negative pressure of 5 psfCeilings, bulkheads, soffits, ceiling transitions, ledges, and coves shall be constructed for a deflection not to exceed 1/360 of the distance between supports.

2.3 STEEL SUSPENDED CEILING FRAMING

A. Components, General: Provide steel framing members sized and spaced as indicated but not less than that required to comply with ASTM C 754 under the maximum deflection conditions specified under Article 'Assembly Performance Requirements.'

B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625 inch diameter wire, or double strand of 0.0475 inch diameter wire.

C. Hanger Attachments to Overhead Decks: Suitable for application indicated, fabricated from corrosion-resistant materials, with eyepins, clips or other devices for attaching hangers and capable of sustaining, without failure, a load equal to 10 times that imposed by the complete ceiling system.

D. Hangers: As follows:

1. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162 inch diameter.
2. Wire Hangers: ASTM A 641/A641M, Class 1 zinc coating, soft temper 0.1055 inch diameter.
3. Rod Hangers: ASTM A 510, mild carbon steel.
    a. Diameter: 1/4 inch.
    b. Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.
4. Flat Hangers: Commercial-steel sheet, ASTM A 653/A 653M, G60, hot-dip galvanized.
    a. Size: 1 by 3/16 inch by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2 inch wide flange, with manufacturer's standard corrosion-resistant zinc coating.

F. Carrying Channels: ASTM C 754, cold rolled steel channels, 1-1/2-inch, 475 pounds per 1000 feet.

G. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating. No equivalent coatings allowed.

1. Cold Rolled Channels: 0.0538 inch bare steel thickness, with minimum 1/2 inch wide flange, 3/4 inch deep.
2. Steel Studs: ASTM C 645, 0.0312 inch minimum base metal thickness and minimum depth as required to suit deflection criteria.
3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
    a. Minimum Base Metal Thickness: 0.0312 inch.
4. Resilient Furring Channels: 1/2 inch deep members designed to reduce sound transmission.

H. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

2.4 STEEL PARTITION AND SOFFIT FRAMING

A. General: Provide steel framing members sized and spaced as indicated but not less than that required to comply with ASTM C 754 under the maximum deflection conditions specified under Article 'Assembly Performance Requirements.'

1. In areas where top of partitions are dependent on ceiling system for lateral support, coordinate design and installation to comply with the above deflection limitation.
2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating. No equivalent coatings (EQ) allowed.

B. Steel Studs and Runners: ASTM C 645, in minimum depth indicated in partition type details; one of the following:

1. Allsteel & Gypsum Products, Inc.
2. CEMCO.
3. Clark Dietrich.
4. Consolidated Fabricators, Corporation.
5. Craco Manufacturing, Inc.
6. Custom Stud, Inc.
7. Marino\WARE.
8. Phillips Manufacturing Company.
9. Quail Run Building Materials, Inc.
10. SCAFCO Corporation.
11. Telling Industries.
12. The Steel Network.
13. United Metal Products.
14. Minimum Base Metal Thickness:
    a. Typical: As required to comply with deflection criteria but not less than 0.0179 inch.
    b. Partitions Supporting Wall Mounted Casework: 0.053 inch minimum thickness.
15. Depth: As indicated.

C. Double-Runner System: ASTM C 645 top runners, inside runner with custom fabricated flanges with depths sized to accommodate roof and floor deck live and dead load deflections but not less than 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.

D. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CEMCO; CST and SLP-TRK brand Slotted Slip Tracks, City of Industry, CA.
b. ClarkDietrich Building Systems; Max Trak (SLT) Slotted Deflection Track, West Chester, OH.
c. Metal-Lite, Inc.; Slotted Track.
d. The Steel Network, Inc; VertiClip SLD Series or VertiTrack VTD Series.

E. Firestop Track: ASTM C 645 top runner with custom fabricated flanges with depths sized to accommodate roof and floor deck live and dead load deflections but not less than 2 inch deep flanges. Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CEMCO; FAS Track 1000 Slotted Deflection Track, City of Industry, CA.
b. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
c. Metal-Lite, Inc.; The System.
d. The Steel Network, Inc.; VertiClip SLD Series or VertiTrack VTD Series.

F. Flat Strap and Backing Plate: 36 inch wide by 6 inch high steel sheet for blocking and bracing required for the attachment of surface mounted items and accessories indicated. Locate to span a minimum of 2 studs.

1. Minimum Base Metal Thickness: 0.0312 inch.

G. Cold-Rolled Channel Bridging: For channel bridging for fixture attachment or lateral bracing provide 0.0538 inch bare steel thickness, with minimum 1/2 inch wide flange:

1. Depth: 1-1/2 inches.
2. Clip Angle: 1-1/2 by 1-1/2 inch, 0.068 inch thick, galvanized steel.

H. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0179 inch.
2. Depth: 7/8 inch.

I. Resilient Furring Channels: 1/2 inch deep, steel sheet members designed to reduce sound transmission.

J. Rated Base Reveal: A nominal 25 gage steel profile 6 inches wide consisting of center.6 in. wide consisting of a 4 inch bottom portion with a 5/8 inch wide intumescent strip running the length of the profile along the bottom facing the bottom track runner and 2 inch wide upper J profile portion that receives the drywall. The steel profile is attached to the framing studs within the 2 inch upper J profile. Provide one of the following:

1. CEMCO; RAS-RBR Rated Base Reveal, City of Industry, CA.

2. Stockton Products; RBR Rated Base Reveal, North Las Vegas, NV.
3. Marino Ware; RBR Rated Base Reveal, South Plainfield, NJ.

K. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members securely to substrates involved; complying with the recommendations of the gypsum board manufacturers for applications indicated.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90. One of the following:

1. SHEETROCK Acoustical Sealant; U.S. Gypsum.
2. AC-20 FTR; Pecora.

C. Isolation Strip at Exterior Walls: Adhesive-backed, closed-cell, compressible, non-extruding, sound transmission reducing, vinyl foam tape strips with approximately 10 Shore 00 hardness that allow fastener penetration without foam displacement, 0.90 inch thick, in width 1/2 inch less than window mullion width.

1. Norseal V820 Series, Norseal V8229 Tape, Saint Gobain; black color.

D. Window Mullion Fillers: Refer to Section 057500 "Decorative Formed Metal."

E. Wood Blocking and Plywood Concealed in Partition Construction: Fire retardant treated, refer to Section 061053 "Miscellaneous Rough Carpentry."

F. Metal Post for Tube Framing at Partial Height Walls: Refer to Section 055000 "Metal Fabrications."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which non-structural metal framing attaches or abuts, installed door frames and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLING STEEL FRAMING, GENERAL

A. General: Install steel framing to comply with ASTM C 754, ASTM C 840 and the gypsum board manufacturer's recommendations, where standards conflict the more stringent shall apply.

B. Install supplementary framing, blocking, backerplates and bracing at locations in gypsum board assemblies which are indicated to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.

    a. Use deep-leg deflection track where indicated.
    b. Use proprietary firestop track where indicated.

3.3 INSTALLING STEEL SUSPENDED CEILING FRAMING

A. Suspended Ceiling Framing:

1. Suspend ceiling hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Attach hangers to structural members. Do not support ceilings from or attach hangers to permanent metal forms, steel deck tabs, steel roof decks, ducts, pipes, or conduit.
4. Secure wire hangers by looping and wire-tying, to eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
5. Secure rod and flat hangers to structure, including intermediate framing members, by attaching to devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.

B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member and transversely between parallel members.

C. Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

D. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards unless more stringent spacings are recommended by the gypsum board manufacturer.

E. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.4 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

A. Install continuous runners (tracks) sized to match studs at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction. Secure runners to substrates with fasteners spaced a maximum of 24 inches on center unless closer spacing is recommended by the framing manufacturer for the floor and ceiling construction involved. Provide fasteners at all corners and ends of runner tracks.

1. Where studs are installed directly against exterior walls, install foam gasket isolation strip between studs and wall.
2. Install two beads of sealant below floor tracks for acoustical and dust control.

B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings and at partial height partitions. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. Cut studs 1/2 inch short of full height to provide perimeter relief.
2. For fire-resistance-rated and STC-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.
3. Terminate partition framing at suspended ceilings where indicated.
4. Terminate partial height partition framing as indicated.

D. Install steel studs and furring in sizes and at spacing indicated but not less than that required by the referenced steel framing installation standard to comply with maximum deflection and minimum loading requirements specified, unless more stringent requirements are recommended by the gypsum board manufacturer:

1. Space studs 16 inches on center, unless otherwise indicated.

E. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.

F. Install backerplates for support of wall mounted items.

G. Curved Partitions:

1. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
2. Support outside (cut) leg of track by clinching steel sheet strip, 1 inch high-by-thickness of track metal, to inside of cut legs using metal lock fasteners.
3. Begin and end each arc with a stud, and space intermediate studs equally along arcs at stud spacing recommended in writing by gypsum board manufacturer for radii indicated. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches on center.

H. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Install two studs at each jamb, unless otherwise indicated. Install one additional stud no more than 6 inches from jamb studs at single doors greater than 48 inches and at all pairs of doors.
2. Install cripple studs at head adjacent to each jamb stud. Provide runner track and typical studs above door openings with studs spaced not more than 24 inches on center.
3. Where indicated, frame openings to receive interior aluminum frames and overhead concealed closers as follows:

a. By inverting the head track, and boxing the header above the closer body. Refer to special template ST-561 for LCN 2010/2030 overhead concealed closers.
b. By forming a box header with back-to-back studs. Refer to template no. 08279232 for Dorma RTS 88 Series overhead concealed closers.
c. By complying with closer manufacturer's template requirements for other overhead concealed closers.

4. At all welded frames with fixed anchor clips secure stud reinforcing to jamb anchor clips with not less than two self tapping screws per clip.
5. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

I. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

J. Isolation Strip Attachment: Where partitions abut exterior wall window mullions, and partition filler panels are not indicated, adhesively attach isolation strips to window mullions. Center isolation strips on mullion to form a continuous, sound resistant and lightproof, recessed joint seal for the entire length of the interface between the partition studs and trim members and the vertical window mullions.

3.5 CLEANING AND PROTECTION

A. Clean floors of all non-structural metal framing debris and leave broom clean. Excess material, scaffolding, tools and other equipment are to be removed upon completion of the Work.

B. Provide final protection and maintain conditions that ensure non-structural metal framing work remains without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.
3. Abuse-resistant interior gypsum board.
4. Acoustically-enhanced gypsum board.

1.2 PRE-INSTALLATION MEETING

A. Prior to start of each type of gypsum board system, and at the Contractor's direction, meet at the site and review the installation procedures and coordination with other Work. Meeting shall include Contractor, Architect and major material manufacturer, as well as the Installer and other subcontractors whose Work must be coordinated with the gypsum board Work.

1.3 ACTION SUBMITTALS

A. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

B. Samples: Submit full size samples in 12 inch long lengths for each exposed trim accessory indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product types in this Section:

a. Flexible Gypsum Board for Curved Surfaces.
b. Sag-Resistant Gypsum Ceiling Board.
c. Impact-Resistant Gypsum Board.
d. Moisture and Mold-Resistant Gypsum Board.
e. Acoustically-Enhanced Gypsum Board.
f. Tile Backing Panels.

g. Cementitious Backer Units.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

B. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

C. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Joint Compound for Interior Gypsum Board.
2. Gypsum Board: Type X, 5/8-inch.
3. Sound attenuation blankets.

D. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

C. Handle gypsum board to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.7 FIELD CONDITIONS

A. Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."

B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

2.2 MATERIALS, GENERAL

A. General: For fire rated assemblies, provide materials, including accessories and fasteners produced by one manufacturer, or, when products of more than one manufacturer are used in a rated system, they shall be acceptable to authorities having jurisdiction.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. Continental Building Products/Lafarge North America Inc.
5. National Gypsum Company.
6. PABCO Gypsum.
7. USG Corporation.

B. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

C. Gypsum Board: ASTM C 1396/C 1396M.

1. Type X:

a. Thickness: 5/8 inch.
b. Long Edges: Tapered.
c. Location: Vertical surfaces, where required for fire-resistance-rated assembly, and where indicated on Drawings.

D. Flexible Gypsum Board for Curved Surfaces: ASTM C 1396/C 1396M, manufactured to bend to fit tight radii and to be more flexible than standard regular-type panels of the same thickness.

1. Thickness: 1/4 inch.
2. Long Edges: Tapered.
3. Location: Apply in double layer at curved assemblies.

E. Gypsum Ceiling Board: ASTM C 1396/C 1396M, manufactured to have more sag-resistance than regular-type gypsum board.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.
3. Location: Interior ceiling surfaces.

F. Impact Resistant Board: Complying with ASTM C 1396/C 1396M and with ASTM C 1629 Minimum Classification Level 2 (for hard body impact resistance), manufactured to produce greater resistance to surface indentation and through-penetration than standard gypsum panels.

1. Type X:

a. 5/8 inch.
b. Long Edges: Tapered.

G. Moisture and Mold Resistant Board: ASTM C 1396/C 1396M; with moisture- and mold-resistant core and facing surfaces.

1. Core: 5/8 inch.

2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
4. Location: Interior ceiling surfaces.

H. Acoustically-Enhanced Gypsum Board: ASTM C 1396/C 1396M. Multilayer products constructed of two layers of gypsum board with an inner layer of visco-elastic sound absorbing polymer core.

1. Core: 5/8 inch.
2. Long Edges: Tapered.
3. Product: Subject to compliance with requirements, provide one of the following:

    a. National Gypsum Company; Sound Break.
    b. Quiet Solutions; Quiet Rock.

2.4 TILE BACKING PANELS

A. Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: ASTM C 1396, with core type and in thickness indicated.
2. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with core type and in thickness indicated. Available products include:

    a. G-P Gypsum Corp.; Dens-Shield Tile Backer.
    b. National Gypsum Company; GOLD BOND Brand EXP Tile Backer.
    c. USG; Durock Brand Glass-Mat Tile Backerboard.

B. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

2.5 TRIM ACCESSORIES

A. Interior Steel Trim Accessories: ASTM C 1047; formed metal sheet steel zinc coated by hot-dipped process. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047.

1. Cornerbead: Use at outside corners.
2. LC-Bead with both face and back flanges to receive joint compound; use at exposed panel edges.
3. U-Bead with face and back flanges; face flange formed to be left without application of joint compound: Use where indicated.
4. Curved-Edge Cornerbead: With notched or flexible flanges; use at curved openings.
5. Expansion (Control) Joint: One-piece control joint formed with V-shaped slot, with removable strip covering slot opening. Use where indicated.

B. Aluminum Trim Accessories: Extruded aluminum trim with 1/4 inch diameter holes in fins for attachment to gypsum board or studs; longest lengths available in profiles indicated; primed for finish painting; sized for scheduled gypsum board thickness shown.

2.6 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of the products and joint treatment materials for each application indicated.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.
3. Paperless Gypsum Board: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use setting-type taping compound.
3. Second Coat: For filling over tape, beads and fasteners. Use setting-type, sandable topping compound.
4. Third Coat: For finishing over tape, beads and fasteners. Use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Moisture/Mold-Resistant Gypsum Backing Board: Use setting-type taping and setting-type, sandable topping compounds.
2. Cementitious Backer Units: As recommended by manufacturer.

E. Joint Compound for Specialty Boards: As recommended by manufacturer.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, nonstaining, latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90. One of the following:

1. SHEETROCK Acoustical Sealant; U.S. Gypsum.
2. AC-20 FTR; Pecora.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Product: Subject to compliance with requirements, provide one of the following:

a. Rockwool AFB; Rockwool.
b. SAFB Blankets; Thermafiber LLC.

E. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Adhesives shall have a VOC content of 50 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed door frames and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840, GA-216, and the gypsum board manufacturer's recommendations, where standards conflict, the more stringent shall apply. Install specialty gypsum board as specified below except where manufacturer's instructions conflict; follow manufacturer's instructions for specialty performance board to maintain warranty coverage.

B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

C. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints or avoid them entirely.

    a. Stagger abutting end joints not less than one framing member in alternate courses of board.
    b. At high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

D. Multilayer Application:

1. On Partitions/Walls: Apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. On Ceilings: Apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply base layers in same sequence. Apply base layers at right angles to framing members and offset face layer joints one framing member, 16 inches minimum, from parallel base joints, unless otherwise indicated or required by fire-resistance-rated assembly.

E. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

F. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.

G. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

H. Curved Partitions:

1. Install panels horizontally and unbroken, to the extent possible, across curved surface plus 12 inches long straight sections at ends of curves and tangent to them.
2. Wet gypsum panels on surfaces that will become compressed where curve radius prevents using dry panels. Comply with gypsum board manufacturer's written recommendations for curve radii, wetting methods, stacking panels after wetting, and other preparations that precede installing wetted gypsum panels.
3. On convex sides of partitions, begin installation at one end of curved surface and fasten gypsum panels to studs as they are wrapped around curve. On concave side, start fastening panels to stud at center of curve and work outward to panel ends. Fasten panels to framing with screws spaced 12 inches o.c.
4. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.
5. Allow wetted gypsum panels to dry before applying joint treatment.

I. Tile Backing Panels:

1. Cementitious Backer Unit Application: ANSI A108.11 at showers, where substrates are indicated to receive Tile Units having a Face Dimension of Greater than 8 by 8 inches, and where otherwise indicated.
2. Glass-Mat, Water-Resistant Backing Panel: Install with 1/4 inch gap where panels abut other construction or penetrations.

J. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

K. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions.

L. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

M. Attach gypsum panels to framing provided at openings and cutouts.

N. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Fit gypsum panels around ducts, pipes, and conduits.

2. Where partitions intersect open exterior and interior wall kickers, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by the wall kickers and other structural members; allow 1/4 to 3/8 inch wide joints to install sealant.
3. Where chase walls are shown, provide bracing between parallel rows of studs. Unless otherwise shown, provide gypsum board braces no less than 1/2 inch thick by 12 inches wide and cut to width of chase. Locate at quarter points in wall height between each pair of parallel studs. Fasten with not less than 3 screws at each stud.

O. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4 to 1/2 inch wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

P. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

Q. Cut openings in gypsum board for electrical outlets, piping and other penetrations. Maintain close tolerances so that edges will be covered by plates and escutcheons. Cut both face and back paper. Do not install electrical outlets back to back on opposing sides of partitions.

R. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

1. Space screws a maximum of 12 inches o.c. for vertical applications.
2. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.
3. Install fasteners not less than 3/8 inch from ends or edges of gypsum board sheets, spacing fasteners opposite each other on adjacent ends or edges.
4. Begin fastening from center of gypsum board and proceed toward edges and corners.
5. Apply pressure on surface of gypsum board adjacent to fasteners being driven to ensure that gypsum board will be secured tightly to supporting members.

    a. Drive fastener with shank perpendicular to face of board.
    b. Drive screws with a power screwdriver as recommended by gypsum board manufacturer. Set heads of screws slightly below surface of paper without cutting paper.

3.3 INSTALLING TRIM ACCESSORIES

A. General: Fasten trim accessories according to manufacturer's written instructions for type, length, and spacing of fasteners.

B. Install corner beads at external corners.

C. Install interior trim accessories where edge of gypsum panels would otherwise be exposed or semiexposed. Provide interior trim accessories with face flange formed to receive joint compound.

D. Install aluminum trim accessories where indicated.

E. Install control joints in locations indicated and where directed by the Architect for visual effect, or if not indicated or directed by the Architect, provide control joints in accordance with ASTM C 840 which is as follows:

1. Where a partition, wall or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
2. Where a wall or a partition runs in an uninterrupted straight plane exceeding 30 linear feet.
3. Control joints in interior ceilings with perimeter relief shall be installed so that linear dimensions between control joints do not exceed 50 feet and total area between control joints does not exceed 2500 square feet.
4. Control joints in interior ceilings without perimeter relief shall be installed so that linear dimensions between control joints do not exceed 30 linear feet and total area between control joints does not exceed 900 square feet.
5. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.

3.4 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Apply joint treatment at gypsum board joints, flanges of interior trim and aluminum trim accessories, interior angles, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated. Produce surfaces free of tool marks and ridges ready for decoration of type indicated. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Cementitious Backer Units: Finish according to manufacturer's written instructions.

E. Glass-Mat, Water-Resistant Backing Panels: Do not use paper tape and joint compound. Finish according to manufacturer's written instructions.

F. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile and where indicated.
3. Level 3: Typically not used.
4. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.
5. Level 5: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface where gypsum board is indicated to receive wall coverings, semi-gloss and high gloss paints, and Italian plaster.

3.5 CLEANING AND PROTECTION

A. Clean floors of all gypsum board debris and leave broom clean. Excess material, scaffolding, tools and other equipment are to be removed upon completion of the Work.

B. Provide final protection and maintain conditions that ensure gypsum board assemblies remain without damage or deterioration at time of Substantial Completion.

END OF SECTION **092900**

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ceramic, porcelain, quarry, and glass tile.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide floor tiles complying with the following standard and performance requirement.

B. Dynamic Coefficient of Friction (DCOF): For tile installed on walkway surfaces, provide products with the following value as determined by testing identical products by the DCOF AcuTest Method using a BOT 3000E Tribometer machine per ANSI A 137.1/ANSI A 326.3 tested for wet surface condition.

1. Walkway Surfaces: Minimum 0.42.

1.3 ACTION SUBMITTALS

A. Product Data: For each product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Submit shop drawings showing the extent of each type of movement joint. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

D. Samples: Submit samples showing full range of color and texture variations expected.

1. Samples for each type, composition, color, and finish of grout.
2. Thresholds in 6-inch lengths, each type.
3. Metal edge strip in 6-inch lengths, each type.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product types in this Section:

    a. Thresholds.
    b. Waterproofing.
    c. Crack-Isolation Membranes.
    d. Epoxy Grout.
    e. Underlayment for Leveling and Patching.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Test Reports: Submit test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of tile products with requirements specified for slip resistance.

C. Master Grade Certificates: Submit master grade certificates for each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

D. Product Certificates: Submit manufacturer's certifications for each type of grout and bonding material being provided suitable for the intended use and meet or exceed the referenced standards and the requirements of this Specification.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Instructions: Submit maintenance instructions for each type of product specified.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Provide attic stock equal to the following for each type, color, pattern, and size (or fraction thereof) of tile provided for the Project. Supply in manufacture's unopened containers, identified with name, brand type, grade, class and all other qualifying information, to a location where directed by the Owner.

1. Two percent of amount installed but not less than one box.

1.7 QUALITY ASSURANCE

A. Installer: Engage an installer, with a minimum of 5 years of successful commercial tile installations similar in material, design, and scope to that indicated.

B. Source Limitations for Tile: Obtain each tile type from one source or producer, and from same production run, and of consistent quality in appearance and physical properties for each contiguous area.

C. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Ceramic Tile.
2. Cementitious Mortar.
3. Cementitious Grout.

D. Field-Constructed Sample Installations: Before installing tile, erect sample installations for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build sample installations to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate sample installations on site, in locations and size indicated or, if not shown or indicated, as directed by Architect but not less than 100 sq. ft. area for floors, and not less than 100 sq. ft. area for walls.
2. Retain and maintain sample installations during construction in undisturbed condition as a standard for judging completed unit of Work.
3. Approved sample installations may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PREINSTALLATION MEETING

A. Prior to the installation of tile, and at the Contractor's direction, meet at the Project site to review the material selections, substrate preparations, installation procedures, coordination with other trades, special details and conditions, standard of workmanship, and other pertinent topics related to the Work. The meeting shall include the Owner, Architect, the Contractor, tile installer, tile and setting material manufacturer's representatives, and representatives of other trades or subcontractors affected by the installation.

1.9 DELIVERY STORAGE AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

B. Provide minimum 28 day cure of concrete and concrete masonry units before the installation of the tile work.

C. Ensure cement and plaster rendering has been applied to interior concrete masonry wall surfaces and has been reviewed by the installer for suitability to receive his mortar bedding materials prior to installation of the tile work.

D. Maintain temperatures within range recommended by the mortar and grout manufacturer, but not less than 50 deg F or more than 90 deg F, in spaces during tile setting. After installation maintain temperatures within range recommended by the mortar and grout manufacturer

E. Close spaces to traffic during tile flooring installation.

F. Close spaces to traffic for 72 hours after tile flooring installation.

G. Shade all tile, materials and the work area from direct sunlight during the installation as needed to prevent rapid evaporation caused by excessive heat or wind.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS, GENERAL (TL##)

A. ANSI Ceramic Tile Standard: Provide 'Standard Grade' tile that complies with ANSI A137.1 "Specifications for Ceramic Tile,"ANSI A137.2, "Specifications for Glass Tile," ANSI A137.3, "Specifications for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs" for types, compositions, and other characteristics indicated.

1. Products and Manufacturers: Provide tile matching the Architect's samples which have been selected from the product lines and manufacturers indicated in Finish Schedule on Drawings.

B. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.

C. Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing where applicable.

D. Rectified Tile Edges: Provide all tile units having a face dimension of greater than 8" x 8" with factory rectified edges.

E. G2 Green Squared® Certification: Tile products shall comply with sustainable requirements of ANSI A138.1 "Green Squared - American National Standard Specifications for Sustainable Ceramic Tiles, Glass Tiles, and Tile Installation Materials."

2.2 ACCESSORY MATERIALS

A. Thresholds: Fabricate to provide transition between adjacent floor finishes. Bevel edges at 1:2 slope, limit height of bevel to 1/2 inch or less, and finish bevel to match face of threshold.

1. Stone Thresholds: ASTM C 503 for marble, with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.

a. Description: Marble with uniform, fine- to medium-grained white stone with gray veining**.**

B. Waterproofing for Toilet Room, Shower and Kitchen Tile Installations:

1. Fabric-Reinforced and Unreinforced Fluid-Applied Product: System consisting of liquid-latex rubber, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), and fabric reinforcement which are compatible with mortar bed specified and complying with ANSI A118.10; one of the following:

a. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane. which is manufactured in the plant closest to the geographic location of the project.
b. LATICRETE International Inc.; Laticrete 9235 Waterproof Membrane. which is manufactured in the plant closest to the geographic location of the project.
c. MAPEI Corporation; Mapelastic AquaDefense, which is manufactured in the plant closest to the geographic location of the project.
d. Ardex; Ardex 8+9 which is manufactured in the plant closest to the geographic location of the project.
e. Master Builders Solutions; MasterTile WP668.
f. Sika; SikaTile - 100 Moisture Guard with reinforcing fabric.

C. Crack Isolation Membrane for Tile Installations:

1. Fabric-Reinforced, Fluid-Applied Product: System consisting of liquid-latex rubber, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) (ASTM D 3960), and fabric reinforcement which are compatible with mortar bed specified and complying with ANSI A118.12; one of the following:

a. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane. which is manufactured in the plant closest to the geographic location of the project.

b. LATICRETE International Inc.; Laticrete 9235 Waterproof Membrane,. which is manufactured in the plant closest to the geographic location of the project.
c. MAPEI Corporation; Mapelastic AquaDefense, which is manufactured in the plant closest to the geographic location of the project.
d. Sika; SikaTile - 200 Fracture Guard Rapid with reinforcing fabric.

2. Paints and coatings shall comply with VOC content as shown in CALgreen Section 5.504.4.3.

2.3 SETTING AND GROUTING MATERIALS

A. Manufacturers and Plant Locations: Provide products manufactured in the plant closest to the geographic location of the project.

B. Source Limitations: For each tile installation, obtain compatible formulations of setting and grouting materials and waterproofing materials containing latex or latex additives from a single manufacturer.

C. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.1A and as specified below:

1. Reinforcing Wire Fabric: Galvanized, flat, welded wire fabric, 2-inch by 2-inch by 0.062-inch diameter; comply with ASTM A1064 and ASTM A 82 except for minimum wire size.
2. Latex Additive: Manufacturer's standard styrene-butadiene-rubber water emulsion, serving as replacement for all gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

D. Latex-Portland Cement Mortar (Thin Set):

1. Prepackaged dry-mortar mix combined with dry powder latex additive, the following:

a. For Thin Set Placed over Slabs on Grade: Complying with ANSI A118.4 and ANSI A118.11, one of the following:

1) Keraflex Plus Mortar; MAPEI Corporation.
2) Laticrete 253 Gold; Laticrete International Inc.
3) Versabond Flex; Custom Building Products.
4) SikaTile 350 Flex Set; Sika.

b. For Thin Set Tile Set over Walls: Complying with ANSI A118.15, one of the following:

1) Kerabond Keralastic; MAPEI Corporation.
2) Laticrete 272 mixed with Laticrete 333 Superflex; Laticrete International Inc.

3) SikaTile 350 Flex Set; Sika.

2. For wall applications, provide nonsagging mortar.
3. For glass tile applications where a low temperature coating has not been factory applied to the tile, use mortar that will not show through glass tile bodies. For glass tile installations where a low temperature coating has been factory applied follow the glass tile manufacturers written recommendations for mortar selection and application.

E. Dry Set Mortar for Large and Heavy Tile (LHT Mortar): Complying with ANSI A118.4 ET, HT or HTF and ANSI A118.15 HT or HTF:

1. Prepackaged dry-mortar mix combined with additives to minimize slump and facilitate a thicker bond coat, and specifically manufactured and recommended in writing by the mortar and underlayment manufacturer for use in LHT mortar assemblies; one of the following:

a. Ultraflex LFT Mortar; MAPEI Corporation.
b. Laticrete 4-XLT; Laticrete International Inc.
c. SikaTile 475 LHT Premium Set; Sika.

F. Polymer-Modified Tile Grout (For Typical Applications): Complying with ANSI A118.7 compounded with calcium aluminate cement, non-shrinking, efflorescence free grout. Provide, and stockpile, grout for each exposed color from a single manufactured and packaged batch source for the entire Project.

1. Polymer Type: Dry, redispersible latex/polymer powder form, prepackaged with other dry ingredients, one of the following:

a. Prism; Custom Building Products.
b. Permacolor; Laticrete International Inc.
c. Ultracolor Plus FA; Mapei Corporation.
d. SikaTile 815 Secure Grout; Sika.
e. MasterTile 545; Master Builders Solutions.

2. Colors: As selected by Architect from manufacturers standards to match tile being grouted.

2.4 MISCELLANEOUS MATERIALS

A. Joint Sealants:

1. Typical Surfaces: "Mildew-Resistant Silicone Sealant', as specified in Section 079200 "Joint Sealants."
2. Floor Joints: "Two-Part Polyurethane Sealant for Paving Applications," as specified in Section 079200 "Joint Sealants."

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Grout Sealer: Grout manufacturers recommended product for sealing cementitious grout joints and that does not change color or appearance of grout.

D. Underlayment Product for Leveling and Patching Floors indicated to receive Tiles: Latex-modified, cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

1. Either Ultraplan or Novaplan Underlyment; MAPEI Corporation.
2. NXT Level Plus Underlayment; Laticrete International Inc.
3. SikaLevel -325; Sika.

E. Metal Edge Strips for Wall Applications: Metallic, angle or L-shaped, depth to match tile and setting-bed thickness and having an integral provision for anchorage to substrate; aluminum alloy exposed-edge material; furnish in longest lengths available.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Blanke Corporation.
    b. Ceramic Tool Company, Inc.
    c. Schluter Systems L.P.

F. Divider, Transition, and Movement Joint Strips:

1. Divider and Transition Strips: Stainless steel shapes and flat bar trims fabricated from ASTM A 666 (for flat bar) and ASTM A 276 (for shapes) Type 304 stainless steel,1/4 inch wide at top edge unless otherwise indicated, depth as required to suit conditions shown and having an integral provision for anchorage to mortar bed or substrate, unless otherwise indicated. Provide NAAMM #4 satin finish at exposed top edge in the long direction, furnish in longest lengths available.
2. Movement Joint Strips: Laminations of extruded aluminum or formed stainless steel angle shapes, depth as required to finish flush with top surface of adjacent tile flooring fields, back to back installed with full height flexible filler to accommodate movement. Control joints shall have either an exposed approximately 5/8 inch wide interlocking continuous top to conceal prefabricated flexible filler or an exposed custom flexible prefabricated filler to accommodate movement. Joint assembly shall have a total movement capability of approximately 1/4 +1/8 inch/-3/32 /inch. Finish of exposed top to be satin. One of the following:

    a. Basis of Design: Emseal Series ESF 16 AL; Emseal Joint Systems, Ltd.
    b. Schluter; Dilex - EDP, fabricated to comply with the specified requirements.

c. CTC (Ceramic Tool Company); CTC Joint custom fabricated to comply with the specified requirements.

2.5 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions. Add materials and liquid latex additives in accurate proportions. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present.

1. Verify that substrates for setting tile are sound and free of voids, bugholes, rock pockets, honeycombs, and protrusions, and which are dry, clean, free of oil, waxy films, and curing compounds. Grind or scarify concrete substrates to remove existing floor adhesive and mortar residues (if any), laitance, films, sealing and curing compounds if they are determined to be present on the substrate.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in the existing floor substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
4. Do not commence installation of flooring materials until floor substrate is within the following tolerances in all directions. If substrate is not within tolerance, level the substrate using a method and an underlayment product(s) that is compatible with and acceptable to the setting materials manufacturer.
    a. Subfloor Surfaces to Receive Thinset and LHT Mortar Setting Beds: +/- 1/8 inch in 10 feet Subfloor Surfaces to Receive Thickset Setting Beds: +/- 1/4 inch in 10 feet No valleys or ridges greater than 1/8 inch

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove paint, coatings, including curing compounds and other substances that are incompatible with tile-setting materials.

B. Blending: Color blend tiles at Project site before installing.

1. Furnish the same lots, batches, etc. within the same contiguous areas of the site (i.e. corridors on the same floors, common rooms which adjoin each other, etc.).

3.3 INSTALLATION, GENERAL

A. Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" and the TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" that apply to types of setting and grouting materials and to methods indicated.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area beginning at thresholds. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

E. Finished Surfaces: Unless otherwise accepted in the sample installation(s), if any, finished surfaces shall present a flat, even appearance, free from waver, projections, and depressions.

F. Movement (Contraction, Control, Expansion, and Isolation Joints) Joints: Locate sealant filled movement joints where recommended by the manufacturer of mortar and grout materials, but not less than the requirements of TCNA EJ171 which follows, and as accepted by the Architect. Form movement joints and other sealant-filled joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles. Where movement joints are to be butted, the ends shall touch and align.

1. Spacing Guidelines:

a. 20 to 25 feet in each direction where interior tile work is not exposed to direct sunlight or moisture.
b. 8 to 12 feet in each direction where interior tile work is exposed to direct sunlight and moisture.
c. Where tilework abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in backing materials, but not at drain strainers.
d. In the joint between tiles making up the inside corner of planes.

e. All contraction, control, expansion, isolation, seismic and cold joints in the horizontal structure and vertical surfaces shall continue through the tile surfaces, but not through membranes.
f. Vertical and Horizontal Joints Widths: Widths for quarry tile and paver tile shall be the same as the grout joint but not less than 1/4 inch or the width of the contraction, control, expansion, seismic, isolation joint whichever is greater; widths for ceramic mosaic tile and glazed wall tile shall not be less than 1/8 inch or the width of the control, expansion, seismic, joint whichever is greater.
g. Keep movement joints free from dirt, debris, grout, mortar, and setting bed materials. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Metal Edge Strips: Install where exposed edge of wall tile meets other wall finishes that finish flush with or below face of tile and the manufacturer of the field tile does not manufacture a tile edge transition trim. Where metal edge strips are indicated and full length single units are not available, joints are to be butted, ends shall touch and align.

H. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout sealer manufacturer's written instructions. As soon as sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

1. Do not install tile over waterproofing until waterproofing has cured, and at each horizontal installation, has been tested for water tightness. Test waterproofing membrane for watertightness by damming the floor drain, and creating a dam at the perimeter of the waterproofed basin followed by filling the basin with water, marking the height, and verifying the same height after 48 hours. Repair leaks before continuing with the installation of subsequent tile.

3.5 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

1. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.6 FLOOR TILE INSTALLATION

A. Thinset Tile over Concrete Slabs (Typical): Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for setting bed methods, installation methods related to types of subfloor construction, and grout installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.

1. Mortar: Latex-Portland Cement Mortar: ANSI A108.5.
2. Concrete Subfloors, Interior: TCNA F113.

    a. With a trowel, having notches sized as recommended by the mortar manufacturer, comb the surface of the mortar with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturer's recommendations.
    b. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying mortar to tiles.
    c. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile for 100 percent coverage to thickness of not less than 1/16-inch.
    d. Place tiles onto mortar bed, maintaining 1/8-inch wide joints, and true accurate pattern as shown. Exercise care to quickly remove spillage from faces of tile using damp sponge. Rake out joints to depth required to receive grout as tile units are set.
    e. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.

3. Grout Installation: Do not begin grouting tiles until they are firmly set and, in no case, in less than 48 hours after they have been installed. Remove spacers, if any, prior to grouting. For typical installations, comply with latex-portland cement: ANSI A108.10. Fill joints of cushion edged tile to the depth of the cushion; fill joints of square edge tile flush with the tile surface. Do not permit mortar, mounting mesh, or spacer material to show through grouted joints. Provide hard finished grout, which is uniform in color, smooth, and without voids, pinholes, or low spots. Tool surfaces with shallow concave profile.

B. Thinset Tile over Waterproof Membrane (Toilet Rooms): Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for setting bed methods, installation methods related to types of subfloor construction, and grout installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.

1. Mortar: Latex-Portland Cement Mortar: ANSI A108.5.

2. Linear Floor Drain and Shower Pan Installation, Concrete Subfloors, Interior: TCNA B422C for curbless shower pans with integral bonding flanges. Tie outlet pipes to sanitary waste piping in accordance with the written instructions of the drain manufacturer. Prime and apply waterproofing membrane materials to drain pan bodies in accordance with the written instructions of the drain manufacturer.
3. Concrete Subfloors, Interior: TCNA F122 (on ground) and F122A (above ground).

    a. Apply the mortar to waterproofed slab with the flat side of the trowel.
    b. With a trowel, having notches sized as recommended by the mortar manufacturer, comb the surface of the mortar with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturer's recommendations.
    c. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying mortar to tiles.
    d. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile for 100 percent coverage to thickness of not less than 1/16-inch.
    e. Place tiles onto mortar bed, maintaining 1/8-inch wide joints, and true accurate pattern as shown. Exercise care to quickly remove spillage from faces of tile using damp sponge. Rake out joints to depth required to receive grout as tile units are set.
    f. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.

4. Grout Installation: Do not begin grouting tiles until they are firmly set and, in no case, in less than 48 hours after they have been installed. Remove spacers, if any, prior to grouting. For typical installations, comply with latex-portland cement: ANSI A108.10. Fill joints of cushion edged tile to the depth of the cushion; fill joints of square edge tile flush with the tile surface. Do not permit mortar, mounting mesh, or spacer material to show through grouted joints. Provide hard finished grout, which is uniform in color, smooth, and without voids, pinholes, or low spots. Tool surfaces with shallow concave profile.

C. Thinset Tile over Crack Isolation Membrane: Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for setting bed methods, installation methods related to types of subfloor construction, and grout installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.

1. Mortar: Latex-Portland Cement Mortar: ANSI A108.5.
2. Concrete Subfloors, Interior: TCNA F125-Full.

    a. Apply the mortar to crack isolation membrane covered slab with the flat side of the trowel.

b. With a trowel, having notches sized as recommended by the mortar manufacturer, comb the surface of the mortar with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturer's recommendations.
c. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying mortar to tiles.
d. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile for 100 percent coverage to thickness of not less than 1/16-inch.
e. Place tiles onto mortar bed, maintaining 1/8-inch wide joints, and true accurate pattern as shown. Exercise care to quickly remove spillage from faces of tile using damp sponges. Rake out joints to depth required to receive grout as tile units are set.
f. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.

3. Grout Installation: Do not begin grouting tiles until they are firmly set and, in no case, in less than 48 hours after they have been installed. Remove spacers, if any, prior to grouting. Comply with Latex-portland cement: ANSI A108.10. Fill joints of cushion edged tile to the depth of the cushion; fill joints of square edge tile flush with the tile surface. Do not permit mortar, mounting mesh, or spacer material to show through grouted joints. Provide hard finished grout, which is uniform in color, smooth, and without voids, pinholes, or low spots. Tool surfaces with shallow concave profile.

D. LHT Set Tile (Only where indicated): Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for setting bed methods, installation methods related to types of subfloor construction, and grout installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.

1. Mortar: Latex-Portland Cement Mortar: ANSI A108.5.
2. Concrete Subfloors, Interior: TCNA F205 (on-ground slabs) and TCNA F205A (above ground slabs) except apply LHT bed in thickness of 3/4" unless otherwise indicated.

a. Where required by the conditions indicated, apply underlayment using methods and within time limits recommended by the mortar manufacturer.
b. With a trowel, having notches sized as recommended by the mortar manufacturer, place and comb the surface of the mortar with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturers recommendations.
c. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying mortar to tiles.
d. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile for 100% coverage to thickness of not less than 1/16-inch.

e. Place tiles onto mortar bed, maintaining 1/8-inch wide joints, and true accurate pattern as shown. Exercise care to quickly remove spillage from faces of tile using damp sponges. Rake out joints to depth required to receive grout as tile units are set.
f. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.

3. Grout Installation: Do not begin grouting tiles until they are firmly set and, in no case, in less than 48 hours after they have been installed. Remove spacers, if any, prior to grouting. Comply with Latex-portland cement: ANSI A108.10. Fill joints of cushion edged tile to the depth of the cushion; fill joints of square edge tile flush with the tile surface. Do not permit mortar, mounting mesh, or spacer material to show through grouted joints. Provide hard finished grout, which is uniform in color, smooth, and without voids, pinholes, or low spots. Tool surfaces with shallow concave profile.

E. Thickset Tile (only where indicated): Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for setting bed methods, installation methods related to types of subfloor construction, and grout installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply. Thickness of mortar bed: Between 1-1/4-inch and 2-inches.

1. Mortar and Bond Coat:

a. Latex-Portland Cement Mortar: ANSI A108.1A (Wet Set Method).
b. Latex-Portland Cement Bond Coat: ANSI A108.5.

2. Concrete Subfloors, Interior: TCNA F121.

a. Apply half of the mortar bed to slab and place reinforcing wire fabric. After placing mesh, apply balance of mortar bed. The mortar shall be rodded and compacted with a steel trowel.
b. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying bond coat to tiles
c. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile sheets for 100 percent coverage to thickness of not less than 1/16-inch.
d. Place tile onto the green mortar bed, maintaining 1/8-inch wide joints for typical tile units and 1/4-inch wide joints for quarry tile units if any, and true accurate pattern as shown. Tamp tile with wood block and rubber mallet to produce finish levels of tile matching adjacent tile surfaces. Beating shall take place prior to mortar taking and initial set. Exercise care to quickly remove spillage from faces of tile using water. Rake out joints to depth required to receive grout as tile units are set. Maintain fully plastic bed throughout tile installation.
e. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.

3. Grout Installation Do not begin grouting tiles until they are firmly set and, in no case, in less than 48 hours after they have been installed. Remove spacers, if any, prior to grouting. For typical installations, comply with Latex-portland cement: ANSI A108.10. Fill joints of cushion edged tile to the depth of the cushion; fill joints of square edge tile flush with the tile surface. Do not permit mortar, mounting mesh, or spacer material to show through grouted joints. Provide hard finished grout, which is uniform in color, smooth, and without voids, pinholes, or low spots. Tool surfaces with shallow concave profile.

F. Stone Thresholds: Install stone thresholds in one piece, notched to fit neatly at door jambs; set in same type of setting bed as abutting field tile in accordance with TCNA Method TR611.

3.7 WALL TILE INSTALLATION

A. Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for ANSI setting bed methods, TCNA installation methods related to types of construction, and grout ANSI installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.

1. Latex Portland Cement Mortar Installation (using specified latex portland cement mortar material): ANSI A108.5.
2. Gypsum Wallboard, Interior (Latex Portland Cement Mortar) Method: TCNA W243, place tiles maintaining 1/8-inch wide joints, and true accurate pattern as shown.
3. Cementitious Backerboard (Latex Portland Cement Mortar) Method: TCNA W244C, place tiles maintaining 1/8-inch wide joints, and true accurate pattern as shown.
4. Grout Installation: Do not begin grouting tiles until they are firmly set and, in no case, in less than 48 hours after they have been installed. Remove spacers, if any, prior to grouting. Comply with Latex-portland cement: ANSI A108.10. Fill joints of cushion edged tile to the depth of the cushion; fill joints of square edge tile flush with the tile surface. Do not permit mortar, mounting mesh, or spacer material to show through grouted joints. Provide hard finished grout, which is uniform in color, smooth, and without voids, pinholes, or low spots. Tool surfaces with shallow concave profile.

B. Large Format Wall Tile Installation: Install in accordance with the applicable provisions of ANSI A108.19, the tile manufacturer's recommendations and requirements indicated below for ANSI setting bed methods, TCNA installation methods related to types of construction, and grout ANSI installation methods and grout types. Where recommendations and methods conflict, the tile manufacturer's recommendations shall apply. Exercise care to quickly remove spillage from faces of tile using damp sponges. Rake out joints to depth required to receive grout as tile units are set.

1. Ceramic Tile Type: Indicated in Finish Schedule as tiles with face size greater than or equal to 11 s.f. (1 sq. m).
2. Latex Portland Cement Mortar Installation (using specified latex portland cement mortar material): ANSI A108.5.

3. Cementitious Backerboard (Latex Portland Cement Mortar) Method: TCNA W244C, place tiles maintaining 1/8-inch wide joints, and true accurate pattern as shown.

    a. Place and attach mechanical edge leveling system to backup substrates using a type of edge leveling system recommended by the tile manufacturer to minimize lippage between panels.
    b. With a trowel, having notches sized as recommended by the mortar manufacturer, place and comb the surface of the mortar on the backerboard substrate with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturer's recommendations. Troweled ridges shall be combed in a straight line parallel to the shortest dimension of the tile.
    c. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying mortar to tiles.
    d. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be placed and combed to back of tile with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturer's recommendations. Troweled ridges shall be combed in a straight line parallel to the shortest dimension of the tile.
    e. Place mortar covered tiles onto mortar covered backerboard mortar bed, maintaining 1/8-inch wide joints, and true accurate pattern as shown. Firmly press from center of the tile to cause the ridges to flatten out and come together in a void free bed. Lightly tamp the surface of the tile with a hard rubber grout float to ensure good contact, do not use a rubber mallet. Exercise care to quickly remove spillage from faces of tile using damp sponges. Rake out joints to depth required to receive grout as tile units are set. Allow mortar to cure a minimum of 48 hours before grouting.

4. Grout: Do not begin grouting tiles until they are firmly set and, in no case, in less than 48 hours after they have been installed. Remove spacers, if any, prior to grouting. Comply with Latex-portland cement: ANSI A108.10. Fill joints of cushion edged tile to the depth of the cushion; fill joints of square edge tile flush with the tile surface. Do not permit mortar or spacer material to show through grouted joints. Provide hard finished grout, which is uniform in color, smooth, and without voids, pinholes, or low spots. Tool surfaces with shallow concave profile.

3.8 RECESSED ACCESS DOOR PANEL INSTALLATION

A. Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for setting bed methods, installation methods related to types of construction, and grout installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply. Exercise care to quickly remove spillage from faces of tile using damp sponges. Rake out joints to depth required to receive grout as tile units are set.

1. Latex Portland Cement Mortar Installation (using specified latex portland cement mortar material): ANSI A108.5, applied to access panel manufacturer supplied metal lath welded to panel substrate.
2. Gypsum Wallboard, Interior (Latex Portland Cement Mortar) Method: TCNA W243, place tiles maintaining 1/8-inch wide joints, and true accurate pattern as shown.
3. Grout Installation: Do not begin grouting tile units until they are firmly set and, in no case, in less than 48 hours after they have been installed. Remove spacers, if any, prior to grouting. Comply with Latex-portland cement: ANSI A108.10. Fill joints flush with the tile unit surface. Do not permit mortar to show through grouted joints. Provide hard finished grout, which is uniform in color, smooth, and without voids, pinholes, or low spots. Tool surfaces with shallow concave profile.

3.9 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work. Replace all cracked, chipped, and broken tile units with matching tile units; patched tile units will not be permitted.

C. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

D. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

END OF SECTION

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.2 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Submit shop drawings of reflected ceiling plans drawn accurately to large scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Patterns of ceiling suspension assembly members with setting out/work points.
2. Method of attaching hangers to building structure.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.

D. Samples: Submit samples for each acoustical panel, for each exposed suspension system member, for each exposed molding and trim, and for each color and texture required, prepared on Samples of size indicated below. Samples shall show the full range of color and texture variations to be expected in the final installation.

1. Acoustical Panel: Set of 6-inch square Samples of each type, color, pattern, and texture.
2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch long Samples of each type, finish, and color.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product type in this Section:

   a. Carrying channels.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish and store at the site where directed, 2 percent of each type of acoustic panel installed in the Project, packaged in manufacturer's unopened cartons and identified as to contents.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer, with not less than 5 years experience in the installation of materials specified, and who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

C. Performance Requirements: In areas where gypsum wallboard partitions are dependent on the ceiling suspension system for lateral support, design and install suspension system components to sustain the imposed load from the completed partition system including a minimum inward and outward pressure of 5 psf normal to the plane of the wall.

D. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 for the geographic location of the site.

E. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Metal Suspension Systems.
2. Metal Edge Moldings and Trim.
3. Acoustical Ceiling Panels.

F. Sample Installations: Before installing acoustical panel ceilings, install sample installations for each type of acoustical panel ceiling installation required to demonstrate aesthetic effects and qualities of materials and execution. The sample installation shall be complete in every way and include all attachments to structure, hangers, grids, ceiling panels, moldings and column trims, light fixtures, air outlets and inlets, speakers, sprinklers heads, heat and smoke detectors. Install sample installations to comply with the following requirements, using materials indicated for the completed Work:

1. Size and Location: Provide 250 square foot sample installations in locations as directed by Architect.
2. Demonstrate the proposed range of aesthetic effects and workmanship.
3. Obtain Architect's approval of sample installations before starting work.
4. Maintain sample installations during construction in an undisturbed condition as a standard for judging the completed Work.

G. Approved sample installations may become part of the completed Work if undamaged at time of Substantial Completion.

H. Requirements of Regulatory Agencies: Provide acoustical ceiling components and assemblies which have been approved for installation in the City of New York. Comply with the applicable provisions of Referenced Standard RS 5-16 of the NYC Building Code.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until wet work (painting, drywall, interior tilework, and concrete leveling) in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 METAL SUSPENSION SYSTEMS

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Overhead Deck Hanger Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

1. Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with eyepins, clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling assembly.

C. Hangers: As follows:

1. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

a. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 12 gage (0.106-inch) diameter wire.

2. Rod Hangers: ASTM A 510, mild carbon steel.

a. Diameter: 1/4-inch.
b. Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.

3. Flat Hangers: Commercial-sheet steel, ASTM A 653/A 653M, G60, hot dip galvanized.

a. Size: 1 by 3/16 inch by length indicated.

D. Carrying Channels: ASTM C 754, cold rolled steel channels, 1-1/2-inch, 475 pounds per 1000 feet.

E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners; provide in longest standard single piece lengths.

1. Shadow (Stepped Moldings): Stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member. Form from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
2. F Moldings: Provide F moldings at ceiling breaks, soffits, bulkheads, and changes in elevation other than vertical walls and columns to the extent indicated. Form from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
3. Metal Perimeter Channel Trim: Shapes and profiles to suit conditions indicated; fabricated from extruded aluminum; finished to match exposed flanges of suspension system runners. Provide manufacturer's recommended tee-bar connection clips, and hanging clips, which lock into specially designed bosses on the channel trim and are screw attached to the web of the intersecting suspension system members. Join sections of trim together with manufacturer's standard splice plates and alignment clips.
4. Perimeter Wing Trim: Shapes and profiles to suit conditions indicated; fabricated from and finished to match exposed panel. Provide manufacturer's recommended connect wing cantilevers, connect splines, connect hooks, connect multi-connection, and installation screws suitable for installation indicated.

F. Clips: Provide support clips, clamps, fasteners, splines, and other attachment devices as required to align components and to connect components and transfer imposed loads of suspension system.

1. Provide partition attachment clips, and fasteners for areas where partition ceiling runners are secured to the ceiling suspension system.
2. Provide attachment clips for runner to angle molding to avoid use of pop rivets.
3. Provide grid converter accessories as required to change main tee direction 90 degrees from adjacent main tee.
4. Provide light fixture clips.
5. Provide hold down clips at entryways to reduce flutter as required.
6. Provide miter closure clips.
7. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
8. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

G. Manufacturers and Products: Refer to drawings and schedules for extent and types of each metal suspension system required.

H. Subject to requirements, provide scheduled suspension systems, or comparable products, acceptable to the Architect, by one of the following:

1. United States Gypsum Company.
2. Armstrong World Industries, Inc.
3. CertainTeed Corporation.
4. Chicago Metallic Corporation.

2.2 ACOUSTICAL PANELS (CL##)

A. Manufacturers and Products: Refer to drawings and schedules for extent and types of each acoustical panel required.

B. Subject to requirements, provide scheduled acoustical panels, or comparable products, acceptable to the Architect, by one of the following:

1. United States Gypsum Company.
2. Armstrong World Industries, Inc.
3. CertainTeed Corporation.
4. Chicago Metallic Corporation.
5. Rockfon (Roxul Inc.).

C. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

2.3 ACCESSORIES

A. Sealant:

1. Sealant shall have a VOC content of 250 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation, anchorage, with requirements for installation tolerances, and other conditions affecting performance of acoustical panel ceilings.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Layout the Work to center board pattern both directions around Work points shown in each major space or room as shown on the Drawings or directed and, where possible, adjust pattern so that edge pieces will be not less than 1/2 unit in width.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook," and as required to match the accepted sample installation.

B. Suspend ceiling hangers as follows:

1. Fasten hangers to anchors that extend into decks. Space hangers not more than 48 inches long each member supported directly from hangers; and provide hangers not more than 6 inches from ends of each member. Provide additional hangers for support of fixtures and other items including but not limited to light fixtures and diffusers, as required to prevent overloading of deck attachment, eccentric deflection or rotation of supporting runners.
2. Hangers:
    a. Secure wire hangers to ceiling suspension members and to supports above with a minimum of 3 tight turns. Connect hangers directly to drilled in anchors (eye screws), or other devices that are secure, and are appropriate for substrate.
    b. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to drilled in anchors, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved.
3. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
4. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of the supporting structure or of the ceiling suspension system.
5. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
6. Lateral Force Bracing:
    a. Horizontal restraints shall be provided by four No. 12 gage (2.7 mm) wires secured to the main runner within 2 inches of the cross runner intersection and splayed 90 degrees from each other at an angle not exceeding 45 degrees from the plane of the ceiling. A strut fastened to the main runner shall be extended to and fastened to the structural members supporting the roof or floor above. The strut shall be adequate to resist the vertical component induced by the bracing wires. These horizontal restraint points shall be placed not more than 12 feet on center in both directions with the first point within 6 feet from each wall. Attachment of the restraint wires to the structure above shall be adequate for the load imposed.

b. Lateral force bracing members shall be spaced a minimum of 6 inches from all horizontal piping or ductwork that is not provided with bracing restraints for horizontal forces. Bracing wires shall be attached to the grid and to the structure in such a manner that they can support a design load of not less than 200 pounds or the actual design load, whichever is greater, with a safety factor of 2.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Typical Edge Molding Attachment: Align moldings accurately and screw attach securely to substrate with concealed fasteners at intervals not more than 16 inches on center and not more than 3 inches from ends, leveling with ceiling suspension system. Miter corners accurately and connect securely.

a. Do not use exposed fasteners, including pop rivets, on moldings and trim.

2. Window and Curtain Wall Frame Head Attachment: Unless otherwise indicated, align moldings accurately and secure to window and curtain wall frame heads using manufacturer's recommended double-sided foam white tape, leveling with ceiling suspension system. Miter corners accurately and adhere securely.

a. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Clip runners to angle moldings do not use exposed fasteners. Finish to lines and levels shown, with maximum deflection not to exceed 1/360 of the span between supports. Laser level accurately in all directions, leveling to a tolerance of 1/8-inch noncumulative. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Run grain of units in one direction as accepted on shop drawings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using sealer and coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Compliance of seismic design.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.

1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.

a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 095133 - ACOUSTICAL METAL PAN CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum pans for acoustical metal pan ceiling.
2. Metal suspension system for acoustical, standard-grid metal pan ceilings.

B. Related Requirements:

1. Section 079219 "Acoustical Joint Sealants" for acoustical sealant for exposed and concealed joints.
2. Section 095113 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.

C. Products furnished, but not installed, under this Section include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include procedure for cutting metal pans.

1. Perforated acoustical modular laminate and metal pans for acoustical metal pan ceiling.

2. Aluminum pans for acoustical metal pan ceiling.

3. Metal suspension system for acoustical, standard-grid metal pan ceilings.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Data: For adhesives and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.

4. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.
5. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
6. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
7. Environmental Product Declaration: For each product.
8. Health Product Declaration: For each product.
9. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
10. Environmental Product Declaration: For each product.
11. Third-Party Certifications: For each product.
12. Third-Party Certified Life Cycle Assessment: For each product.

C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

D. Samples for Initial Selection: For units with factory-applied finishes.

E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:

1. Metal Pans: Set of full-size Samples of each type, finish, color, pattern, and texture. Show pan edge profile.
2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.
3. Sound Absorber: Sample of each type matching size of Sample metal pan.

F. Delegated Design Submittals: For design of seismic restraints and attachment devices.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which suspension systems will be attached.
3. Size and location of access modules for acoustical panels.
4. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.

5. Perimeter moldings.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical metal pan ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Evaluation Reports: For each acoustical metal pan ceiling suspension system and anchor and fastener type.

E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Perforated Acoustical Modular Laminate and Metal Pans with Sound Absorber: Full-size units equal to 2 percent of quantity installed.
2. Acoustical Metal Pans: Full-size units equal to 2 percent of quantity installed.
3. Suspension-System Components: Quantity of each grid, exposed molding, and trim equal to 2 percent of quantity installed.
4. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as indicated on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical metal pans, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Handle acoustical metal pans, suspension-system components, and accessories carefully to avoid damaging units and finishes in any way.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints and attachment devices.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E1264 for Class A materials.
2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL METAL PANS, GENERAL

A. Source Limitations: Obtain each type of acoustical metal ceiling pan and supporting suspension system from single source from single manufacturer.

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

D. Acoustical Panel Standard: Provide manufacturer's standard pans of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E795.

E. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.

1. Aluminum Sheet: Rolled aluminum sheet, complying with ASTM B209; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

F. Sound-Absorbent Fabric Layer: Provide fabric layer, sized to fit concealed surface of pan, and consisting of black, nonwoven, nonflammable, sound-absorbent material with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E84.

1. Bond fabric layer to panels in the factory with manufacturer's standard nonflammable adhesive.

G. Sound-Absorbent Pads: Provide width and length to completely fill concealed surface of pan, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E84, and to comply with the following requirements:

1. Plastic Sheet-Wrapped, Mineral-Fiber Insulation: Pads consisting of nonrigid, PVC plastic sheet encapsulating unfaced mineral-fiber insulation complying with ASTM C553, Type I, Type II, or Type III, and as follows:

   a. Mineral-Fiber Type and Thickness: Glass fiber; 1 inch.
   b. Mineral-Fiber Density: 3/4 lb/cu. ft. .
   c. Plastic Sheet Thickness and Color: Not less than 0.003 inch; Color: As selected by Architect. .

2. Spacer Grids: Provide manufacturer's standard galvanized-steel grid units that provide an air cushion between metal pans and insulation pads and that act to improve sound absorption.

H. Adhesive: Manufacturer's standard nonflammable adhesive for sound-absorbent fabric andpads.

1. Adhesives shall have a VOC content of 70 g/L or less.

2.3 PERFORATED MODULAR LAMINATE AND METAL PANS FOR ACOUSTICAL METAL PAN CEILINGS

A. Perforated Modular Laminate and Metal Pan Ceiling: CL##.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. USG Corporation; Ceilings Plus "Illusions"

2. Size: 18-in. x 36-in.
3. Color Name/Panel Finish: S-25 Natural Ovang Sarante.
4. Backing: Acoustic Backfill.
5. Edge Profile: Butt Joint
6. Grid Style: Torsion Spring Tee Grid.
7. Perforation Pattern: CD05006 (SD-2) 6% Open Area.

2.4 ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING

A. Aluminum Pans for Acoustical Metal Pan Ceiling: CL##.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. USG Corporation; "Panz" Metal Panels.
b. American Decorative Ceilings, Inc.
c. Armstrong Ceiling & Wall Solutions.
d. Certainteed; SAINT-GOBAIN.
e. Gage Corporation International (The).
f. Lindner Group.
g. Rockfon; ROCKWOOL International.

B. Classification: Units complying with ASTM E1264 for Type VII, perforated aluminum facing (pan) with mineral- or glass-fiber-base backing.

1. Perforation Pattern: Macro, no greater than 1/8-in. As selected by Architect.

C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.

1. Lay-in Pans: Formed to set in exposed suspension grid.

D. Pan Thickness: Not less than As selected by Architect.

E. Pan Edge Detail: Manufacturer's standard edge detail.

F. Pan Joint Detail: Wide reveal, not less than 15/16 inch wide.

G. Pan Size: As indicated on Drawings.

H. Pan Face Finish: Painted to match Architect's sample.

I. Light Reflectance Coefficient: As selected by Architect.

J. NRC: As selected by Architect.

K. Ceiling Attenuation Class: As selected by Architect.

2.5 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C635/C635M requirements.

B. Suspension Systems: Provide systems complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.

C. Attachment Devices: Size for 5 times the design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated. Comply with seismic design requirements.

D. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.

E. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

F. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
2. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
3. Nickel-Copper-Alloy Wire: ASTM B164, nickel copper alloy for UNS No. N04400 alloy.
4. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C635/C635M, Table 1, Direct Hung, is less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

G. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

H. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

I. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

J. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

K. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical metal pans in place.

L. Hold-Down Clips: Manufacturer's standard hold-down clips spaced to secure acoustical metal pans in place to molding and trim at perimeter.

M. Exposed Metal Edge Moldings and Trim: Provide exposed members as indicated or as required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of and penetrations through ceiling, to conceal edges of pans and runners, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching acoustical metal pan ceiling units unless otherwise indicated.

1. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.

2.6 METAL SUSPENSION SYSTEM FOR ACOUSTICAL, STANDARD-GRID METAL PAN CEILINGS

A. Metal Suspension System for Acoustical, Standard-Grid Metal Pan Ceilings: .

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. USG Corporation.
b. Armstrong Ceiling & Wall Solutions.
c. Certainteed; SAINT-GOBAIN.
d. Rockfon; ROCKWOOL International.

B. Suspension System: For lay-in torsion-spring-hinged pans.

1. Wide-Face, Capped, Double-Web, Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytic zinc-coated or hot-dip galvanized according to ASTM A653/A653M, G30 coating designation, with prefinished, cold-rolled, 15/16-inch- wide, sheet metal caps on flanges.

a. Structural Classification: Intermediate -duty system.
b. End Condition of Cross Runners: butt-edge type.
c. Face Design: Flat, flush.
d. Cap Material: Steel cold-rolled sheet.
e. Cap Finish: Painted to match color indicated by manufacturer's designation.

2. Suspension System for Torsion-Spring-Hinged Metal Pans: Provide runners with factory-cut slots fabricated to accept torsion-spring-hinged attachment.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

2.8 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. High-Humidity Finish: Comply with ASTM C635/C635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

2.9 ALUMINUM FINISHES

A. Mill Finish: AA-M10C10 (Mechanical Finish: as fabricated, unspecified; Chemical Finish: chemically cleaned).

B. Lacquered Mill Finish: AA-M10C10R1x (Mechanical Finish: as fabricated, unspecified; Chemical Finish: chemically cleaned; Organic Coating: as specified below).

1. Organic Coating: Manufacturer's standard clear organic coating.

C. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

D. Clear Mirror Anodic Finish: AA-M21C12A212, 0.005 mm or thicker.

E. Color-Coated Finish: Manufacturer's standard powder-coat baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.

F. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, protective coating, and minimum thickness to produce a finish uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical metal pan ceilings.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and coordination drawings.

3.3 INSTALLATION

A. General: Install acoustical metal pan ceiling assemblies to comply with ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings,to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members or carrying channels and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that do not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Secure flat, angle, channel, and rod hangers to ceiling suspension members or carrying channels and to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that does not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members or carrying channels and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pans.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet. Cut and treat edges to comply with manufacturer's written instructions.

G. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim. Comply with manufacturer's installation tolerances.

1. For lay-in, square-edge pans, install pans with edges fully hidden from view by flanges of suspension-system runners and moldings.

2. For lay-in, reveal-edge pans on suspension-system runners, install pans with bottom of reveal in firm contact with top surface of runner flanges.
3. For lay-in, reveal-edge pans on suspension-system members with box-shaped flanges, install pans with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
4. For pans, position pans according to manufacturer's written instructions.
5. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
6. Fit adjoining units to form flush, tight joints.
7. Install directionally patterned or textured metal pans in directions indicated.
8. Install sound-absorbent fabric layers in, and bond to, perforated metal pans.
9. Install sound-absorbent pads in perforated metal pans over metal spacer grids.

H. Install sound attenuation panels in areas indicated by reflected ceiling plans or room finish schedules. Lay panels directly on ceiling system and close major openings to form complete coverage in required areas. Lay second sound-absorbent pads on sound attenuation panels.

I. Install hold-down clips where indicated.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Seismic design compliance.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Perform the following tests and inspections of completed installations of acoustical metal panel ceiling hangers, anchors, and fasteners in successive stages. Do not proceed with installations of acoustical metal panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.

1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed.

    a. Within each test area, testing agency selects one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and tests them for 200 lbf of tension; it also selects one of every two postinstalled anchors used to attach bracing wires to concrete and tests them for 440 lbf of tension.
    b. When tested fasteners and anchors do not comply with requirements, testing agency tests those fasteners and anchors not previously tested until 20 pass consecutively and then resumes initial testing frequency.

D. Acoustical metal panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 CLEANING

A. Clean exposed surfaces of acoustical metal pan ceilings, including trim and edge moldings, after removing strippable, temporary protective covering, if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION

SECTION 095443 - STRETCHED-FABRIC CEILING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes custom site-upholstered stretched ceiling systems.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include fabric facing, frame edge and trim, and mounting system.

B. Shop Drawings: For each stretched-fabric system.

1. Include reflected ceiling plans, elevations, sections, and installation and system details.
2. Include details at joints and corners; and details at ceiling intersections and intersections with walls. Indicate frame-edge profile and core materials.
3. Include details at cutouts and penetrations for other work.
4. Include direction of fabric weave and pattern matching.
5. Show sewn-seam locations, types, and methods.

C. Samples for Initial Selection: For each type of fabric facing.

1. Include Samples of accessories involving color or finish selection.

D. Samples for Verification: For the following products:

1. Fabric: Minimum 12 x 12 inch Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
2. Frame System: 12-inch- square Sample(s) showing each edge profile and corner.

E. Delegated-Design Submittal: For design of seismic restraints and attachment devices.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Electrical outlets or connections.
2. Suspended ceiling components above stretched-fabric systems.
3. Structural members to which suspension devices will be attached.
4. Items penetrating or covered by stretched-fabric systems including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Alarms.
    e. Sprinklers.
    f. Access panels.

5. Show operation of hinged and sliding components covered by or adjacent to stretched-fabric systems.

B. Qualification Data: For Installer.

C. Product Certificates: For each type of stretched-fabric system.

D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For stretched-fabric systems to include in maintenance manuals. Include fabric manufacturer's written cleaning, stain-removal, restretching, and reupholstering instructions.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fabric: For each fabric, color, and pattern installed, furnish length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.
2. Framing and Related Installation Items: Furnish manufacturer's full-length units equal to 5 percent of amount installed, but no fewer than 5 units, including unopened adhesives.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with fabric and stretched-fabric system manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

B. Deliver materials in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install stretched-fabric systems until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Air-Quality Limitations: Protect stretched-fabric systems from exposure to airborne odors, such as tobacco smoke, and install systems under conditions free from odor contamination of ambient air.

C. Field Measurements: Where stretched fabric ceiling is indicated, verify actual dimensions of other construction by accurate field measurements before fabrication of system; and indicate measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on shop drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.10 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace components of stretched-fabric systems that fail in performance, materials, or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Fabric sagging, distorting, or releasing from panel edge.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain stretched-fabric ceiling systems specified in Section 090600 , "Schedule for Finishes," from single source from single manufacturer or equal from one of the following:

1. Newmat.
2. Barrisol

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints and attachment devices.

B. Fire-Test-Response Characteristics: Stretched-fabric ceiling systems shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency on systems prepared according to ASTM E 2573. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 25 or less.
    b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.3 STRETCHED-FABRIC CEILING SYSTEMS

A. Custom Stretched-Fabric Ceiling System: Manufacturer's delegated design custom system consisting of facing material stretched tightly over a frame and secured into the frame.

1. Facing Material: Provide manufacturer's standard PVC of color indicated in Division 09, Section "Schedule for Finishes."

B. Back lighting: Provide Manufacturer's standard LED lighting system.

C. Frame Construction: Manufacturer's engineered system.

D. Metal Suspension-System Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635/C 635M requirements. Provide systems complete with runners or beams, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, web covers, load-resisting struts, fixture filler pans, clips and adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.

E. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated.

1. Cast-in-Place and Postinstalled Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

    a. Anchor Type: provide anchor appropriate for existing conditions of substrate and per testing.
    b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 for Class SC service condition (mild).

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing agency.

F. Hanger Rods and Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

G. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

2.4 INSTALLATION MATERIALS

A. Installation Products: Concealed on back of system, recommended by stretched-fabric system manufacturer to support weight of system, fabric tension, and as follows:

1. Fasteners: Manufacturer's standard stainless steel fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fabric, materials, substrates, areas, and conditions, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of stretched-fabric systems.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each area and establish layout of ceiling system within a given area.

B. Before installation, allow fabric to adjust and become stable in spaces where it will be installed according to stretched-fabric system manufacturer's written instructions. Acclimatize fabric for minimum of 24 hours at ambient temperature and humidity conditions indicated for spaces when occupied for their intended use.

3.3 INSTALLATION

A. Install stretched-fabric systems according to system manufacturer's written instructions.

1. Provide continuous perimeter frames of each profile indicated, designed to be inconspicuous when covered by fabric facing, with smooth edges, and with surface finish that will not telegraph through fabric facing.
2. Install framing around penetrations.
3. Tightly fit framing to adjacent construction and securely attach to substrate.
4. Attach frame to substrate with fasteners to support system and prevent deformation of components.
5. Install stretched-fabric systems true in plane.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for structure to which hangers are attached and for hanger type involved.
5. Do not support grids directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. Do not attach hangers to steel deck tabs.

C. Fabric Installation: Apply fabric monolithically in continuous run over area, without joints or reveals, except where panel joints or midspan frames are indicated.

1. Fabric Direction: Run fabric as indicated on Drawings.
2. Fabric Seams: Sewn seams are not permitted.
3. Stretch and secure fabric to frame edges and so frame and frame attachment method are concealed by fabric unless otherwise indicated.
4. Stretch fabric tightly and square without puckers, ripples, or distortions. Acclimatize and restretch if recommended by stretched-fabric system manufacturer. Repair distortions, wrinkles, and sagging.
5. Trim Strip: Back-wrap trim strip fabric from the fabric-insertion point over the exposed part of the frame edge where indicated, resulting in a contrasting fabric along the edge.

3.4 INSTALLATION TOLERANCES

A. Edge Straightness: Plus or minus 1/16 inch in 48 inches.

B. Variation from Alignment with Surfaces: Plus or minus 1/16 inch in 48 inches, noncumulative.

C. Variation from Level or Slope: Plus or minus 1/16 inch.

3.5 CLEANING

A. Clip loose threads; remove pills and extraneous materials.

B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes resilient wall base, .

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product types in this Section:

    a. Trowelable Leveling and Patching Compounds.

2. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Resilient Wall Base.

1.6 FIELD CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT WALL BASE (RB##)

A. Products and Manufacturers: As indicated in Finish Schedule on Drawings. Nominal thickness not less than 1/8 inch unless greater thickness is scheduled. All resilient base shall be manufactured from rubber complying with ASTM F 1861, Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic), Group I (solid, homogeneous). Provide all resilient wall base in continuous coils to minimize field butt joints.

B. Provide all resilient wall bases with a coved base toe style typically; and with straight flat or toeless base style at carpet, unless otherwise indicated in Finish Schedule on Drawings.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based formulation provided or approved by resilient product manufacturers for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Remove paint, sealers, existing floor covering adhesive residues, substrate coatings and other substances that are incompatible with adhesives to be used for installing resilient stair accessories using mechanical methods recommended by manufacturer. Do not use solvents.

C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates indicated to receive resilient stair accessories.

D. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are the same temperature as the space where they are to be installed.

E. Sweep and vacuum clean substrates to be covered by resilient stair accessories products immediately before installation.

3.3 RESILIENT WALL BASE INSTALLATION

A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

D. Apply wall base with full adhesive coverage.

E. Do not stretch wall base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.4 CLEANING AND PROTECTION

A. Remove adhesive and other blemishes from exposed surfaces.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

    a. Do not wash surfaces until after time period recommended by manufacturer.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

END OF SECTION

SECTION 096516 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes resilient sheet floor coverings.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Submit shop drawings showing the following:

1. Show locations of seams, details of special patterns, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

D. Samples: Submit samples in manufacturer's standard size, but not less than 6-by-9-inch sections of each different color and pattern of floor covering required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product type in this Section:

a. Trowelable Leveling and Patching Compounds.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Field Test Reports: Provide signed field test reports for tests indicated below. Indicate results and test locations. Include manufacturer's recommendations.

1. Anhydrous calcium chloride test results.
2. Relative humidity probe test results.
3. Alkalinity test results.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor covering to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage a qualified installer who employs workers for this Project that are competent in techniques required by the sheet flooring manufacturer for the floor covering installation indicated and whose work has resulted in flooring covering installations with a record of successful in-service performance.

B. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Resilient Sheet Flooring.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store sheet floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1. Store rolls of sheet floor coverings upright.

1.7 FIELD CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 SHEET FLOOR COVERING (RS-)

A. Products and Manufacturers: Refer to Finish Schedule on Drawings.

B. Seaming Method: Heat welded.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based formulation provided or approved by floor covering manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit sheet floor covering and substrate conditions indicated.

1. Use adhesives that have a VOC content of not more than 50 g/L for VCT adhesives and 60 g/L for asphalt tile adhesives when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesives shall have a VOC content of 50 g/L or less.

C. Heat-Welding Bead: Solid-strand product of floor covering manufacturer.

1. Color: Match floor covering.

D. Integral-Flash-Cove-Base Accessories:

1. Cove Strip: 1 inch radius provided or approved by floor covering manufacturer.
2. Cap Strip: Square metal or rubber cap provided or approved by floor covering manufacturer.
3. Corners: Metal inside and outside corners and end stops provided or approved by floor covering manufacturer.

E. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of floor coverings, and in maximum available lengths to minimize running joints.

1. Product: Subject to compliance with requirements, provide Schlüter Systems, Jolly-MC.

F. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of floor coverings.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by flooring manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests recommended by flooring manufacturer, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

D. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install floor coverings until they are same temperature as space where they are to be installed.

E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.3 INSTALLATION

A. Unroll sheet floor coverings and allow them to stabilize before cutting and fitting.

B. Lay out sheet floor coverings as follows:

1. Maintain uniformity of floor covering direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
3. Match edges of floor coverings for color shading at seams.
4. Avoid cross seams, filler pieces and strips.

C. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.

D. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.

E. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.

F. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

G. Heat-Welded Seams: Comply with the flooring manufacturer's instructions and ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.

H. Integral Flash Cove Base: Cove floor coverings 4 inches up vertical surfaces. Support floor coverings at horizontal and vertical junction by cove strip. Butt at top against cap strip.

1. Install metal corners at inside and outside corners.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing floor covering installation:

1. Remove adhesive and other blemishes from floor covering surfaces.
2. Sweep and vacuum floor coverings thoroughly.
3. Damp-mop floor coverings to remove marks and soil.
4. Do not wash floor coverings until adhesives have cured unless otherwise recommended by manufacturer.

B. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Do not move heavy and sharp objects directly over floor covering surfaces. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.

1. Apply two coat(s).

D. Cover floor coverings until Substantial Completion.

END OF SECTION

SECTION 096723 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resinous flooring.
2. Integral cove base accessories.
3. Section 012300 "Alternates."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review manufacturer's written instructions for substrate preparation and environmental conditions affecting resinous flooring installation.
2. Review details of integral cove bases.
3. Review manufacturer's written instructions for installing resinous flooring systems.
4. Review protection measures for adjacent construction and installed flooring, floor drainage requirements, curbs, base details, and so forth.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Third-Party Certifications: For each product.
5. Third-Party Certified Life Cycle Assessment: For each product.

6. Multi-Attribute Optimization: For each product, provide documentation of third-party certification, indicating impact reduction in global warming potential, depletion of stratospheric ozone layer, acidification of land and water sources, eutrophication, and/or formation of tropospheric ozone.
7. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
8. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
9. Supply Chain Optimization: For each product, provide documentation demonstrating that manufacturer practices comply with supply chain optimization requirements.
10. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
11. Laboratory Test Reports: For finish system, indicating compliance with requirements for low-emitting materials.
12. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
13. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
14. Product Data: For adhesives, indicating that product contains no urea formaldehyde.

C. Samples: For each resinous floor system required and for each color and texture specified, 6 inches square in size, applied to a rigid backing by Installer for this Project.

D. Samples for Initial Selection: For each type of exposed finish required.

E. Samples for Verification: For each resinous flooring system required and for each color and texture specified, 6 inches square, applied to a rigid backing by Installer for this Project.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each resinous flooring component.

C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Apply full-thickness mockups on 96-inch- square floor area selected by Architect.

a. Include 96-inch length of integral cove base with inside and outside corner.

2. Simulate finished lighting conditions for Architect's review of mockups.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.

C. Close spaces to traffic during resinous flooring installation and for 24 hours after installation unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Flammability: Self-extinguishing in accordance with ASTM D635.

2.2 RESINOUS FLOORING

A. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Stonhard, Inc.

B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

C. System Characteristics:

1. Color and Pattern: As selected by Architect from manufacturer's full range .
2. Wearing Surface: Orange-peel texture .
3. Overall System Thickness: 1/8 inch.

D. Primer: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.

E. Waterproofing Membrane: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.

F. Reinforcing Membrane: Flexible resin formulation that is recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated and that inhibits substrate cracks from reflecting through resinous flooring.

G. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended in writing by manufacturer for installation indicated.

2.3 INTEGRAL COVE BASE ACCESSORIES

A. Precast, Integral Cove Base: Impact-resistant, polymer-resin, cove base moldings with a grit profile to promote adhesion of resinous flooring and recommended in writing by resinous flooring manufacturer.

a. Stonhard, Inc.
b. Dudick, Inc.

2. Radius Cove: Cove molding with approximately 1-inch radius for adhesive installation at floor-to-wall joint as substrate to receive resinous flooring system to form an integral cove base.
3. Radius Cove Base: 6-inch- high base molding that provides approximately 1-inch radius cove at floor-to-wall joint; for adhesive installation as substrate for resinous flooring system to form an integral cove base.

    a. Preformed Inside and Outside Corners: Provide manufacturer's standard square inside and square outside corners.

B. Installation Adhesive: As recommended in writing by accessory manufacturer.

1. Adhesives: Do not use adhesives that contain urea formaldehyde.
2. Adhesives: Do not use adhesives that contain urea formaldehyde.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resinous flooring systems.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare and clean substrates in accordance with resinous flooring manufacturer's written instructions for substrate indicated to ensure adhesion.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Roughen concrete substrates as follows:

    a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
    b. Comply with requirements in SSPC-SP 13/NACE No. 6, with a Concrete Surface Profile of 3 or greater in accordance with ICRI Technical Guideline No. 310.2R, unless manufacturer's written instructions are more stringent.

2. Repair damaged and deteriorated concrete in accordance with resinous flooring manufacturer's written instructions.
3. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

4. Alkalinity and Adhesion Testing: Perform tests recommended in writing by resinous flooring manufacturer. Proceed with installation only after substrate alkalinity is not less than 6 or more than 8 pH unless otherwise recommended in writing by flooring manufacturer,

C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates in accordance with manufacturer's written instructions.

1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring in accordance with manufacturer's written instructions.

D. Resinous Materials: Mix components and prepare materials in accordance with resinous flooring manufacturer's written instructions.

3.3 INSTALLATION

A. Apply components of resinous flooring system in accordance with manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness specified.

1. Coordinate installation of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components in accordance with manufacturer's written instructions. Prevent contamination during installation and curing processes.
3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.

B. Primer: Apply primer over prepared substrate at spreading rate recommended in writing by manufacturer.

C. Waterproofing Membrane: Apply waterproofing membrane over entire substrate surface, in thickness recommended in writing by manufacturer.

1. Apply waterproofing membrane to integral cove base substrates.

D. Reinforcing Membrane: Apply reinforcing membrane to entire substrate surface.

E. Integral Cove Base Accessories: Adhesively install precast accessories before applying flooring coats and in accordance with manufacturer's written instructions.

F. Field-Formed Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring coats. Apply in accordance with manufacturer's written instructions and details, including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.

1. Integral Cove Base: 4 inches high.

G. Self-Leveling Body Coats: Apply self-leveling slurry body coats in thickness specified for flooring system.

1. Aggregates: Broadcast aggregates at rate recommended in writing by manufacturer. After resin is cured, remove excess aggregates to provide surface texture indicated.

H. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness specified for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended in writing by manufacturer.

I. Grout Coat: Apply grout coat to fill voids in surface of final body coat.

J. Topcoats: Apply topcoats in number indicated for flooring system specified, at spreading rates recommended in writing by manufacturer, and to produce wearing surface specified.

3.4 FIELD QUALITY CONTROL

A. Material Sampling: Owner may, at any time and any number of times during resinous flooring installation, require material samples for testing for compliance with requirements.

1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reinstall flooring materials to comply with requirements.

B. Core Sampling: At Owner's direction and at locations designated by Owner, take one core sample per 1000 sq. ft. of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring. Correct deficiencies in installed flooring as indicated by testing.

3.5 PROTECTION

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes wall coverings and accessories necessary for a complete installation.

B. Related Requirements:

1. Section 092900 "Gypsum Board" for Levels 4 and 5 finishes required under wallcovering.
2. Section 097713 "Stretched-Fabric Wall Systems" for panels requiring wall coverings.
3. Section 099123 "Interior Painting" for priming wall surfaces.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of product.

1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Include location and extent of each wall covering type, seam locations and termination points.

D. Samples: Submit wall covering samples in full width by 36-inch- long sections of wall covering for each wall covering indicated and for each color, pattern, and texture required. Samples shall show complete pattern repeat.

1. Wall-Covering Sample: Submit samples from same production run to be used for the Work, with specified treatments applied. Mark top and face of fabric.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.

    a. Wall Coverings.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below, before installation begins, from the same production run as the wall coverings installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Rolls of Wall Covering Material: Full-width rolls of wall covering equal to 5 percent of amount of each type installed, but not less than 1 full roll.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has specialized in the installation of wall coverings similar to that required for this project.

B. Mockups: Install mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.

1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141 for appearance shading characteristics.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

D. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install wall coverings until wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at the levels indicated when the site is occupied for its intended use.

B. Lighting: Do not install wall covering until a permanent level of lighting is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace wall covering that does not comply with requirements or that fails within two years from date of Substantial Completion. Warranty does not include deterioration or failure of wall covering from failure of substrate, vandalism, or abuse. Failures include, but are not limited to, blistering, fading, fraying, seam delamination, and discoloration.

PART 2 - PRODUCTS

2.1 WALL COVERING PRODUCTS (WC##)

A. General: Provide rolls of each type of wall covering from the same run number or dye lot. Color and pattern matching Architect's samples.

1. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.

B. Product(s): As indicated in Finish Schedule on Drawings.

2.2 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.

1. Adhesives shall have a VOC content of 50 g/L or less.

B. Primer/Sealer: Mildew resistant, primer/sealer recommended in writing by the wall-covering manufacturer for intended substrate.

C. Metal Primer: Interior ferrous metal primer recommended in writing by wall-covering manufacturer for intended substrate.

D. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended in writing by wall-covering manufacturer.

1. Adhesives shall have a VOC content of 50 g/L or less.

E. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances that could impair bond of wall covering, including including mold, mildew, oil, grease, incompatible primers, dirt, and dust.

C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.

2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
3. Metals: If not factory primed, clean and apply primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
5. Painted Surfaces: Treat areas susceptible to pigment bleeding.

D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.

E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 WALL LINER INSTALLATION

A. Install wall liner, without gaps or overlaps. Form smooth wrinkle-free surface for finished installation. Do not begin wall-covering installation until wall liner has dried.

3.4 WALL-COVERING INSTALLATION

A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.

1. Fabric Wrapped Panel Applications: For application of fabrics to stretched fabric wall systems, refer to Section 097713 "**Stretched-Fabric Wall Systems.**"

B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.

C. Install strips in same order as cut from roll.

1. For solid-color, even-texture, or random-match wall coverings, reverse every other strip.

D. Install wall covering without lifted or curling edges and without visible shrinkage.

E. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.

F. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.5 CLEANING

A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended in writing by wall-covering manufacturer.

C. Replace strips that cannot be cleaned.

D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION

SECTION 097723 - FABRIC-WRAPPED PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fabric-wrapped wall [**and ceiling**] panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of panel edge and core material specified.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Include attachment devices; and details at head, base, joints, corners, and intersections with shelves, countertops, doors, electrical outlets and switches, thermostats, and other components. Indicate panel edge and core materials.

1. Include [**elevations**] [**reflected ceiling plans**] showing panel sizes and direction of fabric weave.

D. Coordination Drawings: Show relation of fabric-wrapped panels to casework. Show operation of casework drawers and doors.

E. Samples: For each type fabric-wrapped panel and in each color and texture required. Prepare samples from same material to be used for the Work. Include full size sample of attachment device.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."
1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.
2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Qualification Data: For Installer.

C. Warranty: Special warranty specified in this Section.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fabric-wrapped panels. Include fabric manufacturer's cleaning and stain-removal recommendations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fabric: For each fabric, color, and pattern installed, provide length equal to 10 percent of amount installed, but not less than 10 yd..

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

C. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

D. Fire-Test-Response Characteristics: Provide fabric-wrapped panels with flame spread and smoke developed indices of 25 or less and 450 or less, respectively, as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials, fabrication, and installation.

1. Install mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Install mockup of typical [**wall**] [**and**] [**ceiling**] area as shown on Drawings.

    a. Include intersection at [**wall and ceiling**] [**corner**] [**casework doors and drawers**] [**door opening**].

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect fabric-wrapped panels from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install fabric-wrapped panels until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Lighting: Do not install fabric-wrapped panels until a permanent level of lighting is provided on surfaces to receive fabric-wrapped panels.

C. Air-Quality Limitations: Protect fabric-wrapped panels from exposure to airborne odors such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.

D. Field Measurements: Verify locations of fabric-wrapped panels by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Special Warranty: Written warranty, signed by fabric-wrapped panel manufacturer agreeing to repair or replace panels that fail in materials or workmanship within [**two**] <**insert number**> years from date of Substantial Completion. Failures include, but are not limited to, fabric sagging, distorting, or releasing from panel edge.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benton Brothers Solutions.
2. Interior Acoustics, Inc.
3. Panel Solutions.
4. StretchWall Products, Inc.

2.2 FABRIC-WRAPPED PANELS

A. Wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Provide fabric-wrapped panels as follows:

1. Edge Profile: [**Square**] [**Radiused**] [**Beveled**] [**Eased**].
2. Panel Edge: [**Extruded PVC**] [**Extruded aluminum**] [**Chemically-hardened fiberglass board**].
3. Nominal Panel-Edge Thickness: [3/8 inch1/2 inch5/8 inch3/4 inch1 inch1-1/2 inches2 inches.

2.3 CORE MATERIALS

A. General: Provide [**tackable**] core materials with installed NRC of [**0.80**] <**Insert NRC value**> or greater.

B. Composite Wood Products: Products shall be made without urea formaldehyde.

C. Composite Wood Products: Products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert value**> percent.

E. Regional Materials: Products shall be fabricated within 100 miles of Project site from materials that have been extracted, harvested, or recovered within 100 miles of Project site.

F. Fiberglass Board: ASTM C 612, Class 1 and 2; 6 lbs./cu. ft. density, compressible, unfaced.

G. Glass-Fiber Blanket: ASTM C 612, Type IA; ASTM C 553, Types I, II, and III; or ASTM C 665 ; with tackable, thermally bonded white glass-fiber mesh facing, flexible, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

H. Fiberglass Blanket Overlay: ASTM C 553, Type 1, Class B-4 and Type II, Class F-1; unfaced.

I. Mineral-Fiber Board: Density of 23 lbs./cu. ft., plus or minus 3 lbs./cu. ft..

1. Surface: [**Perforated**] [**Sanded**] [**Coated**].
2. Maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.

3. Available Product: Subject to compliance with requirements provide "Micore 300" by United States Gypsum Company.

J. Polyester Board: LBI/Boyd; EcoCore.

K. Cotton Fiber Board: Density of 3 lbs./cu. ft., white.

1. Available Product: AcoustiCotton; AcoustiCotton Semi-Rigid Acoustical Board.

L. Fiberglass Blanket: Tackable with semirigid fiberglass face.

M. Polyester Batting Overlay: Flame-retardant, compressible, fiberfill overlay.

N. Particleboard: ANSI A208.1, Grade [**M-2**] [**M-2-Exterior Glue**][**, made without urea formaldehyde**].

O. Plywood: AWPA C27, Interior Type A, fire-retardant treated.

P. Wood: AWPA C20, Interior Type A, fire-retardant treated.

Q. Medium-Density Fiberboard: ANSI A208.2, Grade [**MD**] [**MD-Exterior Glue**][**, made without urea formaldehyde**].

2.4 FABRIC

A. Face Fabric: Subject to compliance with requirements, provide fabrics indicated for each designation in [**Section 090600 "Schedule for Finishes."**] [**Finish Schedule on Drawings.**]

B. Lining Material: If recommended by fabricator or by Architect in review of mockup, provide lining fabric. Lining fabric shall be product recommended by manufacturer of face fabric for application intended.

2.5 FABRICATION

A. Fabric-Wrapped Panels: Fabric straight and on the grain. No seams are allowed.

B. Fabricate panels with patterned or directional weave fabrics so pattern or weave matches in adjacent panels.

C. Stretch fabric tight and square without puckers, ripples, sagging, or distortions. Do not adhere fabric to panel face.

D. Polyester Batting: Stretched over panel face and edges.

E. Mounting Devices: [**As recommended by manufacturer,**] [**Magnetic strip,**] [**Hook-and-loop tape,**] [**Impaling clips,**] [**Metal "Z"-clips,**] [**Adhesive,**]. Concealed on back of panel, recommended to support weight of panel,[**with base-support bracket system where recommended by manufacturer for additional support of panels,**] and as follows:

1. Adhesives shall have a VOC content of [**70**] <**Insert value**> g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fabric, substrates, and conditions, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of fabric-wrapped panels.

B. Install fabric-wrapped panels vertical and plumb, if applicable; true in plane; and with fabric installed square to the grain. Match and level fabric pattern and grain.

C. Panel Joints: No greater than 1/32 inch wide.

END OF SECTION

SECTION 098010 - ACOUSTIC ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes accessory items installed as part of other construction for the purposes of sound reduction and sound control. Final assemblies will be tested for acoustical performance.

B. Related Requirements:

1. Section **013595** "General Acoustical Requirements" for testing of assemblies.
2. Section 092900 "Gypsum Board" for gypsum board installation.
3. Section 079200 "Joint Sealants" for sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: For all items installed as part of other construction. Include details showing sound tight and light-tight construction.

D. Samples: For each exposed product.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following product type in this Section:

    a. Sound Attenuation Blankets.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Product certificates.

C. Acoustical testing criteria

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site. Invite Architect, subcontractors, acoustical consultant, and product supplier.

B. Mockups: In acoustically rated walls, mockup one room, test performance of acoustical accessories, and make revisions as needed before proceeding to other rooms and spaces.

C. Inspection: Provide for fulltime inspection of critical acoustical assemblies.

PART 2 - PRODUCTS

2.1 SOUND CONTROL ACCESSORIES

A. General: Provide sound control accessories as shown on the Acoustical and Architectural drawings.

B. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

C. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
b. Grabber Construction Products; Acoustical Sealant GSC.
c. Pecora Corporation; AC-20 FTR.
d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.

e. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Sheet Calking for Junction Boxes: Subject to compliance with requirements, provide one of the following:

1. Lowry's "Electrical Box Sealer" (800-772-2521).
2. Tremco Sheet Calking (800-321-7906).

E. Sheet Calking for Junction Boxes at Fire Rated Assemblies: Subject to compliance with requirements, provide one of the following:

1. Firestop Putty Pads by Hevi-Duty/Nelson (800-331-7325).
2. Specified Technologies Inc. (800-992-1180).
3. HILTO CP-617 (800-879-8000).

F. Sound Isolation Clips: Subject to compliance with requirements, provide one of the following:

1. Kinetics Isomax (Acousthetics 415-753-1301).
2. Pliteq Genie Clip (The Finish Line 650-233-1360).
3. PAC International RSIC-1 (1-866-774-2100).

G. Sound Isolation Mounts for Lockers: Mason Industries DNSB Wall braces. Use for mounting selected lockers. Locations shown on Drawings.

H. Backing Rod: Closed cell neoprene rod or polyethylene film.

I. Compressible Foam Gaskets: 3/8 inch thickness; 6 pack density compressible foam with one-side high-tack adhesive; Norseal V-730.

J. Expanding Foam Sealant: Subject to compliance with requirements, provide one of the following:

1. UL Class I Fire Retardant Polycell Expanding Foam by Macklanburg Duncan (800-348-3571).
2. Great Stuff Pro- Gaps & Cracks by Dow (800-800-3626)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical accessories as part of installation of full assembly.

1. Install sealants, gaskets and calking so that entire assembly is "light tight" at areas of installation.
2. Install accessories to prevent vibration, rattles or other movement not intended as part of the assembly.
3. Do not install items back to back in wall cavities.

B. Provide ongoing observation and testing as assemblies are installed.

C. Clean items on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions and requirements of acoustical consultant.

END OF SECTION

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and field application of paint systems on the following interior substrates:

1. Gypsum board.
2. Steel.
3. Galvanized metal.
4. Aluminum (powder-coated).

1.2 DEFINITIONS

A. General: The following terms apply to this Section. Gloss level shall be determined according to ASTM D 523.

1. Gloss Level 1(Flat, or Matte): Not more than 5 units at 60 degrees and 10 units at 85 degrees.
2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees.
3. Gloss Level 3 (Eggshell): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
4. Gloss Level 4 (Satin or Low Luster): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees.
5. Gloss Level 5 (Semigloss): 35 to 70 units at 60 degrees.
6. Gloss Level 6 (Gloss): 70 to 85 units at 60-degrees.
7. Gloss Level 7 (High Gloss): More than 85 units at 60 degrees.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat, with texture to simulate actual conditions.

1. Provide stepped Samples, defining each separate coat, including primers. Use representative colors when preparing Samples for review. Resubmit until required gloss, color, and texture are achieved.

2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
3. Submit paint samples on actual substrate to be painted, 12 inches square, of each color and texture required.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following principal product types in this Section:

a. Primers:

1) Alkali Resistant, Water Based.
2) Latex, for Interior Wood.
3) Bonding, Water Based.
4) Acrylic.

b. Latex, Interior, High-Performance Architectural, Gloss Levels 3 and 5.
c. Semigloss Dry Fall Coating.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Environmental Product Declarations: For the following product types, obtain products with Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025. Industry-wide EPDs must demonstrate that the manufacturer is a member of the publishing body responsible for the product of the EPD.

1. Primer, Sealer, Latex Interior.
2. Latex, Interior, Gloss Levels 1, 3, and 5.

C. Sample Installation: Apply sample installation of each paint system indicated and each color and finish selected to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    b. Other Items: Architect will designate items or areas required.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in sample installations unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved sample installations may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore Family of Products (Benjamin Moore, Coronado, Corotech, Insl-x, LenMar)
2. PPG Paints (PPG)
3. Sherwin-Williams Co. (SW)
4. Vista Paint Corporation (Vista)

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.

2.2 PAINT, GENERAL (PT##)

A. Material Compatibility: Provide materials for use within each paint system that are compatible with one another and with the substrates indicated, under conditions of service and application, as demonstrated by manufacturer based on testing and field experience. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Dry-Fog Coatings: 150 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Rust-Preventive Coatings: 100 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.

C. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

D. Colors and Gloss: As indicated in Finish Schedule on Drawings. Reference to a particular manufacturer's number or color name is used only as a convenience for the Architect in order to establish the Project color and gloss requirements. These references are not intended to describe the required generic paint systems. For generic paint system requirements, refer to the "Interior Paint Schedule" at the end of Part 3, as applicable to the respective conditions of use.

1. The selection of paint colors and gloss are indicated by manufacturer and color type; designated as "PT##."
2. Furnish the same lots, batches, etc. within the same contiguous areas of the building (i.e., corridors on the same floors, common rooms which adjoin each other, etc.).

2.3 PREPARATORY COATS

A. Primer Sealer, Latex, Interior:

1. Benjamin Moore; Ultra Spec 500 Interior Latex Primer (N534).
2. PPG; Speedhide Zero Interior Latex Sealer Quick-Drying (6-4900).
3. SW; ProMar 200 Zero VOC Interior Latex Primer (B28W02600).

B. Primer, Alkali Resistant, Water Based:

1. Benjamin Moore; Super Spec Masonry Int/Ext Acrylic High Build Primer (N068).
2. PPG; Perma-Crete Interior/Exterior Alkali-Resistant Primer (4-603).
3. SW; Loxon Concrete & Masonry Primer Interior/Exterior Latex (A24W8300).

C. Primer, Bonding, Water Based:

1. Benjamin Moore; Insl-x Stix Bonding Primer (SXA-110).
2. PPG; SEAL GRIP Interior/Exterior Acrylic Universal Primer/Sealer (17-921).
3. SW; Adhesion Primer Interior/Exterior Latex (B51W8050).

D. Primer, Acrylic:

1. Benjamin Moore; Super Spec HP Acrylic Metal Primer (P04).
2. PPG; Pitt Tech Interior/Exterior Primer/Finish DTM Industrial Primer (90-712).
3. SW; Pro Industrial Pro-Cryl Universal Primer (B66-310 Series).

E. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

2.4 WATER-BASED PAINTS

A. Latex, Interior, Gloss Level 1 (Flat):

1. Benjamin Moore; Ultra Spec 500 Interior Flat (N536).
2. PPG; SPEEDHIDE zero Interior Zero-VOC Latex Flat (6-4110XI).
3. SW; ProMar 200 Zero VOC Interior Latex Flat (B30-2600 Series).

B. Latex, Interior, Gloss Level 3 (Eggshell).

1. Benjamin Moore; Ultra Spec 500 Interior Eggshell (N538).
2. PPG; SPEEDHIDE zero Interior Zero-VOC Latex Eggshell (6-4310XI).
3. SW; ProMar 200 Zero Interior VOC Latex Eg-Shel (B20-2600 Series).

C. Latex, Interior, Gloss Level 5 (Semigloss):

1. Benjamin Moore; Ultra Spec 500 Interior Semi-Gloss (N539).
2. PPG; SPEEDHIDE zero Interior Zero-VOC Latex Semi-Gloss (6-4510XI).
3. SW; ProMar 200 Zero VOC Latex Semi-Gloss (B31-2600 Series).

D. Latex, Interior, High Performance Architectural, Gloss Level 3 (Eggshell):

1. Benjamin Moore; Corotech PreCatalyzed Waterborne Epoxy Eggshell V342.
2. PPG; Pitt-Glaze WB1 Interior Eggshell Pre-Catalyzed Water-Borne Acrylic Epoxy (16-310).
3. SW; Pro Industrial Pre-Catalyzed Waterbased Epoxy Eg-Shel (K45W1150 Series).

E. Latex, Interior, High Performance Architectural, Gloss Level 5 (Semigloss):

1. Benjamin Moore; Corotech PreCatalyzed Waterborne Epoxy SG (V341).
2. PPG; Pitt-Glaze WB1 Interior Semi-Gloss Pre-Catalyzed Water-Borne Acrylic Epoxy (16-510).
3. SW; Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss (K46W1150 Series).

2.5 INDUSTRIAL MAINTENANCE COATINGS

A. Semigloss Dry Fall Coating:

1. Benjamin Moore; Latex Dry Fall Semi-Gloss 397, semi-gloss finish; applied at a dry film thickness of not less than 1.4 mils (36 microns). (formula does not exceed 43 grams/liter VOCs).
2. Subject to requirements, provide the scheduled product, or a similar product, acceptable to the Architect, by one of the following:
   a. Duron.
   b. M. A. Bruder & Sons, Inc. (M. A. B. Paint).

c. Pittsburgh Paints.
d. Sherwin-Williams.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with manufacturer's requirements for paint application. Comply with procedures specified in PDCA P4.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

3.2 PREPARATION

A. Remove hardware and hardware accessories, cover plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible, provide surface-applied protection before surface preparation and painting.

B. Before applying paint or other surface treatments, clean substrates of substances that could impair bond of paints. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime.

1. Gypsum Wallboard: Repair all surfaces in gypsum wallboard with wallboard joint finishing compound or spackling compound, filled out flush and sanded smooth. Clean all surfaces and taped joints of dust, dirt and other contaminants and be sure they are thoroughly dry before applying paint.
2. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
3. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
4. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
5. Powder-Coated Aluminum Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates. Abrade surface to promote adhesion of subsequently applied paints.

D. Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tint each undercoat a lighter shade to facilitate identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. Apply block fillers to CMU at a rate to ensure complete coverage with pores filled.

B. Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in Finish Schedule on Drawings.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
4. Extend coatings in exposed surfaces, as required, to maintain system integrity and provide desired protection.

    a. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place.

5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint front and back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces. Paint access panels, electrical panels, air diffusing outlets, supply and exhaust grilles, louvers, exposed conduit, primed hardware items, primed outlet covers, primed wall and ceiling cover plates and other items in painted areas to match the areas in which they occur unless otherwise directed by the Architect.

C. Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

    a. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
    b. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
    c. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

2. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

D. Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

E. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

F. Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

G. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

    a. Equipment, including panelboards and switch gear.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.

e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.
h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

a. Color: Flat (gloss level 1), nonspecular, black.

H. Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 MARKING AND IDENTIFICATION

A. Mark fire-rated and smoke-rated partitions required to have protective openings or penetrations.

1. Locate markings in accessible concealed floor, floor-ceiling, or attic spaces.
2. Provide markings within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the partition.
3. Marking shall include stenciled lettering not less than 3 inches in height with a minimum 3/8 inch stroke.
4. Apply markings in a contrasting color with the suggested wording "FIRE AND/OR SMOKE BARRIER---PROTECT ALL OPENINGS", or other wording as approved by the Authority Having Jurisdiction.

B. Mark sound-rated partitions as follows:

1. Locate markings in accessible concealed floor, floor-ceiling, or attic spaces.
2. Provide markings within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the partition.
3. Marking shall include stenciled lettering not less than 3 inches in height with a minimum 3/8 inch stroke.

4. Apply markings in a contrasting color with the suggested wording "STC 45 PARTITION---PROTECT ALL OPENINGS", or other wording as approved by the Owner.

3.5 CLEANING

A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

B. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

C. After completing painting operations in each space or area, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection, if any.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from paint application. Correct damage to work of other trades by cleaning, repairing or replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 INTERIOR PAINTING SCHEDULE

A. Gypsum Board Substrates:

1. Latex System:

   a. Primer: Sealer, latex, interior.
   b. Intermediate Coat: Latex, interior, matching topcoat.
   c. Topcoat: Latex, interior (gloss as indicated in Finish Schedule).

2. High-Performance Architectural Latex System:

   a. Primer: Sealer, latex, interior.
   b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
   c. Topcoat: Latex, interior, high performance architectural (gloss as indicated in Finish Schedule).

B. Steel Substrates:

1. High-Performance Architectural Latex System:

    a. Primer: Acrylic.
    b. Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural (gloss as indicated in Finish Schedule).

2. Semigloss Dry Fall Coating:
    a. Primer: Interior semigloss dry fall coating.
    b. Intermediate Coat: Interior semigloss dry fall coating.
    c. Finish Coat: Interior semigloss dry fall coating.

C. Steel (Factory-Primed) Substrates:

1. High-Performance Architectural Latex System:

    a. Primer: Acrylic (applied over factory primer).
    b. Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural (gloss as indicated in Finish Schedule).

D. Galvanized Metal Substrates:

1. High-Performance Architectural Latex System:

    a. Primer: Acrylic.
    b. Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural (gloss as indicated in Finish Schedule).

E. Aluminum (Powder-Coated) Substrates:

1. High-Performance Architectural Latex System:

    a. Primer: Acrylic.
    b. Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural (gloss as indicated in Finish Schedule).

END OF SECTION

SECTION 099600.13 - EXTERIOR HIGH PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on exterior substrates. The substrates include:

1. Substrates:

    a. Uncoated aluminum.
    b. Architecturally exposed structural steel.
    c. Galvanized steel.
    d. Exterior steel stairs.

B. Related Requirements:

1. Factory- or shop-applied primers applied as Work of other Sections must be coordinated with field-applied finish coats. Review other Sections for factory- or shop-primed products and reference this Section for product requirements:
2. Section 055000 "Metal Fabrications" for shop priming of metal substrates with primers specified in this Section.
3. Section 057000 - "Decorative Metal"
4. Section 099123 "Interior Painting" for general field painting.

1.2 DEFINITIONS

A. Definitions of gloss levels below are from "MPI Architectural Painting Specification Manual" (hereafter, "MPI Manual").

1. Gloss Level 1, Matte or Flat finish: 0 to 5 units at 60 degrees and maximum 10 units at 85 degrees.
2. Gloss Level 2, Velvet finish: Maximum 10 units at 60 degrees and 10 to 35 units at 85 degrees.
3. Gloss Level 3, Eggshell finish: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
4. Gloss Level 4, Satin finish: 20 to 35 units at 60 degrees and minimum 35 units at 85 degrees.
5. Gloss Level 5, Semi-Gloss finish: 35 to 70 units at 60 degrees.
6. Gloss Level 6, Gloss finish: 70 to 85 units at 60 degrees.
7. Gloss Level 7, High-Gloss finish: More than 85 units at 60 degrees.

B. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.

C. ASTM: ASTM International develops international standards for materials, products, systems and services used in construction, manufacturing and transportation: www.astm.org.

D. Bio-Pruf™: Anti-microbial additive that inhibits the growth of odor and stain causing mold and mildew on the paint film. "Antimicrobial" is defined as any means or mode of restricting growth or spread of microbes.

E. CHPS: Collaborative for High Performance Schools. A national movement to improve student performance and the entire educational experience by building the best possible schools: www.chps.net.

F. CRGI: Coatings Research Group Inc. is an international association of paint and coatings manufacturers dedicated to the benefits of shared research and development: crgiconnect.com.

G. DTM: Direct to metal. A coating that can be applied directly to a metal surface; refer to manufacturer's product information for surface preparation and application instructions.

H. EG: Ethylene Glycol. Ethylene glycol is listed as a hazardous air pollutant (HAP) by the U.S. EPA: www.epa.gov.

I. EPR: Environmental Performance Rating. Master Painters Institute's formula that relates VOC, Performance of Category, Gloss and Appropriate specified use. Higher values equate to greater eco- efficiency.

J. HAP: Hazardous Air Pollutant: According to the United States Environmental Protection Agency (EPA), Hazardous air pollutants, also known as toxic air pollutants or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects: www.epa.gov.

K. LEED: LEED (Leadership in Energy and Environmental Design) is a voluntary, consensus-based, market- driven program that provides third-party verification of green buildings: www.usgbc.org.

L. MPI: Master Painters Institute. An organization that establishes architectural paint standards and quality assurance programs in North America: www.paintinfo.com.

M. NACE: National Association of Corrosion Engineers www.nace.org.

N. PDCA: Painting & Decorating Contractors of America: www.pdca.org.

O. RAVOC: Reactivity adjusted VOC. 'Reactivity' means the ability of a VOC to promote ozone formation.

P. SCAQMD: South Coast Air Quality Management District is defined as most of Los Angeles, Orange, Riverside, and San Bernardino counties in California.

Q. CARB: California Air Resources Board District is defined as the counties outside of SCAQMD.

R. OTC: Refers to the Ozone Transmission Commission.

S. SSPC: The Society for Protective Coatings. Surface preparation standards and specifications. www.sspc.org.

T. ICRI: International Concrete Repair Institute. www.icri.org.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data for each type of coating system, label analysis and instructions for handling, storing, and applying each material specified. Include preparation requirements and application instructions.

1. Product List: Cross reference to coating system and locations of application areas. Use same designations indicated on Drawings and in Finish Schedules. Include manufacturer's recommended spreading rate (DFT) and VOC content limits for each separate coat for each type of substrate indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: Submit three samples for each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 12 inches square.

    a. Cured high-performance coating, 60 mils thick.
    b. Reinforced fabric and joint cover sheet.
    c. Ferrous and Nonferrous Metal: Provide two 4 inch square samples of flat metal and two 8 inch long samples of solid metal for each color and finish.

2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample with the following:

    a. Paint color name and number.
    b. Paint brand name.
    c. "P" number if applicable, and application area.

E. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations and VOC content.

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for each principal product type in this Section.
2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

B. Applicator's Project References: Submit list of completed projects.

C. Certificate of Applicator's Supervisor: Submit certificate indicating completion of manufacturer's certified training program.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents for single component products. All 2 component products supplied will be un-catalyzed.

1.6 QUALITY ASSURANCE

A. Contractor shall provide verification of conformance with this specification, referenced standards and related documents. This verification to be performed by a Third Party, minimum NACE Level 1 Certified Coatings Inspector.

1. Provide documentation verifying inspector's certification is both valid and current.

B. Qualifications:

1. Applicator: Use applicator experienced in the application of the specified high-performance coating for a minimum of 2 years on projects of similar size and complexity. Provide a list of completed projects including project name and location, name of Architect, name of coating manufacturer, and approximate quantity of coating applied.

2. Applicator's Supervisor: Employ a supervisor during all phases of the work that has successfully completed manufacturer's contractor training program.
3. Applicator's Personnel: Employ persons trained for the application of high-performance coating.

C. Regulatory Requirements: Comply with environmental regulations.

1. Air Quality Standards: Comply with the IBC and local jurisdiction for air quality regulations and chemical and heavy metal components.
2. Performance and Durability:

    a. Reflectometry.
    b. ASTM D 4828 Standard Test Method for Practical Washability of Organic Coatings.

D. Pre-Application Meeting:

1. Convene a pre-application meeting two weeks before the start of application of the high-performance coating.
2. Require attendance of parties directly affecting work of this Section, including the Contractor, subcontractor, Architect, Building Envelope Consultant, applicator and manufacturer's representative.
3. Review environmental requirements, materials, and protection of adjacent work, surface preparation, application, curing, field quality control, cleaning, and coordination with other work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials in accordance with manufacturer's written instructions and acceptable ranges published in their PDS/TDS and SDS sheets.

1. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
2. Maintain containers in clean condition, free of foreign materials and residue.
3. Remove rags and waste from storage areas daily.

1.8 PRE-JOB CONFERENCE

A. A pre-job conference to review and clarify the specification is recommended.

B. Those attending the meeting shall consist of, at minimum, Contractor, Owner (or Owner's Representative), Coatings Inspector (if applicable), and Architect.

C. Should certified coatings inspection be required as part of the specifying documents; a pre-job conference shall become a mandatory part of the Project.

D. Attendees of this mandatory meeting must include all parties identified above.

1.9 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above dew point; or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operations.
2. Work may continue during inclement weather if areas and surfaces to be coated are enclosed and temperature within the area can be maintained within limits specified by manufacturer during application and drying periods.

C. Do not apply over substrates that are frozen or contain frost.

D. All bare/exposed steel shall be coated within 8 hours of surface preparation.

E. Painting contractor should follow proper painting practices in accordance with SSPC-PA1 and ensure environmental conditions are within range of acceptability as documented in manufacturers Product Data Sheets/Technical Data Sheet (PDS/TDS).

F. Should NACE Certified Coatings Inspection be part of this contract; field conditions shall be verified at the beginning of shift, and three additional times throughout the shift.

1.10 WARRANTY

A. Provide a 10 year material warranty and 1 year labor warranty.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility: Systems could fail if paints used for individual coats are incompatible. Paint systems match primers and topcoats and take compatibility into consideration.

1. Provide materials for use, within each paint system, that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: Paints and coatings to be applied at Project Site shall comply with applicable VOC limits of the U.S. EPA National Emissions Standards for Architectural Coatings, exclusive of colorants added to tint bases, as calculated in accordance with 40 CFR 59 Subpart D (EPA Method 24), as follows:.

1. Flat Coatings: 250 g/L.
2. Nonflat Coatings: 380 g/L.
3. Nonflat - High Gloss Coatings (default Nonflat): 380 g/L.
4. Floor Coatings: 400 g/L.
5. Industrial Maintenance Coatings: 450 g/L.
6. Pre-Treatment Wash Primers: 780 g/L.
7. Primers and Undercoaters: 350 g/L.
8. Rust Preventative Coatings: 400 g/L.
9. Waterproofing Sealers and Treatments: 600 g/L.
10. Zinc-Rich Primers (default Industrial Maintenance): 450g/L.
11. All Shop-Primed Metal to be coated in accordance with applicable federal, state, and local regulations.

C. VOC Content: Paints and coatings to be applied at Project Site shall comply with applicable VOC limits of the Maricopa County Air Quality Department Rule 335 - Architectural Coatings, exclusive of colorants added to tint bases, as calculated in accordance with 40 CFR 59 Subpart D (EPA Method 24), as follows.

1. Flat Coatings: 250 g/L.
2. Nonflat Coatings: 250 g/L.
3. Nonflat - High Gloss Coatings (default Nonflat): 250 g/L.
4. Floor Coatings: 250 g/L.
5. Industrial Maintenance Primers and Topcoats: 420 g/L.
6. Pre-Treatment Wash Primers (default Industrial Maintenance): 420 g/L.
7. Primers, Sealers, and Undercoaters: 350 g/L.
8. Rust Preventative Coatings (default U.S. EPA): 400 g/L.
9. Waterproof Sealers: 400 g/L.
10. Zinc-Rich Primers (default Industrial Maintenance): 420 g/L.
11. All Shop-Primed Metal to be coated in accordance with applicable federal, state, and local regulations.

D. VOC Content: Paints and coatings to be applied at Project Site shall comply with applicable VOC limits of the California Air Resources Board 2007 Suggested Control Measure for Architectural Coatings, exclusive of colorants added to tint bases, as calculated in accordance with 40 CFR 59 Subpart D (EPA Method 24), as follows:

1. Flat Coatings: 50 g/L.
2. Nonflat Coatings: 100 g/L.
3. Nonflat - High Gloss Coatings: 150 g/L.
4. Floor Coatings: 100 g/L.
5. Industrial Maintenance Coatings: 250 g/L.

6. Pre-Treatment Wash Primers: 420 g/L.
7. Primers, Sealers, and Undercoaters: 100 g/L.
8. Rust Preventative Coatings: 250 g/L.
9. (Waterproofing) Concrete/Masonry Sealers: 100 g/L.
10. Zinc-Rich Primers 340 g/L.
11. All Shop-Primed Metal to be coated in accordance with applicable federal, state and local regulations.

E. VOC Content: Paints and coatings to be applied at Project Site shall comply with applicable VOC limits of the South Coast Air Quality Management District Rule 1113: Architectural Coatings, exclusive of colorants added to tint bases, as calculated in accordance with 40 CFR 59 Subpart D (EPA Method 24), as follows:

1. Flat Coatings: 50 g/L.
2. Nonflat Coatings: 50 g/L.
3. Nonflat - High Gloss Coatings (default Nonflat): 50 g/L.
4. Floor Coatings: 50 g/L.
5. Industrial Maintenance (IM) Coatings: 100 g/L.
6. Pre-Treatment Wash Primers: 420 g/L.
7. Primers, Sealers, and Undercoaters: 100 g/L.
8. Rust Preventative Coatings: 100 g/L.
9. Waterproofing Concrete/Masonry Sealers: 100 g/L.
10. Zinc-Rich IM Primers 100 g/L.
11. All Shop-Primed Metal to be coated in accordance with applicable federal, state, and local regulations.

F. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, and shall comply with the applicable VOC limits of Rule 1113, as follows:

1. Colorants for Architectural Coatings, excluding IM Coatings: 50 g/L.
2. Colorants for Solventborne Industrial Maintenance Coatings: 600 g/L.
3. Colorants for Waterborne Industrial Maintenance Coatings: 50 g/L.

G. Colors: As selected by Architect from manufacturer's full range.

1. When the final color has not been selected prior to bid submittal, Contractor may need to bid additional coats when submitting their bid. The Owner should be aware that if a color is chosen following the bid process and the color is significantly different from original color, a change order for an additional finish coat might be required.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. Provide products of same manufacturer for each coat in a coating system.

B. Primer: Recommended by coating manufacturer for system specified for each condition and substrate.

2.3 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. The Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

2.4 MANUFACTURERS

A. Carboline Company.

B. International Protective Coatings; an AkzoNobel Brand.

C. PPG Protective and Marine Coatings (PPG).

D. Sherwin Williams Company Protective and Marine Coatings, (SW).

E. Tnemec Company, Inc.

2.5 ALUMINUM (NOT ANODIZED OR OTHERWISE COATED)

A. Pigmented Polyurethane System: SSPC-SP 16

1. Primer: Epoxy for metal zinc phosphate pigmented <340 g/L.

a. Carboline; Carboguard 893 SG 3.0-6.0 mils (76-152 microns) DFT.
b. International; Intergard 251, 2.0-3.0 mils (50-75 microns) DFT.
c. PPG; PMC Amercoat 385PA Multi-Purpose Epoxy, 3.0-8.0 mils (75-200 microns) DFT.
d. SW; DTM Wash Primer, 0.7-1.3 mils DFT.

2. Topcoat: Polyurethane, two-component, pigmented, gloss <250 g/L.

    a. Carboline; Carbothane 134 VOC 2.0-3.0 mils (50-76 microns) DFT.
    b. International; Interthane 990 Series, (Gloss Level 6) 2.0-4.0 mils (50-100 microns) DFT.
    c. PPG; Pitthane Ultra Gloss Urethane 95-812 Series, 2.0-3.0 mils (50-75 microns) DFT.
    d. SW; Acrolon Ultra High Performance Polyurethane, B65-820, 2.0-3.0 mils DFT.

B. Polysiloxane over Epoxy System: SSPC-SP 16

1. Primer: Epoxy for metal aluminum/MIO filled <250 g/L.

    a. Carboline; Carbomastic 615 AL 5.0-10.0 mils (127-254 microns) DFT.
    b. International; Intergard 251, 2-3.0 mils (50-75 microns) DFT.
    c. PPG; PMC Amerlock 2AL Aluminum Epoxy Mastic, 4.0-8.0 mils (100-200 microns) DFT.
    d. SW; Macropoxy 646, 5.0-7.0 mils DFT.

2. Topcoat: Polysiloxane, two-component, pigmented, gloss <250 g/L.

    a. Carboline; Carboxane 2000 3.0-7.0 mils (76-178 microns) DFT.
    b. International; Interfine 878, 2.0-3.0 mils (50-75 microns) DFT.
    c. PPG; PMC PSX 700, 3.0-7.0 mils (75-175 microns) DFT.
    d. SW; Macropoxy 646, 5.0-7.0 mils DFT.

2.6 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

A. Pigmented Polyurethane over Organic Zinc-Rich Primer System:

1. Primer:

    a. Carboline; Carbozinc 859 VOC, or Cabozinc 859, 3-5 mils, (75-125 microns) DFT.
    b. International; Cathacoat 315, 3.0-4.0 mils (75-100 microns) DFT.
    c. PPG; PMC Amercoat 68 HS Zinc Rich Epoxy, 2.0-5.0 mils (50-125 microns) DFT.
    d. SW; Zinc-Clad III HS, 100, B69A1110-15, 3.0-5.0 mils (75-125 microns) DFT.
    e. Tnemec; Series 90-97 Tneme-Zinc, 2.5-3.5 mils.

2. Top Coat:

    a. Carboline; Carbothane 133 MC, or Carbothane 133 HB, 3-5 mils, (75-125 microns) DFT.
    b. International; Devthane 379H, 2-3.0 mils (50-75 microns) DFT.
    c. PPG; PMC Amerhield Polyester Acrylic Aliphatic Polyurethane, 3.0-6.0 mils (75-150 microns) DFT.
    d. SW; Water-Based Acrolon 100 B65-200 Series, 1.8-3.6 mils (45-90 microns).

e. Tnemec; Series 73 Endura-Shield, 3-5 mils.

B. Pigmented Polyurethane over High-Build Epoxy System:

1. Primer: Epoxy. <250 g/L.

a. Carboline; Carboguard 893 3.0-6.0 mils (76-152 microns) DFT.
b. International; Coating Systems; Intercure 200HS, 6.0-8.0 mils, (150-200 microns) DFT.
c. PPG; PMC Amerlock 2 High Solids Epoxy Coating, 4.0-8.0 mils (100-200 microns) DFT.
d. SW; Zinc-Clad III HS, B69A100-15, 3.0-5.0 mils (75-125 microns) DFT.
e. Tnemec; Series 66HS Hi-Build Epoxoline, 3-6 mils DFT.

2. Topcoat: Polyurethane, two-component, pigmented, gloss <250 g/L.

a. Carboline; Carbothane 134 VOC2.0-2.0 mils (51-75 microns) DFT.
b. International; Interthane 990 Series, (Gloss Level 6), 2.0-3.0 mils (50-75 microns) DFT.
c. PPG; Pitthane Ultra Gloss Urethane 95-812 Series, 2.0-3.0 mils (50-75 microns) DFT.
d. SW; Acrolon Ultra High Performance Polyurethane, B65-820 Series, 2.0-3.0 mils (50-75 microns) DFT.
e. Tnemec; Series 1074 [U] Endura-Shield, 2-3 mils DFT.

C. Polysiloxane over High-Build Epoxy System:

1. Primer: Epoxy for metal. <250 g/L.

a. Carboline; Carboguard 893 3.0-6.0 mils (76-152 microns) DFT.
b. International; Intercure 200HS, 6.0-8.0 mils (150-200 microns) DFT.
c. International; Intergard 475HS 4.0-8.0 mils (100-200 microns) thick DFT.
d. PPG; PMC Amerlock 2 High Solids Epoxy Coating, 4.0-8.0 mils (100-200 microns) DFT.
e. SW; Macropoxy 646, 5.0-7.0 mils DFT.

2. Topcoat: Polysiloxane, two-component, pigmented, gloss <250 g/L

a. Carboline; Carboxane 2000 3.0-7.0 mils (76-178 microns) DFT.
b. International; Interfine 878, gloss, 2-3.0 mils (50-75 microns) DFT.
c. PPG; PMC PSX 700, 3.0-7.0 mils (75-175 microns) DFT.
d. SW; Polysiloxane XLE-80, 3.0-7.0 mils DFT.

D. Pigmented Polyurethane/or Polysiloxane over Aromatic Urethane Zinc-Rich Primer and High-Build Epoxy System with a minimum of 80% zinc dust in the dry film:

1. Primer: Zinc-rich, aromatic urethane.

a. Carboline; Carbozinc 859 (or 859 VOC) Epoxy Zinc or Carboline Carbozinc Inorganic 11 Series, 3.0-5.0 mils (75-125 microns) thick DFT.
b. International; InterZinc 22HS, 2.0-3.0 mils (50-75 microns) thick DFT.
c. PPG; Amercoat 68 MCZ, 4.0 mils (100 microns) thick DFT.
d. SW; Corothane I GAL-VA-PAC Zinc Primer, B65G10.
e. Tnemec; Tneme-Zinc Series 90-97, 2.5-3.5 mils (65-90 microns) thick DFT.

2. Intermediate Coat: Epoxy, high build, low gloss <100 g/L.

a. Carboline; Carboguard 890 VOC Epoxy, 4.0-6.0 mils (100-150 microns) thick DFT.
b. International; Intergard 475HS, 4-8.0 mils (100-200 microns) thick DFT.
c. PPG; Amerlock 2 VOC compliant, 4.0-8.0 (100-200 microns) DFT.
d. SW; Mscropoxy 646-100 Fast Cure Epoxy, B58-620, 5.0-10.0 mils DFT.
e. Tnemec; Hi-Build Epoxoline Series 66HS, 4.0-6.0 mils (100-150 microns) DFT.

3. Topcoat: Polyurethane, two component, pigmented, gloss, semi-gloss or satin. <100 g/L

a. Carboline; Carbothane 134MC Urethane Gloss Finish, 2.0-2.5 mils (50-62 microns) thick (or Satin Version -133MC, 3.0-5.0 mils (75-125 microns) thick DFT (or 133 HB).
b. International; Interfine 1080, 3.0 mils (75 microns) thick DFT.
c. PPG; Pitthane Ultra Gloss 95-812 or Semi-Gloss 95-8800, 2.0-3.0 mils (50-75 microns) DFT.
d. SW; Waterbased Acrolon 100, B65-720, 2.0-4.0 mils DFT.
e. Tnemec; Enduralume Series [1074][1074U][1077], 2.0-3.0 mils (50-75 microns) DFT.

E. Pigmented Polyurethane over Aromatic Urethane Zinc-Rich Primer and High-Build Epoxy System:

1. Primer: Zinc rich, aromatic urethane.

a. Carboline; Carbozinc 859 (or 859 VOC) Epoxy Zinc or Carboline Carbozinc Inorganic 11 Series, 3.0-5.0 mils (75-125 microns) thick DFT.
b. International; InterZinc 22HS or Cathacoat 302H, 2.0-3.0 mils (50-75 microns) thick DFT.
c. PPG; Amercoat 68 MCZ, 4.0 mils (100 microns) thick DFT.
d. SW; Corothane I GAL-VA-PAC Zinc Primer, B65G10.
e. Tnemec; Tneme-Zinc Series 90-97, 2.5-3.5 mils (65-90 microns) thick DFT.

2. Intermediate Coat: Epoxy, high build, low gloss. <100 g/L.

a. Carboline; Carboguard 890 VOC Epoxy, 4.0-6.0 mils (100-150 microns) thick DFT.
b. International; Intergard 475HS or Devran 224V, 4.0-6.0 mils (100-150 microns) thick DFT.

c. PPG; Amerlock 2 VOC compliant, 4.0-8.0 (100-200 microns) DFT.
d. SW; Macropoxy 646-100, B58-+30, 5.0-10.0 mils DFT.
e. Tnemec; Hi-Build Epoxoline Series 66HS, 4.0-6.0 mils (100-150 microns) DFT.

3. Topcoat: Polyurethane, two component, pigmented, gloss, semi-gloss or satin. <100 g/L

a. Carboline; Carbothane 134MC Urethane Gloss Finish, 2.0-2.5 mils (50-62 microns) thick (or Satin Version - 133MC, 3.0-5.0 mils (75-125 microns) thick DFT (or 133 HB).
b. International; Interthane 870 or Devthane 378, 2.0-3.0 mils (50-75 microns) thick DFT.
c. PPG; Pitthane Ultra Gloss 95-812 or Semi-Gloss 95-8800, 2.0-3.0 mils (50-75 microns) DFT.
d. SW; Waterbased Acrolon 100, B65-720, 2.0-4.0 mils DFT.
e. Tnemec; Enduralume Series [1075 for standard] [1077 for metallic], 2.0-3.0 mils (50-75 microns) DFT.

F. Field Applied Fluoropolymer, Pigmented:

1. Primer:

a. PPG; Coraflon, ADS Zinc Rich Epoxy, 3.0-3.0 mils (75-100 microns) DFT.
b. SW; Zinc-Clad III HS, B69A100-15, 3.0-5.0 mils (75-125 microns) DFT.
c. Tnemec; Series 90-97 Tneme-Zinc, 2.5-3.5 mils (65-90 microns) DFT.

2. Intermediate Coat:

a. PPG; Coraflon, Epoxy Intermediate Primer, ADS573/ADS574, 2.0-5.0 mils (50-125 microns) DFT.
b. SW; Macropoxy 646, Fast Cure Epoxy, B58 Series, 3.0-10.0 mils (125-175 microns) DFT.
c. Tnemec; Series 73 Endura-Shield, 2.0-5.0 mils (50-125 microns) DFT.

3. Topcoat: Polyurethane, two component, pigmented, semi-gloss or satin.

a. PPG; Coraflon ADS, 1.5-2.2 mils, DFT.
b. SW; Flurokem HS (Gloss B65-580, Semi-Gloss B65-570, Satin B65-560) at 2.0-3.0 mils (50-75 microns) DFT.
c. Tnemec; Series 1070 Fluornar, 2.0-3.0 mils (50-75 microns) DFT.

2.7 GALVANIZED STEEL

A. Pigmented Polyurethane System:

1. Primer: Epoxy for galvanized steel.

a. Carboline: Rustbond 1.0-2.0 (25-50 microns) DFT.

b. International; Intergard 251, 2.0-3.0 mils (50-75 microns) DFT.
c. PPG; PMC Amercoat 385PA Multi-Purpose Epoxy, 3.0-8.0 mils (75-200 microns) DFT.

2. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)

a. Carboline; Carbothane 134MC Urethane Gloss Finish, 2.0-2.5 mils (50-62 microns) DFT
b. International; Interthane 990 Series, 2.0-4.0 mils (50-100 microns) DFT.
c. PPG; Pitthane Ultra Gloss Urethane 95-812 Series, 2.0-3.0 mils (50-75 microns) DFT.

B. Polysiloxane over Epoxy System:

1. Primer: Epoxy for galvanized steel.

a. Carboline; Rustbond 1.0-2.0 (25-50 microns) DFT.
b. International; Intergard Interplus 251, 2-3.0 mils (50-75 microns) DFT.
c. PPG; PMC Amerlock 2AL Aluminum Epoxy Mastic, 4.0-8.0 mils (100-200 microns) DFT.

2. Topcoat: Polysiloxane, two-component, pigmented, gloss) <250 g/L.

a. Carboline; Carboxane 2000 3.0-7.0 mils (76-178 microns) DFT.
b. International; Interfine 878, 2.0-3.0 (50-75 microns) DFT.
c. PPG; PMC PSX 700, 3.0-7.0 mils (75-175 microns) DFT.

2.8 EXTERIOR STEEL STAIRS

A. Coating System for Exterior Stairs (Not Regularly Used):

1. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning. Anchor profile shall be angular with a 1.5 to 2.0 mils as per ASTM D 4417, Method C or NACE Standard RP0287.
2. Coating System:

a. Primer: Tnemec; Series 90G-1K97 Tneme-Zinc applied at 2.5 to 3.5 dry mils.
b. First Coat: Tnemec; Series 73 Endura-Shield applied at 3.0 to 5.0 dry mils.
c. Second Coat: Tnemec; Series 1070 Fluoronar applied at 2.0 to 3.0 dry mils.

1) Note: For a semi-gloss finish, use Series 1071. For a satin finish, use Series 1072.

B. Coating System for Exterior Stairs (Not Regularly Used)-Metallic Finish:

1. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning. Anchor profile shall be angular with a 1.5 to 2.0 mils as per ASTM D 4417, Method C or NACE Standard RP0287.
2. Coating System:

    a. Primer: Tnemec; Series 90G-1K97 Tneme-Zinc applied at 2.5 to 3.5 dry mils.
    b. First Coat: Tnemec; Series 73 Endura-Shield applied at 3.0 to 5.0 dry mils.
    c. Second Coat: Tnemec; Series 1078 Fluoronar Metallic applied at 2.0 to 3.0 dry mils.

C. Coating System for Exterior Stairs (Regularly Used):

1. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning. Anchor profile shall be angular with a 1.5 to 2.0 mils as per ASTM D 4417, Method C or NACE Standard RP0287.
2. Coating System:

    a. Primer: Tnemec; Series 90G-1K97 Tneme-Zinc applied at 2.5 to 3.5 dry mils.
    b. First Coat: Tnemec; Series 66HS Hi-Build Epoxoline applied at 4.0 to 6.0 dry mils.
    c. Second Coat: Tnemec; Series 290 CRU applied at 2.0 to 3.0 dry mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

1. Confirm shop applied primer is not a temporary protective primer intended for shipping purposes.
2. Confirm primer is suitable for anticipated service conditions.
3. Confirm primer's ability for being top coated with specified materials.

C. Verify environmental conditions are within coating manufacturer's specified range. Environmental conditions shall be monitored at 4 points throughout each shift. Once at beginning, once at end, and two additional times in between. Recording must be taken at area where work is being performed.

D. Each set of environmental readings shall consist of:

1. Relative humidity.
2. Unless otherwise stated; relative humidity must not exceed 85%.

3. Ambient Air Temperature.
4. Dew Point.
5. Δ?? - (+/-Difference between surface temperature and dew point) Surface must be a minimum of 5 deg F above dew point

E. Dust levels remaining on surface shall be verified in accordance with ISO 8502-3. A dust level 3 or cleaner shall be deemed as acceptable.

F. Surface profile shall be verified in accordance with ASTM D 4417. Surface profile ranges must be within ranges listed in manufacturers published data.

G. Proceed with coating application only after unsatisfactory conditions have been corrected. Commencement of coating application constitutes Contractor's acceptance of substrates and conditions.

1. Verify compatibility with, and suitability of, substrates, including compatibility with existing finishes or primers.
2. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
3. Coating application indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates indicated. Recommendations shall be verified to meet site conditions during the preconstruction conference.

B. Remove plates, machined surfaces, and similar items already in place and not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

D. Remove incompatible fillers and reprime substrate with compatible primers or apply the coat as required to produce coating systems indicated.

E. Steel Substrates:

1. All oil, grease, dirt, dust and other foreign materials must be removed prior to surface preparation commencement.

F. Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

1. Prepare surface per SSPC SP6 "Commercial Blast Cleaning" minimum. Surface profile shall be 1.0 to 1.5 mils.
2. Prior to coating, solvent wipe substrate to remove dust and residual contamination.

G. Shop-Primed Steel Substrates:

1. Clean field welds, bolted connections, and abraded areas of shop paint. Paint exposed areas with the same material used for shop priming and comply with SSPC-PA 1 for touching up shop-primed surfaces.
2. Acceptable methods of cleaning shall be in accordance with manufacturer's written instructions.
3. Blast clean according to SSPC/NACE standard specified.

    a. [SSPC-SP5/NACE No. 1, "White Metal Blast Cleaning."]
    b. [SSPC-SP6/NACE No. 3, "Commercial Metal Blast Cleaning."]
    c. [SSPC-SP7/NACE No. 4, "Brush-Off Blast Cleaning."]
    d. [SSPC-SP10/NACE No. 2, "Near White Blast Cleaning."]

H. Galvanized-Metal Substrates

1. Remove grease and oil residue form galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
2. Blast clean new galvanized metal substrate to receive field-applied fluoropolymer coating to SSPC-SP7/NACE NO. 4, "Brush-Off Blast Cleaning," to surface profile of 1.0 to 2.0 mils. Remove all passivator residue.
3. Clean weathered galvanized metal substrate to receive filed-applied fluoropolymer coating to:

    a. SSPC-SP3/NACE No. 4. "Power Tool Cleaning,"
    b. SSPC-SP7/NACE No. 4. "Brush-Off Blast Cleaning,"
    c. To a surface profile of 1.0 to 2.0 mils.

I. Aluminum Substrates: Remove loose surface oxidation with a surface solution approved by the coating manufacturer.

1. Aluminum: Solvent clean the surface with PPG Aluma-Prep 33, per SSPC SP-1, to remove any contamination that may be present.
2. Abrade substrate to obtain a surface profile of at least 1 mil to allow for a mechanical bond. Depending on the alloy, and substrate softness, prepare surface using hand sanding. Scotch-Brite pads, or hand tool cleaning per SSPC SP-2.

J. Material Preparation: Carefully mix and prepare coating materials according to manufacturer written instructions.

1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.

2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions.

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

E. Application: Apply first coat to surfaces that have been cleaned, pretreated, or prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required is the same regardless of application method.
2. Minimum Coating Thickness: Apply each material no thinner than manufacturer recommended spread rate. Provide total dry film thickness of system recommended by manufacturer.

    a. DFT ranges per coat must fall within manufacturer's recommended ranges. Measurements shall be taken in accordance with SSPC-PA2 "method for evaluating DFT."

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: The Owner reserves the right to invoke the following procedures at any time and as often as the Owner deems necessary during the period when paints are being applied.

1. The Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to the site will be taken, identified, sealed and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of paint materials with product requirements.
3. The Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from the site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

B. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION

SECTION 101423.16 - INTERIOR CODE SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes interior base building code signs that are directly attached to the building.

1.2 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Refer to Division 01 Section "Sustainable Design Requirements."

C. Sign location plan and message schedule:

1. The contractor shall furnish a sign location plan and message representing all sign type and every sign location.

D. Artwork:

1. The contractor shall furnish all typography and all necessary artwork for reproduction. Contractor is responsible for purchasing license for typeface(s) as indicated in drawings.

E. Shop Drawings:

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

F. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

G. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Submit full-size sample(s) of each sign type for approval prior to production, unless waived by Owner.

H. Product Schedule: For room-identification signs. Use same designations indicated on Drawings and confirm with owner.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Variable Component Materials: 12 replaceable text inserts and interchangeable characters (letters, numbers, and graphic elements) of each type.
2. Tools: One set(s) of specialty tools for assembling signs and replacing variable sign components.

1.7 FIELD CONDITIONS

A. Verify all measurements and take all field measurements necessary before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Deterioration of embedded graphic image.
c. Separation or delamination of sheet materials and components.

B. Warranty Period: Three years from installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design, ICC A117.1 and local building code.

1. Character Proportion: Letters and numbers on signs must have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10.
2. Color Contrast: Characters and symbols must contrast with their background - either light characters on a dark background or dark characters on a light background.
3. Raised Characters or Symbols: Letters and numbers on signs must be raised 1/32-inch minimum and be sans serif characters. Raised characters or symbols must be at least 5/8-inch high but no higher than 2-inches. Symbols or pictograms on signs must be raised 1/32-inch minimum.
4. Symbols of Accessibility: Accessible facilities required to be identified must use the international symbol of accessibility.
5. Braille: Grade II with accompanying text.

2.2 SIGN TYPES

A. Glass Distraction Markings - Sign Type D.1

1. Mounting: Applied to second surface of glass.
2. Color: 3M Satin Aluminum 120/Pantone 877C .

B. Support Room ID - Sign Type J.1

1. Sign Panel: Brushed Stainless Steel panel.
2. Panel thickness: 0.25-inch.
3. Sign panel perimeter: Finish edges smooth.

    a. Edge condition: Square cut.
    b. Corner condition in elevation: Square.

4. Mounting: Surface mounted to wall with VHB tape & silicone adhesive as required.
5. Graphics & Braille: Accessible raised characters and Braille. Finish raised characters painted to contrast with background color as indicated in drawings. Grade II Braille to match background color.
6. Typeface: Confirm with owner. .
7. Graphic Color: Dark Gray to match Benjamin Moore Steel Wool 2121-20.

C. Restroom ID - Sign Type K.1

1. Sign Panel: Brushed Stainless Steel panel.
2. Panel thickness: 0.25-inch.
3. Sign panel perimeter: Finish edges smooth.
    a. Edge condition: Square cut.
    b. Corner condition in elevation: Square.
4. Mounting: Surface mounted to wall with VHB tape & silicone adhesive as required.
5. Graphics & Braille: Accessible raised characters and Braille. Finish raised characters painted to contrast with background color as indicated in drawings. Grade II Braille to match background color.
6. Typeface: Confirm with owner. .
7. Graphic Color: Dark Gray to match Benjamin Moore Steel Wool 2121-20.

D. Accessible Restroom Directional ID - Sign Type K.4

1. Sign Panel: Brushed Stainless Steel panel.
2. Panel thickness: 0.25-inch.
3. Sign panel perimeter: Finish edges smooth.
    a. Edge condition: Square cut.
    b. Corner condition in elevation: Square.
4. Mounting: Surface mounted to wall with VHB tape & silicone adhesive as required.
5. Graphics & Braille: Accessible raised characters and Braille. Finish raised characters painted to contrast with background color as indicated in drawings. Grade II Braille to match background color.
6. Typeface: Confirm with owner. .
7. Graphic Color: Dark Gray to match Benjamin Moore Steel Wool 2121-20.

E. Fire Equipment ID - Sign Type Q.1

1. Surface-Applied Graphics: applied vinyl film.
2. Mounting: Surface mounted vinyl to face of fire equipment door.
3. Typeface: Confirm with owner. .

F. Fire Command Center ID - Sign Type Q.2

1. Sign Panel: Frosted Acrylic panel.
    a. Color: White to match Benjamin Moore Chantilly Lace OC-65.
2. Panel thickness: 0.25-inch.
3. Surface-Applied Graphics: Direct-print.
4. Sign panel perimeter: Finish edges smooth.

a. Edge condition: Square cut.
b. Corner condition in elevation: Square.

5. Mounting: Surface mounted to wall with VHB tape & silicone adhesive as required.
6. Typeface: Confirm with owner. .
7. Graphic Color: Red to match Benjamin Moore Red 20000-10.

G. Trash / Glass, Metal & Plastic / Paper / Compost (Container Labels) - Sign Types T.1, T.2, T.3, T.4

1. Sign Panel: Brushed Stainless Steel panel.
2. Panel thickness: 0.125-inch.
3. Surface-Applied Graphics: Direct-print.
4. Sign panel perimeter: Finish edges smooth.

a. Edge condition: Square cut.
b. Corner condition in elevation: Square.

5. Mounting: Surface mounted to wall with VHB tape & silicone adhesive as required.
6. Typeface: Confirm with owner.
7. Graphic Color: Dark Gray to match Benjamin Moore Steel Wool 2121-20.

H. Trash / Recycling (Public Area Sign) - Sign Type T.5

1. Sign Panel: Non-glare clear acrylic panel with letter paper insert slot.
2. Panel thickness: 0.125-inch.
3. Frame Color: Dark Gray to match Benjamin Moore Steel Wool 2121-20.
4. Sign panel perimeter: Finish edges smooth.

a. Edge condition: Square cut.
b. Corner condition in elevation: Square.

5. Mounting: Surface mounted to wall with VHB tape & silicone adhesive as required.

I. Low Energy / Power Assist Doors - Sign Type Z.1

1. Mounting: Applied first surface vinyl graphics on door.

2.3 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Coyle & Company.
2. Design Communications, LTD.
3. L&M Architectural Signs.

4. Signature Industries.
5. Visual Graphics Systems.

2.4 SIGN MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

C. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as indicated on drawings.

D. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

E. Bronze: Plate, Sheet, Strip, and Bars: ASTM B36/B36M, Alloy UNS C28000 (muntz metal, 60 percent copper).

F. Stainless Steel: Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304

G. Aluminum: Plate and Sheet: ASTM B209, Alloy 5005-H32

H. Photoluminescent Panel: Provide glow in the dark, photo luminescent material that complies with applicable provisions of ASTM E 2073-02. Photo luminescent material must have up to eight hours of luminance.

2.5 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. Sign Mounting Fasteners:

    a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
    b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes. B. Adhesive: As recommended by sign manufacturer.

3. Adhesives shall have a VOC content of 70 g/L or less.

4. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inches thick, with adhesive on both sides.

C. Hook-and-Loop Tape: Manufacturer's standard two-part tape consisting of hooked part on sign back and looped side on mounting surface.

D. Magnetic Tape: Manufacturer's standard magnetic tape with adhesive on one side.

2.6 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
5. First Surface Copy Direct Print (Non-Tactile) Message may be applied to panel using the direct print process. Edges and corners must be clean. All graphics to match digital artwork.

2.7 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ACRYLIC FINISHES

A. Acrylic P95 finish on face of sign panel and second surface backpainted.

2.9 ALUMINUM FINISHES

A. Brushed Aluminum: horizontal brushed satin finish.

B. Clear Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.

C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.10 COPPER ALLOYS

A. Copper and Copper Alloys, General: Provide alloys indicated and temper to suit application and forming methods but with strength and stiffness not less than H01 (quarter-hard) for plate, sheet, strip, and bars and H55 (light-drawn) for tube and pipe.

B. Extruded Shapes, Bronze: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).

C. Extruded Shapes, Brass: ASTM B 249/B 249M, Alloy UNS No. C36000 (free-cutting brass).

D. Extruded Shapes, Nickel Silver: ASTM B 249/B 249M, Alloy UNS No. C79600.

E. Seamless Pipe, Bronze: ASTM B 43, Alloy UNS No. C23000 (red brass, 85 percent copper).

F. Seamless Tube, Bronze: ASTM B 135, Alloy UNS No. C23000 (red brass, 85 percent copper).

G. Seamless Tube, Brass: ASTM B 135, Alloy UNS No. C26000 (cartridge brass, 70 percent copper).

H. Seamless Tube, Copper: ASTM B 75, Alloy UNS No. C12200 (phosphorous deoxidized, high residual phosphorous copper).

I. Plate, Sheet, Strip, and Bars; Bronze: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).

J. Plate, Sheet, Strip, and Bars; Brass: ASTM B 36/B 36M, Alloy UNS No. C26000 (cartridge brass, 70 percent copper).

K. Plate, Sheet, Strip, and Bars; Copper: ASTM B 152/B 152M, Alloy UNS No. C11000 (electrolytic tough pitch copper) or UNS No. C12200 (phosphorous deoxidized, high-residual phosphorous copper).

2.11 STAINLESS STEEL

A. Tubing: ASTM A 554, Grade MT 304.

B. Pipe: ASTM A 312/A 312M, Grade TP 304.

C. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.

D. Bars and Shapes: ASTM A 276, Type 304.

2.12 STEEL AND IRON

A. Tubing: ASTM A 500 (cold-formed).

B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

E. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.

2.13 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Brazing Rods: For copper alloys, provide type and alloy as recommended by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.

C. Cleaner: Provide a liquid emulsifiable alkaline soak cleaner suitable for metal surfaces. Basis-of-Design Product: E-Kleen 111; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

D. Deoxidizer/Activator: Provide a mixture or dry, granular, free-flowing acid salts which, when dissolved in water, are used to deoxidize and activate metal surfaces prior to plating or chemical conversion finishing. Basis-of-Design Product: E-Pik 211; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

E. Black Oxide Finishing Agent for Steel: Provide an alkaline salt and oxidizing agent mixture containing penetrants, catalysts, activators, rectifiers and wetters which, when dissolved in water and heated, produce a black oxide finish on steel. Basis-of-Design Product: Ultra-Black 400; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

F. Black Oxide Finishing Agent for Stainless Steel: Provide an alkaline salt and oxidizing agent mixture containing penetrants, catalysts, activators, rectifiers and wetters which, when dissolved in water and heated, produce a black oxide finish on stainless steel. Basis-of-Design Product: Ultra-Black 407; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

G. Gloss Acrylic Lacquer: Provide a lacquer sealer designed to produce a hard, dry, clear finish. Basis-of-Design Product: E-Tec 520; Epi, 17000 West Lincoln Avenue, New Berlin, WI 53151, voice (262) 786-9330.

H. Lacquer for Copper Alloys: Clear, acrylic lacquer specially developed for coating copper-alloy products.

I. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."

J. Intermediate Coats and Topcoats for Steel: Provide products that comply with Section 099123 "Interior Painting."

K. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Accessibility: Install signs in locations on walls as indicated on Drawings.

C. Mounting Methods:

D. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

1. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
2. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

E. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

F. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

G. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position and push to engage tape adhesive.

H. Hook-and-Loop Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply sign component of two-part tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage; push to engage tape adhesive. Keep tape strips 0.250 inches away from edges to prevent visibility at sign edges when sign is initially installed or reinstalled. Apply substrate component of tape to substrate in locations aligning with tape on back of sign; push and rub well to fully engage tape adhesive to substrate.

I. Magnetic Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position.

3.2 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423.16

SECTION 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes [**toilet compartments**] [**and**] [**screens**] as follows:

1. Type: [**Steel, color-coated finish**] [**Stainless steel**] [**Plastic laminate**] [**Solid-plastic, phenolic core**] [**Solid-plastic, polymer resin**].
2. Compartment Style: [**Overhead braced and floor anchored**] [**Floor anchored**] [**Ceiling hung**] [**Floor and ceiling anchored**].
3. Screen Style: [**Wall hung**] [**Floor anchored**] [**Ceiling hung**] [**Floor and ceiling anchored**].

1.2 ACTION SUBMITTALS

A. Product Data: For each product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Include plans, elevations, sections, details of installation, and attachments to other Work.

D. Samples: For each exposed finish and for each color and pattern required.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following principal product type in this Section:

    a. Toilet Compartment Panel, Pilaster and Door Assemblies.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Baked Enamel on Steel:

    a. Accurate Partitions Corporation.
    b. Bradley Corporation.
    c. General Partitions Manufacturing Corporation.
    d. Global Steel Products Corporation.
    e. Hadrian Manufacturing, Inc.
    f. Metpar Corporation.

2. Stainless Steel:

    a. Accurate Partitions Corporation.
    b. Bradley Corporation.
    c. General Partitions Manufacturing Corporation.
    d. Global Steel Products Corporation.
    e. Hadrian Manufacturing, Inc.
    f. Metpar Corporation.

3. Plastic Laminate:

    a. Accurate Partitions Corporation.
    b. Bobrick Washroom Equipment, Inc.
    c. General Partitions Manufacturing Corporation
    d. Global Steel Products Corporation.
    e. Metpar Corporation.

4. Phenolic Core, Solid Plastic:

    a. Accurate Partitions Corporation.
    b. Bradley Corporation.
    c. Capital Partitions, Inc.
    d. Bobrick Washroom Equipment, Inc.
    e. General Partitions Manufacturing Corporation.
    f. Global Steel Products Corporation.
    g. Metpar Corporation.

5. Polymer Resin, Solid Plastic:

a. Accurate Partitions Corporation.
b. Capital Partitions, Inc.
c. Compression Polymers Group; Comtec Industries.
d. General Partitions Manufacturing Corporation.
e. Global Steel Products Corporation.
f. Hadrian Manufacturing, Inc.
g. Santana Products, Inc.

2.2 MATERIALS

A. Panel, Pilaster, and Door Material:

1. Steel Sheets with Color-Coated Finish: Mill-phosphatized, corrosion-resistant steel sheet; stretcher-leveled flatness, ASTM A 591/A 591M, Class C, or ASTM A 653/A 653M; with manufacturer's standard baked finish.

    a. Color: [**Match sample**] [**As selected from manufacturer's full range**] <**Insert color(s)**>.

2. Stainless-Steel Sheet: ASTM A 666, Type 302 or 304, stretcher-leveled flatness, [**No. 3 or No. 4 directional polish**] [**textured finish**].
3. Plastic Laminate: NEMA LD 3, Grade HGS.

    a. Color: [**Match sample**] [**As selected from manufacturer's full range**] <**Insert color(s)**>.

4. Solid-Plastic, Phenolic Core: Solid phenolic core with melamine facing on both sides, fused to substrate without visible glue line or seam. Provide units with eased edges and with minimum 3/4 inch thick doors and pilasters and minimum 1/2 inch thick panels and screens.

    a. Color: [**Match sample**] [**As selected from manufacturer's full range**] <**Insert color(s)**>.

5. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch thick with seamless construction and eased edges.

    a. Color: [**Match sample**] [**As selected from manufacturer's full range**] <**Insert color(s)**>.

B. Core Material for Metal-Faced Units: Sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch minimum for doors, panels, and screens and 1-1/4 inches minimum for pilasters.

C. Core Material for Plastic Laminate: ANSI A208.1, Type M-2 particleboard with 45 lb density in thicknesses required to provide nominal thicknesses of 1 inch minimum for doors, panels, and screens and 1-1/4 inches minimum for pilasters.

D. Particleboard: ANSI A208.1, Grade M-2 with 45 lb density.

1. Particleboard shall be made without urea formaldehyde.
2. Particleboard shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. Pilaster Shoes and Sleeves (Caps): [**Stainless steel**] [**Solid plastic, polymer resin**], not less than 3 inches high.

F. Stirrup Brackets: [**Clear-anodized aluminum**] [**Stainless steel**] [**Chrome-plated brass**] [**Manufacturer's standard**].

G. Continuous Brackets: [**Clear-anodized aluminum**] [**Stainless steel**] [**Solid plastic**] [**Manufacturer's standard**].

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: [**Chrome-plated zamac**] [**Clear-anodized aluminum**] [**Stainless steel**] [**Chrome-plated brass**].
2. Hinges: Manufacturer's standard [**paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees**] [**continuous, cam type that swings to a closed or partially open position**] [**continuous, spring-loaded type**] [**integral hinge for solid-polymer doors**] <**Insert requirement**>.
3. Latch and Keeper: Manufacturer's standard [**recessed**] [**surface-mounted**] latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors[**and entrance-screen doors**].
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION

A. Toilet Compartments: [**Overhead braced and floor anchored**] [**Ceiling hung**] [**Floor anchored**] [**Floor and ceiling anchored**].

B. Urinal Screens: [**Ceiling hung**] [**Floor anchored**] [**Floor and ceiling anchored**] [**Wall hung**].

C. Metal Units: Internally reinforce metal panels for hardware, accessories, and grab bars.

D. Solid-Plastic, Polymer-Resin Units: Provide aluminum heat-sink strips at exposed bottom edges of panels and doors.

E. Doors: Unless otherwise indicated, 24 inch wide in-swinging doors for standard toilet compartments and 36 inch wide out-swinging doors with a minimum 32 inch wide clear opening for compartments indicated to be accessible to people with disabilities.

F. Door Hardware: [**Stainless steel**] [**Chrome-plated brass**]. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.

1. Hinges: Self-closing type, adjustable to hold door open at any angle up to 90 degrees.
2. Latches and Keepers: [**Recessed**] [**Surface-mounted**] unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
3. Coat Hook: Combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Rubber-tipped bumpers at out-swinging doors or entrance screen doors.
5. Door Pull: Provide at out-swinging doors. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units rigid, straight, level, and plumb, with not more than 1/2 inch between pilasters and panels and not more than 1 inch between panels and walls. Provide brackets, pilaster shoes, bracing, and other components required for a complete installation. Use theft-resistant exposed fasteners finished to match hardware. Use sex-type bolts for through-bolt applications.

1. Brackets: Align brackets at pilasters with brackets at walls. [**Locate wall brackets so holes for wall anchors occur in masonry or tile joints.**]
2. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

END OF SECTION

SECTION 102123 - CUBICLE CURTAINS AND TRACK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cubicle-curtain support systems.
2. Disposable cubicle curtains (To be provided and installed by Owner).

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for supplementary wood framing and blocking for mounting items requiring anchorage.
2. Section 092216 "Non-Structural Metal Framing" for supplementary metal framing and blocking for mounting items requiring anchorage.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Cubicle-curtain support systems.
2. Disposable cubicle curtains (To be provided and installed by Owner)

B. Shop Drawings: For curtains and tracks.

1. Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
2. Include details of blocking for track support.

C. Samples for Verification: For each type of product required, prepared on Samples of size indicated below:

1. Mesh Top: Not less than 10 inches square.
2. Curtain Track: Not less than 10 inches long.
3. Curtain Carrier: Full-size unit.

D. Product Schedule: For curtains and tracks. Use same designations indicated on Drawings.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For curtains, tracks, and hardware to include in operation and maintenance manuals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Curtain Carriers and Track End Caps: Full-size units equal to 3 percent of amount installed for each size indicated, but no fewer than 10 units.

1.5 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical cubicle as shown on Drawings as part of patient-room mockup.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 CUBICLE-CURTAIN SUPPORT SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AR Nelson.
2. Alderman Acres Manufacturing, Inc.
3. Automatic Devices Company.
4. Barjan Manufacturing Ltd.
5. Construction Specialties, Inc.
6. Covoc Corporation.
7. Cubicle Curtain Factory, Inc.
8. Erwin and Associates, Inc.
9. Healthcare Curtains.
10. Imperial Fastener Company, Inc.

11. Pryor Products, Inc.
12. Standard Textile Co., Inc.
13. inpro Corporation.

B. Extruded-Aluminum Curtain Track: Not less than 1-1/4 inches wide by 3/4 inch high 5/8 inch wide by 1/2 inch high.

1. Track Minimum Wall Thickness: Manufacturer's standard.
2. Curved Track: Factory-fabricated, 12-inch- radius bends.
3. Finish: As selected by Architect.

C. Curtain-Track Mounting: As indicated on Drawings.

D. Curtain-Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.

1. Suspended-Track Support: Not less than 7/8-inch- OD tube.
2. End Stop: Removable with carrier hook.
3. Switch Unit: Shuttle and coupling device for rerouting and securing cubicle curtain, with pull chain for switching track.

E. Curtain Roller Carriers: Two nylon rollers and nylon axle with nylon hook.

F. Breakaway Curtain Carriers: One-piece nylon breakaway curtain carriers designed to allow curtains to detach from tracks with a pulling force of no more than 5 lbf.

G. Exposed Fasteners: Stainless steel.

H. Concealed Fasteners: Stainless steel.

2.2 DISPOSABLE CUBICLE CURTAINS

A. Disposable Cubicle Curtains to be provided and installed by Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install tracks level and plumb, according to manufacturer's written instructions.

B. For tracks of up to 20 feet in length, provide track fabricated from single, continuous length.

1. Curtain-Track Mounting: As indicated on Drawings.

C. Surface-Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer. Fasten tracks to structure at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:

1. Mechanically fasten directly to bottom of concrete deck with post-installed anchors.
2. Mechanically fasten directly to finished ceiling with toggle bolts.
3. Mechanically fasten to furring through suspended ceiling with screw and tube spacer.
4. Mechanically fasten to suspended ceiling grid with screws.
5. Attach track to suspended ceiling grid with manufacturer's proprietary clip.

D. Suspended-Track Mounting: Install track with manufacturer's standard tubular aluminum suspended supports at intervals and with fasteners recommended by manufacturer. Fasten supports to structure. Provide supports at each splice and tangent point of each corner. Secure ends of track to wall with flanged fittings or brackets.

E. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.

1. Provide one locking switch unit for each pair of beds.
2. Provide one hinged loading unit for each bed.

F. Curtain Carriers: Provide curtain carriers adequate for 6-inch spacing along full length of curtain plus an additional carrier.

G. Cubicle Curtains: Hang curtains on each curtain track. Secure with curtain tieback.

END OF SECTION

SECTION 102600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Crash rails
2. Bumper rails
3. Wall guards.
4. Corner guards.
5. Wall coverings.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for stainless-steel corner guards.
2. Section 087100 "Door Hardware" for stainless-steel mop, kick, armor, and push plates.
3. Section 012300 "Alternates."

1.2 ACTION SUBMITTALS

A. Product Data: For each product indicated.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

C. Shop Drawings: Include locations and extent of impact-resistant wall protection and details of installation.

D. Samples: For each unit and for each color and texture required.

1.3 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following principal product types in this Section:

a. Crash rails.
b. Bumper rails.

c. Corner guards.
d. Impact-resistant wall coverings.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.
3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full-size units of maximum length, including vinyl plastic cover and aluminum retainer, equal to 2 percent of each type, color, and texture of each type of unit installed, but no fewer than two units.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

C. Fire-Test-Response Characteristics: Provide components with flame-spread and smoke-developed indices of not more than 25 and 450, respectively, when tested per ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

D. Wood Rail Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

E. Forest Certification: Fabricate wood rails from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: The design for each impact-resistant wall protection unit is based on the product named. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. Construction Specialties, Inc.
2. American Floor Products Co., Inc.
3. Arden Architectural Specialties, Inc.
4. Balco, Inc.
5. Boston Retail Products.
6. IPC Door and Wall Protection Systems, Inc.
7. Koroseal Wall Protection Systems, Inc.
8. K. J. Miller Corp.
9. Pawling Corporation.
10. Tepromark International, Inc.
11. Tri-Guards, Inc.
12. Wilkinson Company, Inc.

2.2 MATERIALS

A. Extruded Plastic: Textured, chemical- and stain-resistant, high-impact-resistant, PVC or acrylic-modified vinyl plastic; thickness as indicated; with a minimum impact resistance of 25.4 ft-lbf/in. of width when tested according to ASTM D 256, Test Method A.

B. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated, but with not less than the strength and durability properties of ASTM B 221 , alloy 6063-T5.

C. Stainless-Steel Plate: Type 304, minimum 0.0625 inch thick.

D. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorroding metal screws, bolts, and other fasteners compatible with aluminum components, hardware, anchors, and other items being fastened. Use vandal-resistant fasteners where exposed to view.

E. Medium-Density Fiberboard: ANSI A208.2, Grade MD; made with binder containing no urea formaldehyde.

F. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.

G. Adhesive: Type recommended by manufacturer for use with material being adhered to substrate indicated.

1. Adhesives shall have a VOC content of 70 g/L or less.

2.3 WALL GUARDS

A. Crash Rails: Nominal 8 inches high by 1 inch deep; heavy-duty assembly with snap-on-type, rigid plastic cover installed over continuous aluminum retainer.

1. Basis-of-Design Product: Construction Specialties, Inc.;SCR-F Series - SCR-40
2. Refer to Finish List on Drawings for additional information.
3. Cover: Extruded, rigid plastic, minimum 0.110 inch thick.

    a. Dimension and Profile: Refer to Finish List on Drawings.

4. Retainer: Continuous, one-piece, extruded-aluminum retainer; minimum 0.0625 inch thick; with continuous rubber or vinyl bumper cushion centered in extrusion.

    a. Mounting: Surface, flush on wall.

5. Accessories: Prefabricated, injection-molded end caps and inside and outside corners with concealed splices, cushions, mounting hardware, and other accessories as required; field adjustable for close alignment with snap-on plastic covers.

    a. Color: Matching plastic cover.

B. Bumper Rails: Continuous, snap-on-type plastic cover installed over continuous aluminum retainer.

1. Basis-of-Design Product: Construction Specialties, Inc.;SCR-F Series
2. Refer to Finish List on Drawings for additional information.
3. Cover: Extruded, rigid plastic, minimum 0.078 inch thick.

    a. Dimension and Profile: Refer to Finish List on Drawings.

4. Retainer: Continuous, 1-piece, extruded-aluminum retainer; minimum 0.072 inch thick.

    a. Mounting: Surface, mounted flush on wall.

5. Accessories: Prefabricated, injection-molded end caps and inside and outside corners with concealed splices, cushions, mounting hardware, and other accessories as required; field adjustable for close alignment with snap-on plastic covers.

    a. Color: Matching plastic cover.

Retain first subparagraph below with "Basis-of-Design Product" Paragraph in Part 2 "Manufacturers" Article.

Revise subparagraph below if retainer contains bumper cushion. Retainer extrusion designs and thicknesses vary widely among manufacturers.

Top cap is only used with surface-mounted corner guards.

2.4 CORNER GUARDS

A. Resilient Plastic Corner Guards: Assembly with snap-on-type plastic cover installed over continuous aluminum retainer.

1. Basis-of-Design Product: Construction Specialties, Inc.; FS-20.
2. Refer to Finish List on Drawings for additional information.
3. Mounting: Flush, full-wall height.
4. Cover: Extruded, rigid plastic, minimum 0.078 inch thick.
    a. Dimension and Profile: Refer to Finish List on Drawings.
    b. Corner Radius: 1/4 inch .
5. Retainer: Continuous, 1-piece, extruded-aluminum retainer; minimum 0.062 inch thick.
6. Top Cap: Injection-molded, field adjustable for close alignment with snap-on plastic covers.
    a. Color: Matching with plastic cover.
7. Accessories: Aluminum base with concealed splices, cushions, mounting hardware, and other accessories as required.

B. Custom End-Wall Resilient Plastic Corner Guards: Assembly with snap-on-type plastic cover installed over continuous aluminum retainer.

Retain first subparagraph below with "Basis-of-Design Product" Paragraph in Part 2 "Manufacturers" Article.

1. Basis-of-Design Product: Construction Specialties, Inc.; FSC-25.
2. Refer to Finish List on Drawings for additional information.
3. Mounting: Flush, full-wall height.
4. Cover: Extruded, rigid plastic, minimum 0.078 inch thick.
    a. Dimension and Profile: Refer to Finish List on Drawings.

Revise subparagraph below if retainer contains bumper cushion. Retainer extrusion designs and thicknesses vary widely among manufacturers.

5. Retainer: Continuous, 1-piece, extruded-aluminum retainer; minimum 0.062 inch thick.

Top cap is only used with surface-mounted corner guards.

6. Top Cap: Injection-molded, field adjustable for close alignment with snap-on plastic covers.

   a. Color: Matching with plastic cover.

7. Accessories: Aluminum base with concealed splices, cushions, mounting hardware, and other accessories as required.

2.5 IMPACT-RESISTANT WALL COVERINGS

A. Semirigid Sheet Wall Covering: Embossed, fiber-backed, impact-resistant plastic sheets, chemical and stain resistant.

1. Basis-of-Design Product: Construction Specialties, Inc.; Wall Panel Series
2. Sheet Size: As indicated.
3. Sheet Thickness: 0.40-inch.
4. Trim: Manufacturer's standard, matching moldings and trim as required for complete installation.

2.6 FINISHES

A. Plastic Color: As selected from manufacturer's full range.

B. Metal Finishes: Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary covering before shipping.

1. Aluminum: Anodic coating, clear, Class II complying with AAMA 611.

   a. Color: As selected from manufacturer's full range.

2. Stainless Steel: No. 4 finish (bright, directional polish).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Preparation: Complete finishing operations, including painting, before installing impact-resistant wall protection system components. Before installation, clean substrate to remove dust, debris, and loose particles.

B. Install impact-resistant wall protection system components level, plumb, and true to line without distortions.

1. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

C. Where splices occur in horizontal runs of more than 20 feet , splice aluminum retainers and plastic covers at different locations along the run.

D. Immediately on completion of installation, clean plastic covers and accessories using standard ammonia-based household cleaning agent. Clean metal components according to manufacturer's written instructions.

1. Remove excess adhesive using methods and materials recommended by manufacturer.

END OF SECTION

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.

1.2 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

C. Coordinate bath accessories with Medical Equipment List. Review with Owner final selections prior to procurement. Coordinate with owner on furnish/install requirements for each accessory.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Approved full-size Samples will be returned and may be used in the Work.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer. Coordinate with owner and medical equipment list.

B. Products and Manufacturers: Provide bath accessories which have been selected from the product lines and manufacturers indicated in Medical Equipment List "Appendix".

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.

D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

2.3 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

C. Bariatric Grab Bars: Install to withstand a downward load of at least 900lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION

SECTION 104400 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire extinguishers and fire extinguisher cabinets.

1.2 COORDINATION

A. Coordinate size of fire-extinguisher cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data including construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.

1. Fire Extinguishers: Include rating and classification.
2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, panel style.

B. Sustainable Design Submittals: Refer to Division 01 Section "Sustainable Design Requirements."

1.4 INFORMATIONAL SUBMITTALS

A. Embodied Carbon Submittals: Refer to Section 018133 "Sustainable Design Requirements - Embodied Carbon."

1. Completed Environmental Product Declaration Reporting Form for the following principal product types in this Section:

    a. Fire Extinguishers.
    b. Fire Extinguisher Cabinets.

2. For products with completed Environmental Product Declaration Reporting Forms claiming availability of an applicable EPD, provide the Product-Specific or Industry-Wide Type III Environmental Product Declaration (EPD) in compliance with ISO 14025.

3. The Contractor is advised that the submission of the embodied carbon EPD materials to the USGBC is not required.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

C. Listing: Fire extinguishers shall be UL listed with UL Listing Mark for type, rating, and classification of extinguisher.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

A. General: Provide fire extinguishers for each fire extinguisher cabinet and at other locations indicated.

1. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher indicated and with plated or baked-enamel finish.

a. Provide brackets for extinguishers located and not located in cabinets.

B. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb. nominal capacity, in enameled-steel container.

C. Located on Drawings by Designation: FE.

D. HVAC, refrigeration, and fire suppression equipment and systems, shall contain no CFCs or halons.

2.2 FIRE-EXTINGUISHER CABINETS

A. General: Provide fire extinguisher cabinets of suitable size for housing fire extinguishers of types and capacities specified.

B. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.

1. Fire-Rated Cabinets: Listed and labeled to meet requirements in ASTM E 814 for fire-resistance rating of wall where it is installed.

    a. Construct fire-rated cabinets with double walls fabricated from 0.0478 inch thick, cold-rolled steel sheet lined with minimum 5/8 inch thick, fire-barrier material.

2. Cabinet Material: Enameled-steel sheet.
3. Cabinet Mounting: Recessed unless otherwise indicated.
4. Cabinet Trim Style: Trimless with hidden flange of same metal and finish as box that overlaps surrounding wall finish and that is concealed from view by an overlapping door.
5. Cabinet Trim Material: Manufacturer's standard steel sheet.
6. Door Material: Manufacturer's standard steel sheet.
7. Door Glazing: Manufacturer's standard, as follows:

    a. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, Class 1 (clear).

8. Door Style: Vertical duo panel with frame.
9. Door Style: Manufacturer's standard design vertical duo panel with frame with 1/4 inch thick glass.
10. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
11. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide exposed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

C. Accessories:
1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
   1) Location: Applied to cabinet door.
   2) Application Process: Pressure-sensitive vinyl letters.
   3) Lettering Color: Red.
   4) Orientation: Vertical.

D. Products and Manufacturers: One of the following:

1. Larsens Manufacturing Company; Occult Series Fire Extinguisher Cabinets.
2. Potter Roemer; Dana Series Fire Extinguisher Cabinets.
3. JL Industries, Inc.; Embassy Series Fire Extinguisher Cabinets.

E. Located on Drawings by designation: FEC.

2.3 FINISHES

A. General: Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.

B. Painted Finishes: Provide painted finish to comply with requirements indicated below for extent, preparation and type:

1. Color: Provide color or color matches indicated, or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.
2. Preparation: Clean surfaces of dirt, grease, and loose rust or mill scale.
3. Field-Paintable Factory Finish: Immediately after cleaning and pretreatment, apply to surfaces indicated below, manufacturer's standard factory-applied paint system which is suitable, after deglossing, as an undercoat for field-applied paint system specified in Section 099123 "Interior Painting."

   a. Exterior of cabinet except for those surfaces indicated to receive another finish.
   b. Interior of cabinet.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.2 INSTALLATION

A. General: Follow manufacturer's printed instructions for installation.

B. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Fasten cabinets to structure, square and plumb.

3.3 ADJUSTING AND CLEANING

A. Adjust cabinet doors to operate freely without binding. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged units.

B. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

END OF SECTION

SECTION 117300 - PATIENT CARE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceiling-mounted patient-lift systems.
2. Intravenous (IV) tracks, carriers, and bottle holders.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for above-ceiling supplementary framing for support and anchorage of patient-lift systems.
2. Section 092216 "Non-Structural Metal Framing" for supplementary metal framing and blocking for mounting items requiring anchorage.
3. Section 102123 "Cubicle Curtains and Tracks" for patient-room cubicles.
4. Appendix "Medical Equipment List" for more information.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Include details of components. Indicate location and size of each field connection.
3. Include diagrams for service connections and power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified, 10 inches long in size.

D. Samples for Initial Selection: For each type of exposed finish.

1. Include Samples of accessories involving color and finish selection.

E. Samples for Verification: For each type of product required, prepared on Samples of size indicated below:

1. Include Samples of accessories to verify color and finish selection.
2. Ceiling-Mounted Patient-Lift Systems (Coordinate with Medical Equipment List): Not less than 10-inch- long, track sections.
3. IV Track Systems (Coordinate with Medical Equipment List):

a. Track: Not less than 10 inches long.
b. IV Carrier: Full-size unit.
c. IV Hanger: Full-size unit.

F. Product Schedule in Medical Equipment List: For patient care equipment..

G. Delegated-Design Submittal: For above-ceiling supplementary framing for support and anchorage of patient-lift systems, signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For ceiling-mounted patient-lift systems, reflected ceiling plan(s), and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which ceiling-mounted patient-lift systems will be attached.
3. Items penetrating finished ceiling including the following:

a. Lighting fixtures.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.

4. Perimeter moldings.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For products to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical installation of the following as shown on Drawings as part of patient-room mockup:

    a. Ceiling-mounted patient-lift system.
    b. IV track, carrier, and bottle holder.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design above-ceiling supplementary framing for support and anchorage of patient-lift systems.

2.2 CEILING-MOUNTED PATIENT-LIFT SYSTEMS

A. Ceiling-Mounted Patient Lift: Consisting of a motor-driven lift unit that traverses on a ceiling-mounted track system.

1. Basis-of-Design Product: Provide product selected by Owner. Refer to Medical Equipment List for more information. Owner to furnish, vendor to install and Contractor to coordinate installation requirements and field verify with associated trades.

B. Ceiling-Mounted Track System: High-strength extruded aluminum in manufacturer's standard profile and thickness to support lifting capacity indicated for lift unit. Provide track shapes and accessories as required to provide a complete system in layout indicated on Drawings.

C. Lift Unit: Steel frame system with separate 24-V dc lifting and horizontal-drive motors secured to chassis.

1. Lifting Capacity: As selected by Owner.
2. Maximum Lift Range: As selected by Owner.
3. Safety Features:

    a. Emergency stop.
    b. Emergency lowering device, mechanical and electrical.
    c. Control of lift strap.
    d. Cut-off Angle: 45 degrees along the rail; 10 degrees across the rail.

4. Electronics:

    a. Control Unit: As selected by Owner. .
    b. On/Off Control: Soft start and stop with overload protection.
    c. Battery Power: 24-V rechargeable nickel-metal hydride batteries in quantity required for lifting capacity indicated. Provide with electric battery charging station that provides maximum charge time of two hours per battery.

        1) Provide wall -mounted charging station at end of track. Provide supplemental clip-on charging station with indicator lights.

    d. Battery Protection: Low-battery light illuminates when battery voltage is below 22 V; hoist disabled when battery voltage is below 20 V.
    e. Motors: Provide in quantity required by lifting capacity indicated.

        1) Lift Motors: 2.3 inches per second lift speed at maximum capacity load.
        2) Horizontal-Drive Motors: 5.9 inches per second horizontal traverse at maximum capacity load.

D. Accessories as selected by owner:

1. Threaded nylon straps and polyester/nylon-net sling to support and cradle patient.
2. Room-to-room carry bar.
3. Two-point carry bar with locking clips.
4. Four-point carry bar with locking clips.
5. Tandem carry bar.
6. Bariatric carry bar.

2.3 IV TRACKS, CARRIERS, AND BOTTLE HOLDERS

A. Manufacturers: Subject to compliance with requirements, as selected by owner. :

1. Basis-of-Design Product: Provide product selected by Owner. Refer to Medical Equipment List for more information. Track and Carriers and Bottle Holder to be furnished and installed by the Contractor.

B. IV Tracks: Extruded aluminum, not less than 1-1/4 inches wide by 3/4 inch high

1. Track Minimum Wall Thickness: Manufacturer's standard.
2. Finish: Clear anodized.

C. IV Carriers: Four nylon rollers and axles with hanger loop fabricated from 1/4-inch- diameter, stainless steel.

1. Provide carriers with ball bearings.

D. Stationary IV Bottle Holders: as selected by owner fixed height with stainless-steel shaft.

1. Arms: As selected by owner 1/4-inch stainless-steel arms with loops.

a. Type: As selected by owner .

E. Telescoping IV Bottle Holders: As selected by owner overall height with a 3/4-inch stainless-steel main shaft and a 3/8-inch stainless-steel inner shaft, minimum vertical adjustment of 16 inches .

1. Arms: As selected by owner 1/4-inch stainless-steel arms with loops.
2. Adjustment Control: As selected by owner .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CEILING-MOUNTED PATIENT-LIFT SYSTEMS

A. Install tracks level and plumb, according to manufacturer's written instructions.

1. Support track directly from structure using manufacturer's standard supports, anchors, and fasteners at intervals required by lifting capacity indicated, but not less than 36 inches o.c.

2. Brace direct-to-structure track supports where distance between suspended ceiling and anchors is more than 18 inches .
3. Provide supports at each track end, splice, and tangent point of each corner.
4. Install track accessories, splices, end caps, connectors, coupling and joining devices, and other accessories as required for a secure and operational installation.

3.3 IV TRACKS, CARRIERS, AND BOTTLE HOLDERS

A. Install tracks level and plumb, according to manufacturer's written instructions.

B. For tracks up to 20 feet in length, provide track fabricated from single, continuous length.

C. Surface-Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer. Fasten tracks to structure at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:

1. Attach track to suspended ceiling grid with manufacturer's proprietary clip.

D. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.

E. IV Bottle Holders: Install per owner's request.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: For patient-bed service walls, perform periodic installation inspections to ensure that products are installed according to manufacturer's written instructions.

1. Installation Inspections: Inspect product installations when installation work is 25, 60, and 100 percent complete.
2. Installation Inspection Reports: Indicate if product installations comply with manufacturer's written instructions and corrective actions required if any.

3.5 ADJUSTING

A. Adjust products for proper function and operation to comply with manufacturer's written instructions.

3.6 PROTECTION

A. Protect installed products from damage for the remainder of the construction period.

B. Repair damaged products according to manufacturer's written instructions. If damaged products cannot be successfully repaired, as determined by Architect, remove and replace damaged products.

END OF SECTION

SECTION 149200 - PNEUMATIC TUBE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hospital Pneumatic Tube System.

1.2 SCOPE

A. This specification applies to the design, installation and operation of a pneumatic tube system.

1.3 PURPOSE

A. Hospital pneumatic tube systems transport small materials to and from pharmacies, laboratories, blood banks, surgery centers, emergency departments and nursing stations, as well as other locations throughout a hospital campus.

1.4 DEFINITION OF TERMS

A. Blower Package - Electro-mechanical industrial compressor blowers that move carriers through tubing with vacuum and pressure.

B. Blower Group - An interconnected set of 2 to 6 blowers, along with a set of forward and reverse facing diverters, configured to allow any one blower to handle a transaction from start to finish between any two stations with a direct tubing (non-interzone) connection.

C. Carrier - Reusable plastic containers that hold and protect contents (lab specimens, pharmaceuticals, blood products, etc.) sent through a pneumatic tube system.

D. Control Center - Software that controls all electro-mechanical devices and system-wide communications, accepts user station commands, monitors system status.

E. Database - A repository of information for each system transaction that contains both stamp data, station data, and item-specific data.

F. Data Network - An Ethernet and/or serial communication network used to send and receive data between electro-mechanical devices, the control center and the database.

G. Interzone Connection - A section of tubing that connects one zone to another zone.

H. Station - Electro-mechanical device that is used to send and receive carriers. They include a touch control user interface, carrier dispatcher, carrier receive bin and empty carrier storage.

I. Diverter - Electro-mechanical route switching device used at branching points within a tube network to allow a carrier to move from one path to another.

J. Transaction - The act of sending an item or items in a carrier between two stations.

K. Tubing - Clear plexi with an O.D. of 6" that form a network of paths in which carriers travel from origin stations to destination stations.

L. Zone - A collection of stations with direct tubing connections. Zones are interconnected with interzone connections. A traditional zone includes approximately 10 stations, while a Blower Group Zone can support up to approximately 60 stations.

1.5 ACTION SUBMITTALS

A. The manufacturer shall provide training materials to teach staff how to use the system to send and receive materials.

B. The manufacturer shall provide product data sheets that include overall dimensions and electrical requirements for each type of equipment used in the system.

C. The manufacturer shall provide a list of recommended spare parts.

D. The manufacturer shall provide an operations manual that includes instruction for proper maintenance.

E. The manufacturer shall provide 2D and/or 3D drawings that illustrate the location of tube routing, communication wire and equipment in the form of riser diagrams and floor plans.

F. The manufacturer shall provide as-built drawings upon completion of the project.

G. The manufacturer shall provide its warranty in written form.

H. Each submittal item listed in this section shall be provided electronically in the form of a PDF.

I. Delegated-Design Submittal: For above-ceiling supplementary framing for support and anchorage of pneumatic tube systems, signed and sealed by the qualified professional engineer responsible for their preparation. For design, coordination, and execution of installation of pneumatic tube systems, approved by the Basis-of-Design manufacturer responsible for their preparation.

1.6 MANUFACTURER PROPOSALS

A. The manufacturer's proposal shall clearly identify any requirements outlined in this specification which they cannot comply.

1.7 WARRANTY

A. The manufacturer shall provide the hospital with a limited warranty that covers mechanical equipment for 12 months and computer and electronic equipment for 24 months. During the warranty period, any defective part(s) returned to the manufacturer shall be repaired or replaced at the manufacturer's discretion. The written warranty provided by the manufacturer shall supersede this section and outline the specific details of coverage.

B. Ordinary wear and tear of equipment, damage caused by improper use, and damage caused by improper maintenance is excluded from the limited warranty.

C. The warranty period commences on the date of signed acceptance of the system or the hospital's first use of the system - whichever occurs first.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

PART 2 - PRODUCTS

2.1 PNEUMATIC TUBE SYSTEMS

A. Pneumatic Tube Systems: A software controlled multi-point pneumatic tube system designed specifically for use in a hospital that transports carriers containing small materials from one pneumatic tube station to another pneumatic tube station that is part of the same interconnected system.

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Basis-of-Design Product: Provide product selected by Owner.

1) TransLogic Pneumatic Tube System; SwissLog Healthcare.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design above-ceiling supplementary framing for support and anchorage of pneumatic tube systems. Engage Basis-of-Design Manufacturer to help design, coordinate, and execute installation of new pneumatic tube system with existing system.

2.2 PERFORMANCE REQUIREMENTS

A. Performance requirements are dependent upon Client's selection of a compatible product based upon the building's current, existing pneumatic tube conveying system.

PART 3 - EXECUTION

3.1 SYSTEM ENGINEERING

A. The manufacturer shall provide all necessary system engineering.

B. The manufacturer shall (as required by the general contractor and/or owner) create 2-D and 3-D CAD drawings of the system that show tube routing, network details and equipment locations, and participate in BIM (building information modeling) coordination.

3.2 SYSTEM CHARACTERISTICS

A. All equipment provided by the manufacturer shall be listed with UL (Underwriter’s Laboratory).

B. The equipment shall be of durable steel construction with minimal use of plastics.

C. The system shall be designed specifically for hospital use and include the capability to track and document each item delivered.

D. Blowers shall be installed in Blower Groups to allow any one blower to handle a transaction from start to finish between any two stations with a direct tubing (non-interzone) connection.

E. If more than one Blower Group is used, they shall be connected with interzone tubes so that carriers can travel from stations attached to one Blower Group to stations attached to the other Blower Groups.

F. The system shall have the capability to manage empty carrier storage and distribution automatically.

G. The system shall dynamically calculate the most efficient route based on resource availability and transaction volume.

H. The system shall deliver carriers and their contents as quickly as possible and never store or park carriers with contents inside the system's tubing or equipment.

I. The equipment and software proposed shall be developed and functional at the time of quotation.

3.3 INSTALLATION

A. Unless specifically excluded, the manufacturer shall provide all labor, material, equipment and supplies required to install the system.

B. The manufacturer shall conform to appropriate building codes and standards.

C. The manufacturer shall install all equipment required to create a working system that meets or exceeds this specification.

D. The manufacturer shall provide and install all required serial low voltage control wire.

E. The manufacturer shall install all equipment so that it is accessible for maintenance.

F. The manufacturer's installers shall be skilled trades people with experience with hospital pneumatic tube system installation and be direct employees of either the manufacturer or the manufacturers authorized distributor.

3.4 CUSTOMER TRAINING AND SUPPORT

A. The manufacturer shall have a training facility with a working pneumatic tube system that includes the equipment being installed to teach the hospital's maintenance staff how to manage and care for the system.

B. The manufacturer shall offer regularly scheduled 3-day classes at its training facility for hospital maintenance staff that covers software use, equipment maintenance and basic system troubleshooting.

C. The manufacturer shall provide the hospital's maintenance staff with an overview on how to operate and monitor the system in a teach-the-teacher format before the system is handed over.

D. The manufacturer shall teach representatives from the hospital how to send and receive carriers in a teach-the-teacher format before the system is handed over.

E. The manufacturer shall employ its own customer support personnel and be able to provide onsite service when requested.

F. The manufacturer shall offer, free of charge, a U.S. based 24/7 help desk staffed by factory trained technicians to assist hospital staff with troubleshooting and overall system support.

3.5 SYSTEM HANDOVER

A. The manufacturer, upon completion of the installation, shall test the system in the presence of the owner or owner representative. The test shall confirm that all equipment is functional and all work has been executed in accordance with this specification.

B. The manufacturer shall repair, replace or rework any part of the system that fails the test.

3.6 CLEANING AND PROTECTION

A. Clean floors of all gypsum board debris and leave broom clean. Excess material, scaffolding, tools, and other equipment are to be removed upon completion of the Work.

B. Provide final protection and maintain conditions that pneumatic tube system remain without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 210001
GENERAL PROVISIONS FOR FIRE SUPPRESSION WORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work in this Section includes the providing of labor, materials, equipment and services necessary for a complete and safe installation in accordance with the contract documents and all applicable codes and authorities having jurisdiction for fire suppression work covered by all sections within the specifications (including but not limited to fire suppression systems and equipment).

B. As a condition of Contractor's use of these specifications, Contractor agrees to: (i) name AKF as additional insured on Contractor's insurance policies wherever permitted, including but not limited to Contractor's General Liability policy, which shall be primary and non-contributory, (ii) provide AKF, upon request, with a certificate of insurance and copies of specific endorsements to Contractor's insurance policies evidencing said additional insured status, and (iii) waive all rights of recovery against AKF by way of subrogation, assignment, or otherwise with regard to insured claims.

C. For attachments to structure, refer to Section 220529.

D. Where Divisions of Work other than 21, 22, 23 and 26 are referenced herein and are not provided elsewhere in the project documents, refer to this section.
   1. For Firestopping, refer to Section 21 0300.
   2. For Demonstration and Training, refer to Section 21 0400.

E. Provide cutting and patching.

F. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows.
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
   2. Provide controllers with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
   3. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   4. Label equipment utilizing series ratings as required by NFPA 70.

G. All electrical equipment, starters and controller assemblies shall be rated for 65,000 AIC or as indicated on electrical drawings.

H. Related Work And Requirements
   1. Requirements of General Conditions, Supplementary Conditions for Mechanical, ELectrical, Plumbing and Fire Suppression Work and Division No. 1.
   2. Requirements noted under other Divisions of Work

1.02 WORK NOT INCLUDED:

A. Fire Alarm Wiring.

B. Finish painting, except for pre-finished equipment or as otherwise specified.

C. Concrete work.

D. Base flashing for piping.

E. Waterproofing.

F. Power wiring for motors and motor controllers.

G. Installation of access doors and frames.

H. Excavating and backfilling.

1.03 DESCRIPTION OF BID DOCUMENTS

A. Specifications, in general, describe quality and character of materials and equipment.

B. Drawings, in general are diagrammatic and indicate sizes, locations, connections to equipment and methods of installation. Provide additional offsets, fittings, hangers, supports, valves, drains as required for construction and coordination with work of other trades.

C. Scaled and indicated dimensions are approximate and are for estimating purposes only. Before proceeding with work, check and verify all dimensions.

D. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.

E. Typical details, where shown on the drawings, apply to each and every item of the project where such items are applicable. Typical details are not repeated in full on the plans, and are diagrammatic only, but with the intention that such details shall be incorporated in full.

F. If any part of Specifications or Drawings appears unclear or contradictory, consult Architect and/or Engineer for interpretation and decision as early as possible during bidding period. Do not proceed with work without the Architect's and/or Engineer's decision.

1.04 DEFINITIONS

A. "Furnish": To supply, deliver, unload, and inspect for damage.

B. "Install": To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. "Provide": To furnish and install.

D. "Supply": Same as Furnish.

E. "Work": includes labor, materials, equipment, services, and all related accessories necessary for the proper and complete installation of complete systems.

F. "Piping": includes pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, unions, traps, drains, insulation, and all related accessories.

G. "Wiring": includes raceway, fittings, wire, boxes, and all related accessories.

H. "Concealed": not in view, installed in masonry or other construction, within furred spaces, double partitions, hung ceilings, trenches, crawl spaces, or enclosures.

I. "Exposed": in view, not installed underground or "concealed" as defined above.

J. "Indicated," "shown," or "noted": as indicated, shown or noted on drawings or specifications.

K. "Similar" or "equal": of base bid manufacturer, equal in quality, materials, weight, size, performance, design and efficiency of specified product, conforming with "Base Bid Manufacturers."

L. "Reviewed," "satisfactory," "accepted," or "directed": as reviewed, satisfactory, accepted, or directed by or to Architect and/or Engineer.

M. "Motor Controllers": includes manual or magnetic starters with or without switches, individual pushbuttons or hand-off-automatic (HOA) switches controlling the operation of motors.

N. "Control or Actuating Devices": includes automatic sensing and switching devices such as thermostats, pressure, float, flow, electro-pneumatic switches and electrodes controlling operation of equipment.

O. "Finished Spaces": Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

P. "Exposed, Interior Installations": Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

Q. "Exposed, Exterior Installations": Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

R. "Concealed, Interior Installations": Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in shafts.

S. "Concealed, Exterior Installations": Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.05 QUALITY ASSURANCE

A. All equipment and accessories shall be the product of manufacturers regularly engaged in their manufacture. All items of a given type shall be the products of the same manufacturer.

B. Furnish all equipment and accessories new and free from defects.

C. All electrical equipment shall be listed by Underwriters' Laboratories, Inc. (UL) or bear UL labels.

D. Supply all equipment and accessories in complete compliance with and in accordance with the applicable standards listed in reference standards of this Section and with all applicable national, state and local codes.

1.06 JOB CONDITIONS

A. Inspection of Site Conditions:
1. Before starting work, visit the site and examine the conditions under which the work has to be performed. Report in writing any conditions which might adversely affect the work.

B. Connections to existing work:
1. Install new work and connect to existing work with minimum interference to existing facilities.
2. Provide temporary shutdown of existing services at no additional charges and only with written consent of Owner. Schedule shutdowns not to interfere with normal operation of existing facilities.
3. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.
4. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition.

C. Removal and relocation of existing work.
1. Disconnect, remove, or relocate fire suppression material, equipment, and other work noted and required by alterations, modifications, or changes in existing construction.
2. Provide new material and equipment required for relocated equipment.
3. Plug or cap active piping behind or below finish.
4. Dispose of removed equipment as directed.
5. Return removed equipment to Owner as directed.

D. Hazardous locations:
1. Provide required material, equipment and installation applicable for hazardous location defined by codes.
2. Provide material, equipment and installation as required for Class, Division and Group noted.

1.07 REFERENCE STANDARDS

A. Published specifications, standards tests, or recommended methods of trade, industry or governmental organizations apply to work in all Sections as noted below:
1. AIA - American Insurance Association.
2. ANSI - American National Standards Institute.
3. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
4. ASME - American Society of Mechanical Engineers.
5. ASTM - American Society for Testing and Materials.
6. AWS - American Welding Society.
7. AWWA: American Water Works Association.
8. NEC - National Electrical Code.

9. NEMA - National Electrical Manufacturers Association.
10. NFPA - National Fire Protection Association.
11. OSHA - Occupational Safety and Health Administration Regulations.
12. UL - Underwriters' Laboratories, Inc.

1.08 SUBMITTALS

A. Submit shop drawings product data, samples and certificates of compliance required by contract documents.

B. Operating instructions, maintenance manuals and parts lists.
   1. Provide manufacturer's equipment brochures and service manuals consisting of the following:
      a. Descriptive literature for equipment and components.
      b. Model number and performance data.
      c. Installation and operating instructions.
      d. Maintenance and repair instructions.
      e. Recommended spare parts lists.
   2. Assemble manufacturers' equipment manuals in chronological order following the specifications' numbering system using heavy duty three ring binders and electronic "PDF" format.
   3. Submit valve tag chart.
   4. Submit field test reports including instrument set points and normal operating valves.

1.09 ELECTRONIC COPIES OF AKF DRAWINGS

A. If the contractor requires (.dwg) format, after preparation the drawings will be forwarded only upon receipt of signed acceptance of terms form. Permission from the architect must first be obtained for AKF to include the architectural background as reference. The contractor is to obtain the architects latest drawings directly from the architect.

B. These files are being issued for the convenience of the contractor and the contractor remains responsible for all contract requirements related to the normal shop drawing preparation process.

1.10 SUBMISSIONS:

A. Provide all coordination drawings and shop drawings in ‘AutoCad” format, version compatible with owner. All catalog cuts and submittals to be provided in electronic “PDF” format. The architect will forward all submissions to the engineer.

B. Indicate on each submission: project name and location, architect and engineer, item identification and approval stamp of prime contractor, subcontractor names and phone numbers, reference to the applicable design drawing or specification article, date and scale.

C. The work described in all shop drawing submission shall be carefully checked for all clearances (including those required for maintenance and servicing), field conditions, maintenance of architectural conditions and proper coordination with all trades on the job.

D. Each submitted shop drawing is to include a certification that all related job conditions have been checked and verified and that there are no conflicts.

E. All shop drawings are to be submitted to allow ample time for checking in advance of field requirements. All submittals to be complete and contain all required and detailed information. Shop drawings with multiple parts shall be submitted as a package.

F. If submittals differ from the contract document requirements, make specific mention of such difference in a letter of transmittal, with request for substitution, together with reasons for same.

1.11 AS-BUILTS AND EQUIPMENT OPERATION INSTRUCTIONS

A. Provide all as-built drawings in AutoCad format, version compatible with owner. All operating instructions and equipment manuals to be provided in electronic “PDF” format. The architect will forward all submissions to the engineer.

B. On completion and acceptance of work, this contractor shall furnish written instructions, equipment manuals and demonstrate to the owner the proper operation and maintenance of all equipment and apparatus furnished under this contract.

C. The contractor shall give one copy of the instructions to the owner and one copy to the engineer. .

D. Final “as-built” drawings indicating as installed conditions shall be provided to the architect and engineer after completion of the installation.

1.12 OPERATING & MAINTENANCE INSTRUCTION

A. Prepare operating and maintenance instructions manuall which including operating instructions, maintenance instructions, manufacturer's data, and specific equipment data.

B. Provide an alphabetical list of all system components, with the name, address, and 24-hour phone number of the company responsible for servicing each item during the first year of operation.

C. Provide operating instructions for complete system, including:
   1. Normal starting, operating, and shut-down.
   2. Emergency procedures for fire or failure of major equipment.

D. Provide maintenance instructions, including:
   1. Valve tag list and equipment tag list.
   2. Proper lubricants and lubricating instructions for each piece of equipment, and date when lubricated.
   3. Required cleaning, replacement and/or adjustment schedule.

E. Provide manufacturer's data on each piece of equipment, including:
   1. Installation instructions.
   2. Drawings and specifications.
   3. Parts list, including recommended items to be stocked.
   4. Complete wiring and temperature control diagrams.
   5. Marked or revised prints locating all concealed parts and all variations from the original system design.
   6. Test and inspection certificates.

F. Provide specific equipment data including, but not limited to, the following:
   1. For Fire Protection System:
      a. Piping.
      b. Valves.
      c. Accessories.
      d. Sprinkler heads.
      e. Tamper switches.
      f. Flow switches.
      g. Flow measuring device.
      h. Electric wiring.
      i. Controllers.
   2. For Automatic Control System
      a. Drawings and description of system controlled.
      b. Sequence of operation for each system.
      c. Data on components.
      d. Wiring and piping, schematic any layout, for panels and panelboards.
      e. System operating manual, including set points.

G. Provide instruction of operating personnel.
   1. Instruct Owner's operating personnel in proper starting sequences, operation, shutdown, and maintenance procedures, including normal and emergency procedures.
   2. Instruction to be by personnel skilled in operation of equipment. Instructions for major equipment to be by equipment manufacturers' representatives.

3. Make arrangements to give instructions by system and not by building areas.
4. Provide five (5) instruction sessions not to exceed six (6) hours each.
5. Instructions on automatic controls to be by manufacturer's representative.

1.13 CLEARANCE FROM ELECTRICAL EQUIPMENT

A. Piping and equipment is prohibited in electric and telephone rooms and closets (except branch piping serving sprinklers within the room), elevator machine rooms, and for installations over or within 5 ft of transformers, substations, switchboards, motor control centers, standby power plants, and motors.

1.14 DRIP PANS

A. Provide drip pans under piping when installation over or within 5 ft of electrical apparatus is unavoidable or in rooms containing electrical equipment. Pan shall be reinforced, properly supported and made watertight. Provide enclosed type for pressure piping. Extend 1-1/4 in. drain pipe from pan to spill over nearest floor drain or as indicated.
   1. Construction shall be 18 gauge galvanized sheet steel.

1.15 PRODUCT, DELIVERY, HANDLING AND STORAGE

A. Ship materials and equipment in crated sections of sizes to permit passing through available space, where required

B. Deliver equipment with protective crating and shrink-wrapped covering.

C. Receive and accept materials and equipment at the site, properly handle, house, and protect them from damage and the weather until installation. Replace equipment damaged in the course of handling without additional charge.

D. Store to prevent damage and protect from weather, dirt, fumes, water, and construction debris in clean dry space

E. Arrange for and provide storage space or area at the job site for all materials and equipment to be received and/or installed in this project

F. All exposed openings of equipment and piping and are to be covered

G. Handle according to manufacturer's written rigging and installation instructions for unloading, transporting, and setting in final location

H. Protect units from physical damage. Leave factory shipping covers in place until installation

1.16 EQUIPMENT AND MATERIALS

A. All products and materials shall be new, clean, free of defects and free of damage and corrosion.

B. No permanent equipment shall be used to provide temporary services during construction.

C. Fully lubricate all equipment when installed and prior to final acceptance.

D. Locate valves, access doors, etc., to be easily accessible, either in mechanical spaces or through access panels specified herein.

E. Follow manufacturers' instructions for installing, connecting, and adjusting all equipment.

1.17 ACCESSIBILITY

A. Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made without written approval.

B. Group concealed valves and equipment requiring access, so as to be freely accessible through access doors.

1.18 SPECIAL TOOLS

A. Provide one set of any special tools required to operate, adjust, dismantle or repair equipment furnished under this Division for the Owner's use at the completion of the work.

B. Provide one suitable tool case for special tools.

1.19 CUTTING AND PATCHING

A. Provide all carpentry, cutting and patching required for proper installation of materials and equipment specified. Do not cut or drill structural members without review by Architect and Structural Engineer.

1.20 PROTECTION OF MATERIALS

A. Protect from damage, water, dust, etc., materials, equipment and apparatus provided under this trade, both in storage and installed

1.21 SUBSTITUTIONS

A. No substitute material or manufacturer of equipment shall be permitted without a formal written submittal to the engineer which includes all dimensional, performance and material specifications and is approved in writing by the engineer. Any changes in layout or design brought about by the use of a substitution shall be submitted to the engineer fully designed for review in conjunction with the submittal of the alternate. Any substitution must be submitted with an explanation why a substitution is being utilized. If the substitute is being utilized for financial reasons, the associated credit must be simultaneously submitted. Final acceptance or rejection of any substitution is subject to the owner's review.

B. Contractor to be responsible for the additional cost relating to the substitution, including but not limited to space requirements, structural support, utilities including electrical power, water, etc.

1.22 STANDARDS:

A. If any item in the specification, as furnished by the contractor, is manufactured in a location which does not certify ASME/ANSI standards, the contractor is to pay the Owner for ALL expenses incurred by the Owner for an outside testing company to confirm such compliance.

1.23 COORDINATION

A. Arrange for pipe spaces, space for equipment, chases, slots, and openings in building structure during progress of construction, to allow for installation.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for items requiring access that are concealed behind finished surfaces.

D. Do not install piping, equipment or other materials in locations that block access to items and equipment requiring access or removal including items of other trades.

E. Provide coordination drawing for all areas of the work. The drawings shall have the following qualities:
   1. Minimum 3/8” scale
   2. Clearly show all the work for each trade including, but not limited to hangers, valves, dampers, actuators, access doors and service access requirements for all items.
   3. Indicate bottom elevations of all ductwork, electrical conduit, raceways, cable trays, control wiring and piping.
   4. Ductwork, piping, and conduit 3 inches and smaller may be shown in single line.
   5. Ductwork, piping, and conduit greater than 3 inches shall be shown in double line.
   6. Color scheme:
      a. Architectural and structural background: Light grey.
      b. Ductwork: Black.
      c. Equipment and pads: Purple.
      d. HVAC piping and equipment: Green.
      e. Electrical conduits and equipment: Blue.
      f. Plumbing: Orange.
      g. Fire protection: Red.
      h. Control wiring: Pink.

1.24 GUARANTEE

A. In accordance with General Conditions (AIA Document 201) & Supplementary Conditions for Mechanical, Electrical, Plumbing and Fire Suppression Work.

B. The Contractor shall furnish a written guarantee to replace or repair promptly and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within one year form the date of final certificate for payment and/or from date or actual use of equipment or occupancy of spaces by Owner included under the various parts of work, whichever date is earlier. This work shall be done as directed by the Owner. This guarantee shall also provide that where defects occur, the Contractor will assume responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by the Contractor.

1.25 PERMITS AND FEES

A. The Contractor shall give necessary notice, file drawings and specifications with the department having jurisdiction, obtain permits or licenses necessary to carry out this work and pay all fees therefore. The Contractor shall arrange for inspection and test of any or all parts of the work if so required by authorities and pay all charges for same. The Contractor shall pay all costs for, furnish to the Owner before final billing, all certificates necessary as evidence that the work installed conforms with all regulations where they apply to this work.

B. This contractor shall prepare or hire the necessary consultants to prepare and file all plans, calculation, forms, etc.. required for filing with all agencies required for this work including but not limited to the local fire protection authority (fire department, fire marshal, etc.), local building department, AHJ (authority having jurisdiction), etc..

1.26 SPECIAL INSPECTION

A. Special inspection shall be provided by the owner. This contractor shall provide all required services to accomplish these inspections.

1.27 SERVICE AND WARRANTY (MAINTENANCE CONTRACT)

A. This contract shall provide a full year service and warranty of all fire suppression components and systems, with add alternate prices for years 2, 3 and 4 following this first year. At the time of acceptance of project, the tenant or owner’s representative will decide to accept which alternate, if any.

1.28 RIGGING

A. This contractor shall provide all required rigging, hoisting and bracing to install the equipment as indicated on the plans. This work shall be performed by an insured certified licensed rigging company that is experienced in rigging equipment of the type indicated for the areas shown on the construction documents. This contractor shall submit rigging plans for approval prior to proceeding with the work.

B. All permits required from the authorities and agencies involved to perform the rigging are the responsibilities of this contractor.

C. All structural supports, modifications or additions are to be submitted to the structural engineer for approval prior to proceeding with the work. All supplemental structural supports, elevator charges /modifications, bracing and protection required for the rig is the responsibility of this contractor

D. The rigging contractor shall hire and pay for all charges and services of the building elevator contractor for the rigging of the equipment

PART 2 PRODUCTS

2.01 BASE BID MANUFACTURERS

A. Base bid on materials or equipment are specified by name of manufacturer, brand or trade name and catalog reference.

B. The choice will be optional with bidder where two or more manufacturers are named.

C. The following are base bid manufacturers for items under this Section:

1. Access doors: Karp Associates, Inc., Higgins Mfg. Co., Milcor Steel Co., and Walsh-Spencer Co.
2. Paint: Sherwin-Williams, Pittsburgh Plate Glass Co., Pratt and Lambert, and Rust-Oleum.
3. Gratings: Irving Grating IKG Industries and Ryerson - Inland Steel Co.

2.02 ACCESS DOORS

A. This contractor shall submit to the architect for approval a plan indicating the size (minimum 24 in. x 24 in. where personnel access is required) and location of all access doors required for operation, maintenance and replacement of all concealed equipment, devices, valves, and controls. Contractor shall arrange for furnishing and installation of all access doors in finished construction and include costs in the bid.

B. Access doors shall be provided sufficiently large for replacementl of all equipment located in inaccessible walls and ceilings. Provide custom size, multileaf access panels, without cross bars, maximum 48 in. x 48 in. with piano hinge and safety chains.

C. Access doors will be provided under General Construction Work.

D. Supply access doors for all concealed Fire Supression items in inaccessible walls and ceilings for complete access, using a with a minimum door size of 18 in. x 18 in. for installation under the General Construction Work. Locating and setting shall be performed after review.

E. Provide access doors for all concealed Fire Supression items in inaccessible walls and ceilings for complete access, using a minimum door size of 18 in. x 18 in. Locating and setting shall be performed after review.

F. Flush type access doors shall be similar to Karp Type DSC-211 with No. 13 USSG steel doors and trim and No. 16 USSG steel frame, metal wings for keying into construction, concealed hinges and screwdriver operated stainless steel cam lock. Provide lift off type access doors, similar to Karp Type DSC-212, where door cannot swing open.

G. In acoustic tile ceilings, factory finished white access doors shall be similar to Karp Type DSC-210, with No. 13 USSG steel frame, No. 16 USSG steel pan door suitable for receiving tile thickness and hinges that are not visible when door is closed. Access door shall have screwdriver operated stainless steel cam locks finishing flush with tile with a minimum of 2 per door.

H. In plaster ceilings recessed access doors shall be similar to Karp DSC-210-PL, with recess to receive plaster.

I. In fire rated construction provide fire rated access doors, similar to Karp KRP-150-FR, listed and lin accordance with applicable code requirements.

J. Access doors shall have one coat of shop-painted zinc chromate primer.

2.03 ACCESS TILE IDENTIFICATION:

A. In removable ceiling tiles, provide buttons, tabs, and markers to identify location of concealed work. Submit for review.

2.04 LADDERS

A. Ladders will be provided under General Construction Work.

B. Provide 18 in. wide properly supported, galvanized structural steel ladders designed in accordance with OSHA regulations with 2-1/2 in. x 2-1/2 in. side rails and 3/4 in. diameter rungs installed 12 in. on center.

PART 3 - EXECUTION

3.01 IDENTIFICATION

A. Refer to identification Section 21 0553.

3.02 WATERPROOFING

A. Waterproofing will be provided under General Construction Work.

B. Where any work pierces waterproofing, installation shall be subject to review, provide all necessary sleeves, caulking, flashing and flashing fittings required to make openings absolutely

watertight.

C. Flashing:
1. Provide Copper: ASTM B370, cold rolled 16 oz/sq ft (24 gage) (0.0216 inch) (0.55 mm) thick; natural finish.
2. Provide Pre-Finished Aluminum: ASTM B209 (ASTM B209M)[<>]; 20 gage, (0.032 inch) (0.81 mm) thick; plain finish shop pre-coated with modified silicone coating. Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.

3.03 FIELD QUALITY CONTROL

A. Perform tests as noted, and in the presence of Architect and/or Engineer and authorities having jurisdiction.

B. Provide required labor, material, equipment, and connections necessary for tests and submit results for review.

C. Repair or replace defective work and pay for restoring or replacing damaged work due to tests, as directed.

3.04 START-UP

A. Properly lubricate all pieces of equipment.

B. Check and clean all pipes of dirt and debris.

C. Prepare each piece of equipment in accordance with manufacturer's installation instructions and have a copy at the equipment.

D. Have representatives of each manufacturer present when hereinafter specified, so that equipment will be started up by manufacturer.

3.05 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.

B. Clean and repair painted exposed work, soiled or damaged, to match adjoining work before final acceptance.

C. Remove debris from inside and outside of material and equipment.

3.06 PROJECT CLOSEOUT PROCEDURES

A. It shall be each contractor's responsibility to personally hand-deliver all of the required project closeout checklist items and to obtain Owner's authorized representative(s) signed receipt on all items requiring Owner sign-off.

B. Review requirements of each section of the specifications and submit for approval to Architect the sign-off forms which shall become the project closeout checklist. These, at a minimum, shall include the following information shown in attached Project Closeout Checklist Example. The Architect and/or Owner may incorporate additional specific items to the following checklist which shall become part of the project requirements.

C. Closeout Checklist Example:

	DATES		
ITEM	**COMPLETED**	**RECEIVED BY OWNER**	**OWNER'S SIGNOFF**
PERMITS			
CITY AND COUNTY INSPECTION			
MANUFACTURER'S WARRANTIES			
CONTRACTOR'S WARRANTIES			
STATE FIRE RATING DATA			
COPY OF FINAL SHOP			

DRAWINGS			
LIST AND POSSESSION OF SPARE PARTS			
PRESSURE TESTS			
EQUIPMENT TESTS REQUIRED BY SPECS			
O & M MANUALS			
RECORD DOCUMENTS			
COORDINATION DRAWINGS			
SANITIZATION REPORTS			
COMMISSIONING REPORTS/LETTERS/FORMS			
ON-SITE TRAINING COMPLETE			
PROTECTIVE DEVICE SETTINGS			
VALVE TAGS AND CHARTS			
FINAL CONTROL PANEL INSTALLATION DRAWINGS			
INSURANCE UNDERWRITERS APPROVALS			
FINAL PUNCH LIST (INITIALED BY CONTRACTOR THAT ITEMS ARE COMPLETE)			
BUILDING CERTIFICATE OF OCCUPANCY (C.O.)			
24-HOUR PHONE NO. FOR SERVICE DURING GUARANTEE PERIOD			

END OF SECTION 210001

SECTION 210500
COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Above ground piping.

B. Escutcheons.

C. Pipe, fittings, sleeves, escutcheons, seals, grout and connections for sprinkler, standpipe and fire hose, and combination sprinkler and standpipe systems.

D. Fire-suppression equipment and piping demolition.

E. Mechanical couplings.

F. Pipe hangers and supports.

G. Pipe sleeves.

H. Pipe sleeve-seal systems.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 099113 - Exterior Painting: Preparation and painting of exterior fire protection piping systems.

C. Section 099123 - Interior Painting: Preparation and painting of interior fire protection piping systems.

D. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.

E. Section 210553 - Identification for Fire Suppression Piping and Equipment: Piping identification.

F. Section 211200 - Fire-Suppression Standpipes: Standpipe design.

G. Section 211300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 REFERENCE STANDARDS

A. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (nonshrink); 2014a.

B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.

C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.

D. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.

E. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.

F. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings 2018.

G. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded 2021.

H. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.

I. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.

J. ASME B16.25 - Buttwelding Ends 2017.

K. ASME B36.10M - Welded and Seamless Wrought Steel Pipe 2018.

L. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).

M. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

N. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe 2021.

O. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023a.

P. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).

Q. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use 2021.

R. ASTM B32 - Standard Specification for Solder Metal 2020.

S. ASTM B75/B75M - Standard Specification for Seamless Copper Tube 2020.

T. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.

U. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.

V. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

W. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2023a.

X. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.

Y. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).

Z. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2018.

AA. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings 2021.

BB. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2023.

CC. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast 2017, with Errata (2018).

DD. AWWA C606 - Grooved and Shouldered Joints 2022.

EE. FM (AG) - FM Approval Guide Current Edition.

FF. ITS (DIR) - Directory of Listed Products Current Edition.

GG. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

HH. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems 2019, with Amendment.

II. NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection: 2016

JJ. UL (DIR) - Online Certifications Directory Current Edition.

KK. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's catalog information. Indicate valve data and ratings.

C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

D. Project Record Documents: Record actual locations of components and tag numbering.

E. Operation and Maintenance Data: Include installation instructions and spare parts lists.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Valve Stem Packings: Two for each type and size of valve.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
   1. Minimum three years experience.

C. Comply with FM (AG) and UL (DIR) requirements.

D. Valves: Bear FM (AG) and UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.

E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

F. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Sprinkler-based System:
   1. Comply with NFPA 13.
   2. See Section 211300.

B. Standpipe and Hose System:
   1. Comply with NFPA 14.
   2. See Section 211200.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX.

D. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

2.02 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A53 Schedule 40 or ASTM A795 Schedule 40, black.
   1. Steel Fittings: ASME B16.25 buttweld ends, ASME B16.5 steel flanges and fittings, or ASME B16.11 forged steel socket welded and threaded.
   2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
   3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   4. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.

2.03 PIPE SLEEVES

A. Vertical Piping:
   1. Sleeve Length: 1 inch above finished floor.
   2. Provide sealant for watertight joint.
   3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.

4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

B. Plastic, Sheet Metal, or Moisture-Resistant Fiber: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

C. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
1. Galvanized steel pipe or black iron pipe with asphalt coating.
2. Connect sleeve with floor plate except in mechanical rooms.

D. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
1. Galvanized steel pipe or black iron pipe with asphalt coating.
2. Connect sleeve with floor plate except in mechanical rooms.

E. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.

F. Clearances:
1. Provide allowance for insulated piping.
2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
3. Rated Openings: Caulked tight with firestopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.04 PIPE SLEEVE-SEAL SYSTEMS

A. Manufacturers:
1. Advance Products & Systems, Inc; _____: www.apsonline.com.
2. The Metraflex Company; _____: www.metraflex.com.
3. Substitutions: See Section 016000 - Product Requirements.

B. Modular Mechanical Seals:
1. Elastomer-based interlocking links to continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
3. Size and select seal component materials in accordance with service requirements.
4. Service Requirements:
   a. Corrosion resistant.
   b. Oil, fuel, gas, and solvent resistant.
   c. Underground, buried, and wet conditions.
   d. Fire Resistance: 3 hour, UL (DIR) approved.
   e. High temperature, up to 400 deg F.
   f. Low temperature, down to minus 67 deg F.
5. Glass-reinforced plastic pressure end plates.

C. Wall Sleeve: Steel material with waterstop collar, and nailer end caps.

D. Sleeve-Forming Disk: Nonconductive plastic-based material, 3 inch thick.

E. Pipeline-Casing Seals:
1. Coated-metallic boltless casing-spacer for 4 inch carrier pipe.
2. Coated-metallic boltless modular seal for 6 inch carrier pipe.
3. Carbon steel band with riser for 12 inch carrier pipe.
4. End Seals: 1/8 inch, pull-on type, rubber or synthetic rubber based.

2.05 ESCUTCHEONS

A. Manufacturers:
1. Fire Protection Products, Inc; _____: www.fppi.com.com.
2. Tyco Fire Protection Products; _____: www.tyco-fire.com.
3. Viking Group Inc; _____: www.vikinggroupinc.com.

B. Material:

1. Fabricate from nonferrous metal.
2. Chrome-plated.
3. Grade TP304, seamless tube, ASTM A269/A269M stainless steel.
4. Metals and Finish: Comply with ASME A112.18.1.

C. Construction:
1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.06 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
1. Manufacturers:
a. AFCON, a brand of Anvil International; _____: www.anvilintl.com.
b. Ferguson Enterprises Inc; _____: www.fnw.com.

B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
1. Manufacturers:
a. AFCON, a brand of Anvil International; _____: www.anvilintl.com.
b. Ferguson Enterprises Inc; _____: www.fnw.com.

C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.

F. Vertical Support: Steel riser clamp.
1. Manufacturers:
a. Anvil International; _____: www.anvilintl.com.

G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
1. Manufacturers:
a. Anvil International; _____: www.anvilintl.com.

2.07 MECHANICAL COUPLINGS

A. Manufacturers:
1. Anvil International; _____: www.anvilintl.com.
2. Shurjoint Piping Products, Inc; _____: www.shurjoint.com.
3. Tyco Fire Protection Products; ____: www.tyco-fire.com.
4. Victaulic Company; FireLock Style 009H: www.victaulic.com.
5. Viega LLC; MegaPress: www.viega.us.

B. Rigid Mechanical Couplings for Grooved Joints:
1. Dimensions and Testing: Comply with AWWA C606.
2. Minimum Working Pressure: 300 psig.
3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
4. Housing Coating: Factory applied orange enamel.
5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
6. Bolts and Nuts: Hot-dipped-galvanized or zinc-electroplated steel.
7. Provide stops for direct stab installation without field assembly.

2.08 GROUT

A. General Purpose Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

B. Pump Mounting: High flow, high strength epoxy machine-based grout: ASTM C 881, CRD-C 590.
   1. Characteristics: Two to Three-component, highly flowable, epoxy-based grout that produces high performance strength plus chemical inertness and excellent bonding properties.
   2. Design Mix: ASTM-C 579, 14,000 / 19,000 psi , 36 hours @72 degree F compressive strength.
   3. Packaging: Factory packaged for field mixing.
   4. Products: Chocfast by ITW Philadelphia resins, ESCOWELD or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Prepare piping connections to equipment with flanges or unions.

3.02 FIRE-SUPPRESSION DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove fire-suppression systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
   3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
   4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.03 INSTALLATION

A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.

B. Install standpipe piping, hangers, and supports in accordance with NFPA 14.

C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

D. Install piping to conserve building space, to not interfere with use of space and other work.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

H. Install piping to permit valve servicing

I. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

J. Pipe Hangers and Supports:
   1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   2. Place hangers within 12 inches of each horizontal elbow.
   3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   4. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   6. Provide copper plated hangers and supports for copper piping.
   7. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
      a. Painting of interior fire suppression systems is specified in Section 099123.
      b. Painting of exterior fire suppression systems is specified in Section 099113.

K. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

L. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
   1. Painting of interior fire suppression systems is specified in Section 099123.
   2. Painting of exterior fire suppression systems is specified in Section 099113.

M. Structural Considerations:
   1. Do not penetrate building structural members unless indicated.
   2. Locate flexible expansion loops at or near the building seismic joint and expansion joint.

N. Provide sleeves when penetrating footings, floors, walls, partitions, and roof slabs. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
   2. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical

sleeve seals.

a. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3. Aboveground Piping:
   a. Pack solid using mineral fiber complying with ASTM C592.
   b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
4. All Rated Openings: Caulk tight with firestopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
5. Sleeves are not required for core-drilled holes.
6. Cut sleeves to length for mounting flush with both surfaces.
   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
7. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
   a. Seal space outside of sleeve fittings with grout.

O. Manufactured Sleeve-Seal Systems:
1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
3. Locate piping in center of sleeve or penetration.
4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a watertight seal.
6. Install in accordance with manufacturer's recommendations.

P. Escutcheons:
1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
3. Attach plates at the underside only of suspended ceilings.
4. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
5. Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
6. Existing Piping: Split-plate with exposed-rivet hinge and spring clips.

Q. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

R. Die-cut threaded joints with full-cut, standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

3.04 GROUTING

A. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.05 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

C. See Section 017419 - Construction Waste Management and Disposal for additional requirements.

END OF SECTION 210500

SECTION 210523
GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Two-piece ball valves with indicators.
B. Bronze butterfly valves with indicators.
C. Iron butterfly valves with indicators.
D. Check valves.
E. Bronze OS&Y gate valves.
F. Iron OS&Y gate valves.
G. NRS gate valves.
H. Trim and drain valves.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 210500 - Common Work Results for Fire Suppression: Pipe and fittings.
C. Section 210553 - Identification for Fire Suppression Piping and Equipment.
D. Section 211200 - Fire-Suppression Standpipes.
E. Section 211300 - Fire-Suppression Sprinkler Systems.
F. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.
G. Section 284600 - Fire Detection and Alarm.

1.03 ABBREVIATIONS AND ACRONYMS

A. EPDM: Ethylene-propylene diene monomer.
B. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
C. NRS: Non-rising stem.
D. OS&Y: Outside screw and yoke.
E. PTFE: Polytetrafluoroethylene.
F. SBR: Styrene-butadiene rubber.

1.04 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch 2013 (Reaffirmed 2018).
B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.
C. ASME B31.9 - Building Services Piping 2020.
D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
E. AWWA C606 - Grooved and Shouldered Joints 2022.
F. FM (AG) - FM Approval Guide Current Edition.
G. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
H. NFPA 13R - Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies 2022, with Errata.
I. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems: 2016.
J. UL (DIR) - Online Certifications Directory Current Edition.
K. UL 262 - Gate Valves for Fire-Protection Service Current Edition, Including All Revisions.

L. UL 312 - Check Valves for Fire-Protection Service Current Edition, Including All Revisions.

M. UL 1091 - Standard for Butterfly Valves for Fire-Protection Service Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
1. Furnish maintenance manuals as specified in Division 1.
2. Furnish complete operation and maintenance manuals for the purchased equipment.
3. Include the following items as a minimum for the purchased equipment.
a. Flow / pressure drop curves.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Obtain valves for each valve type from single manufacturer.
2. Company must specialize in manufacturing products specified in this section, with not less than five years of documented experience.

B. Where listed products are specified, provide products listed, classified, and labeled by FM (AG), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for the purpose indicated.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX.

D. Installer Qualifications:
1. Company specializing in performing the work of this section with minimum five years documented experience.
2. Trained and approved by manufacturer to design, install, test and maintain the equipment specified herein.
3. Complies with manufacturer's certification requirements.
4. Complies with manufacturer's insurance requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
1. Protect internal parts against rust and corrosion.
2. Protect threads and flange faces.
3. Protect threads, flange faces, and weld ends.
4. Set valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:
1. Maintain valve end protection and protect flanges and specialties from dirt.
a. Provide temporary inlet and outlet caps.
b. Maintain caps in place until installation.
2. Store valves in shipping containers and maintain in place until installation.
a. Store valves indoors and maintain at higher than ambient dew point temperature.
b. If outdoor storage is unavoidable, store valves off the ground in watertight enclosures.

C. Use the following precautions for handling:
1. Use sling to handle large valves, rigged to avoid damage to exposed parts.
2. Do not use operating handles or stems as lifting or rigging points.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. UL Listed: Provide valves listed in UL (DIR) under following headings and bearing UL mark:
   1. Main Level: HAMV - Fire Main Equipment.
      a. Level 1: HCBZ - Indicator Posts, Gate Valve.
      b. Level 1: HLOT - Valves.
      c. Level 3: HLUG - Ball Valves, System Control.
      d. Level 3: HLXS - Butterfly Valves.
      e. Level 3: HMER - Check Valves.
      f. Level 3: HMRZ - Gate Valves.
   2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.
      a. Level 1: VQGU - Valves, Trim, and Drain.

B. FM Global Approved: Provide valves listed in FM (AG) Approval Guide under the following headings:
   1. Automated Sprinkler Systems:
      a. Indicator posts.
      b. Valves:
         1) Gate valves.
         2) Single check valves.
         3) Miscellaneous valves.

C. ASME Compliance:
   1. ASME B16.1 for flanges on iron valves.
   2. ASME B1.20.1 for threads on threaded-end valves.
   3. ASME B31.9 for building services piping valves.

D. Comply with AWWA C606 for grooved-end connections.

E. Comply with NFPA 13 and NFPA 14 for valves.

F. Valve Pressure Ratings: Not less than minimum pressure rating indicated or higher as required.

G. Valve Sizes: Same as upstream piping unless otherwise indicated.

H. Valve Actuator Types:
   1. Worm-gear actuator with handwheel for quarter-turn valves, except trim and drain valves.
   2. Handwheel: For other than quarter-turn trim and drain valves.
   3. Hand-lever: For quarter-turn trim and drain valves 2 NPS and smaller.

2.02 TWO-PIECE BALL VALVES WITH INDICATORS

A. Manufacturers:
   1. NIBCO.
   2. Milwaukee.
   3. Stockham.

B. UL 1091, except with ball instead of disc and FM (AG) standard listing for indicating valves (butterfly or ball type), Class Number 1112.

C. Description:
   1. Minimum Pressure Rating: 175 psig.
   2. Body Design: Two piece.
   3. Body Material: Forged brass or bronze.
   4. Port Size: Full or standard.
   5. Seat: PTFE.
   6. Stem: Bronze or stainless steel.
   7. Ball: Chrome-plated brass.
   8. Actuator: Worm gear or traveling nut.
   9. Supervisory Switch: Internal or external.
   10. End Connections for Valves 1 NPS through 2 NPS: Threaded ends.

11. End Connections for Valves 2-1/2 NPS: Grooved ends.

2.03 IRON BUTTERFLY VALVES WITH INDICATORS

A. Manufacturers:
   1. Kennedy Valve; _____: www.kennedyvalve.com.

B. UL 1091 and FM (AG) standard listing for indicating valves (butterfly or ball type), Class Number 112.

C. Minimum Pressure Rating: 175 psig.

D. Body Material: Cast or ductile iron with nylon, EPDM, epoxy, or polyamide coating.

E. Seat: EPDM.

F. Stem: Stainless steel.

G. Disc: Ductile iron, nickel plated.

H. Actuator: Worm gear or traveling nut.

I. Supervisory Switch: Internal or external.

J. Body Design: Grooved-end connections.

2.04 CHECK VALVES

A. Manufacturers:
   1. Crane Co..
   2. NIBCO.
   3. Stockham.

B. UL 312 and FM (AG) standard listing for check valves, Class Number 1045.

C. Minimum Pressure Rating: 175 psig.

D. Type: Center guided check valve.

E. Body Material: Cast iron, ductile iron.

F. Center guided check with elastomeric seal.

G. Hinge Spring: Stainless steel.

H. End Connections: Flanged, grooved, or threaded.

2.05 IRON OS&Y GATE VALVES

A. Manufacturers:
   1. Crane Co..
   2. Milwaukee Valve Co..
   3. NIBCO.

B. UL 262 and FM (AG) standard listing for fire-service water control valves (OS&Y and NRS-type gate valves).

C. Minimum Pressure Rating: 175 psig.

D. Body and Bonnet Material: Cast or ductile iron.

E. Wedge: Cast or ductile iron, or bronze with elastomeric coating.

F. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.

G. Stem: Brass or bronze.

H. Packing: Non-asbestos PTFE.

I. Supervisory Switch: External.

J. End Connections: Flanged.

2.06 NRS GATE VALVES

A. Manufacturers:
   1. Crane Co..

2. Milwaukee Valve Co, .
3. NIBCO.

B. UL 262 and FM (AG) standard listing for fire-service water control valves (OS&Y and NRS-type gate valves).

C. Minimum Pressure Rating: 175 psig.

D. Body and Bonnet Material: Cast or ductile iron.

E. Wedge: Cast or ductile iron with elastomeric coating.

F. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.

G. Stem: Brass or bronze.

H. Packing: Non-asbestos PTFE.

I. Supervisory Switch: External.

J. End Connections: Flanged.

2.07 TRIM AND DRAIN VALVES

A. Ball Valves:
1. Description:
a. Pressure Rating: 175 psig.
b. Body Design: Two piece.
c. Body Material: Forged brass or bronze.
d. Port Size: Full or standard.
e. Seat: PTFE.
f. Stem: Bronze or stainless steel.
g. Ball: Chrome-plated brass.
h. Actuator: Hand-lever.
i. End Connections for Valves 1 NPS through 2-1/2 NPS: Threaded ends.
j. End Connections for Valves 1-1/4 NPS and 2-1/2 NPS: Grooved ends.

B. Angle Valves:
1. Description:
a. Pressure Rating: 175 psig.
b. Body Material: Brass or bronze.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:
1. Description:
a. Pressure Rating: 175 psig.
b. Body Material: Bronze with integral seat and screw-in bonnet.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc Holder and Nut: Bronze.
f. Disc Seat: Nitrile.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

2.08 SPRINKLER SPECIALTY FITTINGS

A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175-psig (1200-kPa) minimum working-pressure rating, and made of materials compatible with piping. Sprinkler specialty fittings shall have 300-psig (2070-kPa) working-pressure rating if fittings are components of high-pressure piping system.

B. Outlet Specialty Fittings:
   1. Manufacturers:
      a. National Fittings, Inc.
      b. Star Pipe Products; Star Fittings Div.
      c. Victaulic Co. of America.
      d. Ward Manufacturing.
   2. Mechanical-T and -Cross Fittings: UL 213, ductile-iron housing with gaskets, bolts and nuts, and threaded, locking-lug, or grooved outlets.

C. Sprinkler Drain and Alarm Test Fittings: Cast- or ductile-iron body; with threaded or locking-lug inlet and outlet, test valve, and orifice and sight glass.
   1. Manufacturers:
      a. Globe Sprinkler Co.
      b. AGF Manufacturing Co.
      c. Viking Corp.
      d. Victaulic Co. of America.

D. Sprinkler Inspector's Test Fitting: Cast- or ductile-iron housing with threaded inlet and drain outlet and sight glass.
   1. Manufacturers:
      a. AGF Manufacturing Co.
      b. G/J Innovations, Inc.

2.09 SPECIALTY VALVES

A. Sprinkler System Control Valves: UL listed or FMG approved, cast- or ductile-iron body with flanged or grooved ends, and 175-psig (1200-kPa) minimum pressure rating. Control valves shall have 300-psig (2070-kPa) pressure rating if valves are components of high-pressure piping system.
   1. Manufacturers:
      a. Tyco Fire Protection.
      b. Reliable Automatic Sprinkler Co., Inc.
      c. Star Sprinkler Inc.
      d. Victaulic Co. of America.
      e. Viking Corp.

B. Automatic Drain Valves: UL 1726, NPS 3/4 (DN 20), ball-check device with threaded ends.
   1. Manufacturers:
      a. AFAC Inc.
      b. Tyc Fire Protection.

PART 3 EXECUTION

3.01 EXAMINATION

A. Confirm valve interior to be free of foreign matter and corrosion.

B. Remove packing materials.

C. Examine guides and seats by operating valves from the fully open position to the fully closed position.

D. Examine valve threads and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage.
   1. Check bolting for proper size, length, and material.
   2. Verify gasket for size, defects, damage, and suitable material composition for service.
   3. Replace all defective valves with new valves.

3.02 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Listed Fire-Protection Valves: UL listed and FMG approved for applications where required by NFPA 13 and NFPA 14.
   a. Shutoff Duty: Use ball, butterfly, or gate valves.
2. Unlisted General-Duty Valves: For applications where UL-listed and FMG-approved valves are not required by NFPA 13 and NFPA 14.
   a. Shutoff Duty: Use ball, butterfly, or gate valves.
   b. Throttling Duty: Use ball valves.

3.03 INSTALLATION

A. Comply with specific valve installation requirements and application in the following Sections:
   1. Section 211200 for application of valves in fire-suppression standpipes.
   2. Section 211300 for application of valves in wet and dry pipe, fire-suppression sprinkler systems.

B. Install listed fire protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections.
   1. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in water supply connections and backflow preventer at potable water supply connections.

D. Valves with threaded connections to have unions at equipment arranged for easy access, service, maintenance, and equipment removal without system shutdown.

E. Valves in horizontal piping installed with stem at or above the pipe center.

F. Position valves to allow full stem movement.

G. Install valve tags. Comply with Section 210553 requirements for valve tags, schedules, and signs on surfaces concealing valves; and the appropriate NFPA standard applying to the piping system in which valves are installed.

END OF SECTION 210523

SECTION 210553
IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Charts.

D. Pipe markers.

E. Painting of piping and equipment.

1.02 RELATED REQUIREMENTS

A. Section 099123 - Interior Painting: Stencil paint.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials 2017.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

E. Product Data: Provide manufacturers catalog literature for each product required.

F. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.

G. Project Record Documents: Record actual locations of tagged valves.

1.05 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Control Panels: Nameplates.

B. Major Control Components: Nameplates.

C. Piping: Pipe markers.

D. Pumps: Nameplates.

E. Small-sized Equipment: Tags.

F. Valves: Tags and nameplates where above lay-in ceilings.

2.02 NAMEPLATES

A. Manufacturers:
   1. Brimar Industries, Inc: www.pipemarker.com.
   2. Kolbi Pipe Marker Company: www.kolbipipemarkers.com.
   3. Seton Identification Products, a Tricor Direct Company: www.seton.com.

B. Description: Laminated three-layer plastic with engraved letters.
   1. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
   2. Letter Color: White.
   3. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
   4. Letter Height: 1/4 inch.
   5. Background Color: Black.
   6. Thickness: 1/8 inch.
   7. Fasteners: Stainless-steel rivets or self-tapping screws.
   8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
   9. Plastic: Comply with ASTM D709.

C. Nameplate Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Nameplate Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

E. Warning Signs and Namplates to include caution and warning information, plus emrgency notification instructions.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC: www.advancedgraphicengraving.com.
   2. Brady Corporation: www.bradycorp.com.
   3. Brimar Industries, Inc: www.pipemarker.com.
   4. Craftmark Pipe Markers: www.craftmarkid.com.
   5. Kolbi Pipe Marker Company: www.kolbipipemarkers.com.
   6. Seton Identification Products, a Tricor Direct Company: www.seton.com.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Fasteners: Brass [wire-link or beaded chain; or S-hook]

D. Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

E. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 CHARTS

A. Provide valve tag chart indicating valve number, system, type, size, location and function for all valves.

B. Mount in aluminum frame and glass.

C. Letter and number valves and controls to correspond with designations on metal tags.

D. Fasten charts permanently in locations, as directed, with four brass screws.

2.05 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com.
   2. Brimar Industries, Inc: www.pipemarker.com.
   3. Craftmark Pipe Markers: www.craftmarkid.com.
   4. Kolbi Pipe Marker Company: www.kolbipipemarkers.com.
   5. Seton Identification Products, a Tricor Company: www.seton.com.

B. Color: Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Pipe Marker Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
   1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
   2. Lettering Size: At least 1-1/2 inches (38 mm) high.

F. Color code as follows:
   1. Fire Quenching Fluids: Red with white letters.
   2. Combined Sprinkler and Standpipe: Red with white letters.
   3. Standpipe: Red with white letters.
   4. Sprinkler: Green with white letters.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
   1. Install or permanently fasten nameplates on each major item of fire suppression equipment.
   2. Locate nameplates where accessible and visible.

B. Install tags on valves.

C. Install tags with corrosion resistant chain.

D. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
   1. Near each valve and control device.
   2. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
   3. At access doors, and similar access points that permit view of concealed piping.
   4. Near major equipment items and other points of origination and termination.
   5. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
   6. On piping above removable acoustical ceilings, omit intermediately spaced labels.

E. Install plastic pipe markers in accordance with manufacturer's instructions.

F. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

G. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.
   2. Install in clear view and align with axis of piping.
   3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 210553

SECTION 211200
FIRE-SUPPRESSION STANDPIPES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire hose cabinets.

B. Hose reels and hoses.

C. Valves.

1.02 RELATED REQUIREMENTS

A. Section 104400 - Fire Protection Specialties.

B. Section 210500 - Common Work Results for Fire Suppression: Fire protection piping.

C. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.

D. Section 210553 - Identification for Fire Suppression Piping and Equipment.

E. Section 211300 - Fire-Suppression Sprinkler Systems.

1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide Current Edition.

B. ITS (DIR) - Directory of Listed Products Current Edition.

C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems 2019, with Amendment.

D. NFPA 1963 - Standard for Fire Hose Connections 2019.

E. UL 405 - Standard for Safety Fire Department Connection Devices Current Edition, Including All Revisions.

F. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's catalog sheet for equipment indicating rough-in size, finish, and accessories.

B. Shop Drawings: Indicate supports, components, accessories, and sizes.
   1. Submit shop drawings and product data to Owner's insurance underwriter for approval.
   2. Submit proof of approval to Architect.

C. Project Record Documents: Record actual locations of components.

D. Operation Data: Include appropriate manufacturer's data.

E. Maintenance Data: Include servicing requirements and test schedule.

F. Certificates: Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests.

G. Welding certificates

H. Fire-hydrant flow test report.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 14. _____ .

B. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

D. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

E. Equipment and Components: Provide products that bear FM (AG) and UL label or marking.

F. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

G. Maintain one copy of referenced design and installation standard on site.

H. Comply with FM (AG) requirements.

I. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience _____.

PART 2 PRODUCTS

2.01 FIRE HOSE CABINETS

A. Manufacturers:
1. Elkhart Brass Mfg. Co., Inc.
2. Fire-End and Croker Corp.
3. Potter-Roemer; Fire-Protection Div.

B. Cabinet:
1. Style: Recessed mounted.
2. Door: 12 gauge, 0.1046 inch thick steel, flush, glazed with 1/4 inch (6.35 mm) thick wired glass full panel; hinged, positive latch device.
3. Finish: Prime coated.

C. Nozzle: Chrome plated brass; combination fog, straight stream, and adjustable shut-off.

D. Hose Station: See below.

2.02 HOSE CONNECTIONS

A. Manufacturers:
1. Elkhart Brass Mfg. Co., Inc.
2. Fire-End and Croker Corp.
3. Potter-Roemer; Fire-Protection Div.

B. Description: UL 668, brass or bronze, 300-psig (2070-kPa) minimum pressure rating, hose valve for connecting fire hose. Include anglepattern design; female NPS inlet and male hose outlet; and lugged cap, gasket, and chain. Include NPS 1-1/2 or NPS 2-1/2 (DN 40 or DN 65) as indicated, and hose valve threads according to NFPA 1963 and matching local fire department threads.
1. Valve Operation: Nonadjustable type, unless pressure-regulating type is indicated.
2. Finish: Rough metal.

2.03 HOSE STATIONS

A. Manufacturers:
1. Elkhart Brass Mfg. Co., Inc.
2. Fire-End and Croker Corp.
3. Potter-Roemer; Fire-Protection Div.

B. Semiautomatic hose stations are connected to wet standpipes. They will supply water if valve is opened.

C. Description: UL 47, semiautomatic hose stations. Include brass rack nipple, hose rack, and the following:
1. Valve: UL 668, brass or bronze, 300-psig (2070-kPa) minimum pressure rating, 90-degree-angle-pattern hose valve with female NPS inlet and outlet, unless otherwise indicated.
a. Valve Operation: Nonadjustable type, unless pressure-regulating type is indicated.
2. Threads and Gaskets: NFPA 1963 and matching local fire department threads.
3. Fire Hose: NFPA 1961 and UL 219, lined fire hose with couplings, gaskets, and nozzle. Include the following fire hose materials:
a. Jacket: Synthetic thread.

b. Lining: Rubber compound.
c. Cover: [Rubber, plastic, or combination of rubber and plastic compounds] [Optional].

4. Nozzles: UL 401.
5. Drain Valves: UL 1726.
6. Mountings: Pipe [clamp or wall bracket for freestanding] [escutcheon for cabinet-mounted] units.

D. NPS 2-1/2 by NPS 1-1/2 (DN 65 by DN 40) Hose Station: NPS 2-1/2 (DN 65) hose valve; NPS 2-1/2 by NPS 1-1/2 (DN 65 by DN 40) reducer adapter; hose rack with water-retention device and pins for folded, NPS 1-1/2 (DN 40) lined hose; NPS 1-1/2 (DN 40) lined hose with swivel inlet coupling and nozzle; and reducer-adapter spanner wrench.
1. Hose-Rack Finish: Red enamel.
2. Hose Valve and Trim Finish: Rough metal .
3. Fire Hose: Lined, [50-foot (15-m)] [75-foot (23-m)] [100-foot (30-m)] [125-foot NYC]length.
4. Nozzle: Polycarbonate plastic, adjustable from shutoff to fog spray or straight stream.

E. NPS 1-1/2 (DN 40) Hose Station: NPS 1-1/2 (DN 40) hose valve; hose rack with water-retention device and pins for folded, NPS 1-1/2 (DN 40) lined hose; and NPS 1-1/2 (DN 40) lined hose with swivel inlet coupling and nozzle.
1. Hose-Rack Finish: Red enamel.
2. Hose Valve and Trim Finish: Rough metal .
3. Fire Hose: Lined, [50-foot (15-m)] [75-foot (23-m)] [100-foot (30-m)] length.
4. Nozzle: Polycarbonate plastic, adjustable from shutoff to fog spray or straight stream.

F. NPS 2-1/2 and NPS 1-1/2 (DN 65 and DN 40) Hose Station: NPS 2-1/2 (DN 65) hose valve with male threaded outlet, cap, and chain and NPS 1-1/2 (DN 40) hose valve; hose rack with water-retention device and pins for folded, NPS 1-1/2 (DN 40) lined hose; and NPS 1-1/2 (DN 40) lined hose with swivel inlet coupling and nozzle.
1. Hose-Rack Finish: Red enamel.
2. Hose Valve and Trim Finish: Rough metal .
3. Fire Hose: Lined, [50-foot (15-m)] [75-foot (23-m)] [100-foot (30-m)] length.
4. Nozzle: Polycarbonate plastic, adjustable from shutoff to fog spray or straight stream.

2.04 VALVES

A. Hose Connection Valve Cabinets:
1. Manufacturers:
a. _____.
b. Elkhart Brass Mfg. Co., Inc.
c. Fire-End and Croker Corp.
d. Potter-Roemer; Fire-Protection Div.

B. Supervisory Switches:
1. Manufacturers:
a. Potter Electric Signal Co..
b. Viking Corporation; [_____]: www.vikinggroupinc.com.
c. Globe Sprinkler.

C. Flow-Restricting Devices: NPS 2-1/2 brass, adjustable for NPS 2-1/2 fire hose inlet.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 14.

C. Locate and secure cabinets plumb and level. Establish top of cabinet (inside horizontal) surface 66 inches above finished floor.

D. Locate hose station valve in cabinet at minimum 36 inches, maximum [60] inches (1500] mm) above finished floor.

E. Where residual pressure at a 1-1/2 inch (40 mm) outlet on a hose connection exceeds 100 psi provide an approved pressure regulating device to limit the pressure at the required flow to 100 psi . A pressure restricting device shall be used in lieu of a pressure regulating device where required by the authority having jurisdiction.

F. Where static pressure exceeds 175 psi at any hose connection, provide an approved pressure regulating device to limit static and residual pressures at the outlet of the hose connection to 100 psi (620 kPa) for 1-1/2 inch (40 mm) hose connections and 175 psi (1085 kPa) for other hose connections. A pressure restricting device shall be used in lieu of a pressure regulating device where required by the authority having jurisdiction.

G. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.

H. Install freestanding-type, fire department connections in level surface.
   1. Install protective pipe bollards on for sides of each fire department connection. Refer to Division 05 Section "Metal Fabrications" for pipe bollards.

I. Install fire hydrants mounted in vertical wall with shutoff valve inside building in heated space.

J. Flush entire system of foreign matter.

3.02 FIELD QUALITY CONTROL

A. Perform field inspection and testing (Field Acceptance Test) in accordance with Section 014000.

B. Test entire system in accordance with NFPA 14.

C. Test shall be witnessed by Authority Having Jurisdiction.

END OF SECTION 211200

SECTION 211300
FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wet-pipe sprinkler system.

B. System design, installation, and certification.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 078700 - Smoke Containment Barriers: Smoke and fire curtains to be released by activation of sprinkler system.

C. Section 149100 - Facility Chutes: Sprinkler heads inside chutes.

D. Section 210500 - Common Work Results for Fire Suppression: Pipe and fittings.

E. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.

F. Section 210553 - Identification for Fire Suppression Piping and Equipment.

G. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

H. Section 284600 - Fire Detection and Alarm.

1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide Current Edition.

B. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2018, with Editorial Revision (2020).

C. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry 2018, with Editorial Revision (2020).

D. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2017, with Editorial Revision (2020).

E. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2023.

F. ITS (DIR) - Directory of Listed Products Current Edition.

G. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 13R - Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies 2022, with Errata.

I. NFPA 1963 - Standard for Fire Hose Connections 2019.

J. UL (DIR) - Online Certifications Directory Current Edition.

K. UL 405 - Standard for Safety Fire Department Connection Devices Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Shop Drawings:
   1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
   2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components, and accessories. Indicate system controls.

3. Submit shop drawings to Authorities Having Jurisdiction for approval. Submit proof of approval to Architect.

D. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.

E. Fire-hydrant flow test report.

F. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations, if applicable.

G. Certificates: Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests.

H. Welding certificates

I. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements for additional provisions.
2. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
3. Sprinkler Wrenches: For each sprinkler type.

K. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13. [_____].

B. Maintain one copy of referenced design and installation standard on site.

C. Comply with FM (AG) requirements.

D. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

E. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

F. Equipment and Components: Provide products that bear FM (AG) and UL label or marking.

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sprinklers, Valves, and Equipment:
1. Tyco Fire Protection Products: www.tyco-fire.com .
2. Viking Corporation: www.vikinggroupinc.com .
3. Reliable Automatic Sprinkler Co.
4. Globe Sprinkler.
5. Victaulic.

2.02 SPRINKLER SYSTEM

A. Sprinkler System: Provide coverage for entire building.

B. Occupancy: Light hazard; comply with NFPA 13.

C. Water Supply: Determine volume and pressure from water flow test data.
   1. Revise design when test data available prior to submittals.

D. Interface system with building fire and smoke alarm system.

E. Storage Cabinet for Spare Sprinklers and Tools: Steel, in location designated.

F. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
   2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
   3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
   5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
   6. Other Types: As required.
   7. Manufacturers:
      a. AFCON, a brand of Anvil International: www.anvilintl.com .
      b. Powers Fasteners, Inc www.powers.com .
      c. Hilt.

2.03 SPRINKLERS

A. See Sprinkler Schedule on drawings.

B. Guards: Finish to match sprinkler finish.

C. Spray Nozzles: Brass with solid cone discharge, 30 degrees of arc with blow-off dust cap.

2.04 PIPING SPECIALTIES

A. General Duty Valves: Refer to Section 21 0523.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with referenced NFPA design and installation standard.

B. Install equipment in accordance with manufacturer's instructions.

C. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.

D. Place pipe runs to minimize obstruction to other work.

E. Place piping in concealed spaces above finished ceilings.

F. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.

G. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

H. Flush entire piping system of foreign matter.

I. Install guards on sprinklers where indicated.

J. Hydrostatically test entire system.

K. Require test be witnessed by Authority Having Jurisdiction.

END OF SECTION 211300

SECTION 220001
GENERAL PROVISIONS FOR PLUMBING WORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work in this Section includes the providing of labor, materials, equipment and services necessary for a complete and safe installation in accordance with the contract documents and all applicable codes and authorities having jurisdiction for plumbing work covered by all sections within the specifications (including but not limited to Plumbing systems and equipment).

B. As a condition of Contractor's use of these specifications, Contractor agrees to: (i) name AKF as additional insured on Contractor's insurance policies wherever permitted, including but not limited to Contractor's General Liability policy, which shall be primary and non-contributory, (ii) provide AKF, upon request, with a certificate of insurance and copies of specific endorsements to Contractor's insurance policies evidencing said additional insured status, and (iii) waive all rights of recovery against AKF by way of subrogation, assignment, or otherwise with regard to insured claims.

C. Where Divisions of Work other than 21, 22, 23 and 26 are referenced herein and are not provided elsewhere in the project documents, refer to this section:
   1. For Firestopping, refer to Section 22 0300.
   2. For Demonstration and Training refer to Section 22 0400.

D. Provide cutting and patching.

E. Provide piping to plumbing terminations, 10 ft from equipment, for water, gas, compressed air and as indicated.

F. Provide drainage from noted equipment to floor drains, roof, sink, or funnel drains.

G. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows.
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
   2. Provide controllers with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
   3. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   4. Label equipment utilizing series ratings as required by NFPA 70.

H. All electrical equipment, starters and controller assemblies shall be rated for 65,000 AIC or as indicated on electrical drawings.

I. Related Work And Requirements
   1. Requirements of General Conditions, Supplementary Conditions for Mechanical, Electrical and Fire Suppression Work and Division No. 1.
   2. Requirements noted under other Divisions of Work

1.02 WORK NOT INCLUDED:

A. Providing temporary toilet facilities.

B. Finish painting, except for pre-finished equipment or as otherwise specified.

C. Concrete work, except equipment inertia and floating bases.

D. Base flashing for piping.

E. Toilet accessories.

F. Waterproofing.

G. Power wiring for motors and motor controllers.

H. Installation of access doors and frames.

I. Providing covers and frames for piping trenches.

1.03 DESCRIPTION OF BID DOCUMENTS

A. Specifications, in general, describe quality and character of materials and equipment.

B. Drawings, in general are diagrammatic and indicate sizes, locations, connections to equipment and methods of installation. Provide additional offsets, fittings, hangers, supports, valves, drains as required for construction and coordination with work of other trades.

C. Scaled and indicated dimensions are approximate and are for estimating purposes only. Before proceeding with work, check and verify all dimensions.

D. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.

E. Typical details, where shown on the drawings, apply to each and every item of the project where such items are applicable. Typical details are not repeated in full on the plans, and are diagrammatic only, but with the intention that such details shall be incorporated in full.

F. If any part of Specifications or Drawings appears unclear or contradictory, consult Architect and/or Engineer for interpretation and decision as early as possible during bidding period. Do not proceed with work without the Architect's and/or Engineer's decision.

1.04 DEFINITIONS

A. "Furnish": To supply, deliver, unload, and inspect for damage.

B. "Install": To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. "Provide": To furnish and install.

D. "Supply": Same as Furnish.

E. "Work": includes labor, materials, equipment, services, and all related accessories necessary for the proper and complete installation of complete systems.

F. "Piping": includes pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, unions, traps, drains, insulation, and all related accessories.

G. "Wiring": includes raceway, fittings, wire, boxes, and all related accessories.

H. "Concealed": not in view, installed in masonry or other construction, within furred spaces, double partitions, hung ceilings, trenches, crawl spaces, or enclosures.

I. "Exposed": in view, not installed underground or "concealed" as defined above.

J. "Indicated," "shown," or "noted": as indicated, shown or noted on drawings or specifications.

K. "Similar" or "equal": of base bid manufacturer, equal in quality, materials, weight, size, performance, design and efficiency of specified product, conforming with "Base Bid Manufacturers."

L. "Reviewed," "satisfactory," "accepted," or "directed": as reviewed, satisfactory, accepted, or directed by or to Architect and/or Engineer.

M. "Motor Controllers": includes manual or magnetic starters with or without switches, individual pushbuttons or hand-off-automatic (HOA) switches controlling the operation of motors.

N. "Control or Actuating Devices": includes automatic sensing and switching devices such as thermostats, pressure, float, flow, electro-pneumatic switches and electrodes controlling operation of equipment.

O. "Finished Spaces": Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

P. "Exposed, Interior Installations": Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

Q. "Exposed, Exterior Installations": Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

R. "Concealed, Interior Installations": Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

S. "Concealed, Exterior Installations": Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.05 QUALITY ASSURANCE

A. All equipment and accessories shall be the product of manufacturers regularly engaged in their manufacture. All items of a given type shall be the products of the same manufacturer.

B. Furnish all equipment and accessories new and free from defects.

C. All electrical equipment shall be listed by Underwriters' Laboratories, Inc. (UL) or bear UL labels.

D. Supply all equipment and accessories in complete compliance with and in accordance with the applicable standards listed in reference standards of this Section and with all applicable national, state and local codes.

1.06 JOB CONDITIONS

A. Inspection of Site Conditions:
   1. Before starting work, visit the site and examine the conditions under which the work has to be performed. Report in writing any conditions which might adversely affect the work.

B. Connections to existing work:
   1. Install new work and connect to existing work with minimum interference to existing facilities.
   2. Provide temporary shutdown of existing services at no additional charges and only with written consent of Owner. Schedule shutdowns not to interfere with normal operation of existing facilities.
   3. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.
   4. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition.
   5. Perform the following work only after regular working hours:

C. Removal and relocation of existing work.
   1. Disconnect, remove, or relocate Plumbing material, equipment, and other work noted and required by alterations, modifications, or changes in existing construction.
   2. Provide new material and equipment required for relocated equipment.
   3. Plug or cap active piping behind or below finish.
   4. Dispose of removed Plumbing equipment as directed.
   5. Return removed Plumbing equipment to Owner as directed.

D. Hazardous locations:
   1. Provide required material, equipment and installation applicable for hazardous location defined by codes.
   2. Provide material, equipment and installation as required for Class, Division and Group noted.

1.07 REFERENCE STANDARDS

A. Published specifications, standards tests, or recommended methods of trade, industry or governmental organizations apply to work in all Sections as noted below:
   1. AIA - American Insurance Association.
   2. ANSI - American National Standards Institute.
   3. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
   4. ASME - American Society of Mechanical Engineers.

5. ASTM - American Society for Testing and Materials.
6. AWS - American Welding Society.
7. AWWA: American Water Works Association.
8. NEC - National Electrical Code.
9. NEMA - National Electrical Manufacturers Association.
10. NFPA - National Fire Protection Association.
11. OSHA - Occupational Safety and Health Administration Regulations.
12. UL - Underwriters' Laboratories, Inc.

1.08 SUBMITTALS

A. Submit shop drawings product data, samples and certificates of compliance required by contract documents.

B. Operating instructions, maintenance manuals and parts lists.
   1. Provide manufacturer's equipment brochures and service manuals consisting of the following:
      a. Descriptive literature for equipment and components.
      b. Model number and performance data.
      c. Installation and operating instructions.
      d. Maintenance and repair instructions.
      e. Recommended spare parts lists.
   2. Assemble manufacturers' equipment manuals in chronological order following the specifications' numbering system using digital format.
   3. Submit valve tag chart.
   4. Submit field test reports including instrument set points and normal operating valves.

1.09 ELECTRONIC COPIES OF AKF DRAWINGS

A. If the contractor requires (.dwg) format, after preparation the drawings will be forwarded only upon receipt of signed acceptance of terms form. Permission from the architect must first be obtained for AKF to include the architectural background as reference. The contractor is to obtain the architects latest drawings directly from the architect.

B. These files are being issued for the convenience of the contractor and the contractor remains responsible for all contract requirements related to the normal shop drawing preparation process.

1.10 SUBMISSIONS:

A. Provide all coordination drawings and shop drawings in digital format, version compatible with owner. All catalog cuts and submittals to be provided in digital format. The architect will forward all submissions to the engineer.

B. Indicate on each submission: project name and location, architect and engineer, item identification and approval stamp of prime contractor, subcontractor names and phone numbers, reference to the applicable design drawing or specification article, date and scale.

C. The work described in all shop drawing submission shall be carefully checked for all clearances (including those required for maintenance and servicing), field conditions, maintenance of architectural conditions and proper coordination with all trades on the job.

D. Each submitted shop drawing is to include a certification that all related job conditions have been checked and verified and that there are no conflicts.

E. All shop drawings are to be submitted to allow ample time for checking in advance of field requirements. All submittals to be complete and contain all required and detailed information. Shop drawings with multiple parts shall be submitted as a package.

F. If submittals differ from the contract document requirements, make specific mention of such difference in a letter of transmittal, with request for substitution, together with reasons for same.

1.11 AS-BUILTS AND EQUIPMENT OPERATION INSTRUCTIONS

A. Provide all coordination drawings and shop drawings in digital format, version compatible with owner. All catalog cuts and submittals to be provided in digital format. The architect will forward all submissions to the engineer.

B. Provide all coordination drawings, shop drawings in digital format, version compatible with owner. All catalog cuts and submittals to be provided in digital format.

C. On completion and acceptance of work, this contractor shall furnish written instructions, equipment manuals and demonstrate to the owner the proper operation and maintenance of all equipment and apparatus furnished under this contract.

D. The contractor shall give one copy of the instructions to the owner and one copy to the engineer. .

E. Final “as-built” drawings indicating as installed conditions shall be provided to the architect and engineer after completion of the installation.

1.12 OPERATING & MAINTENANCE INSTRUCTION

A. Prepare operating and maintenance instructions manual including operating instructions, maintenance instructions, manufacturer's data, specific equipment data.

B. Provide an alphabetical list of all system components, with the name, address, and 24-hour phone number of the company responsible for servicing each item during the first year of operation.

C. Provide operating instructions for complete system, including:
1. Normal starting, operating, and shut-down
2. Emergency procedures for fire or failure of major equipment

D. Provide maintenance instructions, including:
1. Valve tag list and equipment tag list
2. Proper lubricants and lubricating instructions for each piece of equipment, and date when lubricated
3. Required cleaning, replacement and/or adjustment schedule

E. Provide manufacturer's data on each piece of equipment, including:
1. Installation instructions.
2. Drawings and specifications.
3. Parts list, including recommended items to be stocked.
4. Complete wiring control diagrams.
5. Marked or revised prints locating all concealed parts and all variations from the original system design.
6. Test and inspection certificates.

F. Provide specific equipment data including, but not limited to, the following:
1. For Plumbing Systems:
   a. Valves.
   b. Piping, fittings and joints.
   c. Accessories.
   d. Strainers.
   e. Plumbing fixtures and supports.
   f. Plumbing fixture trim.
   g. Flow measuring devices.
   h. Electric wiring.
   i. Pressure gauges and thermometers.
2. For Automatic Control System:
   a. Drawings and description of system controlled.
   b. Sequence of operation for each system.
   c. Data on components.
   d. Wiring and piping, schematic any layout, for panels and panelboards.
   e. System operating manual, including set points.

G. Provide instruction of operating personnel.
   1. Instruct Owner's operating personnel in proper starting sequences, operation, shutdown, and maintenance procedures, including normal and emergency procedures.
   2. Instruction to be by personnel skilled in operation of equipment. Instructions for major equipment to be by equipment manufacturers' representatives.
   3. Make arrangements to give instructions by system and not by building areas.
   4. Provide five (5) instruction sessions not to exceed six (6) hours each.
   5. Instructions on automatic controls to be by manufacturer's representative.

1.13 CLEARANCE FROM ELECTRICAL EQUIPMENT

A. Piping and equipment is prohibited in electric and telephone rooms and closets, elevator machine rooms, and for installations over or within 5 ft of transformers, substations, switchboards, motor control centers, standby power plants, and motors.

B. Branch piping to equipment is acceptable when installed over or within 5 ft of motors.

1.14 STAIRWAYS

A. Piping and equipment is prohibited in egress stairways.

1.15 DRIP PANS

A. Provide drip pans under piping when installation over or within 5 ft of electrical apparatus is unavoidable or in rooms containing electrical equipment. Pan shall be reinforced, properly supported and made watertight. Provide enclosed type for pressure piping. Extend 1-1/4 in. drain pipe from pan to spill over nearest floor drain or as indicated.
   1. Construction shall be 18 gauge galvanized sheet steel.

1.16 PRODUCT, DELIVERY, HANDLING AND STORAGE

A. Ship materials and equipment in crated sections of sizes to permit passing through available space, where required

B. Deliver equipment with protective crating and shrink-wrapped covering.

C. Receive and accept materials and equipment at the site, properly handle, house, and protect them from damage and the weather until installation. Replace equipment damaged in the course of handling without additional charge.

D. Store to prevent damage and protect from weather, dirt, fumes, water, and construction debris in clean dry space

E. Arrange for and provide storage space or area at the job site for all materials and equipment to be received and/or installed in this project

F. All exposed openings of equipment, piping and ductwork are to be covered

G. Handle according to manufacturer's written rigging and installation instructions for unloading, transporting, and setting in final location

H. Protect units from physical damage. Leave factory shipping covers in place until installation

1.17 TEMPORARY TOILETS

A. Temporary toilets will be provided under General Construction Work.

1.18 ACCESSIBILITY

A. Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made without written approval.

B. Group concealed valves, expansion joints, controls, and equipment requiring access, so as to be freely accessible through access doors.

1.19 SPECIAL TOOLS

A. Provide one set of any special tools required to operate, adjust, dismantle or repair equipment furnished under this Division for the Owner's use at the completion of the work.

B. Provide one pressure grease gun with adapters for each type of grease required.

C. Provide one suitable tool case for special tools.

1.20 CUTTING AND PATCHING

A. Provide all carpentry, cutting and patching required for proper installation of materials and equipment specified. Do not cut or drill structural members without review by Architect and Structural Engineer.

1.21 UTILITY CONNECTIONS

A. Arrange for and pay costs for all specified utilities including the following:
1. Connection to utility company mains.
2. Payment of service charges.
3. Provision for temporary utilities.
4. Connect in accordance with authority having jurisdiction.

1.22 PROTECTION OF MATERIALS

A. Protect from damage, water, dust, etcetera, materials, equipment and apparatus provided under this trade, both in storage and installed

1.23 SUBSTITUTIONS

A. No substitute material or manufacturer of equipment shall be permitted without a formal written submittal to the engineer which includes all dimensional, performance and material specifications and is approved in writing by the engineer. Any changes in layout or design brought about by the use of a substitution shall be submitted to the engineer fully designed for review in conjunction with the submittal of the alternate. Any substitution must be submitted with an explanation why a substitution is being utilized. If the substitute is being utilized for financial reasons, the associated credit must be simultaneously submitted. Final acceptance or rejection of any substitution is subject to the owner's review.

B. Contractor to be responsible for the additional cost relating to the substitution, including but not limited to space requirements, structural support, utilities including electrical power, gas, water, etcetera

1.24 STANDARDS:

A. If any item in the specification, as furnished by the contractor, is manufactured in a location which does not certify ASME/ANSI standards, the contractor is to pay the Owner for ALL expenses incurred by the Owner for an outside testing company to confirm such compliance.

1.25 COORDINATION

A. Arrange for pipe spaces, space for equipment, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces.

D. Do not install piping, equip or other materials in locations that block access to items and equipment requiring access or removal including items of other trades.

E. Provide coordination drawing for all areas of the work. The drawings shall have the following qualities:
1. Minimum 3/8” scale
2. Clearly show all the work for each trade including, but not limited to hangers, valves, dampers, actuators, access doors and service access requirements for all items.
3. Indicate bottom elevations of all ductwork, electrical conduit, raceways, cable trays, control wiring and piping.
4. Ductwork, piping, and conduit 3 inches and smaller may be shown in single line.
5. Ductwork, piping, and conduit greater than 3 inches shall be shown in double line.

6. Color scheme:
    a. Architectural and structural background: Light grey.
    b. Ductwork: Black.
    c. Equipment and pads: Purple.
    d. HVAC piping and equipment: Green.
    e. Electrical conduits and equipment: Blue.
    f. Plumbing: Orange.
    g. Fire protection: Red.
    h. Control wiring: Pink.

1.26 GUARANTEE

A. The Contractor shall furnish a written guarantee to replace or repair promptly and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within one year form the date of final certificate for payment and/or from date or actual use of equipment or occupancy of spaces by Owner included under the various parts of work, whichever date is earlier. This work shall be done as directed by the Owner. This guarantee shall also provide that where defects occur, the Contractor will assume responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by the Contractor.

1.27 PERMITS AND FEES

A. The Contractor shall give necessary notice, file drawings and specifications with the department having jurisdiction, obtain permits or licenses necessary to carry out this work and pay all fees therefore. The Contractor shall arrange for inspection and test of any or all parts of the work if so required by authorities and pay all charges for same. The Contractor shall pay all costs for, furnish to the Owner before final billing, all certificates necessary as evidence that the work installed conforms with all regulations where they apply to this work.

B. This contractor shall prepare or hire the necessary consultants to prepare and file all plans, calculation, forms, etcetera. required for filing with all agencies required for this work including but not limited to The DEP (Department of Environmental Protection), DEC (Department of Environmental Conservation, BAR (Bureau of Air Resources), EPA (Environmental Protection Agency), local fire protection authority (fire department, fire marshal, etcetera), utilities (water, sewer, gas, etcetera), AHJ (authorities having jusrisdiction), etcetera.

1.28 SPECIAL INSPECTIONS

A. Special inspection shall be provided by the owner. This contractor shall provide all required services to accomplish these inspections.

1.29 SERVICE AND WARRANTY (MAINTENANCE CONTRACT)

A. This contract shall provide a full year service and warranty of all plumbing components and systems, with add alternate prices for years 2, 3 and 4 following this first year. At the time of acceptance of project, the tenant or owner’s representative will decide to accept which alternate, if any.

1.30 RIGGING

A. This contractor shall provide all required rigging, hoisting and bracing to install the equipment as indicated on the plans. This work shall be performed by an insured certified licensed rigging company that is experienced in rigging equipment of the type indicated for the areas shown on the construction documents. This contractor shall submit rigging plans for approval prior to proceeding with the work.

B. All permits required from the authorities and agencies involved to perform the rigging are the responsibilities of this contractor.

C. All structural supports, modifications or additions are to be submitted to the structural engineer for approval prior to proceeding with the work. All supplemental structural supports, elevator charges /modifications, bracing and protection required for the rig is the responsibility of this contractor

D. The rigging contractor shall hire and pay for all charges and services of the building elevator contractor for the rigging of the equipment

1.31 FIELD QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

H. See individual specification sections for testing and inspection required.

I. Replace Work or portions of the Work not complying with specified requirements.

J. Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

PART 2 PRODUCTS

2.01 BASE BID MANUFACTURERS

A. Base bid on materials or equipment are specified by name of manufacturer, brand or trade name and catalog reference.

B. The choice will be optional with bidder where two or more manufacturers are named.

C. The following are base bid manufacturers for items under this Section:
   1. Access doors: Karp Associates, Inc., Higgins Mfg. Co., Milcor Steel Co., and Walsh-Spencer Co.
   2. Paint: Sherwin-Williams, Pittsburgh Plate Glass Co., Pratt and Lambert, and Rust-Oleum.
   3. Gratings: Irving Grating IKG Industries and Ryerson - Inland Steel Co.

2.02 ACCESS DOORS

A. This contractor shall submit to the architect for approval a plan indicating the size (minimum 24 in. x 24 in. where personnel access is required) and location of all access doors required for operation, maintenance and replacement of all concealed equipment, devices, valves, and controls. Contractor shall arrange for furnishing and installation of all access doors in finished construction and include costs in the bid.

B. Access doors shall be provided sufficiently large for replacement of all equipment located in inaccessible walls and ceilings. Provide custom size, multileaf access panels, without cross bars, maximum 48 in. x 48 in. with piano hinge and safety chains.

C. Access doors will be provided under General Construction Work.

D. Supply access doors for all concealed Plumbing items in inaccessible walls and ceilings for complete access, using a with a minimum door size of 18 in. x 18 in. for installation under the General Construction Work. Locating and setting shall be performed after review.

E. Provide access doors for all concealed Plumbing items in inaccessible walls and ceilings for complete access, using a minimum door size of 18 in. x 18 in. Locating and setting shall be performed after review.

F. Flush type access doors shall be similar to Karp Type DSC-211 with No. 13 USSG steel doors and trim and No. 16 USSG steel frame, metal wings for keying into construction, concealed hinges and screwdriver operated stainless steel cam lock. Provide lift off type access doors, similar to Karp Type DSC-212, where door cannot swing open.

G. In acoustic tile ceilings, factory finished white access doors shall be similar to Karp Type DSC-210, with No. 13 USSG steel frame, No. 16 USSG steel pan door suitable for receiving tile thickness and hinges that are not visible when door is closed. Access door shall have screwdriver operated stainless steel cam locks finishing flush with tile with a minimum of 2 per door.

H. In plaster ceilings recessed access doors shall be similar to Karp DSC-210-PL, with recess to receive plaster.

I. In fire rated construction provide fire rated access doors, similar to Karp KRP-150-FR, listed and labeled in accordance with applicable code requirements.

J. Access doors shall have one coat of shop-painted zinc chromate primer.

2.03 ACCESS TILE IDENTIFICATION:

A. In removable ceiling tiles, provide buttons, tabs, and markers to identify location of concealed work. Submit for review.

PART 3 - EXECUTION

3.01 IDENTIFICATION

A. Refer to identification Section 22 0553.

3.02 WATERPROOFING

A. Waterproofing will be provided under General Construction Work.

B. Where any work pierces waterproofing, installation shall be subject to review, provide all necessary sleeves, caulking, flashing and flashing fittings required to make openings absolutely watertight.

C. Flashing:
1. Provide Copper: ASTM B370, cold rolled 16 oz/sq ft (24 gage) (0.0216 inch) (0.55 mm) thick; natural finish.
2. Provide Pre-Finished Aluminum: ASTM B209 (ASTM B209M)[<>]; 20 gage, (0.032 inch) (0.81 mm) thick; plain finish shop pre-coated with modified silicone coating. Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.

3.03 FIELD QUALITY CONTROL

A. Perform tests as noted, and in the presence of Architect and/or Engineer and authorities having jurisdiction.

B. Provide required labor, material, equipment, and connections necessary for tests and submit results for review.

C. Repair or replace defective work and pay for restoring or replacing damaged work due to tests, as directed.

3.04 START-UP

A. Properly lubricate all pieces of equipment.

B. Check and clean all pipes and ducts of dirt and debris.

C. Fill and vent all water systems.

D. Prepare each piece of equipment in accordance with manufacturer's installation instructions and have a copy at the equipment.

E. Check rotation on each motor.

F. Have representatives of each manufacturer present when hereinafter specified, so that equipment will be started up by manufacturer.

3.05 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.

B. Clean and repair painted exposed work, soiled or damaged, to match adjoining work before final acceptance.

C. Remove debris from inside and outside of material and equipment.

3.06 PROJECT CLOSEOUT PROCEDURES

A. It shall be each contractor's responsibility to personally hand-deliver all of the required project closeout checklist items and to obtain Owner's authorized representative(s) signed receipt on all items requiring Owner sign-off.

B. Review requirements of each section of the specifications and submit for approval to Architect the sign-off forms which shall become the project closeout checklist. These, at a minimum, shall include the following information shown in attached Project Closeout Checklist Example. The Architect and/or Owner may incorporate additional specific items to the following checklist which shall become part of the project requirements.

C. Closeout Checklist Example:

	DATES		
ITEM	**COMPLETED**	**RECEIVED BY OWNER**	**OWNER'S SIGNOFF**
PERMITS			
CITY AND COUNTY INSPECTION			
MANUFACTURER'S WARRANTIES			
CONTRACTOR'S WARRANTIES			
STATE FIRE RATING DATA			
COPY OF FINAL SHOP DRAWINGS			
LIST AND POSSESSION OF SPARE PARTS			
PRESSURE TESTS			
EQUIPMENT TESTS REQUIRED BY SPECS			
O & M MANUALS			
RECORD DOCUMENTS			
COORDINATION DRAWINGS			
SANITIZATION REPORTS			
COMMISSIONING REPORTS/LETTERS/FORMS			
ON-SITE TRAINING COMPLETE			
PROTECTIVE DEVICE SETTINGS			
VALVE TAGS AND CHARTS			
FINAL ATC INSTALLATION DRAWINGS			
INSURANCE UNDERWRITERS APPROVALS			

FINAL PUNCH LIST (INITIALED BY CONTRACTOR THAT ITEMS ARE COMPLETE)			
BUILDING CERTIFICATE OF OCCUPANCY (C.O.)			
24-HOUR PHONE NO. FOR SERVICE DURING GUARANTEE PERIOD			

END OF SECTION 220001

SECTION 220500
COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, fittings, sleeves, escutcheons, seals, grout and connections for plumbing systems.

B. Plumbing equipment and piping demolition.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 099123 - Interior Painting: Preparation and painting of interior fire plumbing piping systems.

C. Section 22 0523 - General-Duty Valves for Plumbing Piping.

D. Section 22 0553 - Identification for Plumbing Piping and Equipment: Piping identification.

E. Section 22 0716 - Plumbing Equipment Insulation: Insulation of fire suppression equipment piping, fittings, valves, mechanical couplings, connections, hangers, insulation inserts, shields, etc.

F. Section 22 0719 - Plumbing Piping Insulation: Insulation of fire suppression piping, fittings, valves, mechanical couplings, connections, hangers, insulation inserts, shields, etc.

G. Section 22 1005 - Plumbing Piping.

H. Section 22 3000 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers catalogue information.

C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 ESCUTCHEONS

A. Material:
   1. Metals and Finish: Comply with ASME A112.18.1.

B. Construction:
   1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
   2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.02 GROUT

A. General Purpose Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
   1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

PART 3 EXECUTION

3.01 PLUMBING DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
   1. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.02 ESCUTCHEONS:

A. Install and firmly attach escutcheons at piping penetrations into finished spaces.

B. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.

C. Attach plates at the underside only of suspended ceilings.

D. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.

E. Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

F. Existing Piping: Split-platewith exposed-rivet hinge and spring clips.

G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

H. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

3.03 GROUTING

A. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.04 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

C. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

END OF SECTION 220500

SECTION 220517
SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

B. Manufactured sleeve-seal systems.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 220719 - Plumbing Piping Insulation.

C. Section 22 1005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2023a.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified this section.
   1. Minimum three years experience.

C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Manufacturers:
   1. Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com.

B. Vertical Piping:
   1. Sleeve Length: 1 inch above finished floor.
   2. Provide sealant for watertight joint.
   3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
   4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

D. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

E. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

F. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.

G. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
   3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Flexicraft Industries; PipeSeal: www.flexicraft.com.
   2. Thunderline Link-Seal.
   3. Metraflex Co..
   4. Calpico Inc.
   5. Advance Products & Systems, Inc.
   6. Substitutions: See Section 016000 - Product Requirements.

B. Modular/Mechanical Seal:
   1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
   2. Provide watertight seal between pipe and wall/casing opening.
   3. Elastomer element size and material in accordance with manufacturer's recommendations.
   4. Stainless stell pressure plates

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Structural Considerations:
   1. Do not penetrate building structural members unless indicated.

E. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
   2. Aboveground Piping:
      a. Pack solid using mineral fiber complying with ASTM C592.

b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.

3. All Rated Openings: Caulk tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.

F. Manufactured Sleeve-Seal Systems:
1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
3. Locate piping in center of sleeve or penetration.
4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a water-tight seal.
6. Install in accordance with manufacturer's recommendations.

G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION 220517

SECTION 220523
GENERAL-DUTY VALVES FOR PLUMBING PIPING

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applications.
B. General requirements.
C. Ball valves.
D. Butterfly valves.
E. Check valves.
F. Gate valves.
G. Globe valves.
H. Chainwheels.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 083100 - Access Doors and Panels.
C. Section 220553 - Identification for Plumbing Piping and Equipment.
D. Section 220719 - Plumbing Piping Insulation.
E. Section 221005 - Plumbing Piping.

1.03 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Non-rising stem.
E. OS&Y: Outside screw and yoke.
F. PTFE: Polytetrafluoroethylene.
G. RS: Rising stem.
H. SWP: Steam working pressure.
I. TFE: Tetrafluoroethylene.
J. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

A. API STD 594 - Check Valves: Flanged, Lug, Wafer, and Butt-Welding 2022.
B. ASME B1.20.1 - Pipe Threads, General Purpose, Inch 2013 (Reaffirmed 2018).
C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.
D. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.
E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves 2022.
F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
G. ASME B16.34 - Valves — Flanged, Threaded, and Welding End 2020.
H. ASME B31.9 - Building Services Piping 2020.
I. ASME B31.1 for power piping valves.

J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.

K. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.

L. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings 2004 (Reapproved 2019).

M. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2022).

N. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).

O. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings 2015 (Reapproved 2021).

P. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings 2017.

Q. AWWA C606 - Grooved and Shouldered Joints 2022.

R. MSS SP-45 - Drain and Bypass Connections 2020.

S. MSS SP-67 - Butterfly Valves 2022.

T. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends 2011.

U. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends 2018.

V. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service 2010a.

W. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves 2019.

X. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends 2011.

Y. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .

Z. MSS SP-125 - Check Valves: Gray Iron and Ductile Iron, In-Line, Spring-Loaded, Center-Guided 2018.

AA. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

BB. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
   1. Furnish maintenance manuals as specified in Division 1.
   2. Furnish complete operation and maintenance manuals for the purchased equipment.
   3. Include the following items as a minimum for the purchased equipment.
      a. Flow / pressure drop curves.

E. Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.
   1. See Section 016000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Manufacturer:
   1. Obtain valves for each valve type from single manufacturer.

2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

C. ASME Compliance:
1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

D. Standards: If any item in this specification, as furnished by the contractor is manufactured in a location which does not certify ASME / ANSI standards, the contractor is to pay the owner for all expenses incurred by the owner for an outside testing company to confirm such compliances.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
2. Protect valve parts exposed to piped medium against rust and corrosion.
3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
5. Secure check valves in either the closed position or open position.
6. Adjust butterfly valves to closed or partially closed position.

B. Use the following precautions during storage:
1. Maintain valve end protection and protect flanges and specialties from dirt.
a. Provide temporary inlet and outlet caps.
b. Maintain caps in place until installation.
2. Store valves in shipping containers and maintain in place until installation.
a. Store valves indoors in dry environment.
b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

1.08 EXERCISE THE FOLLOWING PRECAUTIONS FOR HANDLING:

A. Handle large valves with sling, modified to avoid damage to exposed parts.

B. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. See drawings for specific valve locations.

B. Refer to valve schedule articles for applications of valves.

C. Provide the following valves for the applications if not indicated on drawings:
1. Shutoff: Ball, gate.
2. Dead-End: Single-flange butterfly (lug) type.
3. Throttling: Provide globe or ball.
4. Swing Check (Pump Outlet):
a. 2 NPS and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
b. 2-1/2 NPS and Larger for Domestic Water: Iron swing check valves with closure control, metal or resilient seat check valves.
c. 2-1/2 NPS and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.

D. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.

E. Required Valve End Connections for Non-Wafer Types:
1. Steel Pipe:
a. 2 NPS and Smaller: Threaded ends.

b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
c. 5 NPS and Larger: Grooved or flanged ends.
d. Grooved-End Copper Tubing and Steel Piping: Grooved.

2. Copper Tube:
a. 2 NPS and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.

F. Domestic Cold, Hot and Hot Water Recirculatiion Valves:
1. 2 NPS and Smaller:
a. Bronze: Provide with solder-joint or threaded ends.
b. Ball: Two piece, full port, bronze with bronze or stainless steel trim.
c. Bronze Swing Check: Class 125, bronze disc.
d. Bronze Gate: Class 125, NRS.
e. Bronze Globe: Class 125, bronze disc.
2. 2-1/2 NPS and Larger:
a. Iron, 2-1/2 NPS to 4 NPS: Provide with flanged ends.
b. Iron Ball: Class 150.
c. Iron Single-Flange Butterfly: 200 CWP, EPDM seat, aluminum-bronze disc.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
2. Handwheel: Valves other than quarter-turn types.
3. Hand Lever: Quarter-turn valves 6 NPS and smaller except plug valves.
4. Wrench: Plug valves with square heads.
5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

D. Valves in Insulated Piping: With 2 NPS stem extensions and the following features:
1. Gate Valves: Rising stem.
2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: Extended neck.
4. Memory Stops: Fully adjustable after insulation is installed.

E. Valve-End Connections:
1. Threaded End Valves: ASME B1.20.1.
2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
4. Solder Joint Connections: ASME B16.18.
5. Grooved End Connections: AWWA C606.

F. General ASME Compliance:
1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
2. Solder-joint Connections: ASME B16.18.
3. Building Services Piping Valves: ASME B31.9.

G. Potable Water Use:
1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

H. Bronze Valves:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

I. Valve Bypass and Drain Connections: MSS SP-45.

J. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 BRONZE, BALL VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Two Piece, Full Port with Bronze Trim:
1. Comply with MSS SP-110.
2. SWP Rating: 150 psig.
3. CWP Rating: 600 psig.
4. Body: Forged bronze or dezincified-brass alloy.
5. Ends: Threaded.
6. Seats: PTFE.
7. Stem: Bronze.
8. Ball: Chrome plated brass.
9. Manufacturers:
a. Apollo Valves: www.apollovalves.com.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Crane Co.; Crane Valve Group; Crane Valves.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
h. Viega LLC; _____: www.viega.us.

2.04 STAINLESS STEEL, BALL VALVES

A. Two Piece, Full Port with Stainless Steel Trim:
1. Comply with MSS SP-110.
2. SWP Rating: 150 psig.
3. CWP Rating: 1000 psig.
4. Body: Stainless steel.
5. Ends: Threaded or press.
6. Ends: Threaded
7. Seats: PFTE.
8. Stem: Stainless steel.
9. Ball: Stainless steel.
10. Manufacturers:
a. Apollo Valves: www.apollovalves.com.
b. Ferguson Enterprises Inc: www.fnw.com.
c. Nibco.
d. Milwaukee

2.05 BRASS, HORIZONTAL SWING CHECK VALVES

2.06 BRONZE, SWING CHECK VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125 CWP Rating; 200 psig (1,380 kPa) WOG:
1. Comply with MSS SP-80, Type 3.

2. Design: Y-pattern, horizontal or vertical flow.
3. Body: Bronze, ASTM B62.
4. Ends: Threaded.
5. Disc: Bronze.
6. Manufacturers:
   a. Apollo Valves: www.apollovalves.com.

C. Class 150, Bronze Swing Check Valves with Nonmetallic Disc:
1. Description:
2. Standard: MSS SP-80, Type 4.
3. CWP Rating: 300 psig (2070 kPa).
4. Body Design: Horizontal flow.
5. Body Material: ASTM B 62, bronze.
6. Ends: Threaded.
7. Disc: PTFE or TFE.
8. Manufacturers:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Hammond Valve.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
   f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.07 IRON, HORIZONTAL SWING CHECK VALVES

A. Class 125:
1. Comply with MSS SP-71, Type I.
2. CWP Rating: 200 psig.
3. Design: Clear or full waterway.
4. Body: ASTM A126, gray cast iron with bolted bonnet.
5. Ends: Flanged.
6. Trim: Bronze.
7. Seat Ring and Disc Holder: Bronze.
8. Disc: PTFE or TFE.
9. Gasket: Asbestos free.
10. Manufacturers:
    a. Apollo Valves: www.apollovalves.com.
    b. Ferguson Enterprises Inc: www.fnw.com.
    c. Flomatic Valves; Flo-Flex Swing Check Valve: www.flomatic.com.
    d. Crane Co.; Crane Valve Group; Crane Valves.
    e. Crane Co.; Crane Valve Group; Jenkins Valves.
    f. Crane Co.; Crane Valve Group; Stockham Division.
    g. Hammond Valve.
    h. Milwaukee Valve Company.
    i. NIBCO INC.
    j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

B. Class 250:
1. Comply with MSS SP-71, Type I.
2. CWP Rating: 500 psig.
3. Design: Clear or full waterway.
4. Body: ASTM A126, gray iron with bolted bonnet.
5. Ends: Flanged as indicated.
6. Trim: Bronze.
7. Metal Seat.
8. Gasket: Asbestos free.
9. Manufacturers:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.08 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125 with Lever and Weight-Closure Control.
1. Comply with MSS SP-71, Type I.
2. Description:
a. CWP Rating: 200 psig.
b. Design: Clear or full waterway.
c. Body: ASTM A126, gray iron with bolted bonnet.
d. Ends: Flanged as indicated.
e. Trim: Bronze.
f. Gasket: Asbestos free.
g. Closer Control: Factory installed, exterior lever, and weight.
3. Manufacturers:
a. Apollo Valves: www.apollovalves.com.
b. Flomatic Valves; 90LS/92LS Swing Check Valve: www.flomatic.com.
c. Crane Co.; Crane Valve Group; Crane Valves.
d. Crane Co.; Crane Valve Group; Jenkins Valves.
e. Crane Co.; Crane Valve Group; Stockham Division.
f. Hammond Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.09 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP:
1. CWP Rating: 300 psig.
2. Body: ASTM A536, Grade 65-45-12 ductile iron.
3. Seal: EPDM.
4. Disc: Spring Operated Ductile iron.
5. Coating: Black, non-lead paint.
6. Manufacturers:
a. Tyco Fire Products LP; Grinnell Mechanical Products.
b. Victaulic Company.

2.10 IRON, CENTER-GUIDED CHECK VALVES

A. Class 125, Compact-Wafer:
1. Comply with MSS SP-125.
2. CWP Rating: 200 psig.
3. Body: ASTM A126 gray iron.
4. Style: Compact Wafer.
5. Resilient Seat: EPDM.
6. Manufacturers:
a. Apollo Valves: www.apollovalves.com.
b. Flomatic Valves; 888S6R Wafer Check Valve: www.flomatic.com.
c. Hammond Valve.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Spence Strainers International; a division of CIRCOR International, Inc.

g. Val-Matic Valve & Manufacturing Corp.

B. Class 125, Globe:
1. Comply with MSS SP-125.
2. CWP Rating: 200 psig.
3. Body: ASTM A126 gray iron.
4. Style: Spring loaded.
5. Ends: Flanged.
6. Style: Compact wafer.
7. Resilient Seat: EPDM.
8. Manufacturers:
a. Flomatic Valves; 402BTR Globe Check Valve: www.flomatic.com.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO INC.
e. Val-Matic Valve & Manufacturing Corp.

C. Class 150, Compact-Wafer:
1. Comply with MSS SP-125.
2. CW P Rating: 300 psig.
3. Body: ASTM A395/A395M or ASTM A536, ductile iron.
4. Resilient Seat: EPDM.
5. Manufacturers:
a. Flomatic Valves; 888S6R Wafer Check Valve: www.flomatic.com.
b. Val-Matic Valve & Manufacturing Corp.

D. Class 150, Globe:
1. Comply with MSS SP-125.
2. CWP Rating: 300 psig.
3. Body: ASTM A395/A395M or ASTM A536, ductile iron.
4. Style: Spring loaded.
5. Ends: Flanged.
6. Resilient Seat: EPDM.
7. Manufacturers:
a. Flomatic Valves; 402S6R Globe Check Valve: www.flomatic.com.
b. Val-Matic Valve & Manufacturing Corp.

E. Class 250, Compact-Wafer:
1. Comply with MSS SP-125.
2. CWP Rating: 400 psig.
3. Body: ASTM A126, gray iron.
4. Style: Spring loaded.
5. Resilient Seat: EPDM.
6. Manufacturers:
a. Hammond Valve.
b. Milwaukee Valve Company.
c. NIBCO INC.
d. Val-Matic Valve & Manufacturing Corp.

F. Class 250, Globe:
1. Comply with MSS SP-125.
2. 2-1/2 NPS to 12 NPS, CWP Rating: 400 psig.
3. Body Material: ASTM A126, gray iron.
4. Style: Spring loaded.
5. Ends: Flanged.
6. Resilient Seat: EPDM.
7. Manufacturers:

a. Hammond Valve.
b. Milwaukee Valve Company.
c. NIBCO INC.
d. Val-Matic Valve & Manufacturing Corp.

G. Class 300, Compact-Wafer:
1. Comply with MSS SP-125.
2. CWP Rating: 500 psig.
3. Body: ASTM A395/A395M or ASTM A536, ductile iron.
4. Style: Spring loaded.
5. Resilient Seat: EPDM.
6. Manufacturers:
a. Val-Matic Valve & Manufacturing Corp.

H. Class 300, Globe:
1. Comply with MSS SP-125.
2. CWP Rating: 500 psig.
3. Body: ASTM A395/A395M or ASTM A536, ductile iron.
4. Style: Spring loaded.
5. Ends: Flanged.
6. Resilient Seat: EPDM.
7. Manufacturers:
a. Val-Matic Valve & Manufacturing Corp.
8. Description:
a. Standard: MSS SP-125.
b. CWP Rating: 500 psig (3450 kPa).
c. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
d. Style: Compact wafer, spring loaded.
e. Seat: EPDM.

2.11 BRONZE, GATE VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Rising Stem (RS):
1. Comply with MSS SP-80, Type I.
2. Class 125: CWP Rating: 200 psig:.
3. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
4. Ends: Threaded or solder joint joint.
5. Stem: Bronze.
6. Disc: Solid wedge; bronze.
7. Packing: Asbestos free.
8. Handwheel: Malleable iron, bronze, or aluminum.
9. Manufacturers:
a. Apollo Valves: www.apollovalves.com.
b. Ferguson Enterprises Inc: www.fnw.com.
c. Crane Co.; Crane Valve Group; Crane Valves.
d. Crane Co.; Crane Valve Group; Jenkins Valves.
e. Crane Co.; Crane Valve Group; Stockham Division.
f. Hammond Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
10. Class 150, RS Bronze Gate Valves:
11. Standard: MSS SP-80, Type 2.

12. CWP Rating: 300 psig (2070 kPa).
13. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
14. Ends: Threaded.
15. Stem: Bronze.
16. Disc: Solid wedge; bronze.
17. Packing: Asbestos free.
18. Handwheel: Malleable iron.
19. Manufacturers:
    a. Crane Co.; Crane Valve Group; Crane Valves.
    b. Crane Co.; Crane Valve Group; Stockham Division.
    c. Hammond Valve.
    d. Milwaukee Valve Company.
    e. NIBCO INC.
    f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.12 IRON, GATE VALVES

A. OS & Y:
1. Comply with MSS SP-70, Type I.
2. Class 125: CWP Rating: 200 psig:.
3. Body: ASTM A126, gray iron with bolted bonnet.
4. Ends: Flanged.
5. Trim: Bronze.
6. Disc: Solid wedge.
7. Packing and Gasket: Asbestos free.
8. Manufacturers:
    a. Apollo Valves: www.apollovalves.com.
    b. Ferguson Enterprises Inc: www.fnw.com.
    c. Crane Co.; Crane Valve Group; Crane Valves.
    d. Crane Co.; Crane Valve Group; Jenkins Valves.
    e. Crane Co.; Crane Valve Group; Stockham Division.
    f. Hammond Valve.
    g. Milwaukee Valve Company.
    h. NIBCO INC.
    i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
9. Class 250, OS&Y, Iron Gate Valves:
10. Standard: MSS SP-70, Type I.
11. CWP Rating: 500 psig (3450 kPa).
12. Body Material: ASTM A 126, gray iron with bolted bonnet.
13. Ends: Flanged.
14. Trim: Bronze.
15. Disc: Solid wedge.
16. Packing and Gasket: Asbestos free.
17. Manufacturers:
    a. Crane Co.; Crane Valve Group; Crane Valves.
    b. Crane Co.; Crane Valve Group; Stockham Division.
    c. Hammond Valve.
    d. Milwaukee Valve Company.
    e. NIBCO INC.
    f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.13 BRONZE, GLOBE VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125: CWP Rating: 200 psig:.
   1. Comply with MSS SP-80, Type 1.
   2. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
   3. Ends: Threaded joint.
   4. Stem: Bronze.
   5. Disc: PTFE or TFE.
   6. Packing: Asbestos free.
   7. Handwheel: Malleable Iron.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

E. Examine threads on valve and mating pipe for form and cleanliness.

F. Examine mating flange faces for conditions that might cause leakage.
   1. Check bolting for proper size, length, and material.
   2. Verify gasket for size, defects, damage, and suitable material composition for service.
   3. Replace all defective valves with new valves.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

F. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

G. Install check valves where necessary to maintain direction of flow as follows:
   1. Lift Check: Install with stem plumb and vertical.
   2. Swing Check: Install horizontal maintaining hinge pin level.
   3. Center-Guided Check Valves: In horizontal or vertical position, between flanges.
   4. Orient center-guided into horizontal or vertical position, between flanges.

H. Adjusting:
   1. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

I. General requirements for valve applications
   1. If valve applications are not indicated, use the following:
      a. Shutoff Service: Ball, butterfly, or gate valves.
   2. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
   3. Select valves, except wafer types, with the following end connections:
      a. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
      b. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends.
      c. For Copper Tubing, NPS 5 and Larger: Flanged ends.

d. For Steel Piping, NPS 2 and Smaller: Threaded ends.
e. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends.
f. For Steel Piping, NPS 5 and Larger: Flanged ends.
g. For Grooved-End Copper Tubing and Steel Piping: Valve ends may be grooved.

END OF SECTION 220523

SECTION 220529
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other plumbing work.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

C. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.

C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2023.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).

F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

H. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).

I. MFMA-4 - Metal Framing Standards Publication 2004.

J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
   1. Steel pipe hangers and supports.
   2. Thermal-hanger shield inserts.
   3. Fastener systems.
   4. Pipe positioning systems.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.Show fabrication and installation details and include calculations for the following:
   1. Trapeze pipe hangers. Include Product Data for components.
   2. Metal framing systems. Include Product Data for components.
   3. Pipe stands. Include Product Data for components.
   4. Equipment supports.
   5. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.

D. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.

E. Installer's Qualifications: Include evidence of compliance with specified requirements.

F. Welding certificates.

G. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with applicable building code.

B. All hangars, supports and anchorage to structure shall be selected by the manufacturer's authorized representative and approved by the project structural engineer.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Installer Qualifications for Field-Welding: As specified in Section 055000. Qualify processes and operators acording to AWS D1.1/D1.1M "Structural Welding Code - Steel.

E. Certify that each welder has passed AWS qualification tests for welding processesinvolved and that certification is current.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 SUPPLEMENTARY STEEL

A. Furnish supplementary steel as required for proper installation, mounting and support of HVAC work.

B. Connect supplementary steel firmly to building construction in an acceptable manner.

C. Determine type and size of supplementary steel. Supplementary steel shall be of sufficient strength and size to allow a minimum deflection of the span and in conformance with manufacturer's requirements of loading.

D. Install supplementary steel in a neat and workmanlike manner parallel to walls, floors and ceiling construction.

E. All supplementary steel and channel supports shall be submitted to the structural engineer for review

1.08 EXPANSION ANCHORS

A. Provide spacing and install anchors in accordance with manufacturer's recommendations.

B. Comply with ACI 318 as amended by the authority having jurisdiction.

C. All expansion anchors shall be submitted to the structural engineer for review.

D. File all post installed anchors and assist with special inspections where required by the authority having jurisdiction.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with MSS SP-58.
   2. Select and size all hangers, supports, supplemental steel ans accessories for the imposed loads in accordance with ASME B 31.1 or MSS SP-58 as applicable.
   3. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   4. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   5. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 4.0. Include consideration for vibration, equipment operation, and shock loads where applicable.
   6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   7. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Materials for Metal Fabricated Supports: Comply with Section 055000.

C. Steel Pipe Hangers and Supports
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Manufacturers:
      a. AAA Technology & Specialties Co., Inc.
      b. Bergen-Power Pipe Supports.
      c. B-Line Systems, Inc.; a division of Cooper Industries.
      d. Carpenter & Paterson, Inc.
      e. Empire Industries, Inc.
      f. ERICO/Michigan Hanger Co.
      g. Globe Pipe Hanger Products, Inc.
      h. Grinnell Corp.
      i. GS Metals Corp.
      j. National Pipe Hanger Corporation.
      k. PHD Manufacturing, Inc.
      l. PHS Industries, Inc.
      m. Piping Technology & Products, Inc.
      n. Tolco Inc.
      o. NEFCO
      p. Anvil International

q. Industrial Threaded Products
3. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
4. Nonmetallic Coatings: Plastic coating, jacket, or liner.
5. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

D. Metal Channel (Strut) Framing Systems:
1. Description: MSS SP-69 Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.
2. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
b. Thomas & Betts Corporation: www.tnb.com.
c. ERICO/Michigan Hanger Co.; ERISTRUT Div.
d. GS Metals Corp.
e. Power-Strut Div.; Tyco International, Ltd.
f. Thomas & Betts Corporation.
g. Tolco Inc.
h. Unistrut, a brand of Atkore International Inc: www.unistrut.com.
i. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
3. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
4. Comply with MFMA-4.
5. Channel Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
6. Minimum Channel Thickness: 1/8 inch.
7. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.
8. Nonmetallic Coatings: Plastic coating, jacket, or liner.
9. Minimum Channel Dimensions: 1-1/2 inch width by 1-1/2 height.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Piping up to 1 inch (27 mm) nominal: 3/8 inch diameter.
c. Piping larger than 1 inch (27 mm) nominal: 1/2 inch diameter.
d. Trapeze Support for Multiple Pipes: 1/2 inch diameter.

F. Thermal Insulated Pipe Supports:
1. Description: 100-psig- (690-kPa-) minimum, compressive-strength insulation insert encased in sheet metal shield.
2. Manufacturers:
a. Buckaroos, Inc: www.buckaroos.com.
b. KB Enterprises: www.snappitz.com.
c. Carpenter & Paterson, Inc.
d. ERICO/Michigan Hanger Co.
e. PHS Industries, Inc.
f. Pipe Shields, Inc.
g. Rilco Manufacturing Company, Inc.
h. Value Engineered Products, Inc.
3. General Construction and Requirements:
a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.

d. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.
e. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
f. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
g. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

4. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.
   a. Buckaroos, Inc; CoolDry: www.buckaroos.com.

G. Pipe Supports:
1. Manufacturers:
   a. B-Line Systems.
   b. Carpenter & Paterson.
   c. ERICO.
   d. Grinnell
   e. NEFCO
   f. Anvil International
   g. Empire
   h. Substitutions: See Section 016000 - Product Requirements.
   i. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Operating Temperatures from ____ degrees F:
   a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
   b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
   c. Sliding Support: MSS SP-58 Types 35 through 38.

H. Pipe Stanchions: For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
1. Manufacturers:
   a. Anvil International: www.anvilintl.com.
   b. Carpenter and Paterson.
   c. Enrico.
   d. Grinnell
   e. NEFCO
   f. Substitutions: See Section 016000 - Product Requirements.
2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.

I. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
1. Manufacturers:
   a. Ferguson Enterprises Inc: www.fnw.com.
   b. Anvil International.
   c. Carpenter & Paterson.
   d. Grinnell
   e. Substitutions: See Section 016000 - Product Requirements.
   f. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
3. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

J. Riser Clamps:

1. Manufacturers:
   a. Ferguson Enterprises Inc: www.fnw.com.
   b. Carpenter & Paterson.
   c. Anvil International.
   d. Substitutions: See Section 016000 - Product Requirements.
   e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Provide copper plated clamps for copper tubing support.
3. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.

K. Strut Clamps: Two-piece pipe clamp.
1. Manufacturers:
   a. Ferguson Enterprises Inc: www.fnw.com.
   b. Carpenter & Patterson.
   c. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

L. Insulation Clamps: Two bolt-type clamps designed for installation under insulation.
1. Manufacturers:
   a. Ferguson Enterprises Inc: www.fnw.com.
   b. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

M. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
1. Manufacturers:
   a. Ferguson Enterprises Inc: www.fnw.com.
   b. Carpenter & Patterson.
   c. Anvil.
   d. Empire Industries
   e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
3. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

N. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
1. Manufacturers:
   a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

O. Pipe Positioning Systems:
1. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.
2. Manufacturers:
   a. C & S Mfg. Corp.
   b. HOLDRITE Corp.; Hubbard Enterprises.
   c. Samco Stamping, Inc.

P. Equipment Supports:
1. Equipment supports in this Article require calculation and detail of each unit.
2. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

Q. Miscellaneous Materials:
1. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

2. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   a. Properties: Nonstaining, noncorrosive, and nongaseous.
   b. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

R. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
   a. Hilti, Inc: www.us.hilti.com.
   b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com.
   c. Powers Fasteners, Inc: www.powers.com.
2. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
3. Concrete: Use preset concrete inserts or expansion anchors.
4. Solid or Grout-Filled Masonry: Use expansion anchors.
5. Steel: Use beam clamps, machine bolts, or welded threaded studs.
6. Wood: Use lag bolts.
7. Powder-actuated fasteners are not permitted.
8. Hammer-driven anchors and fasteners are not permitted.
9. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
   a. Comply with MFMA-4.
   b. Channel Material: Use galvanized steel.
   c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
   d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide hangers and supports of same materials as piping and equipment being supported or provide dielectric separation.

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H. Field-Welding (where approved by Architect): Comply with Section 055000.

I. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

J. Equipment Support and Attachment:
1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 4 inch high concrete pad constructed in accordance with Section 033000.
5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

K. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

L. Secure fasteners according to manufacturer's recommended torque settings.

M. Hanger and Support Installation:
1. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
2. Each trapeze pipe hanger in first paragraph and subparagraphs below requires calculation and detail.
3. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
   a. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
   b. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
4. Each metal framing system in paragraph below requires calculation and detail.
5. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
6. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
7. Fastener System Installation:
   a. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
8. Each pipe stand in first paragraph and subparagraphs below requires calculation and detail.
9. Pipe Stand Installation:
   a. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
   b. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Section "Roof Accessories" for curbs.
10. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.
11. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
12. Each equipment support in first paragraph below requires calculation and detail.
13. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
14. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
15. Install lateral bracing with pipe hangers and supports to prevent swaying.
16. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, [NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars

through openings at top of inserts.

17. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
18. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.
19. Insulated Piping: Comply with the following:
    a. Attach clamps and spacers to piping.
        1) Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
        2) Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
        3) Do not exceed pipe stress limits according to ASME B31.9 for building services piping.
    b. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
        1) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
    c. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
        1) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
    d. Shield Dimensions for Pipe: Not less than the following:
        1) NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
        2) NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
        3) NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
        4) NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
        5) NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
    e. Pipes NPS 8 (DN 200) and Larger: Include wood inserts.
    f. Insert Material: Length at least as long as protective shield.
    g. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

N. Adjusting:
    1. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
    2. Trim excess length of continuous-thread hanger and support rods to [1-1/2 inches (40 mm)] [Insert other].

O. Painting:
    1. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 [painting Sections.]
    2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

P. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 220529

SECTION 220553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Warning signs and nameplates

C. Tags.

D. Charts

E. Pipe markers.

F. Ceiling tacks.

1.02 RELATED REQUIREMENTS

A. Section 099123 - Interior Painting: Identification painting.

B. Section 226005 - Medical Air, Gas, and Vacuum Systems: Supply of pipe labels for placement under this section.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials 2017.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for identification.

C. Valve Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number for each piping system to include in maintenance manuals.

D. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

E. Product Data: Provide manufacturers catalog literature for each product required.

F. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

G. Project Record Documents: Record actual locations of tagged valves.

1.05 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Control Panels: Nameplates.

B. Major Control Components: Nameplates.

C. Piping: Tags.

D. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

A. Manufacturers:
   1. Brimar Industries, Inc: www.pipemarker.com.
   2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
   3. Seton Identification Products: www.seton.com.

B. Description: Laminated three-layer plastic with engraved letters.
   1. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
   2. Letter Color: White.
   3. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
   4. Minimum Letter Height: 1/4 inchif viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
   5. Fasteners: Stainless-steel rivets or self-tapping screws.
   6. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
   7. Background Color: Black.
   8. Plastic: Comply with ASTM D709.

C. Nameplate Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Nameplate Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

E. Warning Signs and Namplates to include caution and warning information, plus emrgency notification instructions.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
   2. Brady Corporation: www.bradycorp.com.
   3. Brimar Industries, Inc: www.pipemarker.com.
   4. Craftmark Pipe Markers: www.craftmarkid.com.
   5. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
   6. Seton Identification Products: www.seton.com.

B. Metal Tags: Brass, 0.032-inch (0.8-mm)] minimum thickness, and having predrilled or stamped holes for attachment hardware with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Fasteners: Brass [wire-link or beaded chain; or S-hook]

D. Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

E. Valve Tag Chart:
   1. For each piping system, typewritten on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
      a. Valve-tag schedule shall be included in operation and maintenance data.
      b. Valve-tag schedule(s) shall be mounted in locations to be directed by Owner. Mountings shall be in an anodized aluminum frame with plexi-glass (clear) cover.

2.04 CHARTS

A. Provide valve tag chart indicating valve number, system, type, size, location and function for all valves.

B. Mount in aluminum frame and glass.

C. Letter and number valves and controls to correspond with designations on metal tags.

D. Fasten charts permanently in locations, as directed, with four brass screws.

2.05 PIPE MARKERS

A. Manufacturers:
1. Brady Corporation: www.bradycorp.com.
2. Brimar Industries, Inc: www.pipemarker.com.
3. Craftmark Pipe Markers: www.craftmarkid.com.
4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
5. MIFAB, Inc: www.mifab.com.
6. Seton Identification Products: www.seton.com.

B. Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Pipe Marker Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches (38 mm) high.

F. Color code as follows:
1. Potable, Other Water: Green with white letters.

2.06 CEILING TACKS

A. Manufacturers:
1. Craftmark Pipe Markers: www.craftmarkid.com.
2. Marking Services Inc.
3. Seton Identification Products.

B. Description: Steel with 3/4 inch diameter color coded head.

C. Color code as follows:
1. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
1. Install or permanently fasten nameplates on each major item of plumbing equipment.
2. Locate nameplates where accessible and visible.

B. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule. Install tags with corrosion resistant chain.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings, omit intermediately spaced labels.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Use tags on piping 3/4 inch diameter and smaller.
1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.
3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 220553

SECTION 220719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.
B. Flexible removable and reusable blanket insulation.
C. Jackets and accessories.
D. Insulating cements.
E. Adhesives.
F. Sealants.
G. Tapes.
H. Securements.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 099113 - Exterior Painting: Painting insulation jacket.
C. Section 099123 - Interior Painting: Painting insulation jacket.
D. Section 221005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
D. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019, with Editorial Revision (2023).
E. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2019).
F. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement 2007 (Reapproved 2019).
G. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
H. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation 2017 (Reapproved 2023).
I. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.
J. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2022a.
K. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
L. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing 2022.
M. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2023).
N. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service 2022.

O. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber 2020.

P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

Q. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

R. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).

S. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).

T. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials, thickness and jackets (both factory and field applied, if any) for each service, and locations.

C. Samples: Submit two samples of any representative size illustrating each insulation and jacket type, if requested.

D. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

E. Shop Drawings:
1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing and heat maintenance tape inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.

F. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

G. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

H. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years of experience.

C. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness, ASTM standard designation, type and grade, and maximum use temperature.

1.07 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

1.08 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements for piping insulation application and for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing and heat maintenance ta.

1.09 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Insulation thickness requirements specified in Part 3 schedule articles are based on the conductivity range and mean rating temperatures as given in ASHRAE 90.1. Insulating materials with conductivity outside the given range for the applicable fluid temperature shall have specified thickness adjusted in accordance with note a of the applicable table.

C. Products shall not contain asbestos, lead, formaldehyde, mercury, or mercury compounds.

D. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

E. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

F. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

2.03 GLASS FIBER

A. Manufacturers:
1. CertainTeed Corporation: www.certainteed.com.
2. Johns Manville Corporation: www.jm.com.
3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com.
4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: www.ocbuildingspec.com.
5. Owens Corning Corporation; VaporWick Pipe Insulation: www.ocbuildingspec.com.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.

1. K Value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 850 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible, with wicking material to transport condensed water to the outside of the system for evaporation to the atmosphere.
1. K Value: ASTM C177, 0.23 at 75 degrees F.
2. Maximum Service Temperature: 220 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

D. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
1. K Value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 650 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

E. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

F. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

G. Vapor Barrier Lap Adhesive: Compatible with insulation.
1. Manufacturers:
a. Childers Products, Division of ITW; CP-82.
b. Foster Products Corporation, H. B. Fuller Company; 85-20.
c. ITW TACC, Division of Illinois Tool Works; S-90/80.
d. Marathon Industries, Inc.; 225.
e. Mon-Eco Industries, Inc.; 22-25

H. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
1. Manufacturers:
a. Insulco, Division of MFS, Inc.; Triple I.
b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.

I. Fibrous Glass Fabric:
1. Cloth: Untreated; 9 oz/sq yd weight.
2. Blanket: 1.0 lb/cu ft density.
3. Weave: 5 by 5.

J. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd weight.
2. Vinyl emulsion type acrylic, compatible with insulation, black color.

K. Insulating Cement: ASTM C449.
1. Manufacturers:
a. Insulco, Division of MFS, Inc.; Triple I.
b. P. K. Insulation Mfg. Co., Inc.; Super-Stik

2.04 FLEXIBLE ELASTOMERIC CELLULAR FOAM INSULATION

A. Manufacturers:
1. Aeroflex USA, Inc; Aerocel Stay-Seal with Protape (SSPT): www.aeroflexusa.com.
2. Armacell LLC; AP Armaflex: www.armacell.us.
3. K-Flex USA LLC; Insul-Tube: www.kflexusa.com.

B. Insulation: Preformed flexible elastomeric cellular foam insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
1. Minimum Service Temperature: Minus 40 degrees F.
2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

1. Manufacturers:
   a. Aeroflex USA Inc.; Aeroseal.
   b. Armacell LCC; 520 Adhesive.
   c. RBX Corporation; Rubatex Contact Adhesive

2.05 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:
   1. Manufacturer:
      a. Childers Products, Division of ITW; CP-76-8.
      b. Foster Products Corporation, H. B. Fuller Company; 95-44.
      c. Marathon Industries, Inc.; 405.
      d. Mon-Eco Industries, Inc.; 44-05.
      e. Vimasco Corporation; 750.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.
   3. Fire- and water-resistant, flexible, elastomeric sealant.
   4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
   5. Color: Aluminum.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
   1. Manufacturer:
      a. Childers Products, Division of ITW; CP-76.
      b. Insert manufacturer's name; product name or designation.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.
   3. Fire- and water-resistant, flexible, elastomeric sealant.
   4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
   5. Color: White.

2.06 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
   1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
   2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
   3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
   4. PVDC Jacket for Indoor Applications: 4-mil- (0.10-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms (0.013 metric perms) when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.

2.07 FIELD APPLIED JACKETS

A. PVC Plastic.
   1. High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C.
   2. Manufacturers:
      a. Johns Manville Corporation; _____: www.jm.com.
      b. P.I.C. Plastics, Inc.; FG Series.
      c. Proto PVC Corporation; LoSmoke.
      d. Speedline Corporation; SmokeSafe.
   3. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.

4. Covering Adhesive Mastic: Compatible with insulation.
    a. Manufacturers:
        1) Dow Chemical Company (The); 739, Dow Silicone.
        2) Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
        3) P.I.C. Plastics, Inc.; Welding Adhesive.
        4) Red Devil, Inc.; Celulon Ultra Clear.
        5) Speedline Corporation; Speedline Vinyl Adhesive.

B. Metal Jacket:
1. Manufacturers:
    a. Childers Products, Division of ITW; Metal Jacketing Systems.
    b. PABCO Metals Corporation; Surefit.
    c. RPR Products, Inc.; Insul-Mate.

C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
1. Moisture Barrier for Indoor Applications: 1-mil- (0.025-mm-) thick, heat-bonded polyethylene and kraft paper .
2. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
3. Thickness: 0.016 inch sheet.
4. Finish: Smooth.
5. Joining: Longitudinal slip joints and 2 inch laps.
6. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
    a. Same material, finish, and thickness as jacket.
    b. Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
    c. Tee covers.
    d. Flange and union covers.
    e. End caps.
    f. Beveled collars.
    g. Valve covers.
    h. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
7. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
8. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

D. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.
1. Moisture Barrier for Indoor Applications: 1-mil- (0.025-mm-) thick, heat-bonded polyethylene and kraft paper .
2. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
3. Thickness: 0.010 inch.
4. Finish: Smooth.
5. Joining: Longitudinal slip joints and 2 inch laps.
6. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
    a. Same material, finish, and thickness as jacket.
    b. Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
    c. Tee covers.
    d. Flange and union covers.
    e. End caps.
    f. Beveled collars.
    g. Valve covers.
    h. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
7. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

2.08 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Manufacturers:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
b. Compac Corp.; 104 and 105.
c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Manufacturers:
a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
b. Compac Corp.; 110 and 111.
c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
1. Manufacturers:
a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
b. Compac Corp.; 130.
c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
d. Venture Tape; 1506 CW NS.
2. Width: 2 inches (50 mm).
3. Thickness: 6 mils (0.15 mm).
4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

2.09 SECUREMENTS

A. Bands:
1. Manufacturers:
a. Childers Products; Bands.
b. PABCO Metals Corporation; Bands.
c. RPR Products, Inc.; Bands.
2. Wing seals are primarily used for fastening bands together. Closed seals are occasionally used for large, 84-inch- (2130-mm-) diameter applications and where used with springs. Wing seals are reusable; closed seals are not.
3. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch (0.38 mm) thick, [1/2 inch (13 mm)] [3/4 inch (19 mm)] wide with [wing seal] [closed seal] [wing or closed seal].

B. Insulation Pins and Hangers:
1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
a. Manufacturers:

1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.
2) GEMCO; Perforated Base.
3) Midwest Fasteners, Inc.; Spindle.

b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
c. Spindle: Aluminum, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick, aluminumsheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
a. Manufacturers:
1) AGM Industries, Inc.; RC-150.
2) GEMCO; R-150.
3) Midwest Fasteners, Inc.; WA-150.
4) Nelson Stud Welding; Speed Clips.
b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

D. Wire: 0.062-inch (1.6-mm) soft-annealed, stainless steel.
1. See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers. Retain subparagraph and list of manufacturers below. See Division 01 Section "Product Requirements."
2. Manufacturers:
a. C & F Wire.
b. Childers Products.
c. PABCO Metals Corporation.
d. RPR Products, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. Glass fiber insulated pipes conveying fluids below ambient temperature:
1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

H. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

I. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.

K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

3.03 PREPARATION:

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

B. Install insulation with longitudinal seams at top and bottom of horizontal runs.

C. Install multiple layers of insulation with longitudinal and end seams staggered.

D. Keep insulation materials dry during application and finishing.

E. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

F. Install insulation with least number of joints practical.

G. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

H. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

I. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches (50 mm)] [4 inches (100 mm)] o.c.
      a. For below ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
   5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

J. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

K. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

L. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

M. For above ambient services, do not install insulation to the following:
   1. Vibration-control devices.
   2. Testing agency labels and stamps.
   3. Nameplates and data plates.
   4. Manholes.
   5. Handholes.
   6. Cleanouts.

3.05 PENETRATIONS:

A. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.

3.06 GENERAL PIPE INSULATION INSTALLATION:

A. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
   1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
   2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
   3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
   4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
   5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter,

whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

B. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

C. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.07 FLEXIBLE ELASTOMETRIC INSULATION INSTALLATION:

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install mitered sections of pipe insulation.

2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.08 GLASS-FIBER INSULATION INSTALLATION:

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.09 FIELD-APPLIED JACKET INSTALLATION:

A. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

B. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with

weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.10 FINISHES:

A. Pipe Insulation with ASJ, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
   1. Flat Acrylic Finish: Twofinish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
      a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.11 SCHEDULES

A. Interior Plumbing Systems - refer to Pipe Insulation Schedule on drawings.

B. Other Systems:
   1. Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):
      a. Pipe Size Range: All sizes.
      b. Flexible Elastomeric: 1 inch (25 mm) thick.
   2. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet (3 m) of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):
      a. Pipe Size Range: All sizes.
      b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.

C. INDOOR, FIELD-APPLIED JACKET SCHEDULE
   1. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
   2. Piping, Exposed:
      a. PVC: 20 mils (0.5 mm) thick.

END OF SECTION 220719

SECTION 221005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Sanitary waste and vent.
   3. Domestic water.
   4. Storm water.
   5. Compressed Air
   6. Vacuum
   7. Flanges, unions, and couplings.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 083100 - Access Doors and Panels.

C. Section 099113 - Exterior Painting.

D. Section 099123 - Interior Painting.

E. Section 22 1006 - Plumbing Piping Specialties

F. Section 220516 - Expansion Fittings and Loops for Plumbing Piping.

G. Section 22 0523 - General Duty Valves for Plumbing Piping

H. Section 220553 - Identification for Plumbing Piping and Equipment.

I. Section 220719 - Plumbing Piping Insulation.

J. Section 330110.58 - Disinfection of Water Utility Piping Systems.

1.03 REFERENCE STANDARDS

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.

B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.

C. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250 2021.

D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.

E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.

F. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV 2021.

G. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes 2018.

H. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV 2022.

I. ASME B31.9 - Building Services Piping 2020.

J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.

K. ASSE 1003 - Water Pressure Reducing Valves for Potable Water Distribution Systems 2023.

L. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).

M. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

N. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings 2021.

O. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

P. ASTM B32 - Standard Specification for Solder Metal 2020.

Q. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes 2020.

R. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes 2020.

S. ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed 2019.

T. ASTM B75/B75M - Standard Specification for Seamless Copper Tube 2020.

U. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.

V. ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes 2017.

W. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV) 2020.

X. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.

Y. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.

Z. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings 2020a.

AA. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers 1992 (Reapproved 2022).

BB. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.

CC. AWWA C606 - Grooved and Shouldered Joints 2022.

DD. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).

EE. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications 2021.

FF. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications 2020.

GG. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

HH. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

II. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Welders' Certificates: Submit certification of welders' compliance with ASME BPVC-IX.

D. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.

E. Sustainable Design Documentation: For soldered copper joints, submit installer's certification that the specified installation method and materials were used.

F. Sustainable Design Documentation: For products meeting regulatory lead-content restrictions.

G. Project Record Documents: Record actual locations of valves.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Valve Repacking Kits: One for each type and size of valve.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY WASTE AND VENT PIPING, ABOVE GRADE

A. Piping and Fititing Manufacturers
   1. Tyler Pipe Industries
   2. Charlotte Pipe & Foundry Company
   3. AB&I Foundry

B. Pipe Joints Manufacturers
   1. Husky 4000
   2. Clamp-All Hi Torq125
   3. Mifab MI- X HUB

C. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets.

D. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

E. Copper Tube: ASTM B306, DWV.
   1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, sovent.
   2. Joints: ASTM B32, alloy Sn50 solder.

F. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, using one of the following joint types:
   1. Flanged Joints: ASME B16.1 cast iron fittings.
   2. Threaded Joints: ASME B16.4 cast iron fittings.
   3. Threaded Joints: ASME B16.3 malleable iron fittings.
   4. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

2.03 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.
   3. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze.

2.04 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74 service weight.

1. Fittings: Cast iron.
2. Joint Seals: ASTM C564 neoprene gaskets.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
1. Fittings: Cast iron.
2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Copper Tube: ASTM B306, DWV.
1. Fittings: ASME B16.23, cast copper, or ASME B16.29, wrought copper.
2. Joints: ASTM B32, alloy Sn50 solder.

2.05 COMPRESSED AIR, VACUUM

A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A).
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Joints: ASTM B32, alloy Sn95 solder.

2.06 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:
1. Ferrous Pipe: Class 150 malleable iron threaded unions.
2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 1 Inch:
1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
1. Dimensions and Testing: In accordance with AWWA C606.
2. Housing Material: Provide ASTM A47/A47M malleable iron, ductile iron, or _____, galvanized.
3. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
4. Gasket Material: Nitrile rubber suitable for operating temperature range from minus 20 degrees F to 180 degrees F.
5. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
7. Manufacturers:
a. Apollo Valves; _____: www.apollovalves.com.
b. Grinnell Products; _____: www.grinnell.com.

D. No-Hub Couplings:
1. Gasket Material: Neoprene complying with ASTM C564.
2. Band Material: Stainless steel.
3. Eyelet Material: Stainless steel.
4. Manufacturers:
a. Husky 4000.
b. Clamp All Hi Torq 125.

2.07 TRANSITION FITTINGS

A. General Requirements:
1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
   a. Standard: AWWA C219.
   b. Center-Sleeve Material: Manufacturer's standard
   c. Gasket Material: Natural or synthetic rubber.
   d. Pressure Rating: 200 psig (1380 kPa) minimum.
   e. Metal Component Finish: Corrosion-resistant coating or material.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dresser, Inc.; Dresser Piping Specialties.
   b. Ford Meter Box Company, Inc. (The).
   c. Romac Industries, Inc.
   d. Smith-Blair, Inc; a Sensus company.
   e. Viking Johnson; c/o Mueller Co.

2.08 DIELECTRIC FITTINGS:

A. Assembly of copper alloy and ferrous; threaded, solder, or plain end types; and matching piping system materials.

B. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C). Include insulating material that isolates dissimilar metals and ends with inside threads according to ASME B1.20.1.

C. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure to suit system pressures.

D. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
   1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure to suit system pressures.

E. Dielectric Couplings: Galvanized-steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

F. Dielectric Nipples: Electroplated steel nipples with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types, and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.09 PIPING SPECIALTIES

A. Water Flow Controls for Hot Water Circulation Balancing:
   1. Manufacturers:

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 220516.

G. Install fittings for changes in direction and branch connections.

H. Install nipples, unions, special fittings and valves with pressure ratings same or higheer than the system pressure.

I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, valve and coordinate with other services occupying that space.

J. Install piping to permit valve servicing.

K. Install piping adjacent to equipment and specialties to allow service and maintenance.

L. Install pressure reducing valves downstream of shutoff valves.

M. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

N. Do not use flanges or unions for underground piping.

O. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

P. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
   1. See Section 220719.

Q. Provide access where valves and fittings are not exposed.
   1. Coordinate size and location of access doors with Section 083100.

R. Install copper tube and fittings according to CDA's "Copper Tube Handbook."

S. Install vent piping penetrating roofed areas to maintain integrity of roof assembly..

T. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.

U. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
   1. See Section 099123 for painting of interior plumbing systems and components.
   2. See Section 099113 for painting of exterior plumbing systems and components.

V. Install bell and spigot pipe with bell end upstream.

W. Install water piping to ASME B31.9.

X. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

Y. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

Z. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
   1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 2-1/2 (DN 65) and smaller; 1 percent downward in direction of flow for piping NPS 3 (DN 80) and larger.
   2. Vent Piping: Grade down toward vertical fixture vent or toward vent stack.
   3. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction

AA. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

BB. Install water control valves with inlet and outlet shutoff valves and bypass with globe valve. Install pressure gages on inlet and outlet.

CC. Install balancing valves in locations where they can easily be adjusted.

DD. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve.

3.03 FIELD QUALITY CONTROL OF SANITARY AND WASTE PIPING, ABOVE GRADE

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
   1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
   1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
   2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
   4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
   5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
   6. Prepare reports for tests and required corrective action.

3.04 FIELD QUALITY CONTROL FOR COMPRESSED AIR, CARBON DIOXIDE, NITROGEN,VACUUM AND OXYGEN PIPING

A. Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry nitrogen to pressure of 50psig above system operating pessure, but not less than 150 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.

B. Repair leaks and retest until no leaks exist.

3.05 JOINT CONSTRUCTION

A. Make pipe joints according to the following:
   1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

2. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
3. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   a. Apply appropriate tape or thread compound to external pipe threads.
   b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
4. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
5. Welded Joints:
   a. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
   b. Bevel plain ends of steel pipe.
   c. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
6. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
7. Copper-Tubing Grooved Joints: Roll groove end of tube. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for roll-grooved joints.
8. Steel-Piping Grooved Joints: Rollgroove end of pipe. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
9. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
10. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
11. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
12. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
13. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 22 Section "Common Work Results for Plumbing" for joining piping of dissimilar metals.

3.06 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Provide flow controls in water recirculating systems where indicated.

F. Install thermal activated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for calibrated balancing valves.

3.07 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. NPS 1-1/2 (DN 40) and Smaller: Fitting-type coupling.
2. NPS 2 (DN 50) and Larger: Sleeve-type coupling.

3.08 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric couplings.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flange kits.

D. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.

3.09 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch (10 mm) vertically of location indicated

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.10 FIELD QUALITY CONTROL OF DOMESTIC WATER PIPING

A. Perform tests and inspections.

B. Piping Inspections:
   1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
      b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
   3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:
   1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   4. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, but not less than 150 psig (345 kPa), without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
   6. Prepare reports for tests and for corrective action required.

D. See Division 01 Section "Quality Requirements" for retesting and reinspecting requirements. See Division 01 Section "Execution" for requirements for correcting the Work.

E. Domestic water piping will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.11 ADJUSTING OF DOMESTIC WATER PIPING

A. Perform the following adjustments before operation:
   1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
   a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
   b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.12 DISINFECTION OF FACILITY AND DOMESTIC WATER PIPING SYSTEM

A. Purge new piping and parts of existing piping that have been altered, extended, or repaired.

B. Use purge and disinfection procedures prescribed by authorities having jurisdiction.

C. Disinfect water distribution system in accordance with Section 330110.58.

D. Prior to starting work, verify system is complete, flushed, and clean.

E. Flush facility water distribution system in accordance with NFPA 24.

F. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

G. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.

H. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

I. Maintain disinfectant in system for 24 hours.

J. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

K. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

L. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.13 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches to 1-1/4 inches:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inches to 2 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inches to 3 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.
      d. Pipe Size: 4 inches to 6 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 5/8 inch.

B. Refer to Piping Schedule on drawings for material selection.

END OF SECTION 221005

SECTION 221006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Drains.
B. Cleanouts.
C. Drain Valves
D. Vacuum breakers.
E. Air vents.
F. Trap primers.
G. Backflow preventers.
H. Water hammer arrestors.
I. Mixing valves.

1.02 RELATED REQUIREMENTS

A. Section 221005 - Plumbing Piping.
B. Section 223000 - Plumbing Equipment.
C. Section 224000 - Plumbing Fixtures.
D. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor and Trench Drains 2019.
B. ASME A112.6.4 - Roof, Deck, and Balcony Drains 2022.
C. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers 2023.
D. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent 2021.
E. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies 2021.
F. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance 2011 (Reaffirmed 2016).
G. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
H. NSF 372 - Drinking Water System Components - Lead Content 2022.
I. PDI-WH 201 - Water Hammer Arresters 2017.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
D. Certificates: Certify that grease interceptors meet or exceed specified requirements.
E. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
F. Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.
G. Manufacturer's Qualification Statement.
H. Operation Data: Indicate frequency of treatment required for interceptors.
I. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

J. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, _____.

K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Loose Keys for Outside Hose Bibbs: One.
3. Extra Hose End Vacuum Breakers for Hose Bibbs: One.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

B. A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
2. Josam Company: www.josam.com.
3. Zurn Industries, LLC: www.zurn.com.
4. Watts
5. MIFAB
6. Wade

B. Linear Drains:
1. Body: Provide PVC, ABS, or stainless-steel with sloped channel to vertical waste pipe.
2. Clamping Ring: Stainless steel mechanism to clamp waterproof membrane to linear drain body.
3. Strainer: Removable brushed stainless steel or tile top strainer furnished by manufacturer or others.
4. Additional Components: Manufacturer's standard membrane, sealant, fasteners, and anchors.

C. Floor Drains:
1. Manufacturers:
a. Jay R. Smith Manufacturing Company; _____: www.jrsmith.com.
b. Jay R. Smith Manufacturing Company; _____: www.jrsmith.com.
c. MIFAB, Inc; _____: www.mifab.com.
d. Josam Company; _____: www.josam.com.
e. Zurn Industries, LLC; _____: www.zurn.com.
f. Watts
g. MIFAB
h. Wade

2.03 CLEANOUTS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
2. Josam Company: www.josam.com.
3. MIFAB, Inc: www.mifab.com.
4. Zurn Industries, LLC: www.zurn.com.

B. Cleanouts at Interior Finished Floor Areas (CO-3):

1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

2.04 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:
   1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
   2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
   3. Size: NPS 3/4 (DN 20).
   4. Body: Copper alloy.
   5. Ball: Chrome-plated brass.
   6. Seats and Seals: Replaceable.
   7. Handle: Vinyl-covered steel.
   8. Inlet: Threaded or solder joint.
   9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.05 AIR VENTS

A. Bolted-Construction Automatic Air Vents :
   1. Body: Bronze.
   2. Pressure Rating: 125-psig (860-kPa) minimum pressure rating at 140 deg F (60 deg C).
   3. Float: Replaceable, corrosion-resistant metal.
   4. Mechanism and Seat: Stainless steel.
   5. Size:: [NPS 3/8 (DN 10)] [NPS 1/2 (DN 15)] minimum inlet.
   6. Inlet and Vent Outlet End Connections: Threaded.

B. Welded-Construction Automatic Air Vents:
   1. Body: Stainless steel.
   2. Pressure Rating: 150-psig (1035-kPa) minimum pressure rating.
   3. Float: Replaceable, corrosion-resistant metal.
   4. Mechanism and Seat: Stainless steel.
   5. Size: NPS 3/8 (DN 10) minimum inlet.
   6. Inlet and Vent Outlet End Connections: Threaded.

2.06 BACKFLOW PREVENTERS

A. Manufacturers:
   1. Apollo Valves; _____: www.apollovalves.com.
   2. MIFAB, Inc; _____: www.mifab.com.
   3. Watts Regulator Company, a part of Watts Water Technologies; _____: www.wattsregulator.com.
   4. Zurn Industries, LLC; _____: www.zurn.com.
   5. Febco.
   6. Conbraco

B. Reduced Pressure Zone Assemblies:
   1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

C. Beverage-Dispensing-Equipment Backflow Preventers:
   1. Manufacturers:
      a. Conbraco Industries, Inc.
      b. Watts Industries, Inc.; Water Products Div.
      c. Zurn Plumbing Products Group; Wilkins Div.
   2. Standard: ASSE 1022.
   3. Operation: Continuous-pressure applications.

4. Size: NPS 1/4 or NPS 3/8 (DN 8 or DN 10).
5. Body: Stainless steel.
6. End Connections: Threaded.

2.07 TRAP-SEAL PRIMER VALVES

A. Supply-Type, Trap-Seal Primer Valves:
1. Manufacturers:
   a. MIFAB, Inc.
   b. PPP Inc.
   c. Sioux Chief Manufacturing Company, Inc.
   d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   e. Watts Industries, Inc.; Water Products Div.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig (860 kPa) minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.08 WATER HAMMER ARRESTORS

A. Manufacturers:
1. Cash Acme, a brand of Reliance Worldwide Corporation: www.cashacme.com.
2. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
3. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com.
4. Zurn Industries, LLC: www.zurn.com.
5. Sioux Chief
6. Precision Plumbing Products

B. Water Hammer Arrestors:
1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

2.09 MIXING VALVES

A. Water-Temperature Limiting Devices :
1. Manufacturers:
   a. Armstrong International, Inc.
   b. Cash Acme.
   c. Conbraco Industries, Inc.
   d. Honeywell Water Controls.
   e. Legend Valve.
   f. Leonard Valve Company.
   g. Powers; a Watts Industries Co.
   h. Symmons Industries, Inc.
   i. Taco, Inc.
   j. Watts Industries, Inc.; Water Products Div.
   k. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig (860 kPa).
4. Type: Thermostatically controlled water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Union inlets and outlet.
7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Valve Finish:: Rough bronze.

B. Primary, Thermostatic, Water Mixing Valves :
   1. Manufacturers:
      a. Armstrong International, Inc.
      b. Lawler Manufacturing Company, Inc.
      c. Leonard Valve Company.
      d. Powers; a Watts Industries Co.
      e. Symmons Industries, Inc.
   2. Standard: ASSE 1017.
   3. Pressure Rating: 125 psig (860 kPa).
   4. Type: Cabinet-type], thermostatically controlled water mixing valve.
   5. Material: Bronze body with corrosion-resistant interior components.
   6. Connections: Threaded inlets and outlet.
   7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
   8. Valve Pressure Rating: 125 psig (860 kPa) minimum, unless otherwise indicated.
   9. Valve Finish: Selected by Architect.
   10. Piping Finish: Selected by Architect.
   11. Cabinet: Factory-fabricated, stainless steel, for recessed mounting and with hinged, stainless-steel door.

2.10 AIR VENTS

A. Manufacturers:
   1. Cash Acme, a brand of Reliance Worldwide Corporation: www.cashacme.com.
   2. ITT Bell & Gossett: www.bellgossett.com.
   3. Taco, Inc: www.taco-hvac.com.

B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Type:
   1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install floor cleanouts at elevation to accommodate finished floor.

E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.

F. Pipe relief from backflow preventer to nearest drain.

G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to all quick closing valves.

H. Install backflow preventers in each water supply that may be sources of contamination. Comply with authorities having jurisdiction.
   1. Locate backflow preventers in same room as connected equipment or system.
   2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or

under backflow preventer. Simple air breaks are not acceptable for this application.

3. Do not install bypass piping around backflow preventers.

I. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
   1. Install thermometers and water regulators if specified.
   2. Install cabinet-type units recessed in or surface mounted on wall as specified.

J. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve.

K. Install outlet boxes recessed in wall. Install 2-by-4-inch (38-by-89-mm) fire-retardant-treated-wood blocking wall reinforcement between studs. Fire-retardant-treated-wood blocking is specified in Division 06 Section "Rough Carpentry."

L. Install water hammer arresters in water piping according to PDI-WH 201.

M. Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.

N. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

O. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

END OF SECTION 221006

SECTION 223000
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

RELATED REQUIREMENTS

A. Section 220547-Vibration Controls for Plumbing Piping and Equipment.

B. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.02 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).

B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings 2014 (Reaffirmed 2020).

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

D. NEMA MG 1 - Motors and Generators 2021.

E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittals procedures.

B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity, power requirements.
   3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
   4. Provide electrical characteristics, short circuit ratings and connection requirements.
      a. Include short circuit study to support AIC ratings.

C. Project Record Documents: Record actual locations of components.

D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Certifications:
   1. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

C. ASME Compliance:
   1. Where ASME-code construction is indicated, fabricate and label commercial water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 01.
   2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

D. Field Quality Control:
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
   2. Perform the following field tests and inspections and prepare test reports:
      a. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.

b. Operational Test: After electrical circuitry has been energized, confirm proper operation.
c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related electrical work to achieve operating system.

END OF SECTION 223000

SECTION 224000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water closets.
B. Lavatories.
C. Sinks.
D. Commercial Sinks
E. Service sinks.
F. Mop sinks.
G. Under-lavatory pipe supply covers.
H. Showers.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Owner-furnished fixtures.
B. Section 079200 - Joint Sealants: Sealing joints between fixtures and walls and floors.
C. Section 123600 - Countertops: Preparation of counters for sinks and lavatories.
D. Section 221005 - Plumbing Piping.
E. Section 221006 - Plumbing Piping Specialties.
F. Section 223000 - Plumbing Equipment.
G. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
B. ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment 2014.
C. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration 2008 (Reaffirmed 2013).
D. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use 1997 (Reaffirmed 2017).
E. ASME A112.18.1 - Plumbing Supply Fittings 2018, with Errata.
F. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures 2011 (Reaffirmed 2022).
G. ASME A112.19.1 - Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures 2018.
H. ASME A112.19.2 - Ceramic Plumbing Fixtures 2018, with Errata.
I. ASME A112.19.3 - Stainless Steel Plumbing Fixtures 2022.
J. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures 1994 (Reaffirmed 2009).
K. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks 2022.
L. ASSE 1014 - Performance Requirements for Backflow Prevention Devices for Hand-Held Showers 2020.
M. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices 2020.
N. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019, with Editorial Revision (2023).

O. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.

P. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping 2021.

Q. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

R. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).

S. FM (AG) - FM Approval Guide Current Edition.

T. IAPMO Z124 - Plastic Plumbing Fixtures 2022.

U. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

V. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

W. NSF 372 - Drinking Water System Components - Lead Content 2022.

X. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Manufacturer's Instructions: Indicate installation methods and procedures.

D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.08 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 REGULATORY REQUIREMENTS

A. Comply with applicable codes for installation of plumbing systems.

B. Comply with UL (DIR) requirements.

C. Perform work in accordance with local health department regulations.

2.03 FLUSH VALVE WATER CLOSETS

A. Refer To Contract Drawings For Fixture Schedule

B. Water Closets: Vitreous china, ASME A112.19.2, wall hung, siphon jet flush action, china bolt caps.
   1. Bowl: ASME A112.19.2; 16.5 inches high with elongated rim.
   2. Color: as selected.
   3. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com.
      b. Kohler Company: www.kohler.com.
      c. Sloan
      d. Toto USA, Inc.
      e. Zurn Industries, Inc: www.zurn.com.

C. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Sensor-Operated Type: Solenoid or motor-driven operator, low voltage hard-wired, infrared sensor with mechanical over-ride or over-ride push button.
   2. Concealed Type: Rough brass, exposed parts chrome plated, wall escutcheon, wheel handle stop.
   3. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
   4. Metering Type: Easily accessible adjustment nut.
   5. Manufacturers:
      a. Delany Products: www.delanyproducts.com.
      b. Kohler
      c. Sloan Valve Company: www.sloanvalve.com.
      d. Zurn Industries, Inc: www.zurn.com.

D. Seats:
   1. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com.
      b. Bemis Manufacturing Company: www.bemismfg.com.
      c. Church Seat Company: www.churchseats.com.
      d. Olsonite: www.olsonite.com.
      e. Zurn Industries, Inc: www.zurn.com.
      f. Kohler.
   2. Solid black plastic, open front, extended back, self-sustaining hinge, brass bolts, with cover.

E. Water Closet Carriers:
   1. Manufacturers:
      a. Jay R. Smith MFG. Co: www.jrsmith.com.
      b. JOSAM Company: www.josam.com.
      c. Zurn Industries, Inc: www.zurn.com.
      d. Wade.
      e. Mifab
   2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.04 LAVATORIES

A. Refer To Contract Drawings For Fixture Schedule

B. Lavatory Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com.
   2. DXV by American Standard, Inc: www.dxv.com.
   3. Gerber Plumbing Fixtures LLC: www.gerberonline.com.
   4. Kohler Company: www.kohler.com.
   5. Zurn Industries, Inc: www.zurn.com.

C. Vitreous China Wall Hung Basin: ASME A112.19.2; vitreous china wall hung lavatory, ___ by ___ inch minimum, with 4 inch high back, rectangular basin with splash lip, front overflow, and

soap depression.
1. Drilling Centers: 4 inch.
2. Drilling Centers: 8 inch.

D. Vitreous China Counter Top Basin: ASME A112.19.2; vitreous china self-rimming counter top lavatory, _____ with drillings on 4 inch centers, front overflow, soap depression, seal of putty, calking, or concealed vinyl gasket.

E. Vitreous China Under-Mount Basin: ASME A112.19.2; vitreous china under-mount lavatory, front overflow, mounting kit and template by manufacturer.

F. Lavatory Wrist Control
1. ASME A112.19.2, wall mounted, 20 inches (510 mm) long by 18 inches (460 mm) wide, vitreous china, slab type.
2. Provide with combination faucets with 4 inch (100 mm) wrist control handles, gooseneck spout with aerator, open drain with perforated strainer, angle stops, and 1-1/4 inch (32 mm) cast brass adjustable P-trap with tailpiece.

G. Supply Faucet Manufacturers:
1. Chicago Faucets
2. Delta Faucet Company
3. Grohe America, Inc: www.grohe.com/us.
4. Kohler Company: www.kohler.com.
5. Moen, Inc. Works, Inc.
6. Rohl LLC.
7. Speakman Company
8. T&S Brass & Bronze
9. Zurn Industries, Inc: www.zurn.com.
10. Just Manufacturing Co.

H. Sensor Operated Faucet: Cast brass, chrome plated, wall mounted with sensor located on neck of spout.
1. Spout Style: Standard.
2. Mixing Valve: None, single line for tempered water.
3. Water Supply: 3/8 inch compression connections.
4. Finish: Polished chrome.
5. Accessory: 4 inch deck plate.
6. Lead Content: Extra low; maximum 0.25 percent by weighed average.
7. Sensor Operated Faucet Manufacturers:
   a. American Standard, Inc: www.americanstandard-us.com.
   b. The Chicago Faucet Company: www.chicagofaucets.com.
   c. Powers Controls: www.powerscontrols.com.
   d. Sloan Valve Company: www.sloanvalve.com.
   e. Toto USA: www.totousa.com.
   f. Watts: www.watts.com.
   g. Zurn Industries, Inc; AquaSense Z6913: www.zurn.com.

I. Thermostatic Mixing Valve: Thermostatic mixing valve, ASSE 1070 listed, with combination stop, strainer, and check valves, and flexible stainless steel connectors.
1. Manufacturers:
   a. Acorn Engineering Company: www.acorneng.com.

2.05 SINKS

A. Refer To Contract Drawings For Fixture Schedule

B. Sink Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com.
2. Kohler Company: www.kohler.com.
3. Elkay.

C. Sink Faucet Manufacturers
   1. American Standard, Inc.
   2. Chicago Faucets
   3. Delta Faucet Company
   4. Elkay Manufacturing Co.
   5. Kohler Co.
   6. Moen, Inc.
   7. Symmons Industries, Inc.
   8. T&S Brass and Bronze Works, Inc.
   9. Zurn Plumbing Products Group

2.06 UNDER-LAVATORY PIPE SUPPLY COVERS

A. Refer To Contract Drawings For Fixture Schedule

B. Manufacturers:
   1. Plumberex Specialty Products, Inc: www.plumberex.com.
   2. Truebro.
   3. Proflo.

C. General:
   1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
   2. Adhesives, sewing threads and two ply laminated materials are prohibited.
   3. Exterior Surfaces: Smooth nonabsorbent with no finger recessed indentations for easy cleaning.
   4. Construction: 1/8 inch PVC with antimicrobial, antifungal and UV resistant properties.
      a. Provide one piece injected molded design with internal bridge at top of J-bend to prevent separating.
      b. Comply with ASTM E84 for flame and smoke development.
      c. Comply with ASTM C1822 Type III for covers on accessible lavatory piping.
      d. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
      e. Comply with ICC A117.1.
      f. Thermal Resistance: R value of 0.504 or lower when tested by ASTM C177.
      g. Thermal Conductivity: K value of 0.358 or density of 21.61 pcf per ASTM C518.
      h. Microbial and Fungal Resistance for Interior and Exterior: Comply with ASTM G21.
   5. Color: High gloss white.
   6. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

2.07 BATHTUBS AND SHOWERS

A. Refer To Contract Drawings For Fixture Schedule

B. Bath and Shower Trim: ASME A112.18.1; concealed shower and over rim supply with diverter spout, indexed handles, bent shower arm with adjustable spray ball joint showerhead with maximum 2.5 gallons per minute flow and escutcheon, lever operated pop-up waste and overflow.

C. Bath and Shower Trim: ASME A112.18.1; concealed shower and over rim supply with diverter spout, pressure balanced mixing valve, bent shower arm with adjustable spray ball joint showerhead with maximum 2.5 gallons per minute flow and escutcheon, lever operated pop-up waste and overflow.

D. Thermostatic Mixing Valve: Thermostatic mixing valve, ASSE 1070 listed. Provide with combination stop, strainer, and check valves, and flexible stainless steel connectors.
   1. Manufacturers:
      a. Acorn Engineering Company: www.acorneng.com.
      b. Cash Acme, a brand of Reliance Worldwide Corporation: www.cashacme.com.

2.08 SHOWER RECEPTORS

A. Refer To Contract Drawings For Fixture Schedule

B. Drain Trim: Removable chrome plated strainer and tail piece.

2.09 SHOWERS

A. Refer To Contract Drawings For Fixture Schedule

B. Shower Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com.
   2. DXV by American Standard, Inc; _____: www.dxv.com.
   3. Kohler Company: www.kohler.com.

C. Cabinet: ASME A112.19.4M; porcelain enamelled steel, 32 by 32 by 75 inches with stone texture receptor, soap dish, removable chrome plated strainer, tail piece, _____ color.

D. Cabinet: IAPMO Z124 reinforced glass fiber, 32 by 32 by 75 inches with stone texture, integral receptor, soap dish, integral seat, removable chrome plated strainer, tail piece, _____ color.

E. Trim: ASME A112.18.1; concealed shower supply with indexed handles, bent shower arm with adjustable spray ball joint showerhead with maximum 2.5 gallons per minute flow, and escutcheon.

F. Trim: ASME A112.18.1; concealed straight way pattern valve with indexed cross handle.

G. Trim: ASME A112.18.1; concealed rough brass metering valve with closed fluid metering system adjustable from 5 to 120 seconds, chrome plated push button and escutcheon, wheel handle stop.

H. Trim: ASME A112.18.1; concealed shower supply with pressure balanced mixing valves, integral service stops, bent shower arm with adjustable spray ball joint shower head with maximum flow, and escutcheon.

I. Shower Valve:
   1. Comply with ASME A112.18.1.
   2. Provide two handle in wall diverter valve body with integral thermostatic mixing valve to supply 1.5 gpm.
   3. Shower Valve Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com.
      b. DXV by American Standard, Inc: www.dxv.com.
      c. Kohler
      d. T&S Brass

J. Wall Mounted Shower Valve:
   1. Comply with ASME A112.18.1.
   2. Provide two handle in wall diverter valve body with integral thermostatic mixing valve to supply 1.5 gpm.
   3. Shower Valve Manufacturers:
      a. Acorn Engineering Company; _____: www.acorneng.com.

2.10 MOP SINKS

A. Refer To Contract Drawings For Fixture Schedule

B. Mop Sink Manufacturers:
   1. Acorn Engineering Company; _____: www.acorneng.com.
   2. Zurn Industries, Inc; _____: www.zurn.com.
   3. Florestone.

C. Dimensions: As indicated on drawings.

D. Accessories:

E. Terrazzo Mop Sink Manufacturers:
   1. Acorn Engineering Company; _____: www.acorneng.com.
   2. Zurn Industries, Inc; _____: www.zurn.com.

3. Fiat.

F. Material: Precast terrazzo composed of marble chips cast in Portland cement.

G. Tiling Flange Construction: Galvanized steel.

H. Grid strainer: Stainless steel; integral; removable.

I. Dimensions: As indicated on drawings.

2.11 SINK, SERVICE,DISPOSAL,FLUSHING RIM

A. Refer To Contract Drawings For Fixture Schedule

B. Manufacturers
1. American Standard
2. Kohler

C. Vitreous china pedestal type, 20 by 20 inches (510 by 510 mm), with flushing rim and siphon jet flushing action.

D. Provide 1-1/2 inch top inlet spud and a minimum rim to floor height of 18 inches, with stainless steel rim guards on front and both sides, and elongated open-front seat.

E. Provide ANSI large diaphragm (not less than 2.625 inches upper chamber inside diameter at the point where the diaphragm is sealed between the upper and lower chambers), nonhold open flush valve of chrome plated copper alloy, including vacuum breaker and angle (control-stop) valve with back check.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

F. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
1. Exception: Use ball, gate or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General Duty Valves for Plumbing Piping."

G. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment.

H. Install toilet seats on water closets.

I. Install trap-seal liquid in dry urinals.

J. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep pattern escutcheons if required to conceal protruding fittings.

K. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew resistant silicone sealant. Match sealant colors to fixture color.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

B. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.07 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Do not permit use of fixtures by construction personnel.

C. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 224000

SECTION 226005
MEDICAL AIR, GAS, AND VACUUM SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Medical oxygen gas system.

B. Medical compressed air system.

C. Medical vacuum system.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

C. Section 220553 - Identification for Plumbing Piping and Equipment.

1.03 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.

B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.

C. ASME B40.100 - Pressure Gauges and Gauge Attachments 2022.

D. ASTM B32 - Standard Specification for Solder Metal 2020.

E. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.

F. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.

G. ASTM B819 - Standard Specification for Seamless Copper Tube for Medical Gas Systems 2019.

H. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.

I. CGA V-5 - Standard for Diameter Index Safety System (Noninterchangeable Low Pressure Connections for Medical Gas Applications) 2019.

J. NFPA 99 - Health Care Facilities Code 2021, with Amendment.

K. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers literature and illustrations for all components indicating size, electrical requirements, short circuit ratings, dimensions and configuration.

C. Shop Drawings: Indicate general assembly of components, mounting and installation details, and general layout of control and alarm panels. Submit detailed medical wall assembly drawings.
   1. Include short circuit study to support AIC rating

D. Certificates: Certify that products meet or exceed specified requirements.

E. Independent Testing Agency Reports: Indicate systems are complete, zone valves installed, alarm systems functional, and pressure and cross connections tests performed. Document tests.

F. Manufacturer's Instructions: Indicate installation requirements for equipment and systems.

G. Manufacturer's Field Reports: Indicate systems are complete, zone valves installed, and alarm systems functional.

H. Operation Data: Include installation instructions, assembly views, lubrication instructions, and assembly views.

I. Maintenance Data: Include maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone.

J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

K. Project Record Documents: Record actual locations of piping, valving, and outlets.

L. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Valves: One of each type and size.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 99.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

D. Testing Laboratory: Company specializing in performing testing of the type specified in this section, with minimum _____ years of documented experience.

E. Comply with applicable codes for medical gas systems.

F. Provide certificate of compliance from authorities having jurisdiction, indicating approval of systems.

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept material on site in factory containers and packing. Inspect for damage.

B. Protect from damage and contamination by maintaining factory packaging and caps in place until installation.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for _____.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Amico Corporation: www.amico.com.

B. BeaconMedaes: www.beaconmedaes.com.

2.02 PIPE AND FITTINGS

A. Copper Medical Gas Tube: ASTM B 819, [Type K] [Types K and L] [Type L], seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in green for Type K tube and blue for Type L tube.

B. Oxygen, Compressed Air, Nitrous Oxide, Nitrogen Systems, Aboveground:
1. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn.
2. Copper Tube: ASTM B819, Type K, H58 (drawn general purpose) temper.
3. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper.
4. Joints: AWS A5.8M/A5.8 Classification BCuP-3 or BCuP-4 silver braze.

C. Vacuum and Anesthesia Gas Evacuation Systems, Aboveground:
1. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn.
2. Copper Tube: ASTM B819, Type K, H58 (drawn, general purpose) temper.
3. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper.
4. Joints: AWS A5.8M/A5.8 Classification BCuP-3 or BCuP-4 silver braze or ASTM B32 solder, Grade Sn95.

D. Memory-Metal Couplings: Cryogenic compression fitting made of ASTM F 2063, nickel-titanium, shape-memory-alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Smart Technology, Inc.

2.03 VALVES

A. Factory Preparation for Oxygen Service: Disassemble, clean, degrease, seal, and pack for shipping.

B. Ball Valves:
   1. Manufacturers:
      a. Amico.
      b. Beacon Medaes.
      c. Apollo.
      d. Nibco Inc
      e. Substitutions: See Section 016000 - Product Requirements.

C. Zone Valves:
   1. Manufactures
      a. Amico
      b. Beacon Medaes
   2. Shutoff Valves shall be full-port with three-piece construction, have Teflon seals and be designed for working pressures of 600 psi or 29” Hg vacuum. The valves shall have a blowout proof stem, be cleaned for oxygen service, have a corrosion-resistant bronze body and require only one-quarter turn to completely open or close. All valve assemblies have a total of three 1/8”ports with pipe plugs. One port is used as a provision for connection of a gauge and shall be located on the terminal outlet side of the valve. The second port is used for a DISS connection of a gas sensor. The third port is used for purging during the brazing process and is located upstream of the valve. Optional locking handles are to be available for sizes ½” through 2-1/2”.

D. Zone Valve Boxes:
   1. Manufactures
      a. Amico
      b. Beacon Medaes
   2. Valve Box shall be constructed of extruded or formed aluminum with a ½” plaster flange on all four sides and shall include a 1-½” line pressure monitoring gauge, be available to accommodate one to six valves of various sizes:Valve box shall be labeled for gas identification, and be enclosed with a window displaying the following notice: “CAUTION: Medical Gas Shutoff Valves. Do Not Close Except in Emergency.” The finish frame is constructed of extruded, etched, and anodized aluminum. Concealed mounting screws secure the finish frame to the valve box. The window shall be tinted, shatter resistant, rigid vinyl with pull-ring. Chrome plated valves are not acceptable. Installer shall provide identification for valves in box to identify room name and room numbers. Where valve boxes are located in a rated wall enclosure, the valve box enclosure shall be rated.

2.04 PIPING ACCESSORIES

A. Pressure Gauges:
   1. Manufacturers:
      a. Amico.
      b. Beacon Medaes.
      c. Tri Tech Medical.
   2. ASME B40.100, white dials and black lettering with restrictor.
   3. Oxygen and nitrous oxide systems: Manufactured and labeled expressly for intended service; UL labeled.

B. Vacuum Bottle Brackets: Stainless steel, chrome-plated metal, or aluminum with finish matching adjacent outlet.

C. Piping Identification: Pressure sensitive adhesive tape and decals, color and labeling to comply with Section 220553.

D. OUTLETS
   1. Outlet Units:
      a. Manufacturers:
         1) Amico Corporation; _____: www.amico.com.
         2) BeaconMedaes; _____: www.beaconmedaes.com.
      b. CGA V-5 Diameter-Index Safety System (DISS) non-interchangeable connectors, automatic valves, secondary check valves (except vacuum and evacuation outlets), and capped 3/8 inch tubing stubs for supply connections, color coded and labeled for intended service.
   2. Faceplates:
      a. Flush Outlets: Mount in galvanized steel boxes with stainless steel faceplate with Lexan cover, color coded with embossed labeling.
      b. Surface Outlets: Surface mount with color coded plastic cover and stainless steel faceplate with Lexan cover, color coded with embossed labeling.

E. OXYGEN MANIFOLD
   1. Duplex Automatic Manifold: Consisting of wall mounted control cabinet and necessary header connections and pigtails for _____ cylinders, arranged for _____ cylinders in service and _____ cylinders in reserve.
   2. Delivery: Maximum 220 cfh oxygen continuously at 50 psi. Provide automatic changeover from primary to secondary bank and allow replacing depleted cylinders with no change in line pressure.

F. ALARM SYSTEM
   1. Manufacturers:
      a. Amico Corporation: www.amico.com.
      b. BeaconMedaes: www.beaconmedical.com.
   2. Area Alarm Panels:
      a. Include alarm signals when the following conditions exist:
         1) Oxygen: Pressure drops below 40 psig or rises above 60 psig.
         2) Medical Air: Pressure drops below 40 psig or rises above 60 psig.
         3) Medical Vacuum: Pressure drops to or below 12”Hg.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with NFPA 99.

B. Pre-Installation Cleaning: Disassemble positive pressure gas systems pipe, fittings, valves, and components, except those supplied cleaned and prepared for intended service, and thoroughly wash in hot solution of sodium carbonate or trisodium phosphate mixed 1 lb to 3 gal of water. After washing, rinse with water, dry and cap until installation.

C. Braze joints in pipe and tubing. Avoid leaving excess flux inside of pipe and fittings. During brazing of pipe connections, purge interior of pipe continuously with nitrogen.

D. Effect changes in size with reducing fittings. Make changes in direction of required turns or offsets with fittings or tubing shaped by bending tools. Make bends free of flattening, buckling or thinning of tube wall.

E. Cut pipe and tubing accurately and install without springing or forcing.

F. Install exposed oxygen piping in wall-mounted sheet steel raceways and junction boxes.

G. Provide pipe sleeves where pipes and tubing pass through walls, floors, roofs, and partitions. Finish flush at both ends. Extend 2 inches above finished floors. Pack space between pipe or tubing and sleeve, and calk.

H. Identify piping with tape and decals. Provide piping identification code and schematic for installation under provisions of Section 220553. Install labeling on pipe at intervals of not more than 20 feet and at least once in each room and each story traversed by pipeline.

I. Support gas piping with pipe hooks or hangers suitable for size of pipe, spaced:
   1. 1/2 inch pipe or tubing: 72 inches.
   2. 3/4 inch or one inch pipe or tubing: 96 inches.
   3. 1-1/4 inches or larger (horizontal): 120 inches.
   4. 1-1/4 inches or larger (vertical): Every floor level.

J. Except where indicated or in flush wall mounted cabinets, install manual shut off valves with stem vertical and accessible for operation and maintenance.

3.02 PIPING SYSTEMS CLEANING AND PRESSURE TESTING

A. After erection of pipe and tubing but prior to installation of service outlet valves, blow systems clear of free moisture and foreign matter with nitrogen gas.

B. Install service outlet valves, subject system to test pressure of 150 psi with nitrogen or dry compressed air. Check with soapy water. Provide 24-hour standing pressure test.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Independent testing agency to certify system is complete, zone valves installed, alarm systems functional, and tests performed. Document tests and submit.

C. Reduce pressure in piping systems other than system under investigation to atmospheric.

D. Test system with dry compressed air or dry nitrogen with test pressure in piping system at 50 psi.

E. Check each station outlet of every piping system to determine test gas is dispensed only from outlet of system under investigation. Measure pressure with gauge attached to specific adaptor. Do not use universal adaptors.

F. Disconnect test gas and connect proper gas to each system. Purge entire system to remove test gas. Check with analyzer suitable for gas installed.

END OF SECTION 226005

SECTION 230001
GENERAL PROVISIONS FOR HEATING, VENTILATING, AND AIR CONDITIONING WORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work in this Section includes the providing of labor, materials, equipment and services necessary for a complete and safe installation in accordance with the contract documents and all applicable codes and authorities having jurisdiction for heating, ventilating and air conditioning work covered by all sections within the specifications (including but not limited to HVAC systems and equipment).

B. As a condition of Contractor's use of these specifications, Contractor agrees to: (i) name AKF as additional insured on Contractor's insurance policies wherever permitted, including but not limited to Contractor's General Liability policy, which shall be primary and non-contributory, (ii) provide AKF, upon request, with a certificate of insurance and copies of specific endorsements to Contractor's insurance policies evidencing said additional insured status, and (iii) waive all rights of recovery against AKF by way of subrogation, assignment, or otherwise with regard to insured claims.

C. Where Divisions of Work 01 thru 14 are referenced herein and are not provided elsewhere in the project documents, refer to this section.
   1. For Firestopping, refer to section 23 0300.
   2. For Demonstration and Training refer to section 23 0400.

D. Provide cutting and patching.

E. Provide piping from plumbing terminations, 10 ft from equipment, for water, gas, compressed air and as indicated.

F. Provide drainage from noted equipment to floor drains, roof, sink, or funnel drains.

G. Provide piping connections to equipment, as required, for kitchens, laboratories, laundries, and as indicated.

1.02 SHORT CIRCUIT CURRENT RATING:

A. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
   2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   3. Label equipment utilizing series ratings as required by NFPA 70.

1.03 RELATED WORK AND REQUIREMENTS

A. Requirements of general conditions, supplementary conditions for mechanical and electrical work and Division No. 1.

B. Requirements noted under other Divisions of Work

1.04 WORK NOT INCLUDED:

A. Providing temporary heat.

B. Providing finish painting including pipe stencilling.
   1. Providing access doors and filler.

C. Installing access door and providing filler.
   1. Providing access doors in concrete for access to fuel-oil tanks.

D. Providing trench covers and frames.

E. Providing chimney cleanout door and thimble.

F. Cutting and patching, except as noted in "AIA Document A201" and "Supplementary Conditions for Mechanical and Electrical Work."

G. Excavating and backfilling under building.
H. Excavating and backfilling.
I. Providing louvers in doors.
J. Providing undercut doors.
K. Providing wall louvers and screens.
L. Providing plenums other than sheet metal.
M. Providing flashing.
N. Providing shaft gratings.
O. Providing equipment platforms.
P. Providing pipe heat tracing system.

1.05 DESCRIPTION OF BID DOCUMENTS

A. Specifications, in general, describe quality and character of materials and equipment.
B. Drawings, in general are diagrammatic and indicate sizes, locations, connections to equipment and methods of installation. Provide additional offsets, fittings, hangers, supports, valves, drains as required for construction and coordination with work of other trades.
C. Scaled and indicated dimensions are approximate and are for estimating purposes only. Before proceeding with work, check and verify all dimensions.
D. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.
E. Typical details, where shown on the drawings, apply to each and every item of the project where such items are applicable. Typical details are not repeated in full on the plans, and are diagrammatic only, but with the intention that such details shall be incorporated in full.
F. If any part of Specifications or Drawings appears unclear or contradictory, consult Architect and/or Engineer for interpretation and decision as early as possible during bidding period. Do not proceed with work without the Architect's and/or Engineer's decision.

1.06 DEFINITIONS

A. "Furnish": To supply, deliver, unload, and inspect for damage.
B. "Install": To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
C. "Provide": To furnish and install.
D. "Supply": Same as Furnish.
E. "Work": includes labor, materials, equipment, services, and all related accessories necessary for the proper and complete installation of complete systems.
F. "Piping": includes pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, unions, traps, drains, insulation, and all related accessories.
G. "Wiring": includes raceway, fittings, wire, boxes, and all related accessories.
H. "Concealed": not in view, installed in masonry or other construction, within furred spaces, double partitions, hung ceilings, trenches, crawl spaces, or enclosures.
I. "Exposed": in view, not installed underground or "concealed" as defined above.
J. "Indicated," "shown," or "noted": as indicated, shown or noted on drawings or specifications.
K. "Similar" or "equal": of base bid manufacturer, equal in quality, materials, weight, size, performance, design and efficiency of specified product, conforming with "Base Bid Manufacturers."

L. "Reviewed," "satisfactory," "accepted," or "directed": as reviewed, satisfactory, accepted, or directed by or to Architect and/or Engineer.

M. "Motor Controllers": includes manual or magnetic starters with or without switches, individual pushbuttons or hand-off-automatic (HOA) switches controlling the operation of motors.

N. "Control or Actuating Devices": includes automatic sensing and switching devices such as thermostats, pressure, float, flow, electro-pneumatic switches and electrodes controlling operation of equipment.

O. "Finished Spaces": Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

P. "Exposed, Interior Installations": Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

Q. "Exposed, Exterior Installations": Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

R. "Concealed, Interior Installations": Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

S. "Concealed, Exterior Installations": Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.07 QUALITY ASSURANCE

A. All equipment and accessories shall be the product of manufacturers regularly engaged in their manufacture. All items of a given type shall be the products of the same manufacturer.

B. Furnish all equipment and accessories new and free from defects.

C. All electrical equipment shall be listed by Underwriters' Laboratories, Inc. (UL) or bear UL labels.

D. Supply all equipment and accessories in complete compliance with and in accordance with the applicable standards listed in reference standards of this Section and with all applicable national, state and local codes.

1.08 JOB CONDITIONS

A. Inspection of Site Conditions:
   1. Before starting work, visit the site and examine the conditions under which the work has to be performed. Report in writing any conditions which might adversely affect the work.

B. Connections to existing work:
   1. Install new work and connect to existing work with minimum interference to existing facilities.
   2. Provide temporary shutdown of existing services at no additional charges and only with written consent of Owner. Schedule shutdowns not to interfere with normal operation of existing facilities.
   3. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.
   4. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition.

C. Removal and relocation of existing work.
   1. Disconnect, remove, or relocate HVAC material, equipment, and other work noted and required by alterations, modifications, or changes in existing construction.
   2. Provide new material and equipment required for relocated equipment.
   3. Plug or cap active piping or ductwork behind or below finish.
   4. Dispose of removed HVAC equipment as directed.
   5. Return removed HVAC equipment to Owner as directed.

1.09 REFERENCE STANDARDS

A. Published specifications, standards tests, or recommended methods of trade, industry or governmental organizations apply to work in all Sections as noted below:
   1. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning engineers.
   2. AABC - Associated Air Balance Controls.
   3. AMCA - Air Moving and Conditioning Association.
   4. ADC - Air Diffuser Council.
   5. AWS - American Welding Society.
   6. NEMA - National Electrical Manufacturers' Association.
   7. ANSI - American National Standards Institute.
   8. ASME - American Society of Mechanical Engineers.
   9. ASTM - American Society for Testing and Materials.
   10. NEC - National Electrical Code.
   11. NFPA - National Fire Protection Association.
   12. AHRI - Air-Conditioning, Heating and Refrigeration Institute.
   13. UL - Underwriters' Laboratories, Inc.
   14. OSHA - Occupational Safety and Health Administration Regulations.

1.10 SUBMITTALS

A. Submit shop drawings product data, samples and certificates of compliance required by contract documents.

B. Operating instructions, maintenance manuals and parts lists.
   1. Provide manufacturer's equipment brochures and service manuals consisting of the following:
      a. Descriptive literature for equipment and components.
      b. Model number and performance data.
      c. Installation and operating instructions.
      d. Maintenance and repair instructions.
      e. Recommended spare parts lists.
   2. Assemble manufacturers' equipment manuals in chronological order following the specifications' numbering system using heavy duty three ring binders.
   3. Submit valve tag chart.
   4. Submit field test reports including instrument set points and normal operating valves.

1.11 ELECTRONIC COPIES OF AKF DRAWINGS

A. If the contractor requires (.dwg) format, after preparation the drawings will be forwarded only upon receipt of signed acceptance of terms form. Permission from the architect must first be obtained for AKF to include the architectural background as reference. The contractor is to obtain the architects latest drawings directly from the architect.

B. These files are being issued for the convenience of the contractor and the contractor remains responsible for all contract requirements related to the normal shop drawing preparation process.

1.12 SUBMISSIONS:

A. Provide all coordination drawings, ductwork and piping shop drawings in ‘AutoCad” format, version compatible with owner. All catalog cuts and submittals to be provided in electronic “PDF” format the architect will forward all submissions to the engineer.

B. If paper submissions are to be provided the following shall be adhered to.
   1. Submissions 11 in. X 17 in. or smaller: If the submission is a catalog cut, then the contractor shall submit one original and one copy. Otherwise, they shall submit two copies. The architect will forward the original and one copy (two copies when no original is received) to the engineer. All catalog cuts shall be complete.
   2. Submissions larger than 11 in. X 17 in.: submit two copies to the architect. The architect will forward to the engineer.

C. Indicate on each submission: project name and location, architect and engineer, item identification and approval stamp of prime contractor, subcontractor names and phone numbers, reference to the applicable design drawing or specification article, date and scale.

D. The work described in all shop drawing submission shall be carefully checked for all clearances (including those required for maintenance and servicing), field conditions, maintenance of architectural conditions and proper coordination with all trades on the job.

E. Each submitted shop drawing is to include a certification that all related job conditions have been checked and verified and that there are no conflicts.

F. All shop drawings are to be submitted to allow ample time for checking in advance of field requirements. All submittals to be complete and contain all required and detailed information. Shop drawings with multiple parts shall be submitted as a package.

G. If submittals differ from the contract document requirements, make specific mention of such difference in a letter of transmittal, with request for substitution, together with reasons for same.

1.13 AS-BUILTS AND EQUIPMENT OPERATION INSTRUCTIONS

A. Provide all coordination drawings, ductwork and piping shop drawings in AutoCad format, version compatible with owner. All catalog cuts and submittals to be provided in electronic “PDF” format. The architect will forward all submissions to the engineer.

B. On completion and acceptance of work, this contractor shall furnish written instructions, equipment manuals and demonstrate to the owner the proper operation and maintenance of all equipment and apparatus furnished under this contract.

C. The contractor shall give one copy of the instructions to the owner and one copy to the engineer. .

D. Final “as-built” drawings indicating as installed conditions shall be provided to the architect and engineer after completion of the installation.

1.14 OPERATING & MAINTENANCE INSTRUCTION

A. Prepare operating and maintenance instructions manual including operating instructions, maintenance instructions, manufacturer's data, specific equipment data.

B. Provide an alphabetical list of all system components, with the name, address, and 24-hour phone number of the company responsible for servicing each item during the first year of operation.

C. Provide operating instructions for complete system, including:
1. Normal starting, operating, and shut-down
2. Emergency procedures for fire or failure of major equipment
3. Summer and winter special procedures
4. Day and night special procedures

D. Provide maintenance instructions, including:
1. Valve tag list and equipment tag list
2. Proper lubricants and lubricating instructions for each piece of equipment, and date when lubricated
3. Required cleaning, replacement and/or adjustment schedule

E. Provide manufacturer's data on each piece of equipment, including:
1. Installation instructions.
2. Drawings and specifications.
3. Parts list, including recommended items to be stocked.
4. Complete wiring and temperature control diagrams.
5. Marked or revised prints locating all concealed parts and all variations from the original system design.
6. Test and inspection certificates.

F. Provide specific equipment data including, but not limited to, the following:

1. For Mechanical Systems:
    a. Boilers, heaters and associated equipment.
    b. Refrigeration equipment
    c. Heat rejection equipment
    d. Water treatment
    e. Motors, starters and VFD
    f. Heat exchangers
    g. Air Conditioning equipment
    h. Air Handling equipment
    i. Terminal units
    j. Fans
    k. Pumps.
    l. Valves and strainers.
    m. Piping and accessories.
    n. Ductworkand accessories
    o. Flow measuring devices.
    p. Electric wiring.
    q. Pressure tanks.
2. For Automatic Control System:
    a. Drawings and description of system controlled.
    b. Sequence of operation for each system.
    c. Data on components.
    d. Wiring and piping, schematic any layout, for panels and panelboards.
    e. System operating manual, including set points.

G. Provide instruction of operating personnel.
1. Instruct Owner's operating personnel in proper starting sequences, operation, shutdown, and maintenance procedures, including normal and emergency procedures.
2. Instruction to be by personnel skilled in operation of equipment. Instructions for major equipment to be by equipment manufacturers' representatives.
3. Make arrangements to give instructions by system and not by building areas.
4. Provide five (5) instruction sessions not to exceed six (6) hours each.
5. Instructions on automatic controls to be by manufacturer's representative.

1.15 CLEARANCE FROM ELECTRICAL EQUIPMENT

A. Piping and ductwork is prohibited in electric and telephone rooms and closets, elevator machine rooms, and for installations over or within 5 ft of transformers, substations, switchboards, motor control centers, standby power plants, and motors.

B. Branch piping to equipment is acceptable when installed over or within 5 ft of motors.

1.16 STAIRWAYS

A. Piping and equipment is prohibited in egress stairways.

1.17 DRIP PANS

A. Provide drip pans under piping when installation over or within 5 ft of electrical apparatus is unavoidable or in rooms containing electrical equipment. Pan shall be reinforced, properly supported and made watertight. Provide enclosed type for pressure piping. Extend 1-1/4 in. drain pipe from pan to spill over nearest floor drain or as indicated.
    1. Construction shall be 18 gauge galvanized sheet steel.

1.18 PRODUCT, DELIVERY, HANDLING AND STORAGE

A. Ship materials and equipment in crated sections of sizes to permit passing through available space, where required

B. Deliver equipment with protective crating and shrink-wrapped covering.

C. Receive and accept materials and equipment at the site, properly handle, house, and protect them from damage and the weather until installation. Replace equipment damaged in the course of handling without additional charge.

D. Store to prevent damage and protect from weather, dirt, fumes, water, and construction debris in clean dry space

E. Arrange for and provide storage space or area at the job site for all materials and equipment to be received and/or installed in this project

F. All exposed openings of equipment, piping and ductwork are to be covered

G. Handle according to manufacturer's written rigging and installation instructions for unloading, transporting, and setting in final location

H. Protect units from physical damage. Leave factory shipping covers in place until installation

1.19 TEMPORARY HEAT

A. Temporary heat will be provided under General Construction Work.

1.20 ACCESSIBILITY

A. Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made without written approval.

B. Group concealed valves, expansion joints, controls, dampers, and equipment requiring access, so as to be freely accessible through access doors.

1.21 SPECIAL TOOLS

A. Provide one set of any special tools required to operate, adjust, dismantle or repair equipment furnished under this Division for the Owner's use at the completion of the work.

B. Provide one pressure grease gun with adapters for each type of grease required.

C. Provide one suitable tool case for special tools.

1.22 CUTTING AND PATCHING

A. Provide all carpentry, cutting and patching required for proper installation of materials and equipment specified. Do not cut or drill structural members without review by Architect and Structural Engineer.

1.23 PROTECTION OF MATERIALS

A. Protect from damage, water, dust, etc., materials, equipment and apparatus provided under this trade, both in storage and installed

1.24 SUBSTITUTIONS

A. No substitute material or manufacturer of equipment shall be permitted without a formal written submittal to the engineer which includes all dimensional, performance and material specifications and is approved in writing by the engineer. Any changes in layout or design brought about by the use of a substitution shall be submitted to the engineer fully designed for review in conjunction with the submittal of the alternate. Any substitution must be submitted with an explanation why a substitution is being utilized. If the substitute is being utilized for financial reasons, the associated credit must be simultaneously submitted. Final acceptance or rejection of any substitution is subject to the owner's review.

B. Contractor to be responsible for the additional cost relating to the substitution, including but not limited to space requirements, structural support, utilities including electrical power, gas, water, etc.

1.25 STANDARDS:

A. If any item in the specification, as furnished by the contractor, is manufactured in a location which does not certify ASME/ANSI standards, the contractor is to pay the Owner for ALL expenses incurred by the Owner for an outside testing company to confirm such compliance.

1.26 COORDINATION

A. Arrange for pipe spaces, duct spaces, space for equipment, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces.

D. Do not install piping, ductwork or other materials in locations that block access to items and equipment requiring access or removal including items of other trades.

E. Provide coordination drawing for all areas of the work. The drawings shall have the following qualities:
   1. Minimum 3/8” scale
   2. Clearly show all the work for each trade including, but not limited to hangers, valves, dampers, actuators, access doors and service access requirements for all items.
   3. Indicate bottom elevations of all ductwork, electrical conduit, raceways, cable trays, control wiring and piping.
   4. Ductwork, piping, and conduit 3 inches and smaller may be shown in single line.
   5. Ductwork, piping, and conduit greater than 3 inches shall be shown in double line.
   6. Color scheme:
      a. Architectural and structural background: Light grey.
      b. Ductwork: Black.
      c. Equipment and pads: Purple.
      d. HVAC piping and equipment: Green.
      e. Electrical conduits and equipment: Blue.
      f. Plumbing: Orange.
      g. Fire protection: Red.
      h. Control wiring: Pink.

1.27 GUARANTEE

A. The Contractor shall furnish a written guarantee to replace or repair promptly and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within one year form the date of final certificate for payment and/or from date or actual use of equipment or occupancy of spaces by Owner included under the various parts of work, whichever date is earlier. This work shall be done as directed by the Owner. This guarantee shall also provide that where defects occur, the Contractor will assume responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by the Contractor.

1.28 PERMITS AND FEES

A. The Contractor shall give necessary notice, file drawings and specifications with the department having jurisdiction, obtain permits or licenses necessary to carry out this work and pay all fees therefore. The Contractor shall arrange for inspection and test of any or all parts of the work if so required by authorities and pay all charges for same. The Contractor shall pay all costs for, furnish to the Owner before final billing, all certificates necessary as evidence that the work installed conforms with all regulations where they apply to this work.

B. This contractor shall prepare or hire the necessary consultants to prepare and file all plans, calculation, forms, etc.. required for filing with all agencies required for this work including but not limited to The DEP (Department of Environmental Protection), DEC (Department of Environmental Conservation, Bureau of Air Resources, EPA Environmental protection Agency, FDNY, etc..

1.29 SERVICE AND WARRANTY (MAINTENANCE CONTRACT)

A. This contract shall provide a full year service and warranty of all mechanical components and systems, with add alternate prices for years 2, 3 and 4 following this first year. At the time of

acceptance of project, the tenant or owner's representative will decide to accept which alternate, if any.

1.30 RIGGING

A. This contractor shall provide all required rigging, hoisting and bracing to install the equipment as indicated on the plans. This work shall be performed by an insured certified licensed rigging company that is experienced in rigging equipment of the type indicated for the areas shown on the construction documents. This contractor shall submit rigging plans for approval prior to proceeding with the work.

B. All permits required from the authorities and agencies involved to perform the rigging are the responsibilities of this contractor.

C. All structural supports, modifications or additions are to be submitted to the structural engineer for approval prior to proceeding with the work. All supplemental structural supports, elevator charges /modifications, bracing and protection required for the rig is the responsibility of this contractor

D. The rigging contractor shall hire and pay for all charges and services of the building elevator contractor for the rigging of the equipment

1.31 DRAIN DOWN FOR NEW PIPING CONNECTION INTO EXISTING:

A. Contractor to obtain schedule and coordinate with building management for system drain down and connection into existing building piping. All costs associated with drain down are to be included as part of bid.

1.32 FIELD QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

H. See individual specification sections for testing and inspection required.

I. Replace Work or portions of the Work not complying with specified requirements.

J. Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

PART 2 PRODUCTS

2.01 BASE BID MANUFACTURERS

A. Base bid on materials or equipment are specified by name of manufacturer, brand or trade name and catalog reference.

B. The choice will be optional with bidder where two or more manufacturers are named.

C. The following are base bid manufacturers for items under this Section:
   1. Access doors: Karp Associates, Inc., Higgins Mfg. Co., Milcor Steel Co., and Walsh-Spencer Co.
   2. Paint: Sherwin-Williams, Pittsburgh Plate Glass Co., Pratt and Lambert, and Rust-Oleum.

3. Gratings: Irving Grating IKG Industries and Ryerson - Inland Steel Co.

2.02 ACCESS DOORS

A. This contractor shall submit to the architect for approval a plan indicating the size (minimum 24 in. x 24 in. where personnel access is required) and location of all access doors required for operation, maintenance and replacement of all concealed equipment, devices, valves, dampers and controls. Contractor shall arrange for furnishing and installation of all access doors in finished construction and include costs in the bid.

B. Access doors shall be provided sufficiently large forreplacement of all equipment located in inaccessible walls and ceilings. Provide custom size, multileaf access panels, without cross bars, maximum 48 in. x 48 in. with piano hinge and safety chains.

C. Access doors will be provided under General Construction Work.

D. Supply access doors for all concealed HVAC items in inaccessible walls and ceilings for complete access, using a with a minimum door size of 18 in. x 18 in. for installation under the General Construction Work. Locating and setting shall be performed after review.

2.03 ACCESS TILE IDENTIFICATION:

A. In removable ceiling tiles, provide buttons, tabs, and markers to identify location of concealed work. Submit for review.

2.04 ACCESS PLATFORMS:

A. Access platforms will be provided under General Construction Work. Provide sizes and locations to the General Contractor.

B. Provide access platforms for equipment, where indicated or required by authorities having jurisdiction, in accordance with OSHA regulations and indicate on shop drawings, details of construction and method of attachment.

C. Provide removable gratings, toeplates, and guard rails suitable for a minimum 100 pounds per sq ft floor loading.

D. Provide supports riveted or welded structural steel cross-braced on four sides and welded to baseplates for anchor bolting to concrete piers.

E. Gratings shall be similar to:
1. Steel: Irving "x-bar."
2. Aluminum: Irving "x-bar."
3. Fiberglass: Ryerson Duradek I-5000.

2.05 EQUIPMENT PLATFORMS

A. Equipment platforms will be provided under General Construction Work.

B. Provide equipment platforms, where indicated or required by authorities having jurisdiction, in accordance with OSHA regulations and as indicated. On shop drawings, show details of construction and method of attachment. Submit for review.

C. Equipment platform shall be supported from overhead construction. Platform shall be riveted or welded structural steel frame with intermediate framing and clip angles to receive suspension rods. Corners shall be reinforced with gusset plates. Baseplates shall be minimum 10 USSG steel plate riveted or welded to channel iron frame. Where overhead construction does not permit fastening of rods, provide additional steel members framed to span structural steel. Submit for review.

D. Equipment platform shall be supported from floor. Platform shall be riveted or welded structural steel frame with intermediate framing. Corners shall be reinforced with gusset plates. Baseplate shall be minimum 10 USSG steel plate riveted or welded to frame. Supports shall be riveted or welded structural steel, crossbraced on four (4) sides and welded to baseplate for anchor bolting to concrete piers. Submit for review.

E. Fasten vibration isolation bases as noted. Submit for review.

F. Submit shop drawings with details of construction and method of attachment.

2.06 LADDERS

A. Ladders will be provided under General Construction Work.

B. Provide 18 in. wide properly supported, galvanized structural steel ladders designed in accordance with OSHA regulations with 2-1/2 in. x 2-1/2 in. side rails and 3/4 in. diameter rungs installed 12 in. on center.

2.07 SHAFT GRATINGS

A. Shaft gratings will be provided under General Construction Work.

B. Provide shaft gratings suitable for minimum of 100 pounds per sq ft floor loading.

C. Support on structural steel members and indicate on shop drawings, details of construction and method of attachment.

2.08 GUARD RAILINGS

A. Guards and railings will be provided under General Construction Work.

B. Provide guards and railings as indicated and/or as required by OSHA and authorities having jurisdiction.

C. Provide removable type guards with clearances for motor adjustments, for belt driven and rotating equipment, with No. 18 USSG steel frames and No. 20 USSG galvanized perforated steel fronts with covered test openings to permit rpm readings without removal. Provide galvanized steel angle or channel supports braced to maintain clearances of moving parts.

D. Provide removable type railings constructed of 1-1/4 in. pipe and rail fittings.

PART 3 - EXECUTION

3.01 MECHANICAL IDENTIFICATION

A. Refer to identification Section 23 0553.

3.02 WATERPROOFING

A. Waterproofing will be provided under General Construction Work.

B. Where any work pierces waterproofing, installation shall be subject to review, provide all necessary sleeves, caulking, flashing and flashing fittings required to make openings absolutely watertight.

C. Flashing:
1. Provide Copper: ASTM B370, cold rolled 16 oz/sq ft (24 gage) (0.0216 inch) (0.55 mm) thick; natural finish.
2. Provide Pre-Finished Aluminum: ASTM B209 (ASTM B209M)[<>]; 20 gage, (0.032 inch) (0.81 mm) thick; plain finish shop pre-coated with modified silicone coating. Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.

3.03 FIELD QUALITY CONTROL

A. Perform tests as noted, and in the presence of Architect and/or Engineer and authorities having jurisdiction.

B. Provide required labor, material, equipment, and connections necessary for tests and submit results for review.

C. Repair or replace defective work and pay for restoring or replacing damaged work due to tests, as directed.

3.04 START-UP

A. Properly lubricate all pieces of equipment.

B. Check and clean all pipes and ducts of dirt and debris.

C. Fill and vent all water systems.

D. Check rotation on each motor.

E. Prepare each piece of equipment in accordance with manufacturer's installation instructions and have a copy at the equipment.

F. Have representatives of each manufacturer present when hereinafter specified, so that equipment will be started up by manufacturer.

3.05 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.

B. Clean and repair painted exposed work, soiled or damaged, to match adjoining work before final acceptance.

C. Remove debris from inside and outside of material and equipment.

3.06 PROJECT CLOSEOUT PROCEDURES

A. It shall be each contractor's responsibility to personally hand-deliver all of the required project closeout checklist items and to obtain Owner's authorized representative(s) signed receipt on all items requiring Owner sign-off.

B. Review requirements of each section of the specifications and submit for approval to Architect the sign-off forms which shall become the project closeout checklist. These, at a minimum, shall include the following information shown in attached Project Closeout Checklist Example. The Architect and/or Owner may incorporate additional specific items to the following checklist which shall become part of the project requirements.

C. Closeout Checklist Example:

	DATES		
ITEM	**COMPLETED**	**RECEIVED BY OWNER**	**OWNER'S SIGNOFF**
PERMITS			
CITY AND COUNTY INSPECTION			
MANUFACTURER'S WARRANTIES			
CONTRACTOR'S WARRANTIES			
STATE FIRE RATING DATA			
COPY OF FINAL SHOP DRAWINGS			
LIST AND POSSESSION OF SPARE PARTS			
PRESSURE TESTS			
EQUIPMENT TESTS REQUIRED BY SPECS			
O & M MANUALS			
RECORD DOCUMENTS			
COORDINATION DRAWINGS			
SANITIZATION REPORTS			
COMMISSIONING REPORTS/LETTERS/FORMS			
ON-SITE TRAINING COMPLETE			
PROTECTIVE DEVICE			

SETTINGS			
VALVE TAGS AND CHARTS			
FINAL ATC INSTALLATION DRAWINGS			
INSURANCE UNDERWRITERS APPROVALS			
FINAL PUNCH LIST (INITIALED BY CONTRACTOR THAT ITEMS ARE COMPLETE)			
BUILDING CERTIFICATE OF OCCUPANCY (C.O.)			
24-HOUR PHONE NO. FOR SERVICE DURING GUARANTEE PERIOD			

END OF SECTION 230001

SECTION 230400
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.

B. Section 019113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.

C. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Architect for transmittal to Owner.
   2. Submit to Commissioning Authority for review and inclusion in overall training plan.
   3. Submit not less than four weeks prior to start of training.
   4. Revise and resubmit until acceptable.
   5. Provide an overall schedule showing all training sessions.
   6. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Training Reports:
   1. Identification of each training session, date, time, and duration.

2. Sign-in sheet showing names and job titles of attendees.
3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
4. Include Commissioning Authority's formal acceptance of training session.

E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
1. Format: DVD Disc.
2. Label each disc and container with session identification and date.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.
2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

B. Conduct training on-site unless otherwise indicated.

C. Owner will provide classroom and seating at no cost to Contractor.

D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

E. Provide training in minimum two hour segments.

F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
1. The location of the O&M manuals and procedures for use and preservation; backup copies.

2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
3. Typical uses of the O&M manuals.

I. Product- and System-Specific Training:
1. Review the applicable O&M manuals.
2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION 230400

SECTION 230500
COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Escutcheons, grout and connections for Mechanical systems.

B. Concrete bases.

C. HVAC Demolition

1.02 RELATED REQUIREMENTS

A. Section 017419 - Construction Waste Management and Disposal

1.03 REFERENCE STANDARDS

A. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.

B. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes 2023.

C. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers catalogue information.

C. Shop Drawings: Indicate materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary end caps and closures on ductwork, piping and fittings. Maintain in place until installation.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 ESCUTCHEONS

A. Material:
   1. Fabricate from nonferrous metal.
   2. Chrome-plated.
   3. Metals and Finish: Comply with ASME A112.18.1.

B. Construction:
   1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
   2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.02 GROUT

A. General Purpose Description: ASTM C1107/C1107M, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
   1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 14,000/19000-psi, 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

B. Pump Mounting: High flow, high strength epoxy machine-based grout: ASTM C881/C881M, CRD-C 590.

1. Characteristics: Two to Three-component, highly flowable, epoxy-based grout that produces high performance strength plus chemical inertness and excellent bonding properties.
2. Design Mix: ASTM C579, 14,000 / 19,000 psi , 36 hours @72 degree F compressive strength.
3. Packaging: Factory packaged for field mixing.
4. Products: Chocfast by ITW Philadelphia resins, ESCOWELD or approved equal.

PART 3 EXECUTION

3.01 ESCUTCHEONS:

A. Install and firmly attach escutcheons at piping penetrations into finished spaces.

B. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.

C. Attach plates at the underside only of suspended ceilings.

D. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.

E. Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

F. Existing Piping: Split-platewith exposed-rivet hinge and spring clips.

G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.02 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
   1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
   2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
   3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
   4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   5. Install anchor bolts to elevations required for proper attachment to supported equipment.
   6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
   7. Use 3000-psi 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section.

3.03 GROUTING

A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.04 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

C. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.05 HVAC DEMOLITION

A. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
   3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
   4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
   5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
   6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

C. SPECIFIC DEMOLITION SCOPE OF WORK
   1. This contractor shall visit the site and adjoining areas and examine the existing conditions to become familiar with them and to determine the difficulties which will affect the execution of the work of this contract. This contractor shall perform this prior to the submission of his proposal. Submission of a proposal will be construed as evidence that such an examination has been made and later claims will not be recognized for extra labor, equipment or materials required because of difficulties encountered which could have been foreseen had such an examination been made.
   2. The demolition work shall include, providing all materials, all necessary extensions, connections, cutting, repairing, adapting and other mechanical work required, together with any required temporary connections to maintain service pending the completion of the permanent work. Notes and graphic representation shall not limit the extent of demolition required. Extent of demolition work shall be coordinated with the architect and building management.
   3. Existing work interfering with new.
      a. All existing work required to remain but interfering with proposed new mechanical (as well as electrical and general construction work) shall be relocated and reconnected using materials conforming to standards of this contract.
   4. Provide additional support for all existing ducts and piping to remain which are affected by demolition of existing ceiling and partitions.
   5. Equipment required to be turned over to the owner shall be placed in a mutually acceptable location. All materials and equipment removed as a result of demolition shall be taken from the site and disposed of in accordance with applicable laws and environmental regulations.
   6. Contractor shall identify all existing work to remain by acceptable identification means to confirm proper scope prior to commencement of demolition.

END OF SECTION 230500

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

A. See Section 019113 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 019113.

B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.

C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.

D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:
   1. Control system.
   2. Major and minor equipment items.
   3. Piping systems and equipment.
   4. Ductwork and accessories.
   5. Terminal units.
   6. Sound control devices.
   7. Vibration control devices.
   8. Variable frequency drives.
   9. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.

B. Section 230993 - Sequence of Operations for HVAC Controls.

C. Section 230593 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

A. ASHRAE Guideline 1.1 - The HVAC&R Techincal Requirements for the Commissioning Process 2007 (Errata 2012).

1.04 SUBMITTALS

A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.

B. DRAFT Prefunctional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:
   1. System name.
   2. List of devices.
   3. Step-by-step procedures for testing each controller after installation, including:
      a. Process of verifying proper hardware and wiring installation.
      b. Process of downloading programs to local controllers and verifying that they are addressed correctly.
      c. Process of performing operational checks of each controlled component.
      d. Plan and process for calibrating valve and damper actuators and all sensors.
      e. Description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.

4. Copy of proposed log and field checkout sheets to be used to document the process; include space for initial and final read values during calibration of each point and space to specifically indicate when a sensor or controller has “passed” and is operating within the contract parameters.
5. Description of the instrumentation required for testing.
6. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the Commissioning Authority and TAB contractor for this determination.

C. Startup Reports, Prefunctional Checklists, and Trend Logs: Submit for approval of Commissioning Authority.

D. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:
1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
2. Full as-built set of control drawings.
3. Full as-built sequence of operations for each piece of equipment.
4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
    a. Floor.
    b. Room number.
    c. Room name.
    d. Air handler unit ID.
    e. Reference drawing number.
    f. Air terminal unit tag ID.
    g. Heating and/or cooling valve tag ID.
    h. Minimum air flow rate.
    i. Maximum air flow rate.
5. Full print out of all schedules and set points after testing and acceptance of the system.
6. Full as-built print out of software program.
7. Electronic copy on disk of the entire program for this facility.
8. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
10. Control equipment component submittals, parts lists, etc.
11. Warranty requirements.
12. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
    a. Sequences of operation.
    b. Control drawings.
    c. Points lists.
    d. Controller and/or module data.
    e. Thermostats and timers.
    f. Sensors and DP switches.
    g. Valves and valve actuators.
    h. Dampers and damper actuators.
    i. Program setups (software program printouts).

E. Project Record Documents: See Section 017800 for additional requirements.
1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.

2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.

F. Draft Training Plan: In addition to requirements specified in Section 017900, include:
1. Follow the recommendations of ASHRAE Guideline 1.1.
2. Control system manufacturer's recommended training.
3. Demonstration and instruction on function and overrides of any local packaged controls not controlled by the HVAC control system.

G. Training Manuals: See Section 017900 for additional requirements.
1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

PART 3 EXECUTION

3.01 PREPARATION

A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.

B. Furnish additional information requested by the Commissioning Authority.

C. Prepare a preliminary schedule for HVAC pipe and duct system testing, flushing and cleaning, equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.

D. Notify the Commissioning Authority when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and testing, adjusting, and balancing will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.

E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.

F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.

G. Provide temperature and pressure taps in accordance with Contract Documents.

3.02 INSPECTING AND TESTING - GENERAL

A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.

B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.

C. Provide two-way radios for use during the testing.

D. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.

3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

E. Isolation Valve or System Valve Leak Check: For valves not by coils.
1. With full pressure in the system, command valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.

F. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

3.03 TAB COORDINATION

A. TAB: Testing, adjusting, and balancing of HVAC.

B. Coordinate commissioning schedule with TAB schedule.

C. Review the TAB plan to determine the capabilities of the control system toward completing TAB.

D. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.

E. Have all required Prefunctional Checklists, calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.

F. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

3.04 CONTROL SYSTEM FUNCTIONAL TESTING

A. Prefunctional Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the requirements of Contract Documents and the detailed Sequences of Operation documentation submittal.

B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with Contract Documents.

C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.

D. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.
1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to Owner.
2. Perform all trend logging specified in Prefunctional Checklists and Functional Test procedures.

E. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.

F. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.
1. Setpoint changing features and functions.
2. Sensor calibrations.

G. Demonstrate to the Commissioning Authority:
1. That all specified functions and features are set up, debugged and fully operable.

2. That scheduling features are fully functional and setup, including holidays.
3. That all graphic screens and value readouts are completed.
4. Correct date and time setting in central computer.
5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; if any of those fail test all remaining units at no extra cost to Owner.
6. Functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to Owner.
7. Power failure and battery backup and power-up restart functions.
8. Global commands features.
9. Security and access codes.
10. Occupant over-rides (manual, telephone, key, keypad, etc.).
11. O&M schedules and alarms.
12. Occupancy sensors and controls.
13. All control strategies and sequences not tested during controlled equipment testing.

H. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required at no additional cost to Owner.

3.05 OPERATION AND MAINTENANCE MANUALS

A. See Section 017800 for additional requirements.

B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.

C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

END OF SECTION 230800

SECTION 230513
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General construction and requirements.

B. Applications.

C. Single phase electric motors.

D. Three phase electric motors.

E. Electronically Commutated Motors (ECM).

F. Bearing Protection Rings

1.02 RELATED REQUIREMENTS

A. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

B. Section 230514 - Enclosed Controllers.

C. Section 230515 - Variable Frequency Motor Controllers.

1.03 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).

B. ASHRAE Std 90.1 I-P-2019 - Energy Standard for Buildings Except Low-Rise Residential Buildings 2019, with Errata and Addenda (2021).

C. ICC (IECC)-2018 - International Energy Conservation Code 2018.

D. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators 2017.

E. NEMA MG 1 - Motors and Generators 2021.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.

C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.

D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

E. Operation Data: Include instructions for safe operating procedures.

F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture of electric motors for HVAC use, and their accessories, with minimum three years documented product development, testing, and manufacturing experience.

B. Comply with NFPA 70.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 SHORT CIRCUIT CURRENT RATING:

A. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:

1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
3. Label equipment utilizing series ratings as required by NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.08 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer warranty for motors larger than 20 horsepower.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Baldor Electric Company/ABB Group; _____: www.baldor.com.

B. Toshiba

C. Teco-Westinghouse

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Electrical Service:
1. Motors 1/2 HP and Smaller: Volts indicated, single phase, 60 Hz.
2. Motors Larger than 1/2 Horsepower: Volts indicated, three phase, 60 Hz.

B. Nominal full load efficiency for motors shall comply with ASHRAE 90.1 section 10.4.1 and IECC section C405.7

C. NEMA Design A and B general, special and definite purpose motors shall comply with NEMA Premium efficiency standards.

D. Construction:
1. Open drip-proof type except where specifically noted otherwise.
2. Service factor: 1.15.
3. Design for continuous operation in 104 degrees F environment.
4. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
5. Motors with frame sizes 254T and larger: Energy efficient type.
6. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor

E. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

F. Wiring Terminations:
1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

G. For use on AC power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

H. The mechanical contractor is to provide motor, motor controllers and VFD’s. The mechanical contractor to install motor, motor controllers and VFD’s. The Electrical contractor is to wire all motors, motor controllers and VFD’s

I. Coordination:
1. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
a. Motor controllers
b. Variable frequency motor controllers.
c. Torque, speed, and horsepower requirements of the load.
d. Ratings and characteristics of supply circuit and required control sequence.
e. Ambient and environmental conditions of installation location.

2.03 APPLICATIONS

A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.

B. Single phase motors for shaft mounted fans and centrifugal pumps: Split phase type.

C. Single phase motors for fans, pumps, and blowers: Capacitor start type.

D. Single phase motors for fans, blowers, and pumps: Capacitor start, capacitor run type.

E. Motors located in exterior locations, air cooled condensers, and humidifiers: Totally enclosed type.

F. Motors located outdoors: Totally enclosed weatherproof epoxy-sealed type.

2.04 SINGLE PHASE POWER - SPLIT PHASE MOTORS

A. Starting Torque: Less than 150 percent of full load torque.

B. Starting Current: Up to seven times full load current.

C. Breakdown Torque: Approximately 200 percent of full load torque.

D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.

E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

F. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

G. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

A. Starting Torque: Three times full load torque.

B. Starting Current: Less than five times full load current.

C. Pull-up Torque: Up to 350 percent of full load torque.

D. Breakdown Torque: Approximately 250 percent of full load torque.

E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.

F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.

G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

H. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

I. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns

to normal range.

2.06 THREE PHASE POWER - SQUIRREL CAGE MOTORS

A. Starting Torque: Between 1 and 1-1/2 times full load torque.

B. Starting Current: Six times full load current.

C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.

D. Design, Construction, Testing, and Performance: Comply with NEMA MG 1 for Design B motors.

E. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.

F. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

G. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 262913.

H. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.

I. Sound Power Levels: To NEMA MG 1.

J. Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.

K. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.

L. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

M. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

2.07 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
   1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
   2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
   3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
   4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

B. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.08 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A. Manufacturers:
   1. US Motors, a brand of NIDEC Motor Corporation; _____: www.usmotors.com.

B. Multispeed, constant torque, brushless DC motor for use in single phase AC power systems.

C. Integral, programmable microprocessor controls capable of sdjusting speed, torque and power withour efficiency loss. Controller to be PMW type, either manual or DDC controlled, capable of receiving a 0 to 10 volt DC signal..

2.09 BEARING PROTECTION RING

A. VFD induced shaft voltages may also discharge through the bearing in attached equipment included gear boxes, pillow block bearings, break motor bearings, encoders, etc. Provide AEGIS SGR Bearing Protection Ring applied to the motor shaft to discharge induced electrical voltages to ground and prevent voltages from seeking a discharge path through the attached equipment.

B. GENERAL REQUIREMENTS
   1. Provide shaft grounding ring (AEGIA SGR on the AC motor to discharge shaft currents to the ground whenever variable frequency PWM drives are installed to control AC motors.
   2. Bearing ring to be circumferential conductive micro-fiber and maintenance free
   3. Provide vibration baseline readings before and after installation
   4. Installation to be preformed by factory authorized personnel only.
   5. For outdoor installations, a cover should be installed to prevent rust on the shaft. Use Ted Pella fast drying silver paint on motor shaft to help retard rust.
   6. For wash down duty application, high pressure water should not be directed onto the conductive micro fibers. Install o-ring or slinger to AEGIS SGR.
   7. For severe duty environments, install an o-ring or slinger against the AEGIS SGR to prevent ingress of excess grease or particles.
   8. Verify RPM/ surface rates with AEGIS engineering.
   9. Maximum temperature rating 300F/150C – Verify application specific temperatures with AEGIS engineering.
   10. Minimum temperature rating -40 degrees F/C – Verify application specific temperatures with AEGIS engineering.
   11. Humidity rating - 0-90% - Verify application specific acceptable humidity with AEGIS engineering
   12. Shaft preparation - Motor shaft must be clean and bear metal to ensure electrical contact of motor shaft to conductive micro fibers.
   13. Shaft - Shaft motor manufacturer standard shaft finish is suitable for AEGIS shaft grounding ring application. A nominal 130 micron finish or better.
   14. Corrosion Protection - Apply a Fast Drying Silver paint such as Ted Pella #16040-30, on shaft surface to prevent corrosion.
   15. Thread Locking Compound - Do not use Loctite or any other non-conductive material to secure the screws.
   16. Excessive Vibration - Installation bolts should be tightened and lock washers used. In some critical applications it may also be desirable to use a thread locker. In this case you must use a conductive silver epoxy such as Chemtronics Conductive Silver Epoxy CW2400.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION 230513

SECTION 230514
ENCLOSED CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed NEMA controllers for low-voltage (600 V and less) applications:
   1. Magnetic motor starters.
   2. General purpose contactors.
   3. Manual motor starters.
   4. Motor-starting switches without overload protection.

B. Overcurrent protective devices for motor controllers, including overload relays.

C. Control accessories:
   1. Auxiliary contacts.
   2. Pilot devices.
   3. Control and timing relays.
   4. Control power transformers.
   5. Control terminal blocks.

1.02 RELATED REQUIREMENTS

A. Section 230513 - Common Motor Requirements for HVAC Equipment.

B. Section 230515 - Variable-Frequency Motor Controllers.

1.03 REFERENCE STANDARDS

A. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers 2016.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

D. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).

E. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices 2017.

F. NEMA ICS 6 - Industrial Control and Systems: Enclosures 1993 (Reaffirmed 2016).

G. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.

H. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.

I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.

K. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

L. UL 60947-1 - Low-Voltage Switchgear and Controlgear - Part 1: General Rules Current Edition, Including All Revisions.

M. UL 60947-4-1 - Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters Current Edition, Including All Revisions.

1.04 GENERAL REQUIREMENTS

A. The mechanical contractor is to furnish motor, motor controllers and VFD’s. The mechanical contractor to install motor, motor controllers and VFD’s. The Electrical contractor is to wire all motors, motor controllers and VFD's.

B. The mechanical contractor shall be responsible for coordinating all requirements of the motor and controller manufacturer.

C. If this contractor elects to substitute or increase motor horsepower over that specified, the cost of motor, motor controllers and electrical changes shall be borne by this contractor

D. Each motor except as noted, shall be provided with a combination disconnection means and across-the-line magnetic starter with push button stations mounted on cover or variable frequency drive. Coordinate requirements between trades (electrical and mechanical contractors.

E. For automatically or remotely controlled motors, furnish hand off auto (HOA) selector switches in place of the push buttons.

F. Provide manually operated motor starters of the proper size for all motors less than 1/2 hp which are not automatically controlled. Starters for motors 175 watts or less shall consist of a snap switch with thermal overload protection where such protection is not an integral part of the motor.

G. Combination magnetic starters for all motors shall have thermal overload, pilot light, low voltage protection in all three phases. Include a control transformer for each magnetic starter to provide 120 volt control power with 3 sets of spare normally closed or normally open contacts

H. Starters for motors 75 hp and above shall be solid state electronic soft start type starters.

I. Disconnect switches are to be provided by the electrical contractor if not integral with equipment.

J. Provide enclosures for motor controllers suitable for operating environment.

K. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
   2. Coordinate the work to provide motor controllers and associated overload relays suitable for use with the actual motors to be installed.
   3. Coordinate the work to provide controllers and associated wiring suitable for interface with control devices to be installed.
   4. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   5. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   6. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for motor controllers, enclosures, overcurrent protective devices, and other installed components and accessories.
   1. Include characteristic trip curves for each type and rating of overcurrent protective device.

C. Shop Drawings: Indicate dimensions, voltage, controller sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. Include dimensioned plan and elevation views of enclosed controllers and adjacent equipment with all required clearances indicated.
   2. Include wiring diagrams showing all factory and field connections.
   3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
   4. Include documentation of listed series ratings.
   5. Include documentation demonstrating selective coordination.
   6. Include short circuit study to support AIC ratings.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection,

examination, preparation, and installation of product.

E. Field Quality Control Test Reports.

F. Project Record Documents: Record actual installed locations of controllers and final equipment settings.
   1. Include nameplate data of actual installed motors and associated overload relay selections and settings.Demostrate that selection of heaters suit actual motor nameplate full-load currents. For adjustable overload relays, demostrate that dip switch settings for motor running overload protection suit actual motor to be protected.
   2. Motor Circuit Protectors: Include magnetic instantaneous trip settings.

G. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Electronic Trip Circuit Breakers: Provide one portable test set.
   3. Indicating Lights: Two of each different type.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain field conditions within required service conditions during and after installation.

B. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
   1. Notify Construction Manager no fewer than twodays in advance of proposed interruption of electrical service.
   2. Do not proceed with interruption of electrical service without Construction Manager's written permission.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation; ____: www.eaton.com.

B. General Electric Company; ____: www.geindustrial.com.

C. Rockwell Automation, Inc; Allen-Bradley Products; ____: ab.rockwellautomation.com.

D. Schneider Electric; Square D Products; ____: www.schneider-electric.us.

E. Siemens Industry, Inc; ____: www.usa.siemens.com.

F. ABB Power Distributio, Inc; ABB Control, Inc. Subsidiary

G. Source Limitations: Furnish enclosed motor controllers and associated components produced by a single manufacturer and obtained from a single supplier.

1. Motor-starting switches without overload protection may be produced by the same manufacturer as the wiring devices used for this project.

2.02 SHORT CIRCUIT CURRENT RATING:

2.03 ENCLOSED CONTROLLERS

A. Provide enclosed controller assemblies consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.

B. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:

C. Provide products listed, classified, and labeled as suitable for the purpose intended.
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.

D. Description: Enclosed controllers complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; ratings, configurations and features as indicated on the drawings.

E. Service Conditions:
   1. Provide controllers and associated components suitable for operation under the following service conditions without derating:
   2. Listed series ratings are {CH#105802}.
   3. Label equipment utilizing series ratings as required by NFPA 70.
      a. Altitude:
         1) Class 1 Km Equipment (devices utilizing power semiconductors, e.g. variable frequency controllers): Less than 3,300 feet.
         2) Class 2 Km Equipment (electromagnetic and manual devices): Less than 6,600 feet.
      b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
   4. Provide controllers and associated components suitable for operation at indicated ratings under the service conditions at the installed location.

F. Short Circuit Current Rating:
   1. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:
      a. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
      b. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
      c. Label equipment utilizing series ratings as required by NFPA 70.

G. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures:
   1. Comply with NEMA ICS 6.
   2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1 or Type 12.
      b. Outdoor Locations: Type 3R or Type 4.
      c. Other Wet or Damp Indoor locations: Type 4
   3. Finish: Manufacturer's standard unless otherwise indicated.

J. Instrument Transformers:
   1. Comply with IEEE C57.13.
   2. Select suitable ratio, burden, and accuracy as required for connected devices.
   3. Current Transformers: Connect secondaries to shorting terminal blocks.

4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

K. Magnetic Motor Starters: Combination type unless otherwise indicated.
1. Combination Magnetic Motor Starters: NEMA ICS 2, Class A combination motor controllers with magnetic contactor(s), externally operable disconnect and overload relay(s).
2. Configuration: Full-voltage non-reversing unless otherwise indicated.
3. Use of non-standard starter sizes smaller than specified standard NEMA sizes is not permitted.
4. Disconnects: Circuit breaker type.
a. Circuit Breakers: Motor circuit protectors (magnetic-only) unless otherwise indicated or required.
b. Provide externally operable handle with means for locking in the OFF position. Provide safety interlock to prevent opening the cover with the disconnect in the ON position with capability of overriding interlock for testing purposes.
c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
5. Overload Relays: Bimetallic thermal type unless otherwise indicated.
6. Pilot Devices Required:
a. Furnish local pilot devices for each unit as specified below unless otherwise indicated on drawings.
b. Single-Speed, Non-Reversing Starters:
1) Pushbuttons: START-STOP.
2) Selector Switches: HAND/OFF/AUTO.
3) Indicating Lights: Red ON, Green OFF.

L. General Purpose Contactors: Combination type unless otherwise indicated.
1. Combination Contactors: NEMA ICS 2, Class A combination controllers with magnetic contactor(s) and externally operable disconnect, but without integral overload relay(s).
2. Configuration: Full-voltage non-reversing unless otherwise indicated.
3. Disconnects: Circuit breaker type.
a. Circuit Breakers: Thermal magnetic unless otherwise indicated or required.
b. Provide externally operable handle with means for locking in the OFF position. Provide safety interlock to prevent opening the cover with the disconnect in the ON position with capability of overriding interlock for testing purposes.
c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
4. Pilot Devices Required:
a. Furnish local pilot devices for each unit as specified below unless otherwise indicated on drawings.
b. Contactors for motor applications where overload protection is provided separately or where motor contains integral thermal protectors to be provided with pilot devices as specified for magnetic motor starters above.

M. Manual Motor Starters:
1. Description: NEMA ICS 2, Class A manually-operated motor controllers with overload relay(s).
2. Configuration: Non-reversing unless otherwise indicated.

N. Motor-Starting Switches: Horsepower-rated switches without overload protection; toggle operator.

2.04 OVERCURRENT PROTECTIVE DEVICES

A. Overload Relays:
1. Provide overload relays and, where applicable, associated current elements/heaters, selected according to actual installed motor nameplate data, in accordance with manufacturer's recommendations and NFPA 70; include consideration for motor service factor and ambient temperature correction, where applicable.

2. Inverse-Time Trip Class Rating: Class 20 unless otherwise indicated or required.
3. Trip-free operation.
4. Visible trip indication.
5. Resettable.
   a. Employ manual reset unless otherwise indicated.
   b. Do not employ automatic reset with two-wire control.
6. Bimetallic Thermal Overload Relays:
   a. Interchangeable current elements/heaters.
   b. Adjustable trip; plus/minus 10 percent of nominal, minimum.
   c. Trip test function.
7. Melting Alloy Thermal Overload Relays:
   a. Interchangeable current elements/heaters.
8. Solid-State Overload Relays:
   a. Adjustable full load current.
   b. Phase loss protection.
   c. Phase imbalance protection.
   d. Ambient temperature insensitive.
   e. Thermal memory.
   f. Trip test function.
   g. Provide isolated alarm contact.

B. Fusible Disconnect Switches:
1. Description: Quick-make, quick-break, dead-front fusible switch units complying with NEMA KS 1, and listed and labeled as complying with UL 98; ratings, configurations, and features as indicated on the drawings.
2. Fuse Clips: As required to accept indicated fuses.
3. Provide externally operable handle with means for locking in the OFF position. Provide means for locking switch cover in the closed position. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

C. Circuit Breakers:
1. Interrupting Capacity (not applicable to motor circuit protectors):
   a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.
   b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   c. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.
2. Motor Circuit Protectors:
   a. Description: Instantaneous-trip circuit breakers furnished with magnetic instantaneous tripping elements for short circuit protection, but not with thermal inverse time tripping elements for overload protection; UL 489 recognized only for use as part of a listed combination motor controller with overload protection; ratings, configurations, and features as indicated on the drawings.
   b. Provide field-adjustable magnetic instantaneous trip setting.
   c. Provide the following features and accessories where indicated or where required to complete installation:
      1) Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
      2) Pad-Lock Provision: For locking circuit breaker handle in OFF position.
      3) Auxiliary Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped or been turned off.
      4) Undervoltage Release: For tripping circuit breaker upon predetermined drop in coil voltage with field-adjustable time delay to prevent nuisance tripping.

5) Alarm Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped.

2.05 CONTROL ACCESSORIES

A. Auxiliary Contacts:
   1. Comply with NEMA ICS 5.
   2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each magnetic motor starter, minimum.

B. Pilot Devices:
   1. Comply with NEMA ICS 5; heavy-duty type.
   2. Pushbuttons: Unless otherwise indicated, provide momentary, non-illuminated type with flush button operator; normally open or normally closed as indicated or as required.
   3. Selector Switches: Unless otherwise indicated, provide maintained, non-illuminated type with knob operator; number of switch positions as indicated or as required.
   4. Indicating Lights: Push-to-test type unless otherwise indicated.
   5. Provide LED lamp source for indicating lights and illuminated devices.

C. Control and Timing Relays:
   1. Comply with NEMA ICS 5.
   2. Provide number and type of relays indicated or required to perform necessary functions.

D. Control Power Transformers:
   1. Size to accommodate burden of contactor coil(s) and all connected auxiliary devices, plus ____ VA spare capacity.
   2. Include primary and secondary fuses.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings of enclosed controllers are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed controllers.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install controllers in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment components in accordance with Section 260529.

E. Install enclosed controllers plumb and level.

F. Provide grounding and bonding in accordance with Section 260526.

G. Install all field-installed devices, components, and accessories.

H. Provide fuses complying with Section 262813 for fusible switches as indicated.

I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

J. Set field-adjustable controllers and associated components according to installed motor requirements, in accordance with manufacturer's recommendations and NFPA 70.

K. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed in accordance with Section 260573.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Motor Starters: Perform inspections and tests listed in NETA ATS, Section 7.16.1.1. Tests listed as optional are not required.

D. Fusible Switches: Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

E. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for circuit breakers larger than ____ amperes. Tests listed as optional are not required.

F. Correct deficiencies and replace damaged or defective enclosed controllers or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from controller enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of controllers to Owner, and correct deficiencies or make adjustments as directed.

B. Training: Train Owner's personnel on operation, adjustment, and maintenance of enclosed controllers and associated devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Instructor: Manufacturer's authorized representative.
   3. Location: At project site.

3.07 PROTECTION

A. Protect installed enclosed controllers from subsequent construction operations.

END OF SECTION 230514

SECTION 230515
VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Variable frequency controllers.

1.02 RELATED REQUIREMENTS

A. Section 230513 - Common Motor Requirements for HVAC Equipment.

1.03 REFERENCE STANDARDS

A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable-Speed Drive Systems 2022.

B. NEMA ICS 7 - Industrial Control and Systems: Adjustable-Speed Drives 2020.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.

E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
   1. Include short circuit study to support AIA ratings.

C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

D. Test Reports: Indicate field test and inspection procedures and test results.

E. Compliance to IEEE 519
   1. Harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD).
      a. The VFD manufacturer shall provide calculations, specific to this installation, showing total harmonics voltage distortion is less than 5%. Input line filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519. All VFD’s shall include a minimum of 5% impedance reactors, no exceptions.
      b. No VFD shall be reviewed unless all required calculations are submitted and reviewed as part of the shop drawing submission.

F. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Manufacturer's Field Reports: Indicate start-up inspection findings.

H. Operation Data: NEMA ICS 7.1. Include instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions.

I. Maintenance Data: NEMA ICS 7.1. Include routine preventive maintenance schedule.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Air Filters: Two of each type.

1.05 WORK INCLUDED

A. The mechanical contractor is to furnish motor and variable frequency controllers (VFD's). The mechanical contractor to install motor and VFD's. The Electrical contractor is to wire all motors and VFD's

B. The mechanical contractor shall be responsible for coordinating all requirements of the motor and VFD manufacturer.

C. If this contractor elects to substitute or increase motor horsepower over that specified, the cost of motor, motor controllers and electrical changes shall be borne by this contractor

D. Each motor except as noted, shall be provided with a combination disconnecting means and across-the-line magnetic starter with push button stations mounted on cover or variable frequency drive. Coordinate requirements between trades (electrical and mechanical contractors.

E. For automatically or remotely controlled motors, furnish hand off auto (HOA) selector switches in place of the push buttons.

F. Combination magnetic starters for all motors shall have thermal overload, pilot light, low voltage protection in all three phases. Include a control transformer for each magnetic starter to provide 120 volt control power with 3 sets of spare normally closed or normally open contacts

G. Starters for motors 75 hp and above shall be solid state electronic soft start type starters.

H. Disconnect switches are to be provided by the electrical contractor if not integral with equipment.

I. Provide enclosures for VFD's suitable for operating environment.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary

B. Toshiba International Corporation

C. Yaskawa.

2.02 DESCRIPTION

A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
   1. Employ microprocessor-based inverter logic isolated from power circuits.
   2. Employ pulse-width-modulated inverter system.
   3. Design for ability to operate controller with motor disconnected from output.
   4. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.

B. Twelve (12) Pulse Input Configuration, 25HP to 200HP: The VFD shall be configured with a 12-pulse converter section comprised of two full wave bridge rectifiers, and an integral three-phase-shifting transformers to reduce the harmonic current distortion. The VFD, phase-shifting transformer, and bypass contactors shall be provided in one enclosure. Each 12-pulse VFD shall be furnished with a 3% line reactor and 2.5% D.C. choke to avoid line interference and act as harmonic filters

C. Enclosures, Indoor installation: NEMA 250, Type 1, venitlated suitable for equipment application in places accessible only to qualified personnel.

D. Enclosures, Exterior/Wet environment installation: NEMA 250, Type 4X, in places accessible only to qualified personnel.

E. Short Circuit Current Rating:
   1. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:
      a. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
      b. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
      c. Label equipment utilizing series ratings as required by NFPA 70.

F. Finish: Manufacturer's standard enamel.

2.03 OPERATING REQUIREMENTS

A. Displacement Power Factor: Between 1.0 and 0.96, lagging, over entire range of operating speed and load.

B. Operating Ambient: 0 degrees C to 40 degrees C.

C. Minimum Efficiency at Full Load: 96% percent.

D. Volts Per Hertz Adjustment: Plus or minus 10 percent.

E. Current Limit Adjustment: 60 to 110 percent of rated.

F. Acceleration Rate Adjustment: 0.5 to 30 seconds.

G. Deceleration Rate Adjustment: 1 to 30 seconds.

H. Input Electrical Signal: 4 to 20 mA DC.

I. Overload Capability: 1.1 times the base load current for 60 seconds; 2.0 times the base load current for 3 seconds

J. Minimum Speed: 5 to 25 percent of maximum rpm.

K. Maximum Speed: 80 to 100 percent of maximum rpm.

L. Input transient protection by means of surge suppressors.

M. Under- and overvoltage trips; inverter overtemperature, overload, and overcurrent trips.

N. Motor Overload Relay: Adjustable and capable of NEMA ICS 2, Class 30 performance.

O. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.

P. Instantaneous line-to-line and line-to-ground overcurrent trips.

Q. Loss-of-phase protection.

R. Reverse-phase protection.

S. Short-circuit protection.

T. Motor overtemperature fault.

2.04 CONTROL SIGNAL INTERFACE:

A. Electric Input Signal Interface: A minimum of 2 analog inputs (0 to 10 V or 0/4-20 mA) and 6 programmable digital inputs.

B. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BMS or other control systems:
   1. 0 to 10-V dc.
   2. 0-20 or 4-20 mA.
   3. Potentiometer using up/down digital inputs.
   4. RS485.
   5. Keypad display for local hand operation.

2.05 COMMUNICATIONS

A. Provide an RS485 interface allowing VFD to be used with an external system within a multidrop LAN configuration. Interface shall allow all parameter settings of VFD to be programmed via BMS control. Provide capability for VFD to retain these settings within the nonvolatile memory.

2.06 COMPONENTS

A. Display: Provide integral digital display to indicate output voltage, output frequency, and output current.

B. Status Indicators: Separate indicators for overcurrent, overvoltage, ground fault, overtemperature, and input power ON.

C. Furnish HAND-OFF-AUTOMATIC selector switch and manual speed control.

D. Include under voltage release.

E. Control Power Source: Separate circuit.

F. Door Interlocks: Furnish mechanical means to prevent opening of equipment with power connected, or to disconnect power if door is opened; include means for defeating interlock by qualified persons.

G. Safety Interlocks: Furnish terminals for remote contact to inhibit starting under both manual and automatic mode.

H. Control Interlocks: Furnish terminals for remote contact to allow starting in automatic mode.

I. Manual Bypass: Furnish contactor, motor running overload protection, and short circuit protection for full voltage, non-reversing operation of the motor. Include isolation switch to allow maintenance of inverter during bypass operation.

J. Solid-State, Reduced-Voltage Controller: NEMA ICS 2, suitable for use with NEMA MG 1, Design B, polyphase, medium induction motors for motors 75 horsepower and greater

K. Emergency Stop: Use dynamic brakes for emergency stop function.

L. Disconnecting Means: Include integral fused disconnect switch on the line side of each controller.

M. Provide five eight adjustable set points to lock out operation at frequencies that may provide mechanical resonance.

N. Wiring Terminations: Match conductor materials and sizes indicated.

2.07 ACCESSORIES

A. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

B. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.

C. Control Relays: Auxiliary and adjustable time-delay relays.

D. Standard Displays:
   1. Output frequency (Hz).
   2. Set-point frequency (Hz).
   3. Motor current (amperes).
   4. DC-link voltage (VDC).
   5. Motor torque (percent).

6. Motor speed (rpm).
7. Motor output voltage (V).

2.08 SOURCE QUALITY CONTROL

A. Shop inspect and perform standard productions tests for each controller.

B. Make completed controller available for inspection at manufacturer's factory prior to packaging for shipment. Notify Owner at least 7 days before inspection is allowed.

C. Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify Owner at least 7 days before inspections and tests are scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface is suitable for controller installation.

B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

C. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.

B. Tighten accessible connections and mechanical fasteners after placing controller.

C. Provide fuses in fusible switches; refer to Section 262813 for product requirements.

D. Select and install overload heater elements in motor controllers to match installed motor characteristics.

3.03 FIELD QUALITY CONTROL

A. Provide the service of the manufacturer's field representative to prepare and start controllers.
   1. Service station shall be located within 100 miles of job site and shall be available upon a 24 hour basis.

B. Perform field inspection and testing in accordance with Section 014000.

C. Setup drive set points to lock out operation at frequencies that may provide mechanical resonance.

D. Inspect and test in accordance with NETA ATS, except Section 4.

E. Perform inspections and tests listed in NETA ATS, Section 7.17.

3.04 ADJUSTING

A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.05 CLOSEOUT ACTIVITIES

A. Demonstrate operation of controllers in automatic and manual modes.

3.06 MAINTENANCE

A. See Section 017000 - Execution Requirements, for additional requirements relating to maintenance service.

B. Provide a separate maintenance contract for specified maintenance service.

C. Provide service and maintenance of controllers for one year from Date of Substantial Completion.

END OF SECTION 230515

SECTION 230516
EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Pipe loops, offsets, and swing joints.

B. Alignment guides and anchors.

1.03 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

B. Section 232213 - Steam and Condensate Heating Piping.

C. Section 232300 - Refrigerant Piping.

1.04 REFERENCE STANDARDS

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.

B. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.

C. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded 2021.

D. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service 2022.

E. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Delegated-Design Submittal: For each anchor and alignment guide indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and bends.
2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
3. Alignment Guide Details: Detail field assembly and attachment to building structure.
4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint
5. Coordination:
    a. Coordinate the location of all anchors, guides and expansion devices with the structural engineer.
    b. Submit details for attachment to the building structure to the structural engineer including all loads and supplemental steel.
    c. Coordinate the location of items in this section with access requirements for equipment, valves, dampers, as required for work in other sections, and as indicated on the drawings.
6. Welding certificates.
7. Product Certificates: For each type of pipe expansion joint, signed by product manufacturer.

1.06 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. Steel Shapes and Plates: AWS D1.1, "Structural Welding Code - Steel."

2. Welding to Piping: ASME Boiler and Pressure Vessel Code: Section IX.

B. Engineering Responsibility: Design and preparation of Shop Drawings and calculations for expansion fittings and loops by a qualified professional engineer
   1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of expansion fittings and loops that are similar to those indicated for this Project in material, design, and extent.

PART 2 PRODUCTS

2.01 ACCESSORIES

A. Pipe Alignment Guides:
   1. Manufacturers:
      a. The Metraflex Company; Style IV spider type guide: www.metraflex.com.
      b. Flexicraft Industries; Spider 10 pipe guide.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.

B. Engineered Riser Anchor Clamps:
   1. Manufacturers:
      a. The Metraflex Company; Engineered Riser Anchor Clamp: www.metraflex.com.
   2. Applications:
      a. Provide one clamp to serve as a riser clip.
         1) Verify the total load of filled pipe to be supported will be a safety factor of one less than the maximum loading of the clamp per the manufacturer's instructions.
      b. Provide one clamp above and one clamp below the slab to anchor pipe.
         1) Coordinate with the structural engineer to determine the maximum thrust loading calculated for the slab or floor structure. Use the maximum thrust loading calculations to verify the clamps will be a safety factor of one less than the maximum loading of clamp per the manufacturer's instructions.
   3. Provide two piece, ductile iron in compliance with ASTM A536. Use with metal pipes with an outer diameter of 2.5 inches to 8 inches.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

C. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints where required.

D. Install pipe bends and loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

E. Expansion: Install piping to permit free expansion and contraction without damaging piping or construction.
   1. Provide offsets, expansion loops, anchors, guides and supports to permit expansion, with stress limits of ASME Code for Pressure Piping for temperature range of 40 deg F to minimum of 20 deg F above maximum system temperature.
   2. Steam piping and medium and high temperature water piping shall be cold-sprung.
      a. Piping up to 1-1/2 inch: Cold-sprung 100 percent of expansion.
      b. Piping 2 inch and larger: Cold-sprung 50 percent of expansion.
   3. Attach pipe bends and loops to anchors.

a. Steel Anchors: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
b. Concrete Anchors: Attach by fasteners. Follow fastener manufacturer's written instructions.

4. SWING CONNECTIONS
   a. Connect risers and branch connections to mains with at least [] pipe fittings, including tee in main.
   b. Connect risers and branch connections to terminal units with at least [**four**] pipe fittings, including tee in riser.
   c. Connect mains and branch connections to terminal units with at least [**four**] pipe fittings, including tee in main.
5. ALIGNMENT-GUIDE INSTALLATION
   a. Install guides on piping adjoining pipe expansion fittings and loops.
   b. Attach guides to pipe and secure to building structure.
6. ANCHOR INSTALLATION
   a. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
   b. Fabricate and install steel anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and AWS D1.1.
   c. Construct concrete anchors of poured-in-place concrete of dimensions indicated and include embedded fasteners.
   d. Install pipe anchors according to expansion-joint manufacturer's written instructions if expansion joints or compensators are indicated.
   e. Use grout to form flat bearing surfaces for expansion fittings, guides, and anchors installed on or in concrete.
7. PAINTING
   a. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
      1) Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
      2) Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 230516

SECTION 230517
SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

B. Manufactured sleeve-seal systems.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 230523 - General-Duty Valves for HVAC Piping.

C. Section 230553 - Identification for HVAC Piping and Equipment: Piping identification.

D. Section 230719 - HVAC Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2023a.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified this section.
   1. Minimum three years experience.

C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Manufacturers:
   1. Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com.

B. Vertical Piping:
   1. Sleeve Length: 1 inch above finished floor.
   2. Provide sealant for watertight joint.
   3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
   4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

C. Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

D. Pipe Passing Through Below Grade Exterior Walls:
   1. Zinc coated or cast iron pipe.
   2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

F. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.

G. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
   3. All Rated Openings: Caulked tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Flexicraft Industries; PipeSeal: www.flexicraft.com.
   2. Thunderline Link-seal.
   3. Metraflex Co,.
   4. Calpico Inc.
   5. Advance Products & Systems, Inc.

B. Modular/Mechanical Seal:
   1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
   2. Provide watertight seal between pipe and wall/casing opening.
   3. Elastomer element size and material in accordance with manufacturer's recommendations.
   4. Stainless steel pressure end plates.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Provide sleeves when penetrating floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Aboveground Piping:
      a. Pack solid using mineral fiber in compliance with ASTM C592.
      b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
   2. All Rated Openings: Caulk tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

3. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.

E. Manufactured Sleeve-Seal Systems:
1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
3. Locate piping in center of sleeve or penetration.
4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a water-tight seal.
6. Install in accordance with manufacturer's recommendations.

F. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION 230517

SECTION 230519
METERS AND GAUGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gauges and pressure gauge taps.

B. Thermometers and thermometer wells.

1.02 RELATED REQUIREMENTS

A. Section 230923 - Direct-Digital Control System for HVAC.

B. Section 230993 - Sequence of Operations for HVAC Controls.

C. Section 232113 - Hydronic Piping.

D. Section 232213 - Steam and Condensate Heating Piping.

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments 2022.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers 2014 (Reapproved 2020).

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers 2014 (Reapproved 2021).

D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service Current Edition, Including All Revisions.

E. UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

C. Project Record Documents: Record actual locations of components and instrumentation.

D. Operation and Maintenance Data: _____.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Pressure Gauges: One of each type and size.

1.05 FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

B. Coordinate the location and installation of all items furnished under this specification with and including but not limited to the following:
   1. Equipment installation details.
   2. Purchased equipment.
   3. Piping shop drawings.
   4. Field conditions.

1.06 PRESSURE AND TEMPERATURE RATING:

A. Each meter and gauge shall be rated and suitable for the piping system that it is being installed in.

B. Refer to applicable piping section for service temperature and pressure rating of systems that meters and gauges are to be installed in.

C. Minimum upstream and downstream straight pipe diameters for meters shall be provided as per manufacturer’s published recommendations.

1.07 COORDINATION

A. Coordinate the location and installation of all items furnished under this specification with and including but not limited to the following:
   1. Equipment installation details.
   2. Purchased equipment.
   3. Piping shop drawings.
   4. Field conditions

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

A. Manufacturers:
   1. Dwyer Instruments, Inc; _____: www.dwyer-inst.com.
   2. Moeller Instrument Company, Inc; _____: www.moellerinstrument.com.
   3. Miljoco Corp.
   4. Trerice, H. O. Co.
   5. Weiss Instruments, Inc.

B. Dry type for steam only, liquid-filled case type for all other services.

C. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 4-1/2 inch diameter.
   3. Mid-Scale Accuracy: One percent.
   4. Scale: Psi.

D. Pressure Gage Fittings:
   1. Snubbers: ASME B40.5, NPS 1/4 (DN 8) brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

E. Provide single gauge for pump installations mounted to a 4-port trumpet valve.

2.02 PRESSURE GAUGE TAPPINGS

A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.

B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.

C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

D. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.

2.03 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Dwyer Instruments, Inc; _____: www.dwyer-inst.com.
   2. Omega Engineering, Inc; _____: www.omega.com.
   3. Weksler Glass Thermometer Corp; _____: www.wekslerglass.com.

B. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Stem: 3/4 inch NPT brass.
   4. Accuracy: 2 percent, per ASTM E77.
   5. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.05 TEST PLUGS

A. Manufacturers:
   1. Trerice, H. O. Co.
   2. Watts Industries, Inc.; Water Products Div.

B. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

C. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.

D. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Viton core for temperatures up to 400 degrees F.

E. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gauges, one gauge adapters with 1/8 inch probes, two 1 inch dial thermometers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.

C. Install pressure gauges with pulsation dampers. Provide gauge cock to isolate each gauge. Provide siphon on gauges in steam systems. Extend nipples and siphons to allow clearance from insulation.

D. Install dry-case-type pressure gages for discharge of each pressure-reducing valve

E. Install dry-type pressure gauges in the following locations:
   1. Steam systems.

F. Install liquid-filled-type pressure gauges at suction and discharge of each pump and all other services, except steam.

G. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

H. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Refer to Section 230943. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.

I. Provide instruments with scale ranges selected according to service with largest appropriate scale.

J. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

K. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

L. Calibrate meters according to manufacturer's written instructions, after installation.

M. Locate test plugs adjacent thermometers and thermometer sockets.

END OF SECTION 230519

SECTION 230523
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applications.
B. General requirements.
C. Globe valves.
D. Ball valves.
E. Check valves.
F. Gate valves.
G. Chainwheels.
H. High performance butterfly valves
I. Calibrated balancing valves.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 083100 - Access Doors and Panels.
C. Section 230548 - Vibration and Seismic Controls for HVAC.
D. Section 230553 - Identification for HVAC Piping and Equipment.
E. Section 230716 - HVAC Equipment Insulation.
F. Section 230719 - HVAC Piping Insulation.
G. Section 232113 - Hydronic Piping.

1.03 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. HTHW: High temperature hot water
C. EPDM: Ethylene propylene copolymer rubber.
D. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
E. NRS: Nonrising stem.
F. OS&Y: Outside screw and yoke.
G. PTFE: Polytetrafluoroethylene.
H. RS: Rising stem.
I. SWP: Steam working pressure.
J. TFE: Tetrafluoroethylene.
K. WOG: Water, oil, and gas.
L. WOG: Water, oil, or gas.

1.04 REFERENCE STANDARDS

A. API STD 594 - Check Valves: Flanged, Lug, Wafer, and Butt-Welding 2022.
B. ASME B1.20.1 - Pipe Threads, General Purpose, Inch 2013 (Reaffirmed 2018).
C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.
D. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.
E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves 2022.
F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.

G. ASME B16.34 - Valves — Flanged, Threaded, and Welding End 2020.
H. ASME B31.1 - Power Piping 2022.
I. ASME B31.9 - Building Services Piping 2020.
J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
K. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.
L. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings 2004 (Reapproved 2019).
M. ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service 2021.
N. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2022).
O. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).
P. ASTM A582/A582M - Standard Specification for Free-Machining Stainless Steel Bars 2022.
Q. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings 2015 (Reapproved 2021).
R. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings 2017.
S. MSS SP-45 - Drain and Bypass Connections 2020.
T. MSS SP-67 - Butterfly Valves 2022.
U. MSS SP-68 - High Pressure Butterfly Valves with Offset Design 2021.
V. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends 2011.
W. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends 2018.
X. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service 2010a.
Y. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends 2011.
Z. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves 2019.
AA. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends 2011.
BB. MSS SP-108 - Resilient-Seated Cast Iron Eccentric Plug Valves 2020.
CC. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .
DD. MSS SP-125 - Check Valves: Gray Iron and Ductile Iron, In-Line, Spring-Loaded, Center-Guided 2018.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
    1. Furnish maintenance manuals as specified in Division 1.
    2. Furnish complete operation and maintenance manuals for the purchased equipment.
    3. Include the following items as a minimum for the purchased equipment.
        a. Flow / pressure drop curves.

1.06 QUALITY ASSURANCE

A. Manufacturer:
   1. Obtain valves for each valve type from single manufacturer.
   2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

C. ASME Compliance:
   1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
   2. ASME B31.1 for power piping valves.
   3. ASME B31.9 for building services piping valves.

D. Standards: If any item in this specification, as furnished by the contractor is manufactured in a location which does not certify ASME / ANSI standards, the contractor is to pay the owner for all expenses incurred by the owner for an outside testing company to confirm such compliances.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
   2. Protect valve parts exposed to piped medium against rust and corrosion.
   3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
   4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
   5. Secure check valves in either the closed position or open position.
   6. Adjust butterfly valves to closed or partially closed position.

B. Use the following precautions during storage:
   1. Maintain valve end protection and protect flanges and specialties from dirt.
      a. Provide temporary inlet and outlet caps.
      b. Maintain caps in place until installation.
   2. Store valves in shipping containers and maintain in place until installation.
      a. Store valves indoors in dry environment.
      b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

C. Exercise the following precautions for handling:
   1. Handle large valves with sling, modified to avoid damage to exposed parts.
   2. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Provide the following valves for the applications if not indicated on drawings:
   1. Throttling (Hydronic): Butterfly, Ball, and Globe.
   2. Throttling (Steam): Ball and Globe.
   3. Isolation (Shutoff): Butterfly, Gate, and Ball.
   4. Swing Check (Pump Outlet):
      a. 2 NPS and Smaller: Bronze with bronze disc.
      b. 2-1/2 NPS and Larger: Iron with center-guided with resilient seat.
   5. Dead-End: Butterfly, single-flange (lug) type.

B. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
   1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
   2. Handwheel: Valves other than quarter-turn types.
   3. Hand Lever: Quarter-turn valves 6 NPS and smaller.
   4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

D. Valves in Insulated Piping: Provide 2 NPS stem extensions and the following features:
   1. Gate Valves: Rising stem.
   2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   3. Butterfly Valves: Extended neck.
   4. Memory Stops: Fully adjustable after insulation is installed.

E. Valve-End Connections:
   1. Threaded End Valves: ASME B1.20.1.
   2. Flanged: With flanges according to ASME B16.24 for bronze valves.
   3. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
   4. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
   5. Solder Joint Connections: ASME B16.18.

F. General ASME Compliance:
   1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
   2. Building Services Piping Valves: ASME B31.9.

G. Bronze Valves:
   1. Fabricate from dezincification resistant material.
   2. Copper alloys containing more than 15 percent zinc are not permitted.

H. Valve Bypass and Drain Connections: MSS SP-45.

2.03 BRONZE, GLOBE VALVES

A. Manufacturers:
   1. Crane Co.
   2. Walworth Company
   3. NIBCO Inc.

B. Class 125: CWP Rating: 200 psig:.
   1. Comply with MSS SP-80, Type 1.
   2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
   3. Ends: Threaded or solder joint.
   4. Stem and Disc: Bronze or PTFE.
   5. Packing: Asbestos free.
      a. Handwheel: Malleable iron.

C. Class 150 psi steam, 300 psi cold working pressure (CWP)
   1. Union bonnet
   2. Stainless steel disc
   3. Stainless steel seat
   4. Copper-silicon alloy rising stem
   5. Teflon-impregnated packing with bronze packing nut
   6. Aluminum handwheel
   7. Schedule valve No. 0201

2.04 IRON, GLOBE VALVES

A. Manufacturers:
   1. Crane Co.
   2. NIBCO Inc.

B. 3 inches to 10 inches, MSS SP-85
   1. Class 125 psi steam, 200 psi cold working pressure (CWP)
      a. Class B cast-iron body and bonnet
      b. 6 inch and smaller: solid bronze disc
      c. 8 inch and larger: cast iron disc with bronze facing
      d. Bottom guided disc
      e. Brass alloy stem
      f. Renewable bronze seat
      g. Aluminum, steel, or cast iron handwheel
      h. Schedule Valve No. 0701
   2. Class 250 psi steam, 500 psi cold working pressure (CWP)
      a. ASTM A 126 class B cast-iron body and bonnet
      b. Bolted bonnet
      c. Outside screw & yoke
      d. Rising stem
      e. 3 inch and smaller: solid bronze disc
      f. 6 inch and larger: cast iron disc with bronze facing
      g. Bottom guided disc
      h. Brass alloy stem
      i. Renewable bronze seat
      j. ANSI 250 flat face flanged ends
      k. Non-asbestos packing and gaskets
      l. Aluminum, steel, or cast iron handwheel
      m. Schedule Valve No. 0702

C. 2 inch and smaller, ASME B1.20.1
   1. Class 700 psi steam, 1000 psi cold working pressure (CWP)
      a. Malleable iron body and bonnet
      b. Union bonnet
      c. Rising stem
      d. Nickel alloy disc
      e. Stainless steel stem
      f. Stainless steel seat ring
      g. Non-asbestos ring packing
      h. Aluminum, steel, or cast iron handwheel
      i. Schedule Valve No. 0211 and 1201

2.05 FORGED STEEL GLOBE VALVES, 2 INCHES AND SMALLER, MSS SP-84

A. Manufacturers -Forged steel globe valves
   1. Walworth Co.

B. Class 800 psi steam, 1975 psi cold working pressure (CWP), conventional port
   1. ASTM A105 forged steel body and bonnet
   2. Bolted bonnet
   3. Outside screw and yoke
   4. Bolted gland
   5. Loose disc, steel / chrome alloy
   6. Renewable satellite faced seat
   7. Steel / chrome alloy rising stem
   8. Flexible graphite packing
   9. Malleable-iron handwheel
   10. Schedule Valve No. 1201 for threaded

2.06 CAST STEEL GLOBE VALVES, 2 INCHES TO 12 INCHES

A. Manufacturers:
   1. Crane Co.

2. Walworth Co.
3. Milwaukee Valve Co.

B. Class 150 psi steam, 290 psi cold working pressure (CWP)
1. ASTM A216 grade WCB cast steel body and bonnet
2. Bolted bonnet
3. Outside screw and yoke
4. Rising stem and handwheel
5. Bolted gland
6. Steel with 13% chromium overlay disc
7. Stellite faced seat ring
8. Stainless steel stem
9. Flexible graphite packing
10. Malleable-iron or steel handwheel
11. Raised face flange ends- Schedule Valve No. 1501

C. Class 300 psi steam, 750 psi cold working pressure (CWP)
1. ASTM A216 grade WCB cast steel body and bonnet
2. Bolted bonnet
3. Outside screw and yoke
4. Rising stem and handwheel
5. Bolted gland
6. Steel with 13% chromium overlay disc
7. Stellite faced seat ring
8. Stainless steel stem
9. Flexible graphite packing
10. Raised face flange ends – Schedule Valve No. 1511
11. Malleable-iron or steel handwheel

2.07 BRONZE, BALL VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Two Piece, Full Port with Stainless Steel Trim:
1. Comply with MSS SP-110.
2. SWP Rating: 150 psig.
3. CWP Rating: 600 psig.
4. Body: ASTM B584 cast bronze
5. Ends: Threaded.
6. Seats: PTFE.
7. Stem: Stainless steel.
8. Ball: Stainless steel, vented.
9. PTFE stem packing
10. Zinc plated steel lever with vinyl covered grip
11. Threaded ends standard or full port- Schedul Valve No. 1811
12. Manufacturers:
    a. Apollo Valves; _____: www.apollovalves.com.
    b. Viega LLC; _____: www.viega.us.
    c. Jomar Valves, a division of Jomar Group; _____: www.jomarvalve.com.
    d. Crane Co.; Crane Valve Group; Stockham Division
    e. Jamesbury Inc.
    f. Milwaukee Valve Company

C. Three Piece, Full Port with Stainless Steel Trim:
1. Comply with MSS SP-110.
2. SWP Rating: 150 psig.

3. CWP Rating: 600 psig.
4. Body: ASTM B584 cast bronze.
5. Ends: Threaded.
6. Seats: PTFE.
7. Stem: Stainless steel.
8. Ball: Stainless steel, vented.
9. PTFE stem packing
10. Zinc plated steel lever with vinyl covered grip
11. Scheduled Valve No. 1821
12. Manufacturers:
    a. Apollo Valves; _____: www.apollovalves.com.
    b. Viega LLC; _____: www.viega.us.
    c. Crane Co.; Crane Valve Group; Stockham Division
    d. Jamesbury Inc.
    e. Milwaukee Valve Company

2.08 CARBON STEEL, BALL VALVES

A. Manufacturers:
1. Conbraco Industries Inc.; Apollo Division
2. Crane Co.
3. Cooper Cameron Corp.
4. Milwaukee Valve Company

B. Class 150, Full Port, Stainless Steel Trim, Flanged:
1. Comply with MSS SP-72.
2. CWP Rating: 300 psig WOG.
3. SWP Rating: 150 psig.
4. Body: Carbon steel, ASTM A216/A216M, Type WCB.
5. Ends: Flanged.
6. Seats: PTFE.
7. Stem: Stainless steel.
8. Ball: Stainless steel, vented.
9. Size: 1/2 to 12 inches.
10. Graphite stem packing
11. Galvanized pipe lever
12. Scheduled Valve No. 1941

C. Class 150, Full Port, Stainless Steel Trim, Threaded or socket weld with Lockable Handle:
1. CWP Rating: 125 psig WOG.
2. SWP Rating: 150 psig.
3. Vacuum Rating: 14.2 psig.
4. Body: Carbon steel, ASTM A216/A216M.
5. Seats: PTFE.
6. Stem: Stainless steel.
7. Ball: Stainless steel.
8. Size: 1/4 to 2 inches.
9. Scheduled Valve No. 1901 threaded
10. Schedule Valve No. 1912 socket weld

2.09 HIGH-PERFORMANCE, SINGLE FLANGE BUTTERFLY VALVES

A. Manufacturers:
1. Jamesbury
2. Keystone
3. Bray Valve & Controls

B. Lug type: Bi-directional dead end service without downstream flange.
1. Comply with MSS SP-68.

2. Class 150: CWP Rating: 285 psig at 100 degrees F.
3. Body: Provide carbon steel.
4. Seat: Metal or reinforced PTFE.
5. Offset stem: Stainless steel.
6. Disc: Carbon steel.
7. Class 150, 285 psi cold working pressure (CWP), 3 inch to 24 inch
   a. ASTM A216 WCB carbon steel body
   b. ANSI 150 pattern, fully lugged, and tapped body style
   c. All valves shall have shutoff to full ANSI pressure ratings in either direction with downstream piping removed.
   d. Factory leakage test shall be ANSI class VI , bubbletight.
   e. ASTM A216 WCB carbon steel disc
   f. Blowout proof shaft design
   g. Adjustable packing gland with graphite ring packing
   h. Stainless steel shaft bearings
   i. Schedule Valve No. 2301
8. Class 300, 740 psi cold working pressure (CWP), 3 inch to 24 inch
   a. ASTM A216 WCB carbon steel body
   b. ANSI 300 pattern, fully lugged, and tapped body style
   c. Integral stainless steel body seat
   d. Triple offset conical seating design, for zero leakage applications.
   e. All valves shall have shutoff to full ANSI pressure ratings in either direction with downstream piping removed.
   f. Factory leakage test shall exceed ANSI class VI , bubbletight.
   g. Factory leakage test shall be ANSI class VI , bubbletight.
   h. ASTM A216 WCB carbon steel disc
   i. Laminated stainless steel and graphite disc seat ring
   j. Stainless steel keys, keyed disc to shaft connection
   k. One piece through stainless steel shaft
   l. Blowout proof shaft design
   m. Adjustable packing gland with graphite ring packing
   n. Stainless steel shaft bearings
   o. Schedule Valve No. 2311

2.10 BRONZE, SWING CHECK VALVES

A. Manufacturers:
   1. Crane Co.
   2. Walworth Company
   3. NIBCO Inc.

B. Class 150 psi steam, 300 psi cold working pressure (CWP)
   1. “Y” pattern
   2. Stainless steel free floating hinge pin
   3. Threaded cap
   4. Regrinding seat
   5. Bronze disc
   6. Threaded (steel piping) end connection – Schedule Valve No. 0301

C. Class 300 psi steam, 1000 psi cold working pressure (CWP)
   1. ASTM B 61 cast-bronze body and cap
   2. “Y” pattern
   3. Stainless steel free floating hinge pin
   4. Threaded cap
   5. Regrinding seat
   6. Bronze disc
   7. Schedule Valve No. 0311

2.11 IRON SWING CHECK VALVES

A. Manufacturers:
   1. Crane Co.
   2. NIBCO Inc.

B. 2 inch and smaller, ASME B1.20.1
   1. Class 700 psi steam, 1000 psi cold working pressure (CWP)
      a. Malleable iron body and cap
      b. “Y” pattern swing check
      c. Screwed cap
      d. Stainless steel hinge pin
      e. Iron seat
      f. Threaded ends
      g. Schedule Valve No. 0801

C. 2½ inch to 12 inch, ASME B16.10
   1. Class 125 psi steam, 200 psi cold working pressure (CWP)
      a. Cast iron body and cap
      b. Replaceable bronze seat ring
      c. 6 inch and smaller: solid bronze disc
      d. 8 inch and larger: cast iron disc with bronze facing
      e. Replaceable brass hinge pin
      f. Flanged ends
      g. Schedule Valve No. 0811

2.12 CAST STEEL SWING CHECK VALVES, 2 INCHES TO 24 INCHES

A. Manufacturers:
   1. Crane Co.
   2. Walworth Co.
   3. Milwaukee Valve Co.

B. Class 150 psi steam, 290 psi cold working pressure (CWP)
   1. ASTM A216 grade WCB cast steel body and cover
   2. Bolted cover
   3. Steel with 13% chromium overlay disc
   4. Stellite faced seat ring
   5. Steel hinge, stainless steel hinge pin
   6. Stainless steel / graphite gasket
   7. Raised face flange ends – Schedule Valve No. 1601

C. Class 300 psi steam, 750 psi cold working pressure (CWP)
   1. ASTM A216 grade WCB cast steel body and cover
   2. Bolted cover
   3. Steel with 13% chromium overlay disc
   4. Stellite faced seat ring
   5. Steel hinge, stainless steel hinge pin
   6. Stainless steel / graphite gasket
   7. Raised face flange ends – Schedule Valve No. 1611

2.13 FORGED STEEL CHECK VALVES, 2 INCHES AND SMALLER, MSS SP-84

A. Manufacturers:
   1. Walworth Co.

B. Class 800 psi steam, 1975 psi cold working pressure (CWP), piston check
   1. ASTM A105 forged steel body and cover
   2. Bolted cover
   3. Fully guided disc steel / chrome alloy

4. Renewable satellite faced seat
5. Stainless steel / graphite gasket
6. Threaded end connection – Schedule Valve No. 0311 and 0801 and 1611 (flanged)

2.14 BRONZE, GATE VALVES

A. Non-Rising Stem (NRS) or Rising Stem (RS):
   1. Comply with MSS SP-80, Type I.
   2. Class 150: CWP Rating: 300 psig.
      a. ASTM B 62 cast-bronze body and bonnet
      b. Union bonnet
      c. Solid-bronze wedge
      d. Copper-silicon alloy rising stem
      e. Teflon-impregnated packing with bronze packing nut
      f. Threaded (steel piping) end connection –Schedule Valve No. 0101
      g. Aluminum or malleable-iron handwheel
   3. Class 300 psi steam, 1000 psi cold working pressure (CWP)
      a. ASTM B 61 cast-bronze body and bonnet
      b. Union bonnet
      c. Solid-bronze wedge
      d. Stainless steel seat
      e. Copper-silicon alloy rising stem
      f. Teflon-impregnated packing with bronze packing nut
      g. Threaded end connection
      h. Aluminum or malleable-iron handwheel
      i. Schedule Valve No. 0111
   4. Manufacturers:
      a. Crane Co.
      b. Walworth Company
      c. NIBCO Inc.

2.15 IRON, GATE VALVES

A. Manufacturers:
   1. Crane Co.
   2. NIBCO Inc.

B. 2 1/2 inch to 12 inch, MSS SP 25, MSS SP-70 type 1
   1. Class 125 psi steam, 200 psi cold working pressure (CWP)
      a. ASTM A 126 class B cast-iron body and bonnet
      b. Bolted bonnet
      c. Outside screw & yoke
      d. Rising stem
      e. Solid bronze disc
      f. Steel stem
      g. Renewable bronze seat rings
      h. ANSI 125 flat face flanged ends
      i. Non-asbestos packing and gaskets
      j. Aluminum or malleable-iron handwheel
      k. Schedule Valve No. 0611
   2. Class 250 psi steam, 500 psi cold working pressure (CWP)
      a. ASTM A 126 class B cast-iron body and bonnet
      b. Bolted bonnet
      c. Outside screw & yoke
      d. Rising stem
      e. Solid bronze disc
      f. Steel stem

g. Renewable bronze seat rings
h. ANSI 250 flat face flanged ends
i. Non-asbestos packing and gaskets
j. Aluminum or malleable-iron handwheel
k. Schedule Valve No. 0612

C. 2 inch and smaller, MSS SP 25
1. Class 125 psi steam, 200 psi cold working pressure (CWP)
a. ASTM A 126 class B cast-iron body and bonnet
b. Rising stem
c. Solid bronze disc
d. Bronze stem
e. Renewable bronze seat rings
f. Threaded end connection
g. Aluminum or malleable-iron handwheel
h. Schedule Valve No. 0601
2. Class 250 psi steam, 500 psi cold working pressure (CWP)
a. ASTM A 126 class B cast-iron body and bonnet
b. Bolted bonnet
c. Outside screw & yoke
1) Rising stem
2) Solid bronze disc
3) Steel stem
4) Renewable bronze seat rings
5) ANSI 250 flat face flanged ends
6) Non-asbestos packing and gaskets
7) Aluminum or malleable-iron handwheel
8) SCHEDULE VALVE NO. 0602

2.16 CAST STEEL GATE VALVES, 2 INCHES TO 24 INCHES

A. Manufacturers:
1. Crane Co.
2. Walworth Co.
3. Milwaukee Valve Co.

B. Class 150 psi steam, 290 psi cold working pressure (CWP)
1. ASTM A216 grade WCB cast steel body and bonnet
2. Bolted bonnet
3. Outside screw and yoke
4. Rising stem
5. Bolted gland
6. Solid steel, 13% chromium overlay wedge
7. Stellite faced seats
8. Stainless steel stem
9. Flexible graphite packing
10. Raised face flange ends – Schedule Valve No. 1411
11. Malleable-iron or steel handwheel

2.17 CHAINWHEELS

A. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
2. Attachment: For connection to ball, butterfly, and gate valve stems.
3. Sprocket Rim with Chain Guides: Ductile iron include zinc coating.
4. Chain: Hot-dip galvanized steel. Sized to fit sprocket rim.

2.18 CALIBRATED BALANCING VALVES

A. Manufacturers:
   1. ITT Bell & Gosett
   2. Macon, Tunstall Corp.
   3. Nexus

B. 2 inch and smaller
   1. 300 psi CWP) up to 250ºF
      a. Brass body, straight through ball valve design
      b. Brass ball
      c. Carbon filled TFE seat rings
      d. Read out ports with internal EPT insert and check valve
      e. ¼ inch NPT tapped drain port
      f. Memory stop feature
      g. Calibrated nameplate
      h. Threaded ends
      i. Schedule Valve No. 2502

C. 2½ inch to 3 inch
   1. 175 psi (CWP) up to 250ºF
      a. Cast iron body, straight through ball valve design
      b. Brass ball
      c. Carbon filled TFE seat rings
      d. Read out ports with internal EPT insert and check valve
      e. Memory stop feature
      f. Calibrated nameplate
      g. ANSI class 125 flanged end connections
      h. Schedule Valve No. 2511

D. 3 inch to 12 inch
   1. 175 psi (CWP) up to 250ºF
      a. Cast iron body, “Y” pattern globe valve design
      b. Bronze seat
      c. Replaceable bronze disc
      d. EPDM seal insert
      e. Stainless steel stem
      f. Read out ports with internal EPT insert and check valve
      g. Memory stop feature
      h. Calibrated nameplate
      i. ANSI class 125 flanged end connections
      j. Schedule Valve No. 2521

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.

D. Install check valves where necessary to maintain direction of flow as follows:
   1. Swing Check: Install horizontal maintaining hinge pin level.
   2. Orient center-guided into horizontal or vertical position, between flanges.

E. Install shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, unless only one piece of equipment is connected in the branch line. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.

F. Install calibrated balancing valves in the return water line of each heating or cooling element and elsewhere as required to facilitate system balancing.

G. Install spring loaded check valves at each pump discharge and elsewhere as required to control flow direction.

H. Install safety valves on hot-water generators and elsewhere as required by the ASME Boiler and Pressure Vessel Code. Install safety-valve discharge piping, without valves, to discharge. Comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, for installation requirements.

I. Threaded connections are not to be used for glycol systems.

J. Provide chainwheels on operators for valves 4 NPS and larger where located 96 inches or more above finished floor, terminating 60 inches above finished floor.

K. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.03 VALVE SCHEDULE

A. The valve numbers listed in the tables below correspond to the valve numbers listed in the products section for each valve type.

B. Table abbreviations
   1. CW - Condenser Water
   2. CHW – Chilled Water
   3. HW – Hot Water
   4. HTHW – High Temperature Hot Water
   5. LPS – Low Pressure Steam
   6. MPS – Medium Pressure Steam, classified as high pressure steam, however the requirements may vary
   7. HPS – High Pressure Steam
   8. LPR – Low Pressure steam condensate Return
   9. MPR – Medium Pressure steam condensate Return, classified as high pressure steam, however the requirements may vary
   10. HPR – High Pressure steam condensate Return
   11. GLYCOL - water and glycol mixture. Glycol type and mix percentage may vary based upon system and/or application.
   12. MU - Makeup water
   13. FO - Fuel Oil
   14. The pressures are listed next to the service (i.e. <125 psig is less than 125 psig:, 126-250 is between 126 and 250 psig, >251 is greater than 251 psig).

C. Where the term solder or soldered is used or noted herein, it shall be interpreted to mean braze or brazed. Solder or soldering shall not be used in HVAC piping or sytems.

D. GATE VALVES

Service & Pressure	< 2” threaded	< 2” flanged	> 2” flanged
CW < 125	0101	na	0611

	0601		
CW 126 -250	0101	0602	0612
CW >251	0111	na	1411
CHW <125	0101 0601	na	0611
CHW126-250	0101	0602	0612
CHW>251	0111	na	1411
HW < 125	0101 0601	na	0611
HW 126-250	0101	0602	0612
LPS < 15	0101 0601	na	0611
MPS 16-125	0101 0601	na	0611
HPS 126-250	0111	na	1411
LPR	0101 0601	na	0611
MPR & HPR	0111	na	1411
MU	0101 0601	na	0611

E. GLOBE VALVES

Service & Pressure	< 2” threaded	< 2” flanged	> 2” flanged
CW < 125	0201	na	0701
CW126-250	0201	na	0702
CW >251	0211	na	0702
CHW< 125	0201	na	0701
CHW126-250	0201	na	0702
CHW>251	0211 1201	na	0702
HW < 125	0201	na	0701
HW 126-250	0201 1201	na	0702
LPS < 15	0201	na	0701
MPS 16-125	0201	na	1501
HPS 126-250	0211 1201	na	1511
LPR	0201	na	0701
MPR & HPR	0211	na	1511
MU	0201	na	0701

F. CHECK VALVES

Service & Pressure	< 2" threaded	< 2" flanged	> 2" flanged
CW <125	0301	na	0811
CW 126-250	0301	na	0812
CW >251	0311 0801	na	0812

CHW <125	0301	na	0811
CHW 126-250	0301	na	0812
CHW >251	0311 0801	na	0812
HW <125	0301	na	0811
HW 125-250	0301	na	0812
LPS <15	0301`	na	0811
MPS 16-125	0301	na	1601
HPS 126-250	0311 0801	na	1611
LPR	0301	na	0811
MPR & HPR	0311	na	1611
MU	0301	na	0811

G. BALL VALVES

Service & Pressure	< 3" threaded	> 2" flanged
CW <125	1811 1821 1901	1941
CW 126-300	1811 1821 1901	1941
CW >301	1811 1821 1901	1941
CHW <125	1811 1821 1901	1941
CHW 126-300	1811 1821 1901	1941
CHW >301	1811 1821 1901	1941
HW <125	1811 1821 1901	1941
HW 125-300	1811 1821 1901	1941
LPS <15	1811 1821 1901	1941
LPR	1811 1821 1901	1941
MU	1811 1821 1901	1941

H. HIGH PERFORMANCE BUTTERFLY VALVES

Service & Pressure	3" - 24" flanged
CW <285	2301
CW <740	2311
CHW <285	2301
CHW <740	2311
HW <150	2301
HW <300	2311

I. CALIBRATED BALANCING VALVES

Service & Pressure	< 2" threaded	2 1/2"-3" flanged	3"-12" flanged
CW <175	na	2511	2521
CW <200	na	na	na
CW <300	2502	na	na
CHW <175	na	2511	2521
CHW <200	na	na	na
CHW <300	2502	na	na
HW <175	na	2511	2521
HW <200	na	na	na
HW <300	2502	na	na

END OF SECTION 230523

SECTION 230529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other HVAC/hydronic work.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 230547-Vibration Controls for HVAC.

C. Section 230548 - Vibration and Seismic Controls for HVAC.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.

C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2023.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).

F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

H. MFMA-4 - Metal Framing Standards Publication 2004.

I. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry

anchors, and thermal insulated pipe supports.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
   1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with applicable building code.

B. All hangars, supports and anchorage to structure shall be selected by the manufacturer's authorized representative and approved by the project structural engineer.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Installer Qualifications for Field-Welding: As specified in Section 055000. Qualify processes and operators acording to AWS D1.1/D1.1M "Structural Welding Code - Steel.

E. Certify that each welder has passed AWS qualification tests for welding processesinvolved and that certification is current.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 SUPPLEMENTARY STEEL

A. Furnish supplementary steel as required for proper installation, mounting and support of HVAC work.

B. Connect supplementary steel firmly to building construction in an acceptable manner.

C. Determine type and size of supplementary steel. Supplementary steel shall be of sufficient strength and size to allow a minimum deflection of the span and in conformance with manufacturer's requirements of loading.

D. Install supplementary steel in a neat and workmanlike manner parallel to walls, floors and ceiling construction.

E. All supplementary steel and channel supports shall be submitted to the structural engineer for review

1.08 EXPANSION ANCHORS

A. Provide spacing and install anchors in accordance with manufacturer's recommendations.

B. Comply with ACI 318 as amended by the authority having jurisdiction.

C. All expansion anchors shall be submitted to the structural engineer for review.

D. File all post installed anchors and assist with special inspections where required by the authority having jurisdiction.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with MSS SP-58.
   2. Select and size all hangers, supports, supplemental steel and accessories for the imposed loads in accordance with ASME B 31.1 or MSS SP-58 as applicable.

3. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of mechanical work.
4. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
5. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 4.0. Include consideration for vibration, equipment operation, and shock loads where applicable.
6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
7. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation; _____: www.cooperindustries.com.
    b. Unistrut, a brand of Atkore International Inc; _____: www.unistrut.com.
    c. Carpenter and Patterson, Inc. www.pipehangers.com.
    d. Tolco Inc.
    e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
3. Comply with MFMA-4.
4. Channel Material:
    a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
5. Minimum Channel Thickness: 1/8 inch.
6. Minimum Channel Dimensions: 1-1/2 inch width by 1-1/2 inch height.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    a. Equipment Supports: 1/2 inch diameter.
    b. Piping up to 1 inch (27 mm) nominal: 3/8 inch diameter.
    c. Piping larger than 1 inch (27 mm) nominal: 1/2 inch diameter.
    d. Trapeze Support for Multiple Pipes: 1/2 inch diameter.

D. Pipe Supports:
1. Manufacturers:
    a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Operating Temperatures from all up to 446 degrees F:
    a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
    b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
    c. Sliding Support: MSS SP-58 Types 35 through 38.

E. Pipe Stanchions: For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
   1. Manufacturers:
      a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
   2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
   3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.

F. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
   1. Manufacturers:
      a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
   2. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
   3. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

G. Riser Clamps:
   1. Manufacturers:
      a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
   2. Provide copper plated clamps for copper tubing support.
   3. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.

H. Strut Clamps: Two-piece pipe clamp.
   1. Manufacturers:
      a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

I. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
   1. Manufacturers:
      a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
   2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
   3. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

J. Intermediate Pipe Guides: Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.
   1. Manufacturers:
      a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
   2. Pipe Diameter 6 inches and Smaller: Provide minimum clearance of 0.16 inch.
   3. Pipe Diameter 8 inches: Provide U-bolts with double nuts providing minimum clearance of 0.28 inch.
   4. Pipe Diameter 8 inches: 0.625 inch U-bolt.
   5. Pipe Diameter 10 inches: 0.75 inch U-bolt.
   6. Pipe Diameter 12 to 16 inches: 0.875 inch U-bolt.
   7. Pipe Diameter 18 to 30 inches: 1 inch U-bolt.

K. Pipe Alignment Guides: Galvanized steel.
   1. Manufacturers:
      a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
   2. Pipe Diameter 8 inches and Smaller: Spider or sleeve type.
   3. Pipe Diameter 10 inches and Larger: Roller type.
   4. Pipe Diameter 18 to 30 inches: 1 inch U-bolt.

L. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

M. Pipe Shields for Insulated Piping:
1. Manufacturers:
a. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. General Construction and Requirements:
a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
b. Shields Material: UV-resistant polypropylene with glass fill.
c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
d. Minimum Service Temperature: Minus 40 degrees F.
e. Maximum Service Temperature: 178 degrees F.
f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

N. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
a. Hilti, Inc; _____: www.us.hilti.com.
b. ITW Red Head, a division of Illinois Tool Works, Inc; _____: www.itwredhead.com.
c. Powers Fasteners, Inc; _____: www.powers.com.
2. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
3. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
4. Steel: Use beam clamps, machine bolts, or welded threaded studs.
5. Plastic and lead anchors are not permitted.
6. Powder-actuated fasteners are not permitted.
7. Hammer-driven anchors and fasteners are not permitted.
8. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
a. Comply with MFMA-4.
b. Channel Material: Use galvanized steel.
c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Provide hangers and supports of same materials as piping and equipment being supported or provide dielectric separation.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

I. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   3. Unless otherwise indicated, mount floor-mounted equipment on properly sized 4 inch high concrete pad constructed in accordance with Section 033000. Mount outdoor equipment on 6 inch high concrete pad.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

J. Secure fasteners according to manufacturer's recommended torque settings.

K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 230529

SECTION 230533
HEAT TRACING FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Self-regulating parallel resistance electric heating cable.

1.02 RELATED REQUIREMENTS

A. Section 230553 - Identification for HVAC Piping and Equipment.

B. Section 230719 - HVAC Piping Insulation.

C. Section 230913 - Instrumentation and Control Devices for HVAC.

D. Section 230923 - Direct-Digital Control System for HVAC.

E. Section 230993 - Sequence of Operations for HVAC Controls.

F. Section 232113 - Hydronic Piping.

G. Section 232114 - Hydronic Specialties.

H. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.

I. Section 260526 - Grounding and Bonding for Electrical Systems.

J. Section 260533.13 - Conduit for Electrical Systems.

K. Section 260533.16 - Boxes for Electrical Systems.

L. Section 260583 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. IEEE 515.1 - IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications 2022.

B. ITS (DIR) - Directory of Listed Products Current Edition.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL (DIR) - Online Certifications Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

C. Coordinate the work with other trades to provide ground fault protection for electric heat tracing circuits as required by NFPA 70.

D. Coordinate the work with other trades to provide circuit breaker ratings suitable for installed circuit lengths.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for electric heat tracing.

C. Schedule heating capacity, length of cable, spacing, and electrical power requirement for each electric heating cable required.

D. Shop Drawings: Indicate electric heat tracing layout, electrical terminations, thermostats, controls, and branch circuit connections.

E. Manufacturer's Installation Instructions: Indicate installation instructions and recommendations.

F. Field Quality Control Submittals: Indicate test reports and inspection reports.

G. Manufacturer's Qualification Statement.

H. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions of equipment and controls, maintenance and repair data, and parts listings.

I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Project Record Documents: Record actual locations of electric heat tracing lines and thermostats.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide two year manufacturer warranty for cables, connection kits, accessories, and controls.

PART 2 PRODUCTS

2.01 SELF-REGULATING PARALLEL RESISTANCE ELECTRIC HEATING CABLE

A. Manufacturers:
1. Chromalox, Inc; _____: www.chromalox.com.
2. Thermon Manufacturing Company; _____: www.thermon.com.
3. Raychem; a division of Tyco Thermal Controls..

B. Provide products listed, classified, and labeled by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction (AHJ).

C. Factory Rating and Testing: Comply with IEEE 515.1.

D. Heating Element:
1. Provide pair of parallel No. 16 tinned or nickel coated stranded copper bus wires embedded in cross linked conductive polymer core with varying heat output in response to temperature along its length.
2. Terminations: Waterproof, factory assembled, non-heating leads with connector at one end and water-tight seal at opposite end.
3. Capable of crossing over itself without overheating.

E. Insulated Jacket: Flame retardant polyolefin.

F. Cable Cover: Provide tinned copper and polyolefin outer jacket with UV inhibitor.

G. Maximum Power-On Operating Temperature: 150 degrees F.

H. Maximum Power-Off Exposure Temperature: 185 degrees F.

2.02 OUTER JACKET MARKINGS

A. Name of manufacturer, trademark, or other recognized symbol of identification.

B. Catalog number, reference number, or model.

C. Month and year of manufacture, date coding, applicable serial number, or equivalent.

D. Agency listing or approval.

E. Applicable environmental or area use requirements, such as NEMA 4, Type 4, IP ratings, and hazardous (classified) location markings including temperature rating.

F. Any applicable warning/caution statements such as "WARNING: De-energize circuit before removing cover.

2.03 CONNECTION KITS

A. Name of manufacturer, trademark, or other recognized symbol of identification.

B. Provide power connection, splice/tee, and end seal kits compatible with the heating cable and without requiring cutting of the cable core to expose bus wires.

C. Furnish with NEMA 4X rating for prevention of corrosion and water ingress.

D. Provide UV stabilized components.

2.04 ACCESSORIES

A. Provide Accessories As Indicated or As Required for Complete Installation, Including but Not Limited To:
   1. High temperature, glass filament tape for attachment of heating cable to metal piping.
   2. Aluminum self-adhesive tape for attachment of heating cable to plastic piping.
   3. Heat-conductive putty.
   4. Cable ties.
   5. Silicone end seals and splice kits.
   6. Installation clips.
   7. Warning labels for attachment to exterior of piping insulation. Refer to Section 230553.

2.05 CONTROLS

A. Pipe Mounted Thermostats:
   1. Snap-action, open-on-rise, single pole switch with minimum current rating adequate for the connected cable.
   2. Remote bulb on capillary, resistance temperature device (RTD) or thermistor for direct sensing of pipe wall temperature.
   3. Control Enclosure: Corrosion resistant and waterproof.

B. Provide minimum 30 ampere contactor to indicate operational status and on/off control.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping and equipment are ready to receive work.

B. Verify field measurements are as indicated on shop drawings.

C. Verify required power is available, in proper location, and ready for use.

3.02 PREPARATION

A. Clean all surfaces prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer.

3.03 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. Comply with installation requirements of IEEE 515.1 and NFPA 70, Article 427.

C. Apply heating cable linearly on pipe with fiberglass tape only after piping has successfully completed any required pressure testing.

D. Comply with all national and local code requirements.

E. Controls:
   1. Sequence of Operation: Refer to Section 230993.

F. Grounding: Refer to Section 260526.

G. Identification:
   1. After thermal insulation installation, apply external pipeline decals to indicate presence of the thermal insulation cladding at intervals not to exceed 20 ft including cladding over each valve or other equipment that may require maintenance.
   2. Refer to Section 220553.

H. Electrical Connections: Refer to Section 260519.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Perform start-up by factory technician or factory representative as per Owner's requirements.

C. Field Testing and Inspections:
   1. Commission system in accordance with installation and operation manual.
   2. Inspect for sources of water entry and proper sealing.
   3. Inspect weather barrier to confirm that no sharp edges are contacting the trace heating.
   4. Minimum Acceptable Insulation Resistance: 20 megohms or greater at a test voltage of 2500 VDC for polymer insulated trace heaters.
   5. Test heating cable integrity with megohmmeter at the following intervals:
      a. Before installing the cable.
      b. After cable has been installed onto the piping.
      c. After installing the connection kits.
      d. After the installation of thermal insulation onto the piping.
      e. Prior to initial start-up (commissioning).
   6. Measure voltage and current at each unit.
   7. Controls:
      a. Verify control parameters are set to the application requirements.
      b. Verify factory provided digital temperature controller is correctly configured with the building automation system.
   8. Submit written test report showing values measured on each test for each cable.

3.05 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Demonstrate operation of controls.

3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 230533

SECTION 230547
VIBRATION CONTROLS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.

B. Vibration-isolated equipment support bases.

C. Vibration isolators.

D. Vibration-isolated roof curbs.

1.02 RELATED REQUIREMENTS

A. Section 014533 - Code-Required Special Inspections and Procedures.

B. Section 033000 - Cast-in-Place Concrete.

C. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

D. Section 230529 - Hangers and Supports for HVAC Piping and Equipment.

1.03 DEFINITIONS

A. HVAC Component: Where referenced in this section, applies to any portion of the HVAC system subject to evaluation in accordance with applicable codes, including distributed systems (e.g. ductwork, piping).

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.

C. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.

D. MFMA-4 - Metal Framing Standards Publication 2004.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
   1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification method for spring element load capacities.

2. Include an itemized list showing the items of equipment or piping to be isolated, the isolator type and model number selected, isolator loading and deflection, and reference to specific drawings showing seismic restraints, base and construction where applicable.

D. Shop Drawings - Vibration Isolation Systems:
1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.
2. Show equipment base constructions for each machine, including dimensions, structural member sizes and support point locations.
3. Vibration-Isolated Equipment Support Bases: Include base weights, including concrete fill where applicable; indicate equipment mounting provisions.
4. Concrete and steel details for bases, including anchor bolt locations.

E. Evaluation Reports: For products specified as requiring evaluation and recognition by a qualified evaluation service, provide current evaluation reports.

F. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Evidence of qualifications for manufacturer.

H. Manufacturer’s detailed field testing and inspection procedures.

I. Field quality control test reports.

1.07 QUALITY ASSURANCE

A. It is the objective of this Specification to provide the necessary design requirements for the control of excessive noise and vibration in the buildings due to the operation of machinery or equipment, and/or due to interconnected piping, ductwork or conduit.

B. Work in this section includes the providing of labor, materials, equipment and services necessary for a complete and safe installation in of vibration isolation systems for every mechanical system including piping and ductwork within and on the roof of the building, complete, as shown and specified per the contract documents and all applicable codes and authorities having jurisdiction.

C. Comply with applicable building code. This specification shall be supplemented by all local codes and ordinances which shall take precedence in the event of the existence of any conflict between same and this specification. Where methods or materials specified are equivalent to the code requirements specified, comply with the specified requirements.

D. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10101010101010 years documented experience.

F. The installation of all vibration isolation units, hangers and bases, shall be under the direct supervision of the vibration isolation manufacturer's representative.The isolation manufacturer is to send a letter stating that they have inspected all of the vibration isolation units installed and they are installed properly and operating.

G. Substitution of internally isolated mechanical equipment in lieu of the specified isolation of this Section must be submitted to Architect for approval for individual equipment units.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION SYSTEM MANUFACTURERS

A. Kinetics Noise Control, Inc; ____: www.kineticsnoise.com.

B. Mason Industries; ____: www.mason-ind.com.

C. Vibration Eliminator Company, Inc; ____: www.veco-nyc.com.

D. Vibration Mountings & Controls, Inc., Bloomingdale, NJ

E. Amber Booth, Houston, TX

2.02 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
   1. Determine vibration isolation sizes and locations.
   2. Provide piping and equipment isolation systems as scheduled or specified.
   3. Guarantee specified isolation system deflection.
   4. Provide installation instructions, drawings and field supervision to assure proper installation and performance.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
   1. Select vibration isolators to provide required static deflection.
   2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
   3. Select vibration isolators for outdoor equipment to comply with wind design requirements.
   4. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2 inch operating clearance beneath base unless otherwise indicated.
   5. All mounting systems, exposed to weather and other corrosive environments shall be protected with factory corrosion resistance. All metal parts of mountings (except springs and hardware) to be hot dip galvanized. Springs shall be powder coated and neoprene coated. Nuts and bolts shall be cadmium plated.
   6. Where spring isolation systems are described in the following specifications, the mounting assemblies shall utilize bare springs with the spring diameter not less than 0.8 of the loaded operating height of the spring. Each spring isolator shall be designed and installed so that the ends of the springs remain parallel. The minimum deflection from loaded operating height to spring solid height shall be 50% of the rated static deflection of the spring.
   7. Where neoprene-in-shear isolation systems are described in the following specifications, the mounting assemblies shall utilize bare neoprene elements with unit type design molded in oil resistant neoprene. The neoprene shall be compounded to meet the following:
      a. Shore hardness of 35 to 65 5, after minimum aging of 20 days or corresponding oven-aging.
      b. Minimum tensile strength of 2000 PSI.
      c. Minimum elongation of 300 %.
      d. Maximum compression at 25 % of original deflection.

D. Source Limitations: Furnish vibration isolators, vibration-isolated equipment support bases and associated components and accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

E. Manufacturer responsibilities
   1. Manufacturer of vibration isolation equipment shall have the following responsibilities:
   2. Determine vibration isolation and seismic restraint sizes and locations.
   3. Provide piping and equipment isolation systems and seismic restraints as scheduled or specified.
   4. Guarantee specified isolation system deflection.
   5. Provide installation instructions, drawings and field supervision to assure proper installation and performance.

F. Equipment Isolation: As indicated in Part 3 and elsewhere in the documents.

2.03 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

A. Manufacturers:
   1. Source Limitations: Furnish vibration-isolated equipment support bases and associated components and accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. Vibration-Isolated Bases - Type A:
   1. Description: Vibration Isolators attached directly to equipment base.
   2. Bases: Integral to equipment or furnished as part of the equipment by equipment manufacturer. Additional vibration isolation structural steel base not required.

C. Vibration-Isolated Structural Steel Bases - Type B-1:
   1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
   2. Reinforce, as required, to prevent base flexure at start-up and misalignment of drive and driven units.
   3. Centrifugal Fan Applications: Provide adjustable motor slide rails as required with double adjustment bolts. Drilled for drive and driven unit mounting template.
   4. Pump Applications: Size and configure bases for piping elbow supports as required.
   5. Bases: Mason Type M, WF, or as approved.

D. Vibration-Isolated Concrete Inertia Bases - Type B-2:
   1. Description: Concrete-filled engineered steel forms with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
   2. Concrete inertia bases shall be formed in a structural steel perimeter base, reinforced as required to prevent flexure, misalignment of drive and driven unit or stress transfer into equipment. The base shall be complete with motor slide base with double adjustment bolts , pump base elbow supports, and complete with height saving brackets, reinforcing, equipment bolting provisions and isolators.
   3. Minimum Base Depth: 6 inches.
   4. Minimum thickness of the inertia base shall be according to the following tabulation:

Motor Size		Minimum Thickness	
HP	(kw)	Inches	(mm)
5-15	(4-11)	6	(150
20-50	(15-37)	8	(200)
60-75	(45-55)	10	(250)
100-250	(75-190)	12	(300)
300-500	(220-375)	18	(350)

   5. Minimum Base Mass (Including Concrete): 1.5 times weight of supported equipment.
   6. Concrete Reinforcement: Welded or tied reinforcing bars running both ways in a single layer.
   7. Concrete: Filled on site with minimum 3000 psi concrete in accordance with Section 033000.
   8. Centrifugal Fan Applications: Provide adjustable motor slide rails as required with double adjustment bolts.. Drilled for drive and driven unit mounting template.
   9. Pump Applications: Size and configure bases for piping elbow supports as required.
   10. Bases: Mason Type K, BMK, or as approved.

E. Vibration Isolated Curb Mounted Bases - Type B-3
   1. Curb mounted rooftop equipment shall be mounted on spring isolation curbs that directly sit on roof construction and are anchored to same and are flashed and incorporated into roof's membrane waterproofing system.
   2. All spring locations shall have removable waterproof covers to allow for spring adjustment and/or removal.
   3. All spring mounts shall be same as Vibration Isolator Type B.

4. Curbs shall be Mason Type CMAB or RSC (depending on deflection required), or approved equal.

F. Vibration Isolated Vane Axial Fan Built-Up Casing Floating Bases - Type B-5
1. The vane axial fan casing, coils, filter assembly and inlet/discharge silencers shall be erected on top of a poured-in-place, reinforced concrete floating floor supported on Mason Industries Type EAFM 2" (50 mm) high mounting system, or as approved.
2. The mountings shall be oriented in the floating floor base for the weight and weight distribution of the supported equipment (casing, coils, filter silencers) on the floating floor.
3. The plywood form shall be Type AC exterior grade, 2" (12 mm), thick. Isolation mounts shall be 2" (50 mm), thick and shall be selected and oriented to provide deflections not exceeding 0.3" (7.5 mm) or 10 Hz frequency.
4. The fans shall be resiliently spring supported, and as described elsewhere, from concrete piers erected from the structural slab and isolated from the floating floor.
5. The design and installation of the vane axial fan built-up casing floating floor and fan isolation shall be coordinated with the vibration control vendor such that there will be no short circuit of the floating built-up casing base and the building structure.

2.04 VIBRATION ISOLATORS

A. Manufacturers:
1. Source Limitations: Furnish vibration-isolated equipment support bases and associated components and accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. General Requirements:
1. Isolator Efficiency: Not less than 90 percent.
2. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
3. Spring Elements for Spring Isolators:
   a. Color code or otherwise identify springs to indicate load capacity.
   b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
   c. Lateral Stability: The isolator ratio of lateral to vertical stiffness shall not be less than 0.9 nor more than 1.5.
   d. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
   e. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
   f. Selected to provide designed deflection of not less than 75 percent of specified deflection.
   g. Selected to function without undue stress or overloading.
4. All vibration isolators shall have either known undeflected heights or calibration markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
5. Where spring isolation systems are described in the following specifications, the mounting assemblies shall utilize bare springs with the spring diameter not less than 0.8 of the loaded operating height of the spring. Each spring isolator shall be designed and installed so that the ends of the springs remain parallel. The minimum deflection from loaded operating height to spring solid height shall be 50% of the rated static deflection of the spring.
6. Where neoprene-in-shear isolation systems are described in the following specifications, the mounting assemblies shall utilize bare neoprene elements with unit type design molded in oil resistant neoprene. The neoprene shall be compounded to meet the following:
   a. Shore hardness of 35 to 65 5, after minimum aging of 20 days or corresponding oven-aging.
   b. Minimum tensile strength of 2000 PSI.

c. Minimum elongation of 300 %.
d. Maximum compression at 25 % of original deflection.

7. The theoretical vertical natural frequency for each support point, based upon load per isolator and isolator stiffness, shall not differ from the design objectives for the equipment as a whole by more than 10%.
8. All mounting systems exposed to weather and other corrosive environments shall be protected with factory corrosion resistance. All metal parts of mountings (except springs and hardware) to be hot dip galvanized. Springs shall be powder coated and neoprene coated. Nuts and bolts shall be cadmium plated.
9. All roof-mounted isolators shall be bolted or welded to building structure.

C. Vibration Isolators for Non-Seismic Applications:
1. Type ____ - Resilient Material Isolator Pads, Non-Seismic:
   a. Description: Single or multiple layer pads utilizing elastomeric (e.g. neoprene, rubber) isolator material.
   b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
   c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
2. Type ____ - Resilient Material Isolator Mounts, Non-Seismic:
   a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g. neoprene, rubber) isolator material; fail-safe type.
3. Type ____ - Open (Unhoused) Spring Isolators, Non-Seismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
   b. Bottom Load Plate: Non-skid molded elastomeric isolator material or steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
4. Type ____ - Housed Spring Isolators, Non-Seismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
   b. Furnished with integral elastomeric snubbing elements, non-adjustable or adjustable type as indicated, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
   c. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.
   d. Furnished with integral leveling device for positioning and securing supported equipment.
5. Restrained Spring Isolators, Non-Seismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.
   b. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
6. Resilient Material Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g. neoprene, rubber) isolator material for the lower hanger rod connection.
7. Spring Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in

series with an elastomeric element for the lower hanger rod connection.
b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

8. Combination Resilient Material/Spring Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g. neoprene, rubber) isolator material for the upper hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.
9. Thrust Restraints, Non-Seismic:
   a. Description: Assembly utilizing free-standing, laterally stable steel spring designed for resisting horizontal motion due to thrust (e.g. air pressure from a fan), and intended for installation in pairs.

2.05 VIBRATION-ISOLATED ROOF CURBS

A. Manufacturers:
   1. Source Limitations: Furnish vibration-isolated roof curbs and associated accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. Vibration Isolation Rails and Curbs:
   1. Non-Seismic Curb Rail:
      a. Location: Between structure and rooftop equipment.
      b. Construction: Aluminum.
      c. Integral vibration isolation to conform to requirements of this section.
      d. Weather exposed components consist of corrosion resistant materials.
   2. Non-Seismic Curb:
      a. Location: Between structure and rooftop equipment.
      b. Construction: Aluminum.
      c. Integral vibration isolation to conform to requirements of this section.
      d. Weather exposed components consist of corrosion resistant materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 CODE-REQUIRED SPECIAL INSPECTIONS

A. Arrange work to accommodate tests and/or inspections performed by Special Inspection Agency employed by Owner in accordance with special inspections as required by applicable building code.

B. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
   1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

C. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.

D. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Curb and spring mounting shall be capable of withstanding wind loads of 110 MPH or the windloads required by local Authority Having Jurisdiction, whichever is greater.

D. Install in accordance with manufacturer's written instructions. Vibration isolators must not cause any change of position of equipment or piping resulting in piping stresses or misalignment

E. Mechanical equipment shall be isolated from the building structure by means of noise and vibration isolators as scheduled on the drawings or within these specifications.

F. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation systems herein specified.

G. Electrical circuit connections to isolated equipment shall be looped to allow free motion of isolated equipment.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Field-Welding (where approved by Architect): Comply with Section 055000.

J. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

K. Vibration Isolation Systems:
   1. Vibration-Isolated Equipment Support Bases:
      a. Provide specified minimum clearance beneath base.
      b. Mount floor mounted equipment on 4" (100 mm) high concrete housekeeping pads over complete floor area of equipment. Mount vibration isolating devices and related inertia blocks on concrete pad. Key housekeeping pads with hair pins, as required, to be integral with structural slab.
   2. Spring Isolators:
      a. Position equipment at operating height; provide temporary blocking as required.
      b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
      c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
   3. Isolator Hangers:
      a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
      b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
   4. Thrust Restraints:
      a. Adjust restraint movement under normal operating static pressure.
   5. All piping and ductwork to be isolated shall freely pass through walls and floors without rigid connections. Penetration points shall be sleeved or otherwise formed to allow passage of piping or ductwork, and maintain 3/4" to 1 1/4" (20 to 32 mm) clearance around the outside surfaces. This clearance space shall be tightly packed with fiberglass (except in cases of fire smoke dampers in ducts), and caulked airtight after installation of piping or ductwork.
   6. HVAC piping vertical risers larger than 2" (50 mm) in diameter shall be isolated from the building structure by means of noise and vibration isolation guides and supports.
   7. Isolators shall be installed with the isolator hanger box attached to, or hung as close as possible to, the structure. Hanger rods shall be aligned to clear the hanger box.

8. Isolators shall be suspended from substantial structural members, not from slab diaphragm unless specifically permitted.
9. Structural steel for cooling tower or other equipment must support the equipment without excessive deflection of the steel. The structural steel support shall not be resonant with the isolation system resonant frequencies or the driving frequencies of the supported equipment.
10. Isolate all piping and boiler breeching outside of shafts as follows:
    a. All water, steam and glycol piping and boiler breeching in machine rooms.
    b. Piping where exposed on roof.
    c. Water piping and boiler breeching within 50 ft (15 m), or 100 diameters, which ever is greater, from connected rotating equipment and pressure reducing stations.
    d. All other piping shall be rigidly supported and provided with approved seismic restraints to maintain the piping in a captive position without excessive motion.
    e. Do not use neoprene components on emergency generator exhaust.
    f. All piping 2" (50 mm) and over located in mechanical equipment rooms, and for a minimum of fifty (50) feet (15 m) or 100 pipe diameters, whichever is greater, from connection to vibrating mechanical or electrical equipment, shall be isolated from the building structure by means of noise and vibration isolation hangers, Combination spring/elastomer hanger rod isolators.
    g. Horizontal suspended pipe 2" (50 mm) and smaller and all steam piping shall be suspended by Elastomer hanger rod isolators with a minimum 3/8" (9.5 mm) deflection. Water pipe larger than 2" (50 mm) shall be supported by Combination spring/elastomer hanger rod isolators with a minimum 1" (25 mm), or same static deflection as isolated equipment to which pipe connects, whichever is greater.
    h. Horizontal pipe floor supported at slab shall be supported via Spring isolators, with a minimum static deflection of 1" (25 mm) or same deflection as isolated equipment to which pipe connects, whichever is the greater.
    i. Vertical riser pipe supports shall utilize Pad type elastomer mountings.
    j. Vertical riser guides, if required, shall avoid direct contact of piping with building.
    k. Pipe anchors, where required, shall utilize resilient pipe anchors, to avoid direct contact of piping with building.
    l. Pipe sway braces, where required, shall utilize two (2) neoprene elements (Pad type elastomer mountings to accommodate tension and compression forces).
    m. Pipe extension and alignment connectors: Provide connectors at riser takeoffs, cooling and heating coils, and elsewhere as required, to accommodate thermal expansion and misalignment.
11. Adjust, as required, all isolators to eliminate all contact of the isolated rod with the hanger rod box retainer or short circuiting of the spring.
12. Clean debris from beneath vibration-isolated equipment that could cause short circuiting of isolation.
13. Use elastomeric grommets for attachments where required to prevent short circuiting of isolation.
14. Adjust isolators to be free of isolation short circuits during normal operation.
15. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation control components for damage and defects.

C. Provide manufacturer representative or authorized technician services to assist with inspection and testing of vibration isolation systems. Submit a detailed copy of manufacturer recomended inspection, testing, and field report procedures.

D. Vibration Isolation Systems:
    1. Verify isolator static deflections.
    2. Verify required clearance beneath vibration-isolated equipment support bases.

3. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

E. VIBRATION TESTING
1. Vibration testing will be performed after the equipment is installed, aligned, dynamically balanced and commissioned. The mechanical contractor shall correct any deficiencies found with the new equipment as identified in the vibration analysis report. The vibration testing shall be as follows:
2. Equipment Vibration testing shall be performed by a certified vibration consultant. A report shall be provided indicating all of the pieces of equipment tested, the results of the tests and any deficiencies found.
3. Vibration allowances shall be as per the latest ASHRAE standard for rotating equipment
   a. Vibration shall not exceed 0.20 inches per second (0.20 in/sec), peak value throughout the operating range of the piece of rotating equipment. (If connected to a VFD.)
   b. Measurements for all equipment, at each point shall be taken at each axis (3 axis) throughout the entire operating range of the equipment. (If connected to a VFD.)
   c. Provide critical frequency lockouts for variable frequency drives systems. Critical frequencies are to be analyzed and programmed out of the drive with a finalized report of the critical speeds removed.
   d. The test for equipment connected and driven by a variable frequency drive shall include natural critical speed testing. Measurements shall be taken throughout the operating range of the equipment starting from a complete stop, ramping slowly up to maximum speed and pausing briefly at electrical and mechanical natural frequencies of the equipment / vfd from 0 to 60 hz. Program critical frequencies into the vfd onsite and provide a detailed report of the critical speed data.
   e. Tests for any piece of equipment not driven by a VFD shall be at their normal operating speed, under normal operating conditions.

F. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

G. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.05 SCHEDULE

A. Equipment Isolation Schedule.
1. HVAC Pumps.
   a. Base: Concrete inertia base.
   b. Base Thickness:
2. Fans and Fan sections

Unit Size, Static Pressure	RPM	Deflection (in.)
0-10 HP	All	2.0
15 and up, 0"-4" SP	0-300	3.5
15 and up, 0"-4" SP	301-500	2.5
15 and up, 0"-4" SP	501 and up	1.5
15 and up, 4" SP and up	0-300	3.5
15 and up, 4" SP and up	301-500	2.5
15 and up, 4" SP and up	501 and up	1.5

   a. Isolator Type: Bare Spring or Spring hanger rod
3. Air Cooled Condensing Units.
   a. Base: Structural steel base.

b. Isolator Type: Restrained open spring isolators.
c. Isolator Deflection: 2.0 inches.

4. Air Cooled Refrigerant Condensers.
   a. Base: Structural steel base.
   b. Isolator Type: Open spring isolators.
   c. Isolator Deflection: 1.5 inches.
5. Packaged Roof Top Air Conditioning Units.
   a. Base: Curb Mounted.
   b. Isolator Type: Restrained open spring isolators.
   c. Isolator Deflection: 1 inches.
6. Small fans , fan powered boxes -Indoors.
   a. Isolator Type: Open spring isolators.
   b. Isolator Deflection: 0.5 inches.

END OF SECTION 230547

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC - MASON

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.

B. Seismic control requirements.
   1. Includes requirements for seismic qualification of equipment not specified in this section.

C. Vibration-isolated equipment support bases.

D. Seismic restraint systems.

1.02 RELATED REQUIREMENTS

A. Section 014533 - Code-Required Special Inspections and Procedures.

B. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

C. Section 230529 - Hangers and Supports for HVAC Piping and Equipment.

1.03 DEFINITIONS

A. HVAC Component: Where referenced in this section in regards to seismic controls, applies to any portion of the HVAC system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g. ductwork, piping).

B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures 2010, with 2013 Supplements and Errata.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings 2016.

C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications 2015.

D. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc. 2017.

E. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components 2010, with Editorial Revision (2015).

F. MFMA-4 - Metal Framing Standards Publication 2004.

G. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association 2008.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to provide additional framing and materials required for installation.
   2. Seismic Controls:
      a. Coordinate the arrangement of seismic restraints with piping, conduit, equipment, and other potential conflicts installed under other sections or by others.

B. Sequencing:

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.

1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification method for spring element load capacities.
2. Seismic Controls: Include seismic load capacities.

D. Shop Drawings - Vibration Isolation Systems:

E. Shop Drawings - Seismic Controls:
1. Include dimensioned plan views and sections indicating proposed HVAC component locations and distributed system routing, with locations and details of gravity supports and seismic restraints and associated attachments.
2. Identify mounting conditions required for equipment seismic qualification.
3. Identify anchor manufacturer, type, minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
4. Indicate proposed arrangement of distributed system trapeze support groupings.
5. Indicate proposed locations for distributed system flexible fittings and/or connections.
6. Indicate locations of seismic separations where applicable.

F. Seismic Design Data:
1. Compile information on project-specific characteristics of actual installed HVAC components necessary for determining seismic design forces required to design appropriate seismic controls, including but not limited to the following.
   a. Component operating weight and center of gravity.
   b. Component elevation in the building in relation to the roof elevation (z/h).
   c. Component importance factor (Ip).
   d. For distributed systems, component materials and connection methods.
   e. Component amplification factor (ap) and component response modification factor (Rp), determined in accordance with ASCE 7 tables.
   f. Applicability of overstrength factor (for certain anchorage in concrete and masonry).
2. Include structural calculations, stamped or sealed by seismic controls designer, demonstrating suitability of seismic controls for seismic design forces. Engineer shall be registered in the state where the project is located.

G. Certification for seismically qualified equipment; identify basis for certification.

H. Evaluation Reports: For products specified as requiring evaluation and recognition by a qualified evaluation service, provide current evaluation reports.

I. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

J. Evidence of qualifications for seismic controls designer.

K. Evidence of qualifications for manufacturer.

L. Manufacturer’s detailed field testing and inspection procedures.

M. Field quality control test reports.

1.07 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Seismic Controls Designer Qualifications: Registered professional engineer licensed in the State in which the Project is located and with minimum five years experience designing seismic restraints for nonstructural components.
1. Designer may be employed by the manufacturer of the seismic restraint products.

D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

E. All vibration isolation and seismic restraint devices shall be the product of a single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION SYSTEM MANUFACTURERS

A. Kinetics Noise Control, Inc: www.kineticsnoise.com.

B. Mason Industries: www.mason-ind.com.

C. Vibration Eliminator Company, Inc: www.veco-nyc.com.

D. Vibration Mountings & Controls, Inc., Bloomingdale, NJ

E. Amber Booth, Houston, TX

2.02 SEISMIC CONRTOLS SYSTEM MANUFACTURERS

A. Kinetics Noise Control, Inc: www.kineticsnoise.com.

B. Mason Industries: www.mason-ind.com.

C. Vibration Eliminator Company, Inc: www.veco-nyc.com.

D. Vibration Mountings & Controls, Inc., Bloomingdale, NJ

E. Amber Booth, Houston, TX

F. ISAT, La Mirada, CA, http://www.isatsb.com/seismic-bracing.php

G. TOLCO by Eaton, Highland, IL

2.03 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
   1. Select vibration isolators to provide required static deflection.
   2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
   3. Select seismic type vibration isolators to comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
   4. Select vibration isolators for outdoor equipment to comply with wind design requirements.
   5. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2 inch operating clearance beneath base unless otherwise indicated.

D. Equipment Isolation: as indicated in part 3.

E. Piping Isolation:
   1. Provide vibration isolators for piping supports:
      a. Located in equipment rooms.
      b. Located within 50 feet of connected vibration-isolated equipment and pressure-regulating valve (PRV) stations.
      c. For piping over 2 inch located below or within 50 feet of noise-sensitive areas indicated.
   2. Minimum Static Deflection:
      a. First Three Supports Closest to Isolated Equipment: Same as static deflection of equipment; maximum of 2 inch deflection required.
      b. Remainder of Supports: 0.75 inch deflection unless otherwise indicated.
   3. Suspended Piping, Non-Seismic Applications: Use resilient material isolator hangers, spring isolator hangers, or combination resilient material/spring isolator hangers.

4. Suspended Piping, Seismic Applications: Use seismic type resilient material isolator hangers, seismic type spring isolator hangers, or seismic type combination resilient material/spring isolator hangers.
5. Floor-Mounted Piping, Non-Seismic Applications: Use open (unhoused) spring isolators.
6. Floor-Mounted Piping, Seismic Applications: Use seismic type restrained spring isolators.

F. Thrust Restraint Applications:
1. Use thrust restraints to resist horizontal motion due to thrust for fan heads, suspended fans, and base-mounted and suspended air handling equipment operating at 2.0 inches wg or greater total static pressure.
2. Minimum Static Deflection: Same as static deflection of equipment.
3. Limit lateral movement to 0.25 inch or less unless otherwise indicated.

2.04 SEISMIC CONTROL REQUIREMENTS

A. Design and provide HVAC component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor HVAC components.

B. Seismic Design Criteria: Obtain from project Structural Engineer of Record including Seismic Risk Category.

C. Component Importance Factor (Ip): For Seismic Risk Category IV, all HVAC components to be assigned a component importance factor (Ip) of 1.5 unless otherwise indicated.

D. Component Importance Factor (Ip): HVAC components essential to life safety to be assigned a component importance factor (Ip) of 1.5 as indicated or as required. This includes but is not limited to:
1. HVAC components required to function for life safety purposes after an earthquake.
2. HVAC components that support or otherwise contain hazardous substances.

E. Seismic Restraints:
1. Provide seismic restraints for HVAC components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
2. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
a. ASHRAE (HVACA).
b. SMACNA (SRM).
3. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third party registered professional engineer acceptable to authorities having jurisdiction.
4. Seismic Type Vibration Isolators:
a. Comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
5. External Seismic Snubber Assemblies:
a. Provide quantity and arrangement of external seismic snubber assemblies as required to restrain equipment in all directions (both lateral and vertical).
b. Do not use external seismic snubber assemblies that restrain equipment only in one or more lateral directions (but not vertical) except where uplift forces are zero or are addressed by other restraints.
6. Seismic Restraint Systems:
a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.
b. Use only cable restraints to restrain vibration-isolated HVAC components, including distributed systems.
c. Use only one restraint system type for a given HVAC component or distributed system (e.g. ductwork, piping) run; mixing of cable and rigid restraints on a given component/run is not permitted.

d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain HVAC component in all lateral directions; consider bracket geometry in anchor load calculations.
e. Use rod stiffener clips to attach bracing to hanger rods as required to prevent rod buckling from vertical (upward) compressive load introduced by cable or rigid restraints loaded in tension, in excess of downward tensile load due to supported HVAC component weight.
f. Select hanger rods and associated anchorage as required to accommodate vertical (downward) tensile load introduced by rigid restraints loaded in compression, in addition to downward tensile load due to supported HVAC component weight.
g. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.
h. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.
i. Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.

7. Ductwork Applications:
a. Provide independent support and seismic restraint for in-line components (e.g. fans, heat exchangers, humidifiers) having an operating weight greater than 75 pounds.
b. Positively attach appurtenances (e.g. dampers, louvers, diffusers) with mechanical fasteners.

F. Seismic Attachments:
1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
3. Do not use power-actuated fasteners.
4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
6. Concrete Housekeeping Pads:
a. Increase size of pad as required to comply with anchor requirements.
b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.

G. Seismic Interactions:
1. Include provisions to prevent seismic impact between HVAC components and other structural or nonstructural components.
2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.

H. Seismic Relative Displacement Provisions:
1. Use suitable fittings or flexible connections to accommodate:
a. Relative displacements at connections between components, including distributed systems (e.g. ductwork, piping); do not exceed load limits for equipment utility connections.
b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
c. Design displacements at seismic separations.
d. Anticipated drifts between floors.
2. Include provisions to prevent interruption of utility service due to seismic displacements.

2.05 PERFORMANCE REQUIREMENTS

A. General:
1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
2. Steel springs to function without undue stress or overloading.
3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
4. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75 percent of specified deflection.
5. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.

2.06 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

A. Manufacturers:
1. Source Limitations: Furnish vibration-isolated equipment support bases and associated components and accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. Vibration-Isolated Structural Steel Bases:
1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
2. Centrifugal Fan Applications: Provide adjustable motor slide rails as required.

2.07 VIBRATION ISOLATORS

A. Manufacturers:
1. Source Limitations: Furnish vibration-isolated equipment support bases and associated components and accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. Vibration Isolators for Non-Seismic Applications:
1. Resilient Material Isolator Pads:
a. Description: Single or multiple layer pads utilizing elastomeric (e.g. neoprene, rubber) isolator material.
b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
2. Resilient Material Isolator Mounts, Non-Seismic:
a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g. neoprene, rubber) isolator material; fail-safe type.
3. Open (Unhoused) Spring Isolators:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
b. Bottom Load Plate: Non-skid molded elastomeric isolator material or steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.
c. Furnished with integral leveling device for positioning and securing supported equipment.
4. Housed Spring Isolators:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
b. Furnished with integral elastomeric snubbing elements, non-adjustable or adjustable type as indicated, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
c. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.

d. Furnished with integral leveling device for positioning and securing supported equipment.

5. Restrained Spring Isolators, Non-Seismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.
   b. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
6. Resilient Material Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g. neoprene, rubber) isolator material for the lower hanger rod connection.
7. Spring Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.
8. Combination Resilient Material/Spring Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g. neoprene, rubber) isolator material for the upper hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.
9. Thrust Restraints:
   a. Description: Assembly utilizing free-standing, laterally stable steel spring designed for resisting horizontal motion due to thrust (e.g. air pressure from a fan), and intended for installation in pairs.

C. Vibration Isolators for Seismic Applications:
1. Resilient Material Isolator Mounts, Seismic:
   a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g. neoprene, rubber) isolator material; specifically designed and rated for seismic applications with integral snubbing in all directions.
2. Restrained Spring Isolators, Seismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) in series with elastomeric (e.g. neoprene, rubber) isolator material within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop; specifically designed and rated for seismic applications with integral snubbing in all directions.
   b. Bottom Load Plate: Steel with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
3. Resilient Material Isolator Hangers, Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g. neoprene, rubber) isolator material for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
4. Spring Isolator Hangers, Seismic:

a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

5. Combination Resilient Material/Spring Isolator Hangers, Seismic:
a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g. neoprene, rubber) isolator material for the upper hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

2.08 EXTERNAL SEISMIC SNUBBER ASSEMBLIES

A. Manufacturers:
1. Source Limitations: Furnish external seismic snubber assemblies and associated accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. Description: Steel snubbing assemblies designed for external attachment to both equipment and supporting structure that, as part of a complete system, restrain equipment motion in all directions during a seismic event while maintaining vibration isolation during normal operation.

C. Seismic Snubbing Elements:
1. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
2. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

2.09 SEISMIC RESTRAINT SYSTEMS

A. Source Limitations: Furnish seismic restraint system components and accessories produced by a single manufacturer and obtained from a single supplier.

B. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.

C. Cable Restraints:
1. Comply with ASCE 19.
2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
4. Use protective thimbles for cable loops where potential for cable damage exists.

D. Rigid Restraints: Use {\rs\#1} steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 CODE-REQUIRED SPECIAL INSPECTIONS

A. Arrange work to accommodate tests and/or inspections performed by Special Inspection Agency employed by Owner or Architect in accordance with Section 014533 and statement of

special inspections as required by applicable building code.

B. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
   1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

C. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.

D. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Secure fasteners according to manufacturer's recommended torque settings.

D. Field-Welding (where approved by Architect): Comply with Section 055000.

E. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

F. Vibration Isolation Systems:
   1. Vibration-Isolated Equipment Support Bases:
      a. Provide specified minimum clearance beneath base.
   2. Spring Isolators:
      a. Position equipment at operating height; provide temporary blocking as required.
      b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
      c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
   3. Isolator Hangers:
      a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
      b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
   4. Thrust Restraints:
      a. Adjust restraint movement under normal operating static pressure.
   5. Clean debris from beneath vibration-isolated equipment that could cause short circuiting of isolation.
   6. Use elastomeric grommets for attachments where required to prevent short circuiting of isolation.
   7. Adjust isolators to be free of isolation short circuits during normal operation.
   8. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

G. Seismic Controls:
   1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris, or other obstructions.
   2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
   3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.

4. Equipment with Sheet Metal Housings:
    a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
    b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
    c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
5. Concrete Housekeeping Pads:
    a. Size in accordance with seismic design to meet anchor requirements.
    b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.
6. Seismic Restraint Systems:
    a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
    b. Install restraints within permissible angles in accordance with seismic design.
    c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
    d. Install cable restraints for vibration-isolated components slightly slack to prevent short circuiting of isolation.
    e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Provide manufacturer representative or authorized technician services to assist with inspection and testing of vibration isolation systems and seismic controls. Submit a detailed copy of manufacturer recomended inspection, testing, and field report procedures.

D. Vibration Isolation Systems:
    1. Verify isolator static deflections.
    2. Verify required clearance beneath vibration-isolated equipment support bases.
    3. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

E. Seismic Controls:
    1. Verify snubbing element air gaps.

F. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

G. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.05 SCHEDULE

A. Equipment Isolation Schedule.

END OF SECTION 230548

1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification method for spring element load capacities.
2. Seismic Controls: Include seismic load capacities.

D. Shop Drawings - Vibration Isolation Systems:

E. Shop Drawings - Seismic Controls:
1. Include dimensioned plan views and sections indicating proposed HVAC component locations and distributed system routing, with locations and details of gravity supports and seismic restraints and associated attachments.
2. Identify mounting conditions required for equipment seismic qualification.
3. Identify anchor manufacturer, type, minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
4. Indicate proposed arrangement of distributed system trapeze support groupings.
5. Indicate proposed locations for distributed system flexible fittings and/or connections.
6. Indicate locations of seismic separations where applicable.

F. Seismic Design Data:
1. Compile information on project-specific characteristics of actual installed HVAC components necessary for determining seismic design forces required to design appropriate seismic controls, including but not limited to the following.
   a. Component operating weight and center of gravity.
   b. Component elevation in the building in relation to the roof elevation (z/h).
   c. Component importance factor (Ip).
   d. For distributed systems, component materials and connection methods.
   e. Component amplification factor (ap) and component response modification factor (Rp), determined in accordance with ASCE 7 tables.
   f. Applicability of overstrength factor (for certain anchorage in concrete and masonry).
2. Include structural calculations, stamped or sealed by seismic controls designer, demonstrating suitability of seismic controls for seismic design forces. Engineer shall be registered in the state where the project is located.

G. Certification for seismically qualified equipment; identify basis for certification.

H. Evaluation Reports: For products specified as requiring evaluation and recognition by a qualified evaluation service, provide current evaluation reports.

I. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

J. Evidence of qualifications for seismic controls designer.

K. Evidence of qualifications for manufacturer.

L. Manufacturer’s detailed field testing and inspection procedures.

M. Field quality control test reports.

1.07 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Seismic Controls Designer Qualifications: Registered professional engineer licensed in the State in which the Project is located and with minimum five years experience designing seismic restraints for nonstructural components.
1. Designer may be employed by the manufacturer of the seismic restraint products.

D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

E. All vibration isolation and seismic restraint devices shall be the product of a single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION SYSTEM MANUFACTURERS

A. Kinetics Noise Control, Inc: www.kineticsnoise.com.

B. Mason Industries: www.mason-ind.com.

C. Vibration Eliminator Company, Inc: www.veco-nyc.com.

D. Vibration Mountings & Controls, Inc., Bloomingdale, NJ

E. Amber Booth, Houston, TX

2.02 SEISMIC CONRTOLS SYSTEM MANUFACTURERS

A. Kinetics Noise Control, Inc: www.kineticsnoise.com.

B. Mason Industries: www.mason-ind.com.

C. Vibration Eliminator Company, Inc: www.veco-nyc.com.

D. Vibration Mountings & Controls, Inc., Bloomingdale, NJ

E. Amber Booth, Houston, TX

F. ISAT, La Mirada, CA, http://www.isatsb.com/seismic-bracing.php

G. TOLCO by Eaton, Highland, IL

2.03 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
   1. Select vibration isolators to provide required static deflection.
   2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
   3. Select seismic type vibration isolators to comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
   4. Select vibration isolators for outdoor equipment to comply with wind design requirements.
   5. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2 inch operating clearance beneath base unless otherwise indicated.

D. Equipment Isolation: as indicated in part 3.

E. Piping Isolation:
   1. Provide vibration isolators for piping supports:
      a. Located in equipment rooms.
      b. Located within 50 feet of connected vibration-isolated equipment and pressure-regulating valve (PRV) stations.
      c. For piping over 2 inch located below or within 50 feet of noise-sensitive areas indicated.
   2. Minimum Static Deflection:
      a. First Three Supports Closest to Isolated Equipment: Same as static deflection of equipment; maximum of 2 inch deflection required.
      b. Remainder of Supports: 0.75 inch deflection unless otherwise indicated.
   3. Suspended Piping, Non-Seismic Applications: Use resilient material isolator hangers, spring isolator hangers, or combination resilient material/spring isolator hangers.

4. Suspended Piping, Seismic Applications: Use seismic type resilient material isolator hangers, seismic type spring isolator hangers, or seismic type combination resilient material/spring isolator hangers.
5. Floor-Mounted Piping, Non-Seismic Applications: Use open (unhoused) spring isolators.
6. Floor-Mounted Piping, Seismic Applications: Use seismic type restrained spring isolators.

F. Thrust Restraint Applications:
1. Use thrust restraints to resist horizontal motion due to thrust for fan heads, suspended fans, and base-mounted and suspended air handling equipment operating at 2.0 inches wg or greater total static pressure.
2. Minimum Static Deflection: Same as static deflection of equipment.
3. Limit lateral movement to 0.25 inch or less unless otherwise indicated.

2.04 SEISMIC CONTROL REQUIREMENTS

A. Design and provide HVAC component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor HVAC components.

B. Seismic Design Criteria: Obtain from project Structural Engineer of Record including Seismic Risk Category.

C. Component Importance Factor (Ip): For Seismic Risk Category IV, all HVAC components to be assigned a component importance factor (Ip) of 1.5 unless otherwise indicated.

D. Component Importance Factor (Ip): HVAC components essential to life safety to be assigned a component importance factor (Ip) of 1.5 as indicated or as required. This includes but is not limited to:
1. HVAC components required to function for life safety purposes after an earthquake.
2. HVAC components that support or otherwise contain hazardous substances.

E. Seismic Restraints:
1. Provide seismic restraints for HVAC components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
2. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
a. ASHRAE (HVACA).
b. SMACNA (SRM).
3. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third party registered professional engineer acceptable to authorities having jurisdiction.
4. Seismic Type Vibration Isolators:
a. Comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
5. External Seismic Snubber Assemblies:
a. Provide quantity and arrangement of external seismic snubber assemblies as required to restrain equipment in all directions (both lateral and vertical).
b. Do not use external seismic snubber assemblies that restrain equipment only in one or more lateral directions (but not vertical) except where uplift forces are zero or are addressed by other restraints.
6. Seismic Restraint Systems:
a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.
b. Use only cable restraints to restrain vibration-isolated HVAC components, including distributed systems.
c. Use only one restraint system type for a given HVAC component or distributed system (e.g. ductwork, piping) run; mixing of cable and rigid restraints on a given component/run is not permitted.

d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain HVAC component in all lateral directions; consider bracket geometry in anchor load calculations.
e. Use rod stiffener clips to attach bracing to hanger rods as required to prevent rod buckling from vertical (upward) compressive load introduced by cable or rigid restraints loaded in tension, in excess of downward tensile load due to supported HVAC component weight.
f. Select hanger rods and associated anchorage as required to accommodate vertical (downward) tensile load introduced by rigid restraints loaded in compression, in addition to downward tensile load due to supported HVAC component weight.
g. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.
h. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.
i. Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.

7. Ductwork Applications:
a. Provide independent support and seismic restraint for in-line components (e.g. fans, heat exchangers, humidifiers) having an operating weight greater than 75 pounds.
b. Positively attach appurtenances (e.g. dampers, louvers, diffusers) with mechanical fasteners.

F. Seismic Attachments:
1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
3. Do not use power-actuated fasteners.
4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
6. Concrete Housekeeping Pads:
a. Increase size of pad as required to comply with anchor requirements.
b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.

G. Seismic Interactions:
1. Include provisions to prevent seismic impact between HVAC components and other structural or nonstructural components.
2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.

H. Seismic Relative Displacement Provisions:
1. Use suitable fittings or flexible connections to accommodate:
a. Relative displacements at connections between components, including distributed systems (e.g. ductwork, piping); do not exceed load limits for equipment utility connections.
b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
c. Design displacements at seismic separations.
d. Anticipated drifts between floors.
2. Include provisions to prevent interruption of utility service due to seismic displacements.

2.05 PERFORMANCE REQUIREMENTS

A. General:
1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
2. Steel springs to function without undue stress or overloading.
3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
4. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75 percent of specified deflection.
5. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.

2.06 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

A. Manufacturers:
1. Source Limitations: Furnish vibration-isolated equipment support bases and associated components and accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. Vibration-Isolated Structural Steel Bases:
1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
2. Centrifugal Fan Applications: Provide adjustable motor slide rails as required.

2.07 VIBRATION ISOLATORS

A. Manufacturers:
1. Source Limitations: Furnish vibration-isolated equipment support bases and associated components and accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. Vibration Isolators for Non-Seismic Applications:
1. Resilient Material Isolator Pads:
a. Description: Single or multiple layer pads utilizing elastomeric (e.g. neoprene, rubber) isolator material.
b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
2. Resilient Material Isolator Mounts, Non-Seismic:
a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g. neoprene, rubber) isolator material; fail-safe type.
3. Open (Unhoused) Spring Isolators:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
b. Bottom Load Plate: Non-skid molded elastomeric isolator material or steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.
c. Furnished with integral leveling device for positioning and securing supported equipment.
4. Housed Spring Isolators:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
b. Furnished with integral elastomeric snubbing elements, non-adjustable or adjustable type as indicated, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
c. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.

d. Furnished with integral leveling device for positioning and securing supported equipment.

5. Restrained Spring Isolators, Non-Seismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.
   b. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
6. Resilient Material Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g. neoprene, rubber) isolator material for the lower hanger rod connection.
7. Spring Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.
8. Combination Resilient Material/Spring Isolator Hangers, Non-Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g. neoprene, rubber) isolator material for the upper hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.
9. Thrust Restraints:
   a. Description: Assembly utilizing free-standing, laterally stable steel spring designed for resisting horizontal motion due to thrust (e.g. air pressure from a fan), and intended for installation in pairs.

C. Vibration Isolators for Seismic Applications:
1. Resilient Material Isolator Mounts, Seismic:
   a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g. neoprene, rubber) isolator material; specifically designed and rated for seismic applications with integral snubbing in all directions.
2. Restrained Spring Isolators, Seismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) in series with elastomeric (e.g. neoprene, rubber) isolator material within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop; specifically designed and rated for seismic applications with integral snubbing in all directions.
   b. Bottom Load Plate: Steel with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
3. Resilient Material Isolator Hangers, Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g. neoprene, rubber) isolator material for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
4. Spring Isolator Hangers, Seismic:

a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

5. Combination Resilient Material/Spring Isolator Hangers, Seismic:
a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g. neoprene, rubber) isolator material for the upper hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

2.08 EXTERNAL SEISMIC SNUBBER ASSEMBLIES

A. Manufacturers:
1. Source Limitations: Furnish external seismic snubber assemblies and associated accessories produced by the same manufacturer as the vibration isolators and obtained from a single supplier.

B. Description: Steel snubbing assemblies designed for external attachment to both equipment and supporting structure that, as part of a complete system, restrain equipment motion in all directions during a seismic event while maintaining vibration isolation during normal operation.

C. Seismic Snubbing Elements:
1. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
2. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

2.09 SEISMIC RESTRAINT SYSTEMS

A. Source Limitations: Furnish seismic restraint system components and accessories produced by a single manufacturer and obtained from a single supplier.

B. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.

C. Cable Restraints:
1. Comply with ASCE 19.
2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
4. Use protective thimbles for cable loops where potential for cable damage exists.

D. Rigid Restraints: Use {\rs\#1} steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 CODE-REQUIRED SPECIAL INSPECTIONS

A. Arrange work to accommodate tests and/or inspections performed by Special Inspection Agency employed by Owner or Architect in accordance with Section 014533 and statement of

special inspections as required by applicable building code.

B. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
   1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

C. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.

D. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Secure fasteners according to manufacturer's recommended torque settings.

D. Field-Welding (where approved by Architect): Comply with Section 055000.

E. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

F. Vibration Isolation Systems:
   1. Vibration-Isolated Equipment Support Bases:
      a. Provide specified minimum clearance beneath base.
   2. Spring Isolators:
      a. Position equipment at operating height; provide temporary blocking as required.
      b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
      c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
   3. Isolator Hangers:
      a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
      b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
   4. Thrust Restraints:
      a. Adjust restraint movement under normal operating static pressure.
   5. Clean debris from beneath vibration-isolated equipment that could cause short circuiting of isolation.
   6. Use elastomeric grommets for attachments where required to prevent short circuiting of isolation.
   7. Adjust isolators to be free of isolation short circuits during normal operation.
   8. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

G. Seismic Controls:
   1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris, or other obstructions.
   2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
   3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.

4. Equipment with Sheet Metal Housings:
    a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
    b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
    c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
5. Concrete Housekeeping Pads:
    a. Size in accordance with seismic design to meet anchor requirements.
    b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.
6. Seismic Restraint Systems:
    a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
    b. Install restraints within permissible angles in accordance with seismic design.
    c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
    d. Install cable restraints for vibration-isolated components slightly slack to prevent short circuiting of isolation.
    e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Provide manufacturer representative or authorized technician services to assist with inspection and testing of vibration isolation systems and seismic controls. Submit a detailed copy of manufacturer recomended inspection, testing, and field report procedures.

D. Vibration Isolation Systems:
    1. Verify isolator static deflections.
    2. Verify required clearance beneath vibration-isolated equipment support bases.
    3. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

E. Seismic Controls:
    1. Verify snubbing element air gaps.

F. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

G. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.05 SCHEDULE

A. Equipment Isolation Schedule.

END OF SECTION 230548

SECTION 230549
NOISE CONTROL AND ACOUSTICAL PERFORMANCE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions for Heating, Ventilating and Air Conditioning Work, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.02 SUMMARY

A. It is the objective of this Specification to provide the necessary design requirements for the noise control measures and acoustical performance criteria for mechanical systems.

B. Work in this section includes the providing of labor, materials, equipment and services necessary for a complete installation of sound control for every mechanical system including piping and ductwork within and on the roof of the building, complete, as shown and specified per the contract documents and all applicable codes and authorities having jurisdiction for the following:
   1. Duct silencers.
      a. Absorptive silencers.
      b. Film-lined silencers.
      c. Packless silencers.

1.03 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

B. Section 092116 - Gypsum Board Assemblies: Sealing acoustical gaps in gypsum board walls.

C. Section 092300 - Gypsum Plastering: Sealing acoustical gaps in gypsum plaster work.

D. Section 092400 - Cement Plastering: Sealing acoustical gaps in Portland cement plaster work.

E. Section 092613 - Gypsum Veneer Plastering: Sealing acoustical gaps in gypsum veneer plaster work.

F. Section 230547 - Vibration Controls for HVAC

G. Section 233100 - HVAC Ducts and Casings.

H. Section 233300 - Air Duct Accessories.

I. Section 232113 - Hydronic Piping

J. Section 232213 - Steam and Condensate Heating Piping

1.04 CODE AND REFERENCE STANDARDS

A. Published Specifications' standards, tests or recommended methods of trade, industry or governmental organizations that apply to work in this Section, latest Edition.

B. Comply with all applicable national, state and local codes. Refer to General Provisions Section for additional reference standards.

C. AABC (NSTSB) -

D. NEBB (STDS) - Procedural Standard for Measurement of Sound and Vibration

E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans

F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data

G. AMCA 302 - Application of Sone Ratings for Non-Ducted Air Moving Devices

H. AMCA 303 - Application of Sound Power Level Ratings for Fans

I. ANSI S1.8 - American National Standard Reference Values for Levels Used in Acoustics and Vibrations

J. ANSI S1.13 - American National Standard Measurement of Sound Pressure Levels in Air

K. ANSI S12.1 - American National Standard Guidelines for the Preparation of Standard Procedures to Determine the Noise Emission from Sources

L. ASHRAE Std 62.1-2019 - Ventilation for Acceptable Indoor Air Quality

M. ASHRAE (HVACA)-2015 - ASHRAE Handbook - HVAC Applications

N. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

O. ASTM E477 - Standard Test Method for Laboratory Measurements of Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers

P. ASTM E596 - Standard Test Method for Laboratory Measurement of Noise Reduction of Sound-Isolating Enclosures

Q. ASTM C553 - Mineral Fiber Blanket And Felt Insulation.

R. ASTM C612 - Mineral Fiber Block And Board Thermal Insulation.

S. ASTM E84- Surface Burning Characteristics Of Building Materials.

T. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

U. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

V. UL 723 - Surface Burning Characteristics Of Building Materials.

W. UL 181- Factory-Made Air Ducts And Air Connectors

X. ASTM C1071 - Standard Specification For Fibrous Glass Duct Lining Insulation

Y. ASTM C423 - Standard Test Method For Sound Absorption And Sound Absorption Coefficients By The Reverberation Room Method

Z. ASTM E795 - Standard Practices For Mounting Test Specimens During Sound Absorption Tests

AA. ASTM C919 - Standard Practice For Use Of Sealants In Acoustical Applications

BB. NFPA 90A - Standard For The Installation Of Air-Conditioning And Ventilating Systems

CC. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment

DD. AHRI 575 - Method of Measuring Machinery Sound Within an Equipment Space

EE. AHRI 885 with Addendum 1 - Procedure For Estimating Occupied Space Sound Levels In The Application Of Air Terminals And Air Outlets

FF. ASTM E1414/E1414M - Standard Test Method For Airborne Sound Attenuation Between Rooms Sharing A Common Ceiling Plenum.

GG. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible

1.05 SUBMITTAL AND DATA REQUIREMENTS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Submit data for each product indicated.

C. Product Data: Provide catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance.

D. Shop Drawings: Indicate assembly, materials, thicknesses, dimensional data, pressure losses, acoustical performance, layout, and connection details.

E. Design Data: Provide engineering calculations, referenced to specifications and AHRI 270, AMCA 301, AMCA 302, AMCA 303, and ANSI S12.1 standards indicating that maximum room sound levels are not exceeded.

F. Test Reports: Indicate dynamic insertion loss and noise generation values of silencers.

G. Manufacturer's Installation Instructions: Indicate installation procedures necessary to maintain integrity of sound isolation.

H. Manufacturer's Field Reports: Indicate installation is complete and in accordance with instructions.

I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Sound traps and silencers
1. Include certified test data of sound attenuation and self-generated flow noise.

1.06 QUALITY ASSURANCE

A. Applicator: Company specializing in sound trap construction with five years minimum experience.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

C. Design application of duct silencers under direct supervision of a Professional Engineer experienced in design of this work and licensed the State in which the Project is located.

D. Perform Work in accordance with AHRI 575, AMCA 300, or ANSI S1.13 standards and recommendations of ASHRAE Std 68.

E. Acoustical Criteria:
1. Noise levels due to equipment and ductwork shall permit attaining sound pressure levels in all 8 octave bands in occupied spaces conforming to noise criteria established by the acoustic consultant.
2. Noise levels due to equipment and ductwork shall permit attaining sound pressure levels in all 8 octave bands in occupied spaces conforming to noise Criteria (NC) curves as follows:

Conference Rooms	NC-35
Auditorium	NC-30
Video-Conference Rooms	NC-30
Lobbies, Toilets, Corridors, Computer Terminal Rooms, Laboratories (without fume hoods), Retail Tenant Spaces, Spaces within 10 feet of duct penetration through floor and walls of fan rooms	NC-45
Storage, Locker Rooms	NC-50
Kitchen, Laundry, Computer Rooms	NC-50
Laboratories with fume hoods	NC-55
Garage	NC-60+

F. MECHANICAL EQUIPMENT ACOUSTICAL DESIGN PERFORMANCE
1. Air Distribution System:
a. Air Control Device Noise:
1) Maximum permissible sound-power levels in octave bands of airborne transmission through the combination of grille, registers, diffusers, and terminal units or related pressure reducing devices, when operated at the maximum inlet pressure and cfm in installed condition per plans and specifications shall be as per the acoutic consultants criteria.
b. Air Control Device Noise:
1) Maximum permissible sound-power levels in octave bands of airborne transmission through the combination of grille, registers, diffusers, and terminal units or related pressure reducing devices, when operated at the maximum inlet pressure and cfm in installed condition per plans and specifications shall be as follows:

AIR DISTRIBUTION SYSTEM EQUIPMENT/TERMINAL DEVICE NOISE, MAX. PWL (dB re 10-12 Watt)					
Octave	**NC-30**	**NC-35**	**NC-40**	**NC-45**	**NC-50+**

Band					
1	58	62	66	68	70
2	50	56	60	63	66
3	45	49	54	58	62
4	41	46	51	56	61
5	38	43	48	53	58
6	37	42	47	52	57
7	36	41	46	51	56
8	37	42	47	52	57

2) Air Control Device Radiated Noise, including Air Terminal Units, VAV, CAV and Fan Powered Boxes.
   (a) Maximum permissible radiated sound-power levels in octave bands of pressure reducing valves when operated at the maximum inlet pressure and air quantity in an installed condition over occupied spaces shall be as follows:

RADIATED SOUND POWER, MAX. PWL (dB re 10-12 WATT)				
Octave Band	**NC-35**	**NC-40**	**NC-45**	**NC-50+**
1	72	76	79	82
2	70	74	77	80
3	61	65	68	71
4	60	64	68	72
5	57	62	68	72
6	56	60	65	70
7	66	70	75	80
8	65	70	75	80

c. The project criterion of NC-35 for private offices and NC-40 for all other spaces over which the box is located shall be certified at the design air flow rate and 1.5"w.g. inlet pressure and 0.3"w.g. discharge pressure.
   1) The manufacturer shall, in addition to meeting the above sound power limits, test or provide substantiating data showing that all units have been tested in a mock-up office ceiling plenum. The mock-up office test shall be representative of the project conditions in terms of:
      (a) Ceiling plenum depth and project ceiling type and ceiling grid type.
      (b) Light fixtures and return air provisions. (NOTE: For worst-case scenario, the light fixture and/or return air grille shall be located directly below the unit.)
      (c) Project inlet and discharge ductwork (i.e., hard ductwork).
      (d) Mock-up office walls shall terminate at the slab above, unless the project conditions indicate otherwise.
   2) The units shall be tested at the maximum design air flow rates and specified inlet pressures of 1.5" wg and downstream pressure of 0.3" w.g.

2. Acoustical Performance Within Equipment Spaces:
   a. Equipment room noise levels and noise transmission to adjacent buildings shall comply with all Federal, State and City Noise Ordinances.
3. Motor Acoustical Performance:
   a. Motor drives for pumps and refrigeration machine, when installed per plans and specifications, shall operate with noise levels not exceeding 90 dB(A).
   b. Noise levels shall be determined in accordance with IEEE Standard #85 Test "Procedure for Airborne Noise Measurements on Rotating Electric Equipment."
4. Cooling Towers and Condensers Acoustical Performance:

a. The maximum permissible noise levels under design operating conditions shall be in accordance with applicable Building code requirements

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable Building Code for sound levels at the property line.

B. Comply with applicable codes for sound levels between wall partitions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Duct Silencers
1. Price Industries, Inc
2. SEMCO LLC, Flakt Woods Group
3. Vibro-Acoustics, A Swegon Group Company
4. IAC Acoustics, A Division of Sound Seal; _____

2.02 DUCT SILENCERS

A. Description: Duct section with sheet metal outer casing, sound absorbing fill material, and inner casing of perforated sheet metal; incorporating interior baffles of similar construction.

B. General Requirements:
1. Casing, sealants, adhesives, accessory materials, and packing materials to comply with ASTM E84.
2. Airstream surfaces installed in a return air plenum to comply with requirements in ASHRAE Std 62.1.
3. Factory-fabricated, field-installed products.
a. Shell:
1) Galvanized steel: minimum 22 USSG (0.85 mm).
2) Leakproof at pressure differential of 8 inch wg (200 mm wg).
b. Media:
1) Flamespread: maximum 25.
2) Fuel contributed and smoke developed: maximum 20.
3) Minimum 1.5 lbs per cubic foot (24 kg/m) density glass or mineral fiber packed under 5 percent compression.
4) Filler to be inert, vermin and moisture proof.
c. Inner Casing and Splitters: Minimum 24 gauge, 0.0239 thick perforated galvanized steel.

C. Geometry:
1. Circular straight with center bodies or pods.
2. Rectangular straight with splitters or baffles.
3. Specialty or custom geometry.

D. Provide all required duct transition pieces and connections. Connections to match ductwork being connected to.

E. Protective plastic film shall be provided between air stream and fill to prevent any intermingling of the airstream with the fill material.

F. Silencers for fume hoods or other hazardous exhaust systems shall have no media (packless).

G. Net Insertion Ratings: Determined by duct-to-reverberant room test method at design airflow shall be as per ascoustic consultants criteria

H. Certified Tests:
1. Submit certified test data from approved laboratory for pressure drop and insertion loss ratings.
2. For square or rectangular attenuators: 24 inch x 24 inch (610 mm x 610 mm).
3. For round attenuators: 24 inch (610 mm) diameter.
4. Certification data for pressure drop and net insertion loss based on tests of same attenuator.

5. Attenuators and tests: Subject to inspection upon request of Architect or Engineer.

2.03 TRANSFER AIR DUCTS AND CROSS-TALK SILENCERS

A. Fabricate in accordance with SMACNA (DCS) HVAC Duct Construction Standards.

B. Configuration: Rectangular, "L", "Z" and "U" configurations as indicated.

C. Materials:
1. Outer Casing: Minimum 22 gauge, 0.0299 inch thick galvanized steel with mastic filled lock formed seams.

2.04 NON-HARDENING CAULKING:

A. Guaranteed to be permanently elastic.

B. Similar to Tremco Polybutene.

PART 3 EXECUTION

3.01 DUCT SILENCERS

A. Install in accordance with manufacturer's recommendations and instructions to obtain published performance.

B. Maximum static pressure loss: Refer to schedules.

C. Support duct silencers independent of ducts

3.02 TRANSFER AIR DUCTS AND CROSS-TALK SILENCERS

A. Install transfer air ducts and cross-talk silencers above ceiling unless otherwise indicated.

3.03 TESTS

A. Noise Criterion Levels
1. After air systems are properly air balanced, the resulting octave band noise levels should be measured by acoustical consultant in all spaces specified to determine compliance.
2. If any design noise levels are exceeded, the air balancer should check all air moving devices to insure all fan systems are operating at the lowest rpm and static pressure to deliver (exhaust) the design cfm (l/s) from the most remote point. If the balancer needs to make a sheave change to accomplish this, the change should be at no charge to the owner.

END OF SECTION 230549

SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.
B. Tags.
C. Charts
D. Adhesive-backed duct markers.
E. Pipe markers.
F. Ceiling tacks.
G. Warning signs and labels

1.02 RELATED REQUIREMENTS

A. Section 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.
B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials 2017.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.
B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
D. Product Data: Provide manufacturers catalog literature for each product required.
E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.
B. Air Terminal Units: Tags.
C. Automatic Controls: Tags. Key to control schematic.
D. Control Panels: Nameplates.
E. Dampers: Ceiling tacks, where located above lay-in ceiling.
F. Ductwork: Nameplates.
G. Heat Transfer Equipment: Nameplates.
H. Instrumentation: Tags.
I. Major Control Components: Nameplates.
J. Piping: Tags.
K. Small-sized Equipment: Tags.
L. Thermostats: Nameplates.
M. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC; _____: www.advancedgraphicengraving.com.

2. Brimar Industries, Inc; _____: www.pipemarker.com.
3. Craftmark Pipe Markers; _____: www.craftmarkid.com.
4. Kolbi Pipe Marker Co; _____: www.kolbipipemarkers.com.
5. Seton Identification Products, a Tricor Direct Company; _____: www.seton.com.

B. Letter Color: White.

C. Letter Height: 1/4 inch.

D. Background Color: Black.

E. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Manufacturers:
1. Advanced Graphic Engraving; _____: www.advancedgraphicengraving.com.
2. Brady Corporation; _____: www.bradycorp.com.
3. Brimar Industries, Inc; _____: www.pipemarker.com.
4. Craftmark Pipe Markers; _____: www.craftmarkid.com.
5. Kolbi Pipe Marker Co; _____: www.kolbipipemarkers.com.
6. Seton Identification Products, a Tricor Company; _____: www.seton.com.

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags:
1. Material and Thickness: Brass, 0.032-inch (0.8-mm), Stainless steel, 0.025-inch (0.64-mm), Aluminum, 0.032-inch (0.8-mm), or anodized aluminum, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
3. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 CHARTS

A. Provide valve tag chart indicating valve number, system, type, size, location and function for all valves.

B. Mount in aluminum frame and glass.

C. Letter and number valves and controls to correspond with designations on metal tags.

D. Fasten charts permanently in locations, as directed, with four brass screws.

E. Supplement numbering and lettering of charts of existing building.

2.05 ADHESIVE-BACKED DUCT MARKERS

A. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; printed with UV and chemical resistant inks.

B. Style: Individual Label.

C. Color: Yellow/Black.

2.06 PIPE MARKERS

A. Manufacturers:
1. Brady Corporation; _____: www.bradycorp.com.
2. Brimar Industries, Inc; _____: www.pipemarker.com.
3. Craftmark Pipe Markers; _____: www.craftmarkid.com.

4. Kolbi Pipe Marker Co; _____: www.kolbipipemarkers.com.
5. MIFAB, Inc; _____: www.mifab.com.
6. Seton Identification Products, a Tricor Company; _____: www.seton.com.

B. Color: Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Color code as follows:
1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

2.07 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

B. Color code as follows:
1. HVAC Equipment: Yellow.
2. Fire Dampers and Smoke Dampers: Red.
3. Heating/Cooling Valves: Blue.

2.08 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch (1.6 mm) thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. In paragraph below, describe required label content. The objective of labeling equipment is to coordinate it with Drawings, including plans, details, and schedules. This will allow other information, such as capacities and operating characteristics, to be obtained.

J. Label Content: Include caution and warning information, plus emergency notification instructions.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.
   2. Install in clear view and align with axis of piping.
   3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

F. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 230553

SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic, steam, and refrigerating systems.

C. Measurement of final operating condition of HVAC systems.

D. Vibration measurement of equipment operating conditions.

E. Space pressurization testing and adjusting.

F. Existing systems TAB.

G. Verifying that automatic control devices are functioning properly.

H. Commissioning activities.

I. Reporting results of activities and procedures specified in this Section.

1.02 RELATED REQUIREMENTS

A. Section 012100 - Allowances: Inspection and testing allowances.

B. Section 014000 - Quality Requirements: Employment of testing agency and payment for services.

C. Section 019113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.

D. Section 250500 - Common Work Results for Integrated Automation.

1.03 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition 2016.

B. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods 2016, with Errata.

C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems 2008, with Errata (2019).

D. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems 2019.

E. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing 2002.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Architect.
   2. Submit to the Commissioning Authority.
   3. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   4. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
   5. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Identification and types of measurement instruments to be used and their most recent calibration date.

d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
e. Final test report forms to be used.
f. Detailed step-by-step procedures for TAB work for each system and issue, including:
   1) Terminal flow calibration (for each terminal type).
   2) Diffuser proportioning.
   3) Branch/submain proportioning.
   4) Total flow calculations.
   5) Rechecking.
   6) Diversity issues.
g. Procedures for formal deficiency reports, including scope, frequency and distribution.

C. Field Logs: Submit at least once a week to the Commissioning Authority.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit under provisions of Section 014000.
2. Submit to the the Commissioning Authority within two weeks after completion of testing, adjusting, and balancing.
3. Revise TAB plan to reflect actual procedures and submit as part of final report.
4. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
6. Include signature of TAB firm who certifies the report.
7. Provide table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
8. Provide summary of contents including the following:
   a. Indicated versus final performance.
   b. Notable characteristics of systems.
   c. Description of system operation sequence if it varies from the Contract Documents.
9. Provide nomenclature sheets for each item of equipment.
10. Provide notes to explain why certain final data in the body of reports varies from indicated values.
11. Provide test conditions for fans and pump performance forms including the following:
   a. Settings for outside-, return-, and exhaust-air dampers.
   b. Conditions of filters.
   c. Cooling coil, wet- and dry-bulb conditions.
   d. Face and bypass damper settings at coils.
   e. Fan drive settings including settings and percentage of maximum pitch diameter.
   f. Settings for supply-air, static-pressure controller.
   g. Other system operating conditions that affect performance.
12. Provide system Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
   a. Quantities of outside, supply, return, and exhaust airflows.
   b. Water and steam flow rates.
   c. Duct, outlet, and inlet sizes.
   d. Pipe and valve sizes and locations.
   e. Terminal units.
   f. Balancing stations.
   g. Position of balancing devices.
13. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
14. Units of Measure: Report data in I-P (inch-pound) units only.
15. Include the following on the title page of each report:
   a. Name of Testing, Adjusting, and Balancing Agency.

b. Address of Testing, Adjusting, and Balancing Agency.
c. Telephone number of Testing, Adjusting, and Balancing Agency.
d. Project name.
e. Project location.
f. Project Architect.
g. Project Engineer.
h. Project Contractor.
i. Project altitude.
j. Report date.

E. Project Record Documents: Record actual locations of flow measuring stations.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
1. AABC (NSTSB), AABC National Standards for Total System Balance.
2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
2. Having minimum of three years documented experience.
3. Certified by one of the following:
a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
b. NEBB, National Environmental Balancing Bureau: www.nebb.org.

E. TAB Supervisor Qualifications: Professional Engineer licensed in the State in which the Project is located.

F. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.
1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.

13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers whose work will be tested, adjusted, or balanced.

B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

C. Pre-construction air and water testing.
1. Measure pressure, temperature, and volume of air from existing base building system before starting work. Traverse main supply and return ducts before work to obtain total flow. Submit report to engineer immediately after completion of test.
2. Measure flowrate of water (chilled, glycol, hot, condenser water) and differential pressure across risers or mains to space to determine flowrate, entering and differential pressure being provided.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.06 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

M. On fan powered VAV boxes, adjust air flow switches for proper operation.

N. Cut insulation, ducts, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.

3.07 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

G. Cut insulation, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.

3.08 PROCEDURES FOR SPACE PRESSURIZATION MEASUREMENTS AND ADJUSTMENTS

A. Before testing for space pressurization, observe the space to verify the integrity of the space boundaries. Verify that windows and doors are closed and applicable safing, gaskets, and sealants are installed. Report deficiencies and postpone testing until after the reported deficiencies are corrected.

B. Measure, adjust, and record the pressurization of each room, each zone, and each building by adjusting the supply, return, and exhaust airflows to achieve the indicated conditions.

C. Measure space pressure differential where pressure is used as the design criteria, and measure airflow differential where differential airflow is used as the design criteria for space pressurization.

1. For pressure measurements, measure and record the pressure difference between the intended spaces at the door with all doors in the space closed. Record the high-pressure side, low-pressure side, and pressure difference between each adjacent space.
2. For applications with cascading levels of space pressurization, begin in the most critical space and work to the least critical space.
3. Test room pressurization first, then zones, and finish with building pressurization.

D. To achieve indicated pressurization, set the supply airflow to the indicated conditions and adjust the exhaust and return airflow to achieve the indicated pressure or airflow difference.

E. For spaces with pressurization being monitored and controlled automatically, observe and adjust the controls to achieve the desired set point.
1. Compare the values of the measurements taken to the measured values of the control system instruments and report findings.
2. Check the repeatability of the controls by successive tests designed to temporarily alter the ability to achieve space pressurization. Test overpressurization and underpressurization, and observe and report on the system's ability to revert to the set point.
3. For spaces served by variable-air-volume supply and exhaust systems, measure space pressurization at indicated airflow and minimum airflow conditions.

F. In spaces that employ multiple modes of operation, such as normal mode and emergency mode or occupied mode and unoccupied mode, measure, adjust, and record data for each operating mode.

G. Record indicated conditions and corresponding initial and final measurements. Report deficiencies.

3.09 PROCEDURES FOR VIBRATION MEASUREMENTS

A. Use a vibration meter meeting the following criteria:
1. Solid-state circuitry with a piezoelectric accelerometer.
2. Velocity range of 0.1 to 10 inches per second.
3. Displacement range of 1 to 100 mils.
4. Frequency range of at least 0 to 1000 Hz.
5. Capable of filtering unwanted frequencies.

B. Calibrate the vibration meter before each day of testing.
1. Use a calibrator provided with the vibration meter.
2. Follow vibration meter and calibrator manufacturer's calibration procedures.

C. Perform vibration measurements when other building and outdoor vibration sources are at a minimum level and will not influence measurements of equipment being tested.
1. Turn off equipment in the building that might interfere with testing.
2. Clear the space of people.

D. Perform vibration measurements after air and water balancing and equipment testing is complete.

E. Clean equipment surfaces in contact with the vibration transducer.

F. Position the vibration transducer according to manufacturer's written instructions and to avoid interference with the operation of the equipment being tested.

G. Measure and record vibration on rotating equipment over 3 hp.

H. Measure and record equipment vibration, bearing vibration, equipment base vibration, and building structure vibration. Record velocity and displacement readings in the horizontal, vertical, and axial planes.
1. Fans and HVAC Equipment with Fans:
a. Fan Bearing: Drive end and opposite end.
b. Motor Bearing: Drive end and opposite end.
c. Equipment Casing: Top and side.
d. Equipment Base: Top and side.

e. Building: Floor.
f. Ductwork: To and from equipment after flexible connections.
g. Piping: To and from equipment after flexible connections.

2. Chillers and HVAC Equipment with Compressors:
a. Compressor Bearing: Drive end and opposite end.
b. Motor Bearing: Drive end and opposite end.
c. Equipment Casing: Top and side.
d. Equipment Base: Top and side.
e. Building: Floor.
f. Piping: To and from equipment after flexible connections.

I. For equipment with vibration isolation, take floor measurements with the vibration isolation blocked solid to the floor and with the vibration isolation floating. Calculate and report the differences.

J. Inspect, measure, and record vibration isolation.
1. Verify that vibration isolation is installed in the required locations.
2. Verify that installation is level and plumb.
3. Verify that isolators are properly anchored.
4. For spring isolators, measure the compressed spring height, the spring OD, and the travel-to-solid distance.
5. Measure the operating clearance between each inertia base and the floor or concrete base below. Verify that there is unobstructed clearance between the bottom of the inertia base and the floor.

3.10 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the refrigerant charge.
4. Check the condition of filters.
5. Check the condition of coils.
6. Check the operation of the drain pan and condensate drain trap.
7. Check bearings and other lubricated parts for proper lubrication.
8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished.
1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
1. Compare the indicated airflow of the renovated work to the measured fan airflows and determine the new fan, speed, filter, and coil face velocity.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the airflow and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated airflow and water flow rates. If 5 percent or less, equipment adjustments are not required.
4. Air balance each air outlet.

3.11 COMMISSIONING

A. See Sections 019113 - General Commissioning Requirements for additional requirements.

B. Perform prerequisites prior to starting commissioning activities.

C. Fill out Prefunctional Checklists for:
   1. Air side systems.
   2. Water side systems.

D. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.

E. Re-check minimum outdoor air intake flows and maximum and intermediate total airflow rates for 100 percent of the air handlers plus a random sample equivalent to 100 percent of the final TAB report data as directed by Commissioning Authority.
   1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
   2. Use the same test instruments as used in the original TAB work.
   3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
   4. For purposes of re-check, failure is defined as follows:
      a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
      b. Minimum Outside Air Flow: Deviation of more than 20 percent of instrument reading; for inlet vane or VFD OSA compensation system using linear proportional control, deviation of more than 30 percent at intermediate supply flow.
      c. Temperatures: Deviation of more than one degree F.
      d. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
      e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
   5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.

F. In the presence of the Commissioning Authority, verify that:
   1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
   2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
   3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

G. SCOPE
   1. Test, adjust, and balance the following:
      a. Air Cooled Refrigerant Condensers.
      b. Packaged Roof Top Heating/Cooling Units.
      c. Air Coils.
      d. Terminal Heat Transfer Units.
      e. Air Handling Units.

f. Fans.
g. Air Filters.
h. Air Terminal Units.
i. Air Inlets and Outlets.

H. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data: Include the following:
a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Sheave make, size, and bore.
g. Sheave dimensions, center-to-center, and amount of adjustments.
h. Number of belts, make, and size.
i. Number of filters, type, and size.
2. Motor Data:
a. Make and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size, and bore.
f. Sheave dimensions, center-to-center, and amount of adjustments.
3. Test Data (Indicated and Actual Values):
a. Total airflow rate.
b. Total system static pressure.
c. Fan rpm.
d. Discharge static pressure.
e. Filter static-pressure differential.
f. Preheat coil static-pressure differential.
g. Cooling coil static-pressure differential.
h. Heating coil static-pressure differential.
i. Outside airflow.
j. Return airflow.
k. Outside-air damper position.
l. Return-air damper position.

I. Apparatus-Coil Test Reports:
1. Coil Data:
a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft..
h. Tube size in NPS.
i. Tube and fin materials.
2. Test Data (Indicated and Actual Values):
a. Airflow rate.
b. Average face velocity.
c. Air pressure drop.
d. Outside-air, wet- and dry-bulb temperatures.
e. Return-air, wet- and dry-bulb temperatures.
f. Entering-air, wet- and dry-bulb temperatures.

g. Leaving-air, wet- and dry-bulb temperatures.
h. Water flow rate.
i. Water pressure differential.
j. Entering-water temperature.
k. Leaving-water temperature.
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure.
n. Refrigerant suction temperature.
o. Inlet steam pressure.

J. MINIMUM DATA TO BE REPORTED
1. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
   a. Include a list of instruments used for procedures, along with proof of calibration.
2. Electric Motors:
   a. Manufacturer.
   b. Model/Frame.
   c. HP/BHP.
   d. Phase, voltage, amperage; nameplate, actual, no load.
   e. RPM.
   f. Service factor.
   g. Starter size, rating, heater elements.
   h. Sheave Make/Size/Bore.
   i. Efficiency rating.
3. Electric Motors Driven by Variable-Frequency Controllers:
   a. Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.
4. V-Belt Drives:
   a. Identification/location.
   b. Required driven RPM.
   c. Driven sheave, diameter and RPM.
   d. Belt, size and quantity.
   e. Motor sheave diameter and RPM.
   f. Center to center distance, maximum, minimum, and actual.
5. Air Cooled Condensers:
   a. Identification/number.
   b. Location.
   c. Manufacturer.
   d. Model number.
   e. Serial number.
   f. Entering DB air temperature, design and actual.
   g. Leaving DB air temperature, design and actual.
   h. Number of compressors.
   i. Refrigerant pressure.
   j. Refrigerant temperature.
6. Cooling Coils:
   a. Identification/number.
   b. Location.
   c. Service.
   d. Manufacturer.
   e. Air flow, design and actual.
   f. Entering air DB temperature, design and actual.
   g. Entering air WB temperature, design and actual.
   h. Leaving air DB temperature, design and actual.

i. Leaving air WB temperature, design and actual.
j. Saturated suction temperature, design and actual.
k. Air pressure drop, design and actual.

7. Air-to-Air Heat-Recovery Unit:
   a. Unit identification.
   b. Location.
   c. Service.
   d. Make and type.
   e. Model and serial numbers.
   f. Motor Data:
      1) Make and frame type and size.
      2) Horsepower and rpm.
      3) Volts, phase, and hertz.
      4) Full load amperage and service factor.
      5) Sheave make, size, and bore.
      6) Sheave dimensions, center-to-center, and amount of adjustments.
   g. Total exhaust airflow rate.
   h. Purge exhaust airflow rate.
   i. Outside airflow rate.
   j. Total exhaust fan static pressure.
   k. Total outside-air fan static pressure.
   l. Pressure drop on each side of recovery wheel.
   m. Exhaust air temperature entering.
   n. Exhaust air temperature leaving.
   o. Outside-air temperature entering.
   p. Outside-air temperature leaving.
   q. Calculate sensible and total heat capacity of each airstream.
8. Exhaust Fans:
   a. Location.
   b. Manufacturer.
   c. Model number.
   d. Serial number.
   e. Air flow, specified and actual.
   f. Total static pressure (total external), specified and actual.
   g. Inlet pressure.
   h. Discharge pressure.
   i. Sheave Make/Size/Bore.
   j. Number of Belts/Make/Size.
   k. Fan RPM.
9. Duct Traverses:
   a. System zone/branch.
   b. Duct size.
   c. Area.
   d. Design velocity.
   e. Design air flow.
   f. Test velocity.
   g. Test air flow.
   h. Duct static pressure.
   i. Air temperature.
   j. Air correction factor.
10. Duct Leak Tests:
    a. Description of ductwork under test.
    b. Duct design operating pressure.
    c. Duct design test static pressure.

d. Duct capacity, air flow.
e. Maximum allowable leakage duct capacity times leak factor.
f. Test apparatus:
1) Blower.
2) Orifice, tube size.
3) Orifice size.
4) Calibrated.
g. Test static pressure.
h. Test orifice differential pressure.
i. Leakage.

11. Terminal Unit Data:
a. Manufacturer.
b. Type, constant, variable, single, dual duct.
c. Identification/number.
d. Location.
e. Model number.
f. Size.
g. Minimum static pressure.
h. Minimum design air flow.
i. Maximum design air flow.
j. Maximum actual air flow.
k. Inlet static pressure.

12. Air Distribution Tests:
a. Air terminal number.
b. Room number/location.
c. Terminal type.
d. Terminal size.
e. Area factor.
f. Design velocity.
g. Design air flow.
h. Test (final) velocity.
i. Test (final) air flow.
j. Percent of design air flow.

K. Vibration Tests:
1. Equipment designation, location, equipment, speed, motor speed, and motor horsepower.
2. Diagram of equipment showing the vibration measurement locations.
3. Measurement readings for each measurement location.
4. Calculate isolator efficiency using measurements taken.
5. Description of predominant vibration source.
6. Location of points:
a. Fan bearing, drive end.
b. Fan bearing, opposite end.
c. Motor bearing, center (if applicable).
d. Motor bearing, drive end.
e. Motor bearing, opposite end.
f. Casing (bottom or top).
g. Casing (side).
h. Duct after flexible connection (discharge).
i. Duct after flexible connection (suction).
j. Test readings:
1) Horizontal, velocity and displacement.
2) Vertical, velocity and displacement.
3) Axial, velocity and displacement.

k. Normally acceptable readings, velocity and acceleration.
l. Unusual conditions at time of test.

3.12 INSPECTIONS

A. Initial Inspection:
1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
2. Randomly check the following for each system:
a. Edit random checks to coincide with TAB tests specified.
b. Measure airflow of at least 10 percent of air outlets.
c. Measure water flow of at least 5 percent of terminals.
d. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
e. Measure space pressure of at least 10 percent of locations.
f. Verify that balancing devices are marked with final balance position.
g. Note deviations to the Contract Documents in the Final Report.

B. Final Inspection:
1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Owner.
2. Owner shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to either 10 percent of the total measurements recorded, or the extent of measurements that can be accomplished in a normal 8-hour business day.
3. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
4. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
5. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
6. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

END OF SECTION 230593

SECTION 230713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Insulation jackets.

1.02 RELATED REQUIREMENTS

A. Section 230553 - Identification for HVAC Piping and Equipment.

B. Section 233100 - HVAC Ducts and Casings: Glass fiber ducts.

C. Section 230549 - Noise Control and Acoustical Performance

D. Ductwork insulation schedule on drawings.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

D. Shop Drawings:
   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail insulation application at duct expansion joints for each type of insulation.
   3. Detail insulation application at elbows, fittings, flanges, dampers, and specialties for each type of insulation.
   4. Detail removable insulation at equipment connections, and access panels.
   5. Detail application of field-applied jackets.
   6. Detail application at linkages of control devices.
   7. Detail field application for each equipment type.
   8. UL listed installation details for fire-rated insulation systems.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, documented experience and approved by manufacturer.
   1. Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

C. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 or UL 723 using the specimen preparation and mounting procedures of ASTM E2231, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
   1. Insulation: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service and not less than 250F.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

1.07 COORDINATION

A. Coordinate size and location of supports and hangers to accomodate duct insulation.

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate duct insulation installation with pressure testing. Duct pressure testing is to be complete and satisfactory prior to installing ductwork insulation. Insulation application may begin on segments that have satisfactory test results.

PART 2 PRODUCTS

2.01 GENERAL

A. Products shall not contain asbestos, lead, formaldehyde, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

E. Comply with requirements indicated in ductwork insulation schedule provided on drawings.

2.02 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.03 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Johns Manville; Microlite EQ: www.jm.com.
   2. Knauf Insulation; Atmosphere Duct Wrap: www.knaufinsulation.com.
   3. Owens Corning Corporation; _____: www.ocbuildingspec.com.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K value: 0.25 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 250 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.
   4. Minimum Density: 1.5 pounds per cubic foot.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Indoor Vapor Barrier Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

F. Outdoor Vapor Barrier Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

G. Tie Wire: Annealed steel, 16 gauge, 0.0508 inch diameter.

2.04 GLASS FIBER, RIGID

A. Manufacturer:
1. Johns Manville; _____: www.jm.com.
2. Knauf Insulation; _____: www.knaufinsulation.com.
3. Owens Corning Corporation; 700 Series FIBERGLAS Insulation: www.ocbuildingspec.com.

B. Insulation: ASTM C612; rigid, noncombustible blanket.
1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
2. Maximum Service Temperature: 450 degrees F.
3. Maximum Water Vapor Absorption: 5.0 percent.
4. Maximum Density: 8.0 lb/cu ft.

C. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
2. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.05 JACKETS

A. Flexible Weather-Proofing Outdoor Jacket: Self-healing, field-applied outdoor cladding.
1. Material: Aluminum foil/polymer laminate with rubberized asphalt layer and acrylic adhesive.
2. Thickness: 34 mils.
3. Finish: Smooth.
4. Color: Silver.
5. Water Vapor Transmission: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
6. Mold Resistance: Pass when tested in accordance with ASTM C1338.
7. Emissivity: 0.30 when tested in accordance with ASTM C1371.
8. Manufacturers:
a. Polyguard Products; Alumaguard: www.polyguardproducts.com.com.

B. Metal Jacket:
1. Manufacturers:
a. Childers Products, Division of ITW; Metal Jacketing Systems.
b. PABCO Metals Corporation; Surefit.
c. RPR Products, Inc.; Insul-Mate.
2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005, Temper H-14.
a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
b. Finish and thickness are indicated in insulation schedules.
c. Moisture Barrier for Indoor Applications:3-mil- thick, heat-bonded polyethylene and kraft paper

d. Moisture Barrier for Outdoor Applications: 2.5-mil- thick Polysurlyn
e. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
   a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
   b. Material, finish, and thickness are indicated in insulation schedules.
   c. Moisture Barrier for Indoor Applications:3-mil- thick, heat-bonded polyethylene and kraft paper
   d. Moisture Barrier for Outdoor Applications:2.5-mil- thick Polysurlyn
   e. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

2.06 ALL WEATHER FLEXIBLE WATHER-PROOFING JACKET

A. Manufacturers:
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Polyguard Products, Inc.; Alumaguard® (standard foil face finish), or Alumaguard® All Weather and/or Alumaguard®Lite.

B. Alumaguard, Alumaguard Lite laminated jacketing systems.

C. Alumaguard Lite is a multi-ply composite (5 layers) of polyester and aluminum foil films coated with an aggressive, low temperature acrylic pressure sensitive adhesive. Product is available in smooth and stucco-embossed aluminum or white and can be installed as a complete system or in combination with Alumaguard as the material used on the bottom of the duct to eliminate the need for pinning. See Tables 2 and 3 for physical properties.

D. The jacketing system is installed over outdoor insulation on exterior ductwork.

E. The membranes is to be 'peel and stick'.

F. Product is not to promote mold growth.

2.07 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
   1. Manufacturers:
      a. Childers Products, Division of ITW; CP-82.
      b. Foster Products Corporation, H. B. Fuller Company; 85-20.
      c. ITW TACC, Division of Illinois Tool Works; S-90/80.
      d. Marathon Industries, Inc.; 225.
      e. Mon-Eco Industries, Inc.; 22-25.

C. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
   1. Manufacturers:
      a. Childers Products, Division of ITW; CP-82.
      b. Foster Products Corporation, H. B. Fuller Company; 85-20.
      c. ITW TACC, Division of Illinois Tool Works; S-90/80.
      d. Marathon Industries, Inc.; 225.
      e. Mon-Eco Industries, Inc.; 22-25.

2.08 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

B. Products: Subject to compliance with requirements, provide the following :
   1. Childers Products, Division of ITW; CP-76-8.
   2. Foster Products Corporation, H. B. Fuller Company; 95-44.
   3. Marathon Industries, Inc.; 405.
   4. Mon-Eco Industries, Inc.; 44-05.
   5. Vimasco Corporation; 750.

C. Materials shall be compatible with insulation materials, jackets, and substrates.

D. Fire- and water-resistant, flexible, elastomeric sealant.

E. Service Temperature Range: Minus 40 to plus 250 deg F

F. Color: Aluminum.

G. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
   1. Products: Subject to compliance with requirements, provide the following :
      a. Childers Products, Division of ITW; CP-76.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.
   3. Fire- and water-resistant, flexible, elastomeric sealant.
   4. Service Temperature Range: Minus 40 to plus 250 deg F.

H. Color: White.

2.09 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
   1. Products: Subject to compliance with requirements, provide the following :
      a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
      b. Compac Corp.; 104 and 105.
      c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
      d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
   2. Width: 3 inches (75 mm).
   3. Thickness: 11.5 mils (0.29 mm).
   4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
   5. Elongation: 2 percent.
   6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
   7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
   1. Products: Subject to compliance with requirements, provide the following :
      a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
      b. Compac Corp.; 110 and 111.
      c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
      d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
   2. Width: 3 inches (75 mm).
   3. Thickness: 6.5 mils (0.16 mm).
   4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
   5. Elongation: 2 percent.
   6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
   7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
   1. Products: Subject to compliance with requirements, provide the following :
      a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
      b. Compac Corp.; 120.
      c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
      d. Venture Tape; 3520 CW.
   2. Width: 2 inches (50 mm).
   3. Thickness: 3.7 mils (0.093 mm).
   4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
   5. Elongation: 5 percent.
   6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test ductwork for design pressure prior to applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and duct system as specified in ductwork insulation schedule provided on drawings.

D. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with aluminum jacket.

E. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with Metal jacket.

F. Slope exterior ductwork to shed water.

G. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

H. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

I. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

J. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

K. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

L. For above ambient services, do not install insulation to the following:
   1. Vibration-control devices.
   2. Testing agency labels and stamps.
   3. Nameplates and data plates.
   4. Manholes.
   5. Handholes.
   6. Cleanouts.

M. Penetrations
   1. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

a. Seal penetrations with flashing sealant.
b. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
c. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
d. Seal jacket to roof flashing with flashing sealant.

2. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
   a. Seal penetrations with flashing sealant.
   b. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
   c. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
   d. Seal jacket to wall flashing with flashing sealant.
3. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
4. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
5. Insulation Installation at Floor Penetrations:
   a. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.

N. Blanket Insulation Installation on Ducts: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
   a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
   b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
   c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
   d. Do not overcompress insulation during installation.
   e. Impale insulation over pins and attach speed washers.
   f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.

5. Blanket insulation shall be cut to “stretch-out” dimensions per the manufacturer’s requirements to assure installed thermal performance.
6. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
7. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
8. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

O. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Revise first subparagraph below to allow adhesive to be omitted from top surface of horizontal rectangular ducts.
3. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
4. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
   a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
   b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
   c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
   d. Do not overcompress insulation during installation.
   e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
5. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.03 SCHEDULES

A. Refer to ductwork insulation schedule on drawings.

END OF SECTION 230713

SECTION 230716
HVAC EQUIPMENT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Equipment insulation.

B. Flexible removable and reusable blanket insulation.

C. Covering.

1.02 RELATED REQUIREMENTS

A. Section 230553 - Identification for HVAC Piping and Equipment.

B. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.

C. Section 232114 - Hydronic Specialties.

D. Section 232300 - Refrigerant Piping: Placement of inserts.

E. Equipment insulation schedule on drawings.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

B. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

D. Shop Drawings:
   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail removable insulation at equipment connections, and access panels.
   3. Detail application of field-applied jackets.
   4. Detail application at linkages of control devices.
   5. Detail field application for each equipment type.
   6. UL listed installation details for fire-rated insulation systems.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

1.08 COORDINATION

A. Coordinate size and location of supports and hangers to accomodate equipment insulation.

B. Coordinate clearance requirements with equipment Installer for equipment insulation application. Before preparing equipment Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate equipment insulation installation with system testing. Equipment tests and system filling is to be complete and satisfactory prior to installing equipment insulation to prevent damage to insulation. Insulation application may begin on segments that have satisfactory test results.

PART 2 PRODUCTS

2.01 GENERAL

A. Products shall not contain asbestos, lead, formaldehyde, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

D. Comply with requirements indicated in equipment insulation schedule provided on drawings.

2.02 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.03 MOLDED MINERAL-FIBER GLASS

A. Molded, heavy-density, high performance, mineral-glass fiber insulation with a factory-applied vapor barrier facing. Comply with ASTM C 547, ASTM C 585, ASTM C 795, ASTM C1136 (facings). Insulation is to be UL Environment GREENGUARD Gold certified.
   1. Manufacturers:
      a. Johns Manville; Micro-Lok HP.
      b. Knauf Insulation; Earthwool 1000 Pipe Insulation.
      c. Owens Corning; Fiberglas Pipe Insulation.

B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches (0.029 ng/Pa s m).

C. Tie Wire: 0.048 inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300 mm) centers.

D. Vapor Barrier Lap Adhesive: Compatible with insulation.

E. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
   1. Manufacturers:
      a. Insulco, Division of MFS, Inc.; Triple I.
      b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.

F. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
   2. Vinyl emulsion type acrylic, compatible with insulation, black color.

G. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

H. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

I. Insulating Cement: ASTM C449.

J. Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers:
   a. Childers Products, Division of ITW; CP-82.
   b. Foster Products Corporation, H. B. Fuller Company; 85-20.
   c. ITW TACC, Division of Illinois Tool Works; S-90/80.
   d. Marathon Industries, Inc.; 225.
   e. Mon-Eco Industries, Inc.; 22-25.

K. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.04 RIGID MINERAL-FIBER GLASS BOARD INSULATION

A. Inorganic mineral-glass fiber insulation bonded with a thermosetting resin and formed into rigid boards with a factory-applied vapor barrier facing. Comply with ASTM C 553, ASTM C 612, ASTM C 795 and ASTM C1136 (facings).
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Johns Manville; 800 Series Spin-Glas or Insul-SHIELD.
      b. Knauf Insulation; Earthwool Insulation Board with ECOSE Technology.
      c. Owens Corning; Fiberglas 700 Series.
      d. Substitutions: See Section 01 6000 - Product Requirements.

2.05 CALCIUM SILICATE

A. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.

B. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.

C. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

D. Manufacturers:
   1. Industrial Insulation Group (The); Thermo-12 Gold.
   2. Johns Manville

E. Tie Wire: 0.048 inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300 mm) centers.

F. Insulating Cement: ASTM C449.

G. Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.
   1. Manufacturers:
      a. Childers Products, Division of ITW; CP-97.
      b. Foster Products Corporation, H. B. Fuller Company; 81-27/81-93.
      c. Marathon Industries, Inc.; 290.
      d. Mon-Eco Industries, Inc.; 22-30.
      e. Vimasco Corporation; 760.

H. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.06 ELASTOMERIC FOAM INSULATION

A. Closed-cell, sponge- or expanded-rubber polybrominated diphenyl ethers free material. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
   1. Manufacturers:
      a. Aeroflex USA Inc.; Aerocel.
      b. Armacell LLC; AP Armaflex.
      c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180

B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
   1. Comply with MIL-A-24179A, Type II, Class I.

2. Manufacturers:
   a. Aeroflex USA Inc.; Aeroseal.
   b. Armacell LCC; 520 Adhesive.
   c. Foster Products Corporation, H. B. Fuller Company; 85-75.
   d. RBX Corporation; Rubatex Contact Adhesive.

2.07 PREFORMED REMOVABLE THERMAL JACKET:

A. Manufacturer:
   1. ThermaXX LLC.

B. Insulation:
   1. For Box Type Jackets:
      a. High-temperature insulation blanket formed of silica Aerogel and reinforced with a non-woven, glass-fiber batting.
         1) Insulation must be hydrophobic
         2) Maximum Use Temperature 1200°F
   2. For Non Box Type Jackets:
      a. Glass mat, type E needled fiber. ¼", ½" @ 9 LB/CF & 1" @ 11.3 LB/CF. Maximum Use Temperature 1200°F
         1) Fiberglass mat with no chemical binders, type HP5 needled fiber. 1" @ 5 LB/CF. Maximum Use Temperature 1000°F

C. All insulation materials shall be Non-Asbestos

D. Insulation thickness: Minimum as per insulation schedules and as required for Touch Temperature/Exterior of jacket < 120F

E. Jacket Dry, Wet or Damp Location:
   1. Hot Side
      a. Silicone Fiberglass Composite Jacketing, 17 oz/sq. yd. minimum
      b. Estimation of Maximum Use Temperature 450°F
   2. Cold Side
      a. Silicone Fiberglass Composite Jacketing, 17 oz/sq. yd. minimum
      b. Estimation of Maximum Use Temperature 450°F
   3. Above 375F, provide PTFE Fiberglass Composite, 16.5 oz/sq yd jacketing and teflon straps.

F. Jacket Wet Location (Steam Systems in Equipment Rooms, Vaults and Pits):
   1. Hot Side
      a. All PTFE (Pure Teflon)- LFP 2110 13.5 oz/sq. yd. minimum
      b. Estimation of Maximum Use Temperature 600°F
   2. Cold Side
      a. All PTFE (Pure Teflon)- LFP 2110 13.5 oz/sq. yd. minimum
      b. Estimation of Maximum Use Temperature 600°F

G. Thread:
   1. Kevlar
      a. Begins to decompose at about 800 degrees.
      b. Does not melt
      c. Diameter- .0114 inches
      d. Break Point - 35LBS

H. Construction:
   1. Sewn with lock stitch at a minimum of 4 to 6 stitches per inch. Jackets shall be sewn using specified thread in section 1.3D. The thread must be able to withstand the skin temperatures without degradation.
   2. Hog rings, staples and wire are not an acceptable methods of closure.
   3. No raw cut jacket edges shall be exposed after install.
   4. Jackets shall be fastened using hook and loop (Velcro) straps and D-rings.

5. Provide a permanently attached Laser Etched Anodized Aluminum nameplate (2” x 3.5”) on each jacket to identify its location and item number. Each nameplate must have a Laser Etched QR code linking to a website that contains the following information about that particular jacket:
    a. Item Number
    b. Location Information
    c. Application Type
    d. Operating Pressure
    e. Component Type
    f. Component Size
    g. Jacket Min Max Temp
    h. Insulation Thickness
    i. Jacket material Hot Side
    j. Jacket material Cold Side
    k. ANSI Class or NPT
    l. Install Date
    m. Jacket O&M History
    n. Pre Photo & Post Photos
    o. Component Maintenance History
6. The insulation shall be designed to minimize the convection current in the space between the hot metal surface and the inner layer of insulation.
7. All jacket pieces which match mating seams must include an extended 2" flap constructed from the exterior fabric (or equivalent) and shall be secured using hook & loop closure (i.e. Velcro) parallel to the seam.
8. Insulation must be sewn as integral part of the jacket to prevent shifting of the insulation. Insulation pins are NOT an allowable method of preventing the insulation from shifting and shall NOT be used.
9. Steam Trap Jackets must be constructed in a box shape for removal and replacement inspection ease.

I. Warranty all materials and labor for a period of Five Years

2.08 JACKETS

A. Metal Jacket:
1. Manufacturers:
    a. Childers Products, Division of ITW; Metal Jacketing Systems.
    b. PABCO Metals Corporation; Surefit.
    c. RPR Products, Inc.; Insul-Mate.
2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005, Temper H-14.
3. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
4. Finish and thickness are indicated in insulation schedules.
5. Moisture Barrier for Indoor Applications:3-mil- thick, heat-bonded polyethylene and kraft paper
6. Moisture Barrier for Outdoor Applications: 2.5-mil- thick Polysurlyn
7. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    a. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
8. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

B. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
1. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
2. Material, finish, and thickness are indicated in insulation schedules.
3. Moisture Barrier for Indoor Applications:3-mil- thick, heat-bonded polyethylene and kraft paper
4. Moisture Barrier for Outdoor Applications:3-mil- thick, heat-bonded polyethylene and kraft paper

5. Factory-Fabricated Fitting Covers:
   a. Same material, finish, and thickness as jacket.
   b. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

2.09 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
   1. Manufacturers:
      a. Childers Products, Division of ITW; CP-82.
      b. Foster Products Corporation, H. B. Fuller Company; 85-20.
      c. ITW TACC, Division of Illinois Tool Works; S-90/80.
      d. Marathon Industries, Inc.; 225.
      e. Mon-Eco Industries, Inc.; 22-25.

C. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
   1. Manufacturers:
      a. Childers Products, Division of ITW; CP-82.
      b. Foster Products Corporation, H. B. Fuller Company; 85-20.
      c. ITW TACC, Division of Illinois Tool Works; S-90/80.
      d. Marathon Industries, Inc.; 225.
      e. Mon-Eco Industries, Inc.; 22-25.

D. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.
   1. Manufacturers:
      a. Childers Products, Division of ITW; CP-97.
      b. Foster Products Corporation, H. B. Fuller Company; 81-27/81-93.
      c. Marathon Industries, Inc.; 290.
      d. Mon-Eco Industries, Inc.; 22-30.
      e. Vimasco Corporation; 760.

E. Lagging Adhesive:
   1. Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
      a. Manufacturers:
         1) Childers Products, Division of ITW; CP-52.
         2) Foster Products Corporation, H. B. Fuller Company; 81-42.
         3) Marathon Industries, Inc.; 130.
         4) Mon-Eco Industries, Inc.; 11-30.
         5) Vimasco Corporation; 136.
      b. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.
      c. Service Temperature Range: Minus 50 to plus 180 deg F.
      d. Color: White.

2.10 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:
   1. Products: Subject to compliance with requirements, provide the following :
      a. Childers Products, Division of ITW; CP-76-8.
      b. Foster Products Corporation, H. B. Fuller Company; 95-44.
      c. Marathon Industries, Inc.; 405.
      d. Mon-Eco Industries, Inc.; 44-05.
      e. Vimasco Corporation; 750.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F
5. Color: Aluminum.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
1. Products: Subject to compliance with requirements, provide the following :
   a. Childers Products, Division of ITW; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide the following :
   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
   b. Compac Corp.; 104 and 105.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide the following :
   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   b. Compac Corp.; 110 and 111.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
   d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 GENERAL INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Factory Insulated Equipment: Do not insulate.

C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment as specified in equipment insulation schedule provided on drawings.

D. Exposed Equipment: Locate insulation and cover seams in least visible locations.

E. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.

F. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.

G. Insulated equipment containing fluids below ambient temperature; insulate entire system.

H. Fiber glass insulated equipment containing fluids below ambient temperature; provide vapor barrier jackets, factory-applied or field-applied. Finish with glass cloth and vapor barrier adhesive.

I. For hot equipment containing fluids 140 degrees F or less, do not insulate flanges and unions, but bevel and seal ends of insulation.

J. For hot equipment containing fluids over 140 degrees F, insulate flanges and unions with removable sections and jackets.

K. Fiber glass insulated equipment containing fluids above ambient temperature; provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Finish with glass cloth and adhesive.

L. Inserts and Shields:
1. Application: Equipment 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between hangers and inserts.
3. Insert Location: Between support shield and equipment and under the finish jacket.
4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
6. Finish insulation at supports, protrusions, and interruptions.

M. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with aluminum jacket or stainless steel jacket.

N. Exterior Applications:
1. Provide vapor barrier jacket or finish with glass mesh reinforced vapor barrier cement.
2. Cover with aluminum or stainless steel.

O. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, and other projections with vapor-barrier mastic.
1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

P. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.

Q. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.

R. Equipment Requiring Access for Maintenance, Repair, or Cleaning Including all Pumps: Provide pre-formed, removable thermal jacket.

S. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

T. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

U. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

V. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.
7. Expansion tanks

3.03 EQUIPMENT, TANK, AND VESSEL INSULATION INSTALLATION

A. Mineral Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.
   1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of tank and vessel surfaces.
   2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
   3. Protect exposed corners with secured corner angles.
   4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:
      a. Do not weld anchor pins to ASME-labeled pressure vessels.
      b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
      c. On tanks and vessels, maximum anchor-pin spacing is 3 inches (75 mm) from insulation end joints, and 16 inches (400 mm) o.c. in both directions.
      d. Do not overcompress insulation during installation.
      e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
      f. Impale insulation over anchor pins and attach speed washers.
      g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
   5. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
   6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches (150 mm) from each end. Install wire or cable between two circumferential girdles 12 inches (300 mm) o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches (1200 mm) o.c. Use this network for securing insulation with tie wire or bands.
   7. Stagger joints between insulation layers at least 3 inches (75 mm).
   8. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
   9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
   10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.

B. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels.
   1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
   2. Seal longitudinal seams and end joints.

3.04 SCHEDULE

A. Refer to equipment insulation schedule on drawings.

END OF SECTION 230716

SECTION 230719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.

C. Section 232213 - Steam and Condensate Heating Piping: Placement of hangers and hanger inserts.

D. Section 232300 - Refrigerant Piping: Placement of inserts.

E. Piping insulation schedule on drawings.

1.03 REFERENCE STANDARDS

A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.

B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019, with Editorial Revision (2023).

C. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2019).

D. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement 2007 (Reapproved 2019).

E. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2022a.

F. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2023).

G. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces 2008 (Reapproved 2019).

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

D. Shop Drawings:
   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail attachment and covering of heat tracing inside insulation.
   3. Detail insulation application at pipe expansion joints for each type of insulation.
   4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.

5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.
8. Detail field application for each equipment type.
9. UL listed installation details for fire-rated insulation systems.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

C. When fire-performance characteristics are important requirements, verify surface-burning characteristics of insulation materials by an independent testing agency and require test report submittals.

D. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 or UL 723 using the specimen preparation and mounting procedures of ASTM E2231, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
   1. Insulation: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

1.08 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields to accomodate piping insulation.

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate piping insulation installation with pressure testing. Piping pressure testing is to be complete and satisfactory prior to installing piping insulation. Insulation application may begin on segments that have satisfactory test results.

PART 2 PRODUCTS

2.01 GENERAL

A. Products shall not contain asbestos, lead, formaldehyde, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

E. Comply with requirements indicated in piping insulation schedule provided on drawings.

2.02 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.03 CALCIUM SILICATE

A. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.

B. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.

C. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

D. Manufacturers:
1. Industrial Insulation Group (The); Thermo-12 Gold.
2. Johns Manville

E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

F. Insulating Cement: ASTM C449.

G. Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.
1. Manufacturers:
a. Childers Products, Division of ITW; CP-97.
b. Foster Products Corporation, H. B. Fuller Company; 81-27/81-93.
c. Marathon Industries, Inc.; 290.
d. Mon-Eco Industries, Inc.; 22-30.
e. Vimasco Corporation; 760.
2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.04 ELASTOMERIC FOAM INSULATION

A. Closed-cell, sponge- or expanded-rubber polybrominated diphenyl ethers free material. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

B. Manufacturers:
1. Aeroflex USA Inc.; Aerocel.
2. Armacell LLC; AP Armaflex.
3. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
1. Comply with MIL-A-24179A, Type II, Class I.
2. Manufacturers:
a. Aeroflex USA Inc.; Aeroseal.
b. Armacell LCC; 520 Adhesive.
c. Foster Products Corporation, H. B. Fuller Company; 85-75.
d. RBX Corporation; Rubatex Contact Adhesive.

2.05 GLASS FIBER, RIGID

A. Manufacturers:
1. CertainTeed Corporation; _____: www.certainteed.com.
2. Johns Manville Corporation; _____: www.jm.com.
3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com.
4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: www.ocbuildingspec.com.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
1. K Value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 850 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive: Compatible with insulation.

F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

G. Indoor Vapor Barrier Finish:
1. Vinyl emulsion type acrylic, compatible with insulation, black color.

H. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

2.06 SEALANTS

A. Joint Sealants:
1. Joint Sealants for Cellular-Glass Products:
a. Manufacturers:
1) Childers Products, Division of ITW; CP-76.
2) Foster Products Corporation, H. B. Fuller Company; 30-45.
3) Marathon Industries, Inc.; 405.
4) Mon-Eco Industries, Inc.; 44-05.
5) Pittsburgh Corning Corporation; Pittseal 444.
6) Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.
5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. FSK and Metal Jacket Flashing Sealants:
1. Manufacturers:
a. Childers Products, Division of ITW; CP-76-8.
1) Foster Products Corporation, H. B. Fuller Company; 95-44.
2) Marathon Industries, Inc.; 405.
3) Mon-Eco Industries, Inc.; 44-05.
4) Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
1. Manufacturers:
a. Childers Products, Division of ITW; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.07 JACKETS

A. PVC Jacket
1. High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is

indicated in insulation schedules.

2. Manufacturers:
   a. Johns Manville; Zeston.
   b. P.I.C. Plastics, Inc.; FG Series.
   c. Proto PVC Corporation; LoSmoke.
   d. Speedline Corporation; SmokeSafe.
3. PVC Jacket Adhesive: Compatible with PVC jacket and as recommended by jacket matrial manufacturer.
   a. Manufacturers:
      1) Dow Chemical Company (The); 739, Dow Silicone.
      2) Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
      3) P.I.C. Plastics, Inc.; Welding Adhesive.
      4) Speedline Corporation; Speedline Vinyl Adhesive.
   b. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Color: White

B. Metal Jacket:
1. Manufacturers:
   a. Childers Products, Division of ITW; Metal Jacketing Systems.
   b. PABCO Metals Corporation; Surefit.
   c. RPR Products, Inc.; Insul-Mate.
2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105 or 5005, Temper H-14.
   a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
   b. Finish and thickness are indicated insulation schedules.
   c. Joining: Longitudinal slip joints and 2 inch laps.
   d. Moisture Barrier for Indoor Applications: 1-mil-thick, heat-bonded polyethylene and kraft paper.
   e. Moisture Barrier for Outdoor Applications: 2.5-mil-thick Polysurlyn.
   f. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.
   g. Factory-Fabricated Fitting Covers:
      1) Same material, finish, and thickness as jacket.
      2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      3) Tee covers.
      4) Flange and union covers.
      5) End caps.
      6) Beveled collars.
      7) Valve covers.
      8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
   a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
   b. Material, finish, and thickness are indicated in insulation schedules.
   c. Moisture Barrier for Indoor Applications:3-mil-thick, heat-bonded polyethylene and kraft paper
   d. Moisture Barrier for Outdoor Applications: 2.5-mil- thick, polysurlyn
   e. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.
   f. Factory-Fabricated Fitting Covers:
      1) Same material, finish, and thickness as jacket.
      2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      3) Tee covers.
      4) Flange and union covers.
      5) End caps.
      6) Beveled collars.

7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.08 ACCESSORIES

A. General Requirements:
1. Provide required accessories in accordance with and subject to the recommendations of the insulation manufacturer.
2. Furnish compatible materials which do not contribute to corrosion, soften, or otherwise attack surfaces to which applied, in either the wet or dry state.
3. Comply with ASTM C795 requirements for materials to be used on stainless steel surfaces.
4. Supply materials that are asbestos free.

B. Corrosion Inhibitors:
1. Corrosion Control Gel:
a. Corrosion Protection: Comply with ASTM B117 and ASTM D610.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

D. Insulated Pipes Conveying Fluids Below Ambient Temperature:
1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.

2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

H. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

I. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

J. Inserts and Shields:
1. Application: Piping 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert location: Between support shield and piping and under the finish jacket.
4. Insert Configuration: Minimum 6 incheslong, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

N. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.

O. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 078400.

P. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with aluminum jacket.

Q. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with stainless steel jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

R. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with stainless steel jacket with seams located on bottom side of horizontal piping.

3.04 SCHEDULE

A. Refer to piping insulation schedule on drawings.

END OF SECTION 230719

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

A. See Section 019113 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 019113.

B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.

C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.

D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:
   1. Control system.
   2. Major and minor equipment items.
   3. Piping systems and equipment.
   4. Ductwork and accessories.
   5. Terminal units.
   6. Sound control devices.
   7. Vibration control devices.
   8. Variable frequency drives.
   9. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.

B. Section 230993 - Sequence of Operations for HVAC Controls.

C. Section 230593 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

A. ASHRAE Guideline 1.1 - The HVAC&R Techincal Requirements for the Commissioning Process 2007 (Errata 2012).

1.04 SUBMITTALS

A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.

B. DRAFT Prefunctional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:
   1. System name.
   2. List of devices.
   3. Step-by-step procedures for testing each controller after installation, including:
      a. Process of verifying proper hardware and wiring installation.
      b. Process of downloading programs to local controllers and verifying that they are addressed correctly.
      c. Process of performing operational checks of each controlled component.
      d. Plan and process for calibrating valve and damper actuators and all sensors.
      e. Description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.

4. Copy of proposed log and field checkout sheets to be used to document the process; include space for initial and final read values during calibration of each point and space to specifically indicate when a sensor or controller has “passed” and is operating within the contract parameters.
5. Description of the instrumentation required for testing.
6. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the Commissioning Authority and TAB contractor for this determination.

C. Startup Reports, Prefunctional Checklists, and Trend Logs: Submit for approval of Commissioning Authority.

D. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:
1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
2. Full as-built set of control drawings.
3. Full as-built sequence of operations for each piece of equipment.
4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
    a. Floor.
    b. Room number.
    c. Room name.
    d. Air handler unit ID.
    e. Reference drawing number.
    f. Air terminal unit tag ID.
    g. Heating and/or cooling valve tag ID.
    h. Minimum air flow rate.
    i. Maximum air flow rate.
5. Full print out of all schedules and set points after testing and acceptance of the system.
6. Full as-built print out of software program.
7. Electronic copy on disk of the entire program for this facility.
8. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
10. Control equipment component submittals, parts lists, etc.
11. Warranty requirements.
12. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
    a. Sequences of operation.
    b. Control drawings.
    c. Points lists.
    d. Controller and/or module data.
    e. Thermostats and timers.
    f. Sensors and DP switches.
    g. Valves and valve actuators.
    h. Dampers and damper actuators.
    i. Program setups (software program printouts).

E. Project Record Documents: See Section 017800 for additional requirements.
1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.

2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.

F. Draft Training Plan: In addition to requirements specified in Section 017900, include:
1. Follow the recommendations of ASHRAE Guideline 1.1.
2. Control system manufacturer's recommended training.
3. Demonstration and instruction on function and overrides of any local packaged controls not controlled by the HVAC control system.

G. Training Manuals: See Section 017900 for additional requirements.
1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

PART 3 EXECUTION

3.01 PREPARATION

A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.

B. Furnish additional information requested by the Commissioning Authority.

C. Prepare a preliminary schedule for HVAC pipe and duct system testing, flushing and cleaning, equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.

D. Notify the Commissioning Authority when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and testing, adjusting, and balancing will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.

E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.

F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.

G. Provide temperature and pressure taps in accordance with Contract Documents.

3.02 INSPECTING AND TESTING - GENERAL

A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.

B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.

C. Provide two-way radios for use during the testing.

D. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.

3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

E. Isolation Valve or System Valve Leak Check: For valves not by coils.
1. With full pressure in the system, command valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.

F. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

3.03 TAB COORDINATION

A. TAB: Testing, adjusting, and balancing of HVAC.

B. Coordinate commissioning schedule with TAB schedule.

C. Review the TAB plan to determine the capabilities of the control system toward completing TAB.

D. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.

E. Have all required Prefunctional Checklists, calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.

F. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

3.04 CONTROL SYSTEM FUNCTIONAL TESTING

A. Prefunctional Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the requirements of Contract Documents and the detailed Sequences of Operation documentation submittal.

B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with Contract Documents.

C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.

D. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.
1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to Owner.
2. Perform all trend logging specified in Prefunctional Checklists and Functional Test procedures.

E. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.

F. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.
1. Setpoint changing features and functions.
2. Sensor calibrations.

G. Demonstrate to the Commissioning Authority:
1. That all specified functions and features are set up, debugged and fully operable.

2. That scheduling features are fully functional and setup, including holidays.
3. That all graphic screens and value readouts are completed.
4. Correct date and time setting in central computer.
5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; if any of those fail test all remaining units at no extra cost to Owner.
6. Functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to Owner.
7. Power failure and battery backup and power-up restart functions.
8. Global commands features.
9. Security and access codes.
10. Occupant over-rides (manual, telephone, key, keypad, etc.).
11. O&M schedules and alarms.
12. Occupancy sensors and controls.
13. All control strategies and sequences not tested during controlled equipment testing.

H. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required at no additional cost to Owner.

3.05 OPERATION AND MAINTENANCE MANUALS

A. See Section 017800 for additional requirements.

B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.

C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

END OF SECTION 230800

SECTION 230900
HVAC INSTRUMENTATION AND CONTROLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Mechanical, Electrical, Plumbing and Fire Protection drawings

B. General conditions

C. Supplementary Conditions

D. Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

1.03 DEFINITIONS

A. AHU: Air Handling Unit.

B. ATC: Automatic Temperature Control.

C. BMS: Building Management System.

D. CFM: Cubic Feet per Minute.

E. DDC: Direct-digital controls.

F. FAS: Fire Alarm System.

G. HVAC: Heating, Ventilating and Air Conditioning.

H. LAN: Local area network.

I. LCD: Liquid Crystal Display

J. MER: Mechanical Equipment Room.

K. PID: Proportional Integral Derivative.

L. POT: Portable Operators Terminal.

M. VFD: Variable Frequency Drive.

1.04 SYSTEM DESCRIPTION

A. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories and software connected to distributed controllers operating in multiuser, multitasking environment on a network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan and control device depicted by point-and-click graphics.

B. Furnish a totally BACnet-based system, based on a distributed control system in accordance with this specification. The operator’s workstation, all controllers and all input/output devices shall communicate using the protocols and network standards as defined by the latest version of ANSI/ASHRAE Standard 135 - BACnet. In other words, all workstations and controllers shall be BACnet devices. No gateways shall be used for communication to controllers installed under this section. Gateways may be used for communication to existing systems or to systems installed under other sections. Use of proprietary protocol on any part of the network is prohibited.

C. Provide Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA) and Smart Sensors (SS) as required. Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in the latest version of ANSI/ASHRAE 135, BACnet Annex L unless otherwise specified, hardwired actuators and sensors may be used in lieu of BACnet Smart Actuators and Smart Sensors.

1.05 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

B. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
   1. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
   2. Object Command: Reaction time of less than 2 seconds between operator command of a binary object and device reaction.
   3. Object Scan: Transmit change of state and change of analog values to control units or workstation within 6 seconds.
   4. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within 5 seconds of each other.

1.06 WORK INCLUDED

A. Furnish a complete distributed direct digital control system in accordance with this specification section. This includes all supervisory controllers, network controllers, logic controllers and all input/output devices. Items of work included are as follows:
   1. Provide a submittal that meets the requirements below for approval.
   2. Coordinate installation schedule with the mechanical contractor and general contractor.
   3. Provide installation of all panels and devices unless otherwise stated.
   4. Provide power for panels and control devices from a source designated by the electrical contractor. All 120 volt power circuits to the DDC panel(s) shall be provided by this Contractor (unless specifically shown on the electrical drawings).
   5. Provide all low voltage control wiring for the DDC system. All wiring of sensors and control devices including any power wiring of devices and necessary conduit shall be provided under this section of the specifications.
   6. Provide miscellaneous control wiring for HVAC and related systems regardless of voltage.
   7. Provide engineering and technician labor to program and commission software for each system and operator interface. Submit commissioning reports for approval.
   8. Provide testing, demonstration and training as specified below.
   9. Provide all necessary BACnet-compliant hardware and software to meet the system’s functional specifications. Provide Protocol Implementation Conformance Statement (PICS) for Windows-based control software and every controller in system.
   10. The BMS server licensing options shall allow a minimum of five (5) local workstation connections/access concurrently.
   11. The web server licensing options shall allow concurrent access by a minimum of five (5) remove browser connections. These licenses shall be in addition to the five (5) licenses assigned for local connections

1.07 SUBMITTALS

A. One (1) submittal package shall be provided for the project that includes information for controls for all systems being provided as part of the project. Partial submittals are not acceptable and shall not be reviewed by the Engineer. For example, it is not acceptable to submit a control valve schedule as part of one package and control diagrams as part of a later package. For large projects or where partial submittals may be required to maintain the project schedule, the contractor shall coordinate a schedule for delivery of each partial submittal and the items to be contained within each submittal. It shall not be up to the contractor’s discretion as to what shall be included in each partial submittal.

B. Product Information: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials and installation and startup instructions for each type of product indicated.
   1. Each control device labeled with setting or adjustable range of control.
   2. DDC System Hardware: Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels and operator interface equipment.

3. Control System Software: Include technical data for operating system software, operator interface, color graphics and other third-party applications.
4. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number and product data. Include written description of sequence of operation including schematic diagram.

C. Submittal Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components and location and size of each field connection. Submittal shall include the following as a minimum:
1. Schematic flow diagrams showing fans, pumps, coil, dampers, valves, instrumentation, and control devices.
2. Wiring Diagrams: Interior panel diagrams to include, power, signal and control wiring as well as physical dimension layout of all interior components such as terminal strips, wire raceways, transformers, relays and all transducers.
3. Architecture drawing including all communication wiring, network devices, etc. Indicate type of cabling and number of conductors.
4. Symbol and abbreviation list for control diagrams.
5. Points list including hardwired and software points.
6. Manufacturer’s technical cut sheets which include a table of contents and an associated sheet numbering system for all pages. Model number shall be circled or pointed with an arrow.
7. A complete bill of materials specific to each system detailing the equipment to be used, quantity, manufacturer, specific model number and tag number.
8. List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule and operator notations.
9. Details of control panel faces, including controls, instruments and labeling.
10. Schedule of dampers including size, leakage and flow characteristics.
11. Schedule of valves including leakage, flow characteristics, GPM, design pressure drop, actual pressure drop, design CV, calculated CV, valve body pressure rating, and close-off pressure rating at a minimum.
12. All shop drawings used by field personnel for the installation of equipment shall bear an Engineer’s approval stamp.
13. Architectural floor plans indicating proposed locations of all wall-mounted devices (i.e., DDC units, control panels, sensors, thermostats, etc.) and mechanical drawings indicating proposed locations of all temperature, flow and pressure transmitters.
14. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

D. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with the latest version of ASHRAE 135 related to BACnet.

E. Samples for Initial Selection: For each color required, of each type of thermostat and/or sensor cover with factory-applied color finishes.

F. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Keyboard illustrations and step-by-step procedures indexed for each operator function.
3. Inspection period, cleaning methods, cleaning materials recommended and calibration tolerances.
4. Calibration records and list of set points.

G. The BMS Contractor shall correct any errors or omissions noted by the Owner and Engineer during review.

H. Device substitutions shall be considered as long as they are submitted to the engineer one week in advance of the bid via a formal RFI. Contractor shall provide a technical comparison in spreadsheet format that includes, at a minimum, comparison of physical size, accuracy, drift, cost, turndown, options provided, device warranty, as applicable.

1.08 SEQUENCING AND SCHEDULING

A. Sequence and coordinate the work of this Section with the scheduling requirements and the Engineer. Review the approved schedule with the Engineer, sub-contractors, manufacturers, vendors, suppliers and all other contractors. Schedule and sequence all Work with the adjoining Work, and Work of others such that all Work can be accomplished concurrently during the same time period.

1.09 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is an authorized representative of the automatic control system manufacturer for both installation and maintenance of units required for this Project.

B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

C. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."

D. Materials and equipment shall be the catalogued products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements.

E. All portions of the system must be designed, furnished, installed, commissioned and serviced by manufacturer-approved, factory-trained employees.

F. Single source responsibility of supplier shall be the complete installation and proper operation of the BMS and control system and shall include debugging and proper calibration of each component in the entire system.

G. Supplier shall have an in-place support facility within 50 miles of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

H. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Section 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.

I. BMS shall comply with UL 916 PAZX and be so listed at the time of bid.

J. System devices shall have UL 864 (UUKL smoke control) and shall be so certified at time of bid, if the system is being used for smoke control or life safety.

K. All system components shall be fault-tolerant. System shall include:
   1. Satisfactory operation without damage at 110% and 90% of rated voltage and at plus 3 Hertz variation in line frequency.
   2. Static, transient and short-circuit protection on all inputs and outputs.
   3. Protection for communication lines against incorrect wiring, static transients and induced magnetic interference.
   4. Network-connected devices to be AC coupled or equivalent so that any single device failure will not disrupt or halt network communication.
   5. All real time clocks and data file RAM to be battery-backed for a minimum 100 hours and include local and remote system low battery indication.

L. The BMS contractor shall be regularly engaged in the installation and maintenance of BMS systems and shall meet the following qualifications.
   1. A minimum of 10 years of demonstrated technical expertise and experience in the installation and maintenance of BMS systems similar in size and complexity to this project.
   2. A minimum of 10 years experience installing the control system of the manufacturer that is to be proposed.
   3. Shall be a certified-to-install, direct representative of a control system manufacturer that has a minimum of 10 years experience producing control systems similar to that which is to be proposed.
   4. A maintained service organization consisting of at least 8 competent servicemen, within 50 miles of the project site, for a period of not less than 10 years.

5. The Bidder shall not be considered qualified to bid this project unless they can provide a list of 10 projects, similar in size and scope to this project, completed within the last 4 years.
6. The system manufacturer/installer shall provide an experienced project manager for this work from beginning of control installation until final completion. The project manager is responsible for direct supervision of the design, installation, start-up and commissioning of the BMS as well as attending of project meetings whenever directed by the owner, construction manager and/or mechanical contractor. It shall not be acceptable to change the project manager after the project has begun and before final completion. If the BMS manufacturer wishes to change the project manager, the construction manager and/or owner's representative must be notified immediately and both the new project manager and the previous project manager shall spend three (3) consecutive business days together on-site performing a project management switchover. Exceptions may be allowed for small projects as determined by the construction manager and/or owner's representative.

M. Comply with all current governing codes, ordinances and regulations including UL, NFPA, the local Building Code, NEC, etc.

N. The system shall have a documented history of compatibility by design for a minimum of 15 years. Future compatibility shall be supported for no less than 10 years. Compatibility shall be defined as the ability for any existing control system component including but not limited to primary control panels, secondary control panels, personal operator workstations and portable operator's terminals, to be connected and directly communicate with any new BMS system equipment without bridges, routers or protocol converters.

1.10 DELIVERY, STORAGE AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

B. Provide factory shipping cartons for each piece of equipment and control device. Maintain cartons while shipping, storing and handling as required to prevent equipment damage, and to eliminate dirt and moisture from equipment. Store equipment and materials inside and protect from weather. The stored products shall be protected from the weather, humidity and temperature variations, dirt and dust, and other contaminants, within the storage condition limits published by the equipment manufacturer.

C. System Software: Update to latest version of software at project completion.

1.11 COORDINATION

A. Coordinate location of temperature sensors, humidity sensors and other exposed control sensors with plans and room details before installation.

B. Coordinate installation of taps, valves, airflow stations, etc. with the mechanical contractor.

C. Coordinate BMS equipment with all relevant divisions including, but not limited to, Fire Alarm to achieve compatibility with equipment that interfaces with that system.

D. Coordinate BMS equipment to achieve compatibility with motor starters and annunciation devices.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers and Authorized Dealers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
1. ABM – Alerton.
2. Albireo Energy – Schneider Electric.
3. AME – Honeywell.
4. Automated Logic Corporation NY/NJ – Factory Office.
5. Brandon Controls – ABB/Cylon/AAM.
6. Climatec – Distech Controls.

7. Control Solutions Group – Automated Logic.
8. Honeywell, Inc. – Branch Office.
9. Johnson Controls, Inc. – Factory Office.
10. Schneider Electric Branch Office.
11. Siemens Building Technologies, Inc.
12. TEC Systems – Honeywell.

2.02 CONTROL PANELS

A. Fully enclosed, steel-rack-type cabinet with locking doors or locking removable backs. Match finish of panels and provide laminated as-built wiring diagrams, flow diagrams, etc. related to the system being controlled inside the associated cabinet. Each control panel shall be clearly and permanently labeled with the controller designation and indication of the mechanical equipment served.

B. Unitized cabinet with suitable brackets for wall or floor mounting, located adjacent to each system under automatic control. Provide common keying for all panels.
   1. Fabricate panels of furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish. All panels shall have common keying.
   2. Primary control panel: Provide minimum NEMA 12 rating for indoor application and NEMA 4 rating for outdoor application or the appropriate NEMA rating for application. Electrical piping and wiring shall be penetrated through the bottom of the panel with 4 inches nipples and 4 inches wiring trough.
   3. Secondary control panel: Provide minimum NEMA 1 rating for indoor application.
   4. Size control panel enclosures for twenty percent spare mounting capacity for future expansion.
   5. Only one controller shall be allowed in a control panel with expansion modules if extra points are needed. The BMS contractor shall utilize the largest controller available and if maxed out, only then can a second controller be installed within the panel.

C. Control panel shop drawings shall be submitted for each system (air handling unit, chilled water system, hot water system, etc.) for approval prior to fabrication.

D. Coordinate installation of the control panels with the engineer/architect. Coordinate power for the panels with the electrical contractor.

E. Control Panel Internal Components:
   1. Provide identification sleeves at each termination at the terminal strip.
   2. All control panels shall be provided with DIN Rail mounted screw terminal blocks. Field wiring shall be connected to the screw terminal blocks. It is not acceptable to terminate any field wiring directly to the DDC controller or any panel devices such as relay and transducers. The screw terminal blocks located/attached to the DDC controller alone does not comply with this requirement. Terminal blocks shall be rated for 300 volts, medium duty. Provide Phoenix Feed-through terminal block UT 2,5 or pre-approved equal.
   3. All control devices such as relays, transformers, transducers, power supplies, associated I/O devices, etc. shall be installed inside the panel, not at the starter or electrical junction box.
   4. All panel wirings shall in be installed in Panduit and wiring duct. This shall include but not be limited to wiring from the DDC controller to the terminal block, between DDC controller and relay (and other panel mounted control devices), power wiring for the controller, communication, etc.
   5. Mounting any control devices on the back of the control panel enclosure door is not acceptable.
   6. The use of wire nuts in the control panel enclosures is also prohibited.

F. Power wiring and communication wiring shall be provided in separate conduits with separate hot, neutral, and ground wire runs and separate breakers.

G. Coordinate installation of the control panels with the Owner. Coordinate power for the panels with the electrical contractor.

2.03 BMS SYSTEM ARCHITECTURE

A. The BMS system shall use a Client/Server architecture based on a modular PC network, utilizing industry standard operating systems, networks and protocols.

B. The system shall allow the distribution of system functions such as monitoring and control and graphical user interface etc. across the network to achieve maximum flexibility and performance.

C. Data communications protocol shall be BACnet and shall comply with the latest version of ASHRAE 135.

D. The BMS shall communicate over the primary network via TCP/IP over Ethernet.

E. The primary network will consist of multimode fiber optic vertical communication backbone and CAT6 horizontal homeruns from the floor level network switch to the individual primary controllers. The floor level network switches shall be located approximately every 5 floors and on major mechanical floors. The primary network switches shall be connected in a daisy chain configuration.

2.04 BMS NETWORK

A. The design of the BMS shall network the BMS server or servers, personal computer operator workstations (if applicable), primary control panels and secondary control panels. The network architecture shall consist of multiple network levels. Provide a peer-to-peer Primary Network to connect the server, operator workstation(s) and all primary control panels in the building for global system operation. Provide secondary networks to connect from each primary control panel to the secondary control panels of associated terminal equipment.

B. Access to system data shall not be restricted by the hardware configuration of the BMS. The hardware configuration of the BMS network shall be totally transparent to the user when accessing data or developing control programs.

C. The BMS design shall allow the co-existence of current and future primary control panels and personal computer operator workstations on the same primary network.

D. The BMS contractor shall provide new supervisory controllers/routers as required to connect to all new controllers being installed as part of this project, while still keeping with all requirements such as spare capacity requirements, etc.

E. The network shall not be utilized to send data required by a control algorithm from one controller to another. The data shall be a direct input to the controller containing the control algorithm. If multiple controllers require the same piece of data for a control algorithm, the data shall be an input to each controller.

F. Primary Peer-to-Peer Network
   1. All operator workstations and primary controllers shall directly reside on a network such that communications (i.e., ability to access, edit, modify, add, delete, back up, report, trend, restore all system point database and all programs) may be executed directly between servers, primary control panels, and operator workstations on a peer-to-peer basis.
   2. All operator devices either network resident or connected via intranet and internet, shall have the ability to access all point status and application report data or execute control functions for any and all other devices via the primary network or the secondary network. Access to data shall be based upon logical identification of building equipment. No hardware or software limits shall be imposed on the number of devices with global access to the network data.
   3. The primary network shall provide the following minimum performance:
      a. Provide high-speed data transfer rates for alarm reporting, quick report generation from multiple controllers and upload/download efficiency between network devices. System performance shall insure that an alarm occurring at any Control Panel is displayed at any PC workstation, standalone alarm printer and/or Control Panel within 5 seconds.

b. Support of any combination of primary control panels and operator workstations directly connected to the primary network. A minimum of 64 devices and a maximum of 100 devices shall be supported on a single primary network.
c. Message and alarm buffering to prevent information from being lost.
d. Error detection, correction and re-transmission to guarantee data integrity.
e. Synchronization of real-time clocks between server, primary control panels, and operator workstations, including automatic daylight savings time corrections.
f. Provide network wiring as required to ensure total system operation and communication without interruption, even if the network wiring is open in one (1) location.
g. The primary network shall allow the primary control panels to access any data from, or send control commands and alarm reports directly to, any other primary control panel or combination of controllers on the network without dependence upon a central or intermediate processing device. The primary control panel shall send alarm reports to multiple operator workstations without dependence upon a central or intermediate processing device. The peer-to-peer network shall also allow any primary control panel to access, edit, modify, add, delete, back up, restore all system point database and all programs.
h. The primary network shall allow the primary control panels to assign password access and control priorities to each system individually. The logon password (at any PC workstation or portable operator terminal) shall enable the operator to monitor, adjust and control only the system that the operator is authorized for. All other systems shall not be displayed at the PC workstation or portable terminal. Passwords and priorities for every point shall be fully programmable and adjustable.
i. Each personal computer operator workstation shall support hardwired and dial up type primary networks.

G. Secondary Network
1. This network shall connect and support stand-alone secondary control panels and shall communicate bi-directionally with the primary network through primary control panels for transmission of global data. A sufficient number of primary control panels shall be provided for connection of secondary networks based on quantity of secondary controls panels and distance limitations.
2. Secondary control panels shall be arranged on the secondary network in a functional relationship manner with the primary control panels. For example, a VAV secondary control panel on a secondary network of a primary control panel that is controlling the VAV's corresponding AHU.
3. A maximum of 60 secondary control panels may be configured on an individual secondary network to insure adequate global data and alarm response times and future space capacity.
4. The Secondary Network shall be connected to and communicate with the primary control panel independently.

2.05 ETHERNET COMMUNICATION NETWORK

A. The Communication Network provided for the BMS should comply with IEEE 802.3, IEEE 802.3u IEEE 802.3z. The Ethernet interface to be employed should be a combination of 100BASE-T, 100BASE-TX, and 1000BASE-LX. No other brands of technology are acceptable.

B. The connection between Ethernet Switches and field 100BASE-TX hubs or field Ethernet devices, should be using electrical Category 6a UTP cable.

C. The bandwidth requirement should be analyzed by the contractor, such that predetermined bandwidth should be provided for individual systems and sub-systems, by implementing Virtual LANs techniques.

D. All network devices shall be UL Listed.

2.06 FLOOR LEVEL NETWORK SWITCH (FLNS)

A. Each switch shall be installed with 25% of installed spare port capacity.

B. Provide EX33000 or pre-approved equal. Provide 14 10/100BASE-TX ports plus 2 100BASE-FX ports. Switch shall support 10/100Mbps-Full/Half-duplex, Auto-Negotiation, Auto-MDI/MDIX. Redundant power inputs (12 - 48VDC) with Terminal Block and DC Jack (12VDC). -10°C to 60°C (-14°F to 140°F) and is tested for functional operation @ -20°C to 70°C (-4°F to 158°F) Provides DIN-rail, Panel or Rack mounting. Complies with IEC61000-6-2 EMC Generic standard immunity for Industrial environment.

2.07 UNINTERRUPTIBLE POWER SUPPLY

A. An Uninterruptible Power Supply (UPS) shall be provided and installed by the Contractor for each of the following devices that are powered by the BMS including: Network switches, BMS primary control panels, operator's workstation(s), printer(s), and field devices. Each UPS shall power the device for a minimum of 30 minutes, in the case of power interruption.

B. The UPS shall consist of a battery power source, charger, AC output inverter system and automatic load transfer circuits for a full automatic operation. The UPS shall be an on-line type. When normal AC power returns, the UPS shall transfer the load to the rectifier output. At this time, the charger shall turn on to its ‘high’ charge rate until the batteries are charged approximately 80% of their rated capacity and then automatically shall switch to its maintenance ‘sensing’ position to keep the batteries in their best full-charge condition. Battery recharge time shall not be more than 3 hours.

C. Each UPS shall be provided, as a minimum, with pilot lights for the following conditions: “Incoming AC Power is Available”, “UPS Ready Mode” and “UPS in Standby Mode”. The UPS shall have the capability to hot-swap batteries without interrupting the supply of power to its users.

D. The batteries shall be of the totally enclosed nickel-cadmium type or equal. Batteries that can leak gas shall not be acceptable. There shall not be any damages should the emergency outage of line power exceed the maximum operation time of the UPS. Automatic shutdown shall occur when the UPS’ maximum duty cycle is exceeded.

E. The BMS shall monitor the battery status and power failure alarm of each UPS via hardwired points or communication interface.

F. Provide APC, Liebert, or pre-approved equal.

2.08 PRIMARY CONTROL PANEL HARDWARE

A. Provide one (1) primary control panel to each AHU, primary chilled water system, primary hot water system, and primary condenser water system, etc.

B. ASHRAE 135 Compliance: Primary control panels shall use the latest version of BACnet/ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

C. Spare Capacity
   1. All primary control panels shall be installed with 10% spare points (of each type) and 10% spare memory capacity for future connections. The type of spare point capacity shall be in the same proportion as the implemented I/O functions of the panel, but in no case shall there be less than two (2) spares of each implemented I/O type. Provide all hardware modules, software modules, processors, power supplies, communication controllers, etc. required to ensure adding a point to the spare point location only requires the addition of the appropriate sensor/actuator and field wiring/tubing.
   2. Provide all processors, power supplies and communication controllers so that the implementation of adding a point to the spare point location only requires the addition of the appropriate:
      a. Expansion modules.
      b. Sensor/actuator.
      c. Field wiring/tubing.

D. Provide all necessary hardware for a complete operating system as required. All hardware shall reside in each primary control panel. Primary control panels shall not be dependent upon any higher level computer or another controller for operation.

E. Each primary control panel shall, at a minimum, be provided with:
   1. Appropriate NEMA 12 rated metal enclosure.
   2. An integral real-time clock.
   3. A 32bit, stand-alone, multi-tasking, multi-user, real-time 48M Hz digital control microprocessor module.
   4. Primary Network communication module, if needed for primary network communications.
   5. Secondary Network communication module, if needed for secondary network communications.
   6. Memory to accommodate all primary control panel software requirements, including but not limited to, its own operating system and databases, including control processes, energy management applications, alarm management applications, historical/trend data for points specified, maintenance support applications, custom processes, operator I/O, dial-up communications. Controller shall have a minimum of 32 MB RAM, 1 MB of flash, and 16K EPROM or EEPROM. Controller shall be provided with battery backup capable of supporting all RAM, clock functions, DDC database and operating programs within the controller for a minimum of 72 hours in the event of power failure or power interruption (if information is not stored in non-volatile memory).
   7. Data collection/ Data Trend module sized for 10,000 data samples.
   8. Power supplies as required for all associated modules, sensors, actuators, etc.
   9. Software modules as required for all sequences of operation, logic sequences and energy management routines. Relay logic is not acceptable.
   10. A portable operator terminal connection port to allow the temporary use of portable devices without interrupting the normal operation of permanently connected, printers or terminals.
   11. Monitoring of the status of all HOA switches. The status of the HOA switch shall be available as a BMS data point.
   12. Monitoring of all industry standard types of analog and digital inputs and outputs, without the addition of equipment to the primary control panel.
   13. Auxiliary enclosure for analog output transducers, isolation relays, etc. Auxiliary enclosure shall be part of primary enclosure or mounted adjacent to the primary enclosure.
   14. Local status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Each primary control panel shall perform diagnostics on all inputs and outputs and a failure of any input or output shall be indicated both locally and at the operator workstation.
   15. Graduated intensity LEDs or analog indication of value for each analog output

F. The operator shall have the ability to manually override automatic or centrally executed commands at the primary control panels via local, point discrete, on-board hand/off/auto operator override switches. If on board switches are not available, provide separate control panels with HOA switches. Mount panel adjacent to primary control panel. These override switches shall be operable whether the panel processor is operational or not. Provide HOA switch for each digital output, including spares. Provide hand/auto switch and gradual positioning potentiometer for each analog output, including spares.

G. Each primary control panel shall continuously perform self-diagnostics on all hardware modules and network communications. The primary control panel shall provide both local and remote annunciation of any detected component failures, or repeated failure to establish communication with any system.

H. All databases and programs shall be stored in non-volatile EEPROM, EPROM and PROM.

I. Each primary control panel shall support firmware upgrades without the need to replace hardware.

J. Primary control panels shall provide at least two (2) EIA-232C serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, and portable laptop operator's terminals. Primary control panels shall allow temporary use of portable devices without interrupting the normal operation of permanently connected printers or terminals.

K. Immunity to power and noise.
   1. Controller shall be able to operate at +/-10% of nominal voltage rating and shall power off below 80% nominal voltage.
   2. Controller shall protect itself from and from 2-way radios up to 5W at 1m (3') and from electrical noise between 5 – 120 Hz.
   3. Isolation shall be provided at all primary network terminations, as well as all field point terminations to suppress induced voltage transients consistent with:
      a. RF-Conducted Immunity (RFCI) per ENV 50141 (IEC 1000-4-6) at 3V.
      b. Electro Static Discharge (ESD) Immunity per EN 61000-4-2 (IEC 1000-4-2) at 8kV air discharge, 4kV contact.
      c. Electrical Fast Transient (EFT) per EN 61000-4-4 (IEC 1000-4-4) at 500V signal, 1kV power.
      d. Output Circuit Transients per UL 864 (2,400V, 10A, 1.2 Joule max).
   4. Isolation shall be provided at all Primary Controller's AC input terminals to suppress induced voltage transients consistent with:
      a. IEEE Standard 587 1980.
      b. UL 864 Supply Line Transients.
      c. Voltage Sags, Surge and Dropout per EN 61000-4-11 (EN 1000-4-11).

2.09 PRIMARY CONTROL PANEL SOFTWARE

A. Furnish the following applications software to form complete operating system for building and energy management as described in this specification.

B. Provide all necessary software for a complete operating system as required. All software shall reside in each primary control panel. Primary control panels shall not be dependent upon any higher level computer or another controller for operation.

C. All points, panels and programs shall be identified by a 30 character name and a 16 character point descriptor. The same names shall be displayed at both the primary control panel(s) (via portable terminal or printer) and the PC operator workstation(s).

D. All digital points shall have a user-defined, 2-state status indication with 8 characters minimum (e.g., Summer, Enabled, Disabled, Abnormal).

E. System Security
   1. User access shall be secured using individual security passwords and user names.
   2. Passwords shall restrict the user to the objects, applications and system functions as assigned by the system manager.
   3. Primary Controllers shall be able to assign a minimum of 50 passwords access and control priorities to each point individually. The logon password (at any Operator Interface or portable operator terminal) shall enable the operator to monitor, adjust and control only the points that the operator is authorized for. All other points shall not be displayed at the Operator Interface or portable terminal. Passwords and priorities for every point shall be fully programmable and adjustable.
   4. User Log On / Log Off attempts shall be recorded.
   5. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user-definable.

F. Each primary control panel shall, at a minimum, be provided with software for:
   1. 2-position control, proportional control, proportional plus integral control, proportional, integral, plus derivative control algorithms, all with automatic control loop tuning.
   2. Limiting the number of times each piece of equipment may be cycled within any 1-hour period.
   3. The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads. Upon the resumption of power, each DDC Controller shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling and turn equipment on or off as necessary to resume normal operations.
   4. Priority load shedding (10 zones).

5. Energy management routines including time of day scheduling, calendar-based scheduling, holiday scheduling, temporary schedule overrides, start-stop time optimization, automatic daylight savings time switch over, night setback control, enthalpy switch over, peak demand limiting, temperature-compensated duty cycling, heating/ cooling interlock, supply temperature reset, priority load shedding and power failure restart.
6. Custom, job-specific processes defined by the user, to automatically perform calculations and special control routines and sequences of operations.
    a. Controllers shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
    b. It shall be possible to use any system measured point data or status, any system calculated data, a result from any process or any user-defined constant in any controller in the system.
    c. Any process shall be able to issue commands to points in any and all other controllers in the system.
    d. Processes shall be able to generate operator messages and advisories to other operator I/O devices. A process shall be able to directly send a message to a specified device or cause the execution of a dial-up connection to a remote device such as a printer or pager.
    e. The custom control programming feature shall be documented via English language descriptors.
    f. Each controller shall support text comment lines in the operating program to allow for quick troubleshooting, documentation and historical summaries of program development.
    g. Controller shall provide a HELP function key, providing enhanced context sensitive on-line help with task orientated information from the user manual.
7. Generate and receive automatic and manual operator messages and advisories.
8. Comment lines for all programs.
9. Distributed independent alarm analysis and filtering. Reporting of selected alarms during system shutdown and start-up shall be automatically inhibited. A minimum of 6 priority levels shall be provided for each point.
10. Automatically accumulate and store run-time hours for all digital points.
11. Automatically sample, calculate and store consumption totals on a daily, weekly or monthly basis for all analog and pulse input type points.

G. Trend data shall be stored at the primary control panels and automatically uploaded to the PC workstation. Uploads shall occur based on user-defined intervals, manual commands, or automatically when the trend buffer is 80% full. All trend data shall be available for use in any 3rd party personal computer applications located in the BMS.

H. Primary control panels shall be able to assign password access and control priorities to each system individually. The logon password (at any PC workstation(s) or POT) shall enable the operator to monitor, adjust and/or control only the systems, programs, primary control panel and/or secondary control panels that the operator is authorized for. All other systems, programs, primary and secondary control panels shall not be displayed at the PC workstation or POT. Passwords and priority levels for each system, program, primary control panel and secondary control panel shall be fully programmable and adjustable.

I. Primary control panels shall be able to access any data from, or send control commands and alarm reports directly to, any other primary control panel or combination of controllers on the network without dependence upon a central or intermediate processing device. Primary control panels shall also be able to send alarm reports to multiple operator workstations without dependence upon a central or intermediate processing device.

J. Alarm management shall be provided to monitor and direct alarm information to operator devices. Each DDC Controller shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost. At no time shall the DDC Controllers ability to report alarms be affected by either operator or activity at a PC workstation, local I/O device or

communications with other panels on the network.

1. All alarm or point change reports shall include the point's English language description and the time and date of occurrence.
2. The user shall be able to define the specific system reaction for each point. Alarms shall be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. A minimum of 6 priority levels shall be provided for each point. Point priority levels shall be combined with user definable destination categories (PC, printer, DDC Controller, etc.) to provide full flexibility in defining the handling of system alarms. Each DDC Controller shall automatically inhibit the reporting of selected alarms during system shutdown and start-up. Users shall have the ability to manually inhibit alarm reporting for each point.
3. Alarm reports and messages shall be routed to user-defined list of operator workstations or other devices based on time and other conditions. An alarm shall be able to start programs, print, be logged in the event log, generate custom messages and display graphics.
4. In addition to the point's descriptor and the time and date, the user shall be able to print, display or store a 200 character alarm message to more fully describe the alarm condition or direct operator response.
    a. Each DDC Controller shall be capable of storing a library of at least 50 alarm messages. Each message may be assignable to any number of points in the Controller.
5. Operator-selected alarms shall be capable of initiating a call to a remote operator device.

K. Scheduling:
1. Provide a comprehensive menu driven program to automatically start and stop designated object or group of objects in the system according to a stored time.
2. It shall be possible to define a group of objects as a custom event (i.e., meeting, athletic activity, etc.). Events can then be scheduled to operate all necessary equipment automatically.
3. For points assigned to one (1) common load group, it shall be possible to assign variable time delays between each successive start and stop within that group.
4. The operator shall be able to define the following information:
    a. Time, day.
    b. Commands such as on, off, auto and so forth.
    c. Time delays between successive commands.
    d. There shall be provisions for manual overriding of each schedule by an appropriate operator.
5. It shall be possible to schedule calendar-based events up to 1 year in advance based on the following:
    a. Weekly Schedule. Provide separate schedules for each day of the week. Each of these schedules should include the capability for start, stop, optimal start, optimal stop and night economizer. When a group of objects are scheduled together as an Event, provide the capability to adjust the start and stop times for each member.
    b. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed, it will be discarded and replaced by the standard schedule for that day of the week.
    c. Holiday Schedules. Provide the capability for the operator to define up to 99 special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.

L. Peak Demand Limiting (PDL):
1. The Peak Demand Limiting (PDL) program shall limit the consumption of electricity to prevent electrical peak demand charges.
2. PDL shall continuously track the amount of electricity being consumed, by monitoring one (1) or more electrical kilowatt-hour/demand meters. These meters may measure the

electrical consumption (kWh), electrical demand (kW) or both.

3. PDL shall sample the meter data to continuously forecast the demand likely to be used during successive time intervals.
4. If the PDL forecasted demand indicates that electricity usage is likely to exceed a user preset maximum allowable level, then PDL shall automatically shed electrical loads.
5. Once the demand peak has passed, loads that have been shed shall be restored and returned to normal control.

M. Temperature-compensated duty cycling.
1. The DCCP (Duty Cycle Control Program) shall periodically stop and start loads according to various patterns.
2. The loads shall be cycled such that there is a net reduction in both the electrical demands and the energy consumed.

N. Automatic Daylight Savings Time Switchover: The system shall provide automatic time adjustment for switching to/from Daylight Savings Time.

O. Night setback control. The system shall provide the ability to automatically adjust setpoints for night control.

P. Enthalpy switchover (economizer). The Primary Controller Software shall control the position of the air handler relief, return and outside air dampers. If the outside air enthalpy is below the return air enthalpy, the software will modulate the dampers to provide 100% outside air. The user will be able to quickly changeover to an economizer system based on enthalpy and will be able to override the economizer cycle and return to minimum outside air operation at any time.

Q. PID Control. A PID (proportional-integral-derivative) algorithm with direct or reverse action and anti-windup shall be supplied. The algorithm shall calculate a time-varying analog value that is used to position an output or stage a series of outputs. The controlled variable, set point and PID gains shall be user-selectable.

R. Sequencing. Provide application software based upon the sequences of operation specified to properly sequence equipment.

S. Staggered Start:
1. Simultaneous restarting of equipment after a power outage shall be prevented. User defined time delays between starts shall be adjustable.
2. Upon the resumption of power, each Primary Controller shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling and turn equipment on or off as necessary to resume normal operations.

T. Totalization:
1. Run-Time Totalization. Primary Controllers shall automatically accumulate and store run-time hours for all digital input and output points. A high runtime alarm shall be assigned, if required, by the operator.
2. Consumption totalization. Primary Controllers shall automatically sample, calculate and store consumption totals on a daily, weekly or monthly basis for all analog and digital pulse input type points.
3. Event totalization. Primary Controllers shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly or monthly basis for all points. The event totalization feature shall be able to store the records associated with events before reset.

U. A variety of historical data collection utilities shall be provided to manually or automatically sample, store and display system data for all points.
1. DDC Controllers shall store point history data for selected analog and digital inputs and outputs:
a. Any point, physical or calculated may be designated for trending. Any point, regardless of physical location in the network, may be collected and stored in each DDC Controllers point group. Two (2) methods of collection shall be allowed: either by a pre-defined time interval or upon a pre-defined change of value. Sample intervals of l minute to 7 days shall be provided. Each DDC Controller shall have a

dedicated RAM-based buffer for trend data and shall be capable of storing a minimum of 10,000 data samples.

b. Trend data shall be stored at the DDC Controllers and automatically uploaded to the workstation. Uploads shall occur based upon user-defined interval, manual command or automatically when the trend buffers are 80% full. All trend data shall be available for use in any third party personal computer applications located on the server or workstation.

c. DDC Controllers shall also provide high resolution sampling capability for verification of control loop performance. Operator-initiated automatic and manual loop tuning algorithms shall be provided for a minimum of 36 operator-selected PID control loops. Provide capability to view or print trend and tuning reports.

1) The controller shall perform a step response test with a minimum 1-second resolution, evaluate the trend data, calculate the new PID gains and input these values into the selected LOOP statement.

2) Loop tuning shall be capable of being initiated either locally at the DDC Controller or from a network workstation. For all loop tuning functions, access shall be limited to authorized personnel through password protection.

V. DDC Controllers shall automatically accumulate and store run-time hours for all digital input and output points.

W. DDC Controllers shall automatically sample, calculate and store consumption totals on a daily, weekly, or monthly basis for all analog and digital pulse input type points.

X. DDC Controllers shall count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly and monthly basis for all points. The event totalization feature shall be able to store the records associated with a minimum of 9,999.9 events before reset.

2.10 SECONDARY CONTROL PANEL HARDWARE

A. ASHRAE 135 Compliance: Secondary control panels shall use the latest version of BACnet/ASHRAE 135 protocol over MS/TP.

B. Each secondary control panel shall operate as a stand-alone controller capable of performing its user selectable control routines independently of any other controller in the system. Each secondary control panel shall be a microprocessor-based, multi-tasking, real-time digital control processor.

C. Each Primary Controller shall be able to communicate with secondary controllers over the Secondary Network to control terminal equipment only.

D. Each secondary controller shall include all point inputs and outputs necessary to perform the specified control sequences. The secondary controller shall accept input and provide output signals that comply with industry standards. Controllers utilizing proprietary control signals shall not be acceptable. Outputs may be utilized either for 2-state, modulating, floating or proportional control, allowing for additional system flexibility.

E. Provide a secondary control panel for each of the following types of equipment (if applicable):

1. Constant Air Volume (CAV) boxes.
2. Duct-mounted reheat coils.
3. Fan Coil Units.
4. Fan Powered Variable Air Volume (VAV) Boxes.
5. Reheat Coils.
6. Supplemental AC units.
7. Variable Air Volume (VAV) Boxes.
8. Fan Powered Boxes (FPB).
9. Heat Pumps.
10. Unit Ventilators.
11. Room Pressurization.
12. Digital Energy Monitors.
13. Exhaust Fans.

14. Other terminal equipment.

F. Each secondary control panel shall, at a minimum, be provided with:
1. Appropriate NEMA rated enclosure.
2. A stand-alone real-time digital control microprocessor module.
3. Secondary network communications ability.
4. Power supplies as required for all associated modules, sensors, actuators, etc.
5. Input/output points as required.
6. Software as required for all sequences of operation, logic sequences and energy management routines. Relay logic is not acceptable.
7. A portable operator terminal connection port.
8. Auxiliary enclosure for analog output transducers, isolation relays, etc. Auxiliary enclosure shall be part of primary enclosure or mounted adjacent primary enclosure.
9. Local LED status indication for each digital input and output.
10. Each controller measuring air volume shall include provisions for manual and automatic calibration of the differential pressure transducer in order to maintain stable control and insuring against drift over time.
11. Each controller measuring air volume shall include a differential pressure transducer.
12. SCR control of electric heaters.
13. Fan speed controller for fan powered VAV boxes.
14. Fan relay for fan powered VAV boxes and fan coil units.

G. Communication. Each controller shall perform its primary control function independent of other Secondary Network communication or if Secondary Network communication is interrupted. Reversion to a fail-safe mode of operation during Secondary Network interruption is not acceptable.

H. Control Algorithms. The controller shall receive its real-time data from the Primary Controller time clock to insure Secondary Network continuity. Each controller shall include algorithms incorporating proportional, integral and derivative (PID) gains for all applications. All PID gains and biases shall be field-adjustable by the user via room sensor LCD or the portable operator’s terminal as specified herein. Controllers that incorporate proportional and integral (PI) control algorithms only shall not be acceptable.

I. Control Applications. Operating programs shall be field-selectable for specific applications. In addition, specific applications may be modified to meet the user's exact control strategy requirements, allowing for additional system flexibility. Controllers that require factory changes of all applications are not acceptable.

J. Calibration. Each controller shall include provisions for manual and automatic calibration of the differential pressure transducer in order to maintain stable control and insuring against drift over time.
1. Manual calibration may be accomplished by either commanding the actuator to 0% via the POT or by depressing the room sensor override switch. Calibration of the transducer at the controller location shall not be necessary.

K. Each secondary control panel shall continuously perform self-diagnostics on all hardware and secondary network communications. The secondary control panel shall provide both local and remote annunciation of any detected component failures or repeated failure to establish communication to the system.

L. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences. As a minimum, 50% of the point outputs shall be of the Universal type; that is, the outputs may be utilized either as modulating or two-state, allowing for additional system flexibility. In lieu of Universal outputs, provide a minimum of 50% spare outputs of each type via additional point termination boards or controllers. Analog outputs shall be industry standard signals such as 24 VAC floating control, allowing for interface to a variety of modulating actuators. Terminal equipment controllers utilizing proprietary control signals and actuators shall not be acceptable.

M. Provide each secondary control panel with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All databases and programs shall be stored in non-volatile EEPROM, EPROM and PROM. The controllers shall be able to return to full normal operation without user intervention after a power failure of unlimited duration. Provide uninterruptible power supplies (UPSs) of sufficient capacities for all terminal controllers that do not meet this protection requirement. Operating programs shall be field-selectable for specific applications. In addition, specific applications may be modified to meet the user's exact control strategy requirements, allowing for additional system flexibility. Controllers that require factory changes of all applications are not acceptable. Controller shall have a minimum of 16K EPROM or EEPROM.

N. The secondary control panels shall be powered from a 24 VAC source provided by this contractor and shall function normally under an operating range of 18 – 28 VAC (-25% – 17%), allowing for power source fluctuations and voltage drops. Install plenum data line and sensor cable in accordance with local code and NEC. The BMS contractor shall provide a dedicated power source and separate isolation transformer for each controller to function normally under the specified operating range. The controllers shall also function normally under ambient conditions of 32º – 122ºF (0º – 50ºC) and 10% – 95% RH (non-condensing). Provide each controller with a suitable cover or enclosure to protect the intelligence board assembly. Power supply must be rated at a minimum of 125% of power consumption and shall be of the fused or current limiting type. The BMS contractor shall provide 24 VAC power to the terminal units by utilizing:
   1. The existing line voltage power trunk and installing separate isolation transformers for each controller.
   2. Dedicated line voltage power source and isolation transformers at a central location and installing 24 VAC power trunk to supply multiple controllers in the area.

O. Environment. The controllers shall function normally under ambient conditions of 32º – 122ºF (0º – 50ºC) and 10% – 95% RH (non-condensing). Provide each controller with a suitable cover or enclosure to protect the circuit board assembly.

P. Immunity to noise. Operation shall be protected against electrical noise of 5 – 120Hz and from keyed radios up to 5W at 1m (3’).

2.11 SECONDARY CONTROL PANEL SOFTWARE

A. Provide all necessary software for a complete operating system as required. All software shall reside in each secondary control panel. Secondary control panels shall not be dependent upon any higher level computer or another controller for operation.

B. Secondary control panel software configured for CAV or VAV control algorithms shall include provisions for manual and automatic calibration of attached differential pressure transducer in order to maintain stable control and insuring against drift over time. Calibration shall be accomplished by stroking the terminal unit damper actuator to a 0% position so that a 0 CFM air volume reading is sensed. The controller shall automatically accomplish this whenever the system mode switches from occupied to unoccupied or vice versa. Manual calibration may be accomplished by either commanding the actuator to 0% via the POT or by depressing the room sensor override switch. Calibration of the transducer at the controller location shall not be necessary.

C. Each secondary controller shall perform its primary control function independent of primary controller LAN communication, or if LAN communication is interrupted. Reversion to a fail-safe mode of operation during LAN interruption is not acceptable. The controller shall receive its real-time data from the primary control panel time clock to insure LAN continuity. Each controller shall include algorithms incorporating proportional, integral and derivative (PID) control for all applications. All PI parameters shall be field-adjustable by the user via a portable operator’s terminal.

D. Secondary control panels shall support pressure independent terminal boxes including VAV cooling only, VAV with hot water or electric reheat, Fan-powered VAV and Fan-powered VAV with hot water or electric reheat. All VAV box control applications shall be field-selectable such that a single controller may be used in conjunction with any of the above types of terminal units

to perform the specified sequences of control. This requirement must be met in order to allow for future design and application changes and to facilitate system expansions. Controllers that require factory application changes are not acceptable.

2.12 BMS SERVER

A. Each BMS Server shall consist of the following, at a minimum:
   1. Rack mounted, Dual processors, 16 core Intel® Xeon® Gold series with 22 MB, 64 GB of RDIMM RAM, xUGA graphics card capable of 1920x1080 pixel resolution (or better) and 64 Bit colors, non-interlaced (70Hz or better vertical refresh rate), 12 function-key keyboard, 2-button Intellimouse pointing device with scrolling wheel, 2X 3.84 TB SSD SATA Hard Disk Drive (3.84 TB) in a RAID 1 configuration with SAS PERC internal RAID Controller. Multiple USB 3.0 ports located in the front and back of server. Hot-plug hard drives, redundant power supply, ECC memory, battery-backed cache. ATAPI DVD+/-RW Drive and Dual NIC (network interface card) for Ethernet Networking compatible with TCP/IP network protocols. Windows Server 2016 with latest Microsoft Office software, Server shall have capability to plug in at least two (2) monitors. The server shall be Dell PowerEdge or pre-approved equal.
   2. Color monitor shall be a minimum of 24”, Flat Panel type with height adjustable stand which allows the panel to swivel, tilt and pivot. Separate controls shall be provided for color, contrasts, brightness, size, geometry, position and degauss. The screen shall be non-reflective. The LCD module shall be active matrix, thin film transistor (TFT). The monitor shall support a resolution of 1920x1080 pixels at 60 Hz, at a minimum. Available power supply is 120 VAC at 60Hz.

2.13 OPERATOR WORKSTATION HARDWARE

A. Provide (X) workstations of equal capability. The workstations shall be located…

B. Personal computer operator workstation(s) shall be provided for command entry, information management, network alarm management and database management functions. All real-time control functions shall be resident in the DDC Controllers to facilitate greater fault tolerance and reliability.

C. Each workstation shall consist of the following, at a minimum:
   1. Intel 12 cores processor i7 12th generation with 12 MB l3 cache, 16 GB of DDR5 ram (4800 MHz), XUGA graphics card capable of 1920x1080 pixel resolution (or better) and 64 bit colors, non-interlaced (70hz or better vertical refresh rate), 12 function-key keyboard, 2-button intellimouse pointing device, speakers,1.0TB SSD STAT hard disk drive. Multiple USB 3.0 ports located in the front and back of workstation, ATAPI DVD+/-RW drive and network interface card for ethernet networking compatible with TCP/IP network protocols, Windows 10 professional including latest Microsoft Office software. A Celeron processor or other manufacturer's equivalent is not acceptable.
   2. Color monitor shall be a minimum of 24”, Flat Panel type with height adjustable stand which allows the panel to swivel, tilt and pivot. Separate controls shall be provided for color, contrasts, brightness, size, geometry, position and degauss. The screen shall be non-reflective. The LCD module shall be active matrix, thin film transistor (TFT). The monitor shall support a resolution of 1920 x 1080 pixels at 60 Hz, at a minimum. Available power supply is 120VAC at 60Hz.

D. Provide a black and white printer at each workstation for the recording of critical alarms, operator transactions and systems reports. The printer shall have the following minimum requirements:
   1. 132 column/400 character per second print speed.
   2. 24 Pin, impact dot matrix technology.
   3. Compressed mode option for 220 characters per line.
   4. Bitmapped fonts shall include double-wide, double-high, condensed and double strike.
   5. Adjustable line spacing in 1/6” or programmable (minimum 1/350” increments).
   6. Adjustable tractor for 4-22” paper widths.
   7. 96 ASCII upper and lower case character set.
   8. Rated for 10,000 power on hours mean time between failures.

9. Maximum graphics resolution of 360x360dpi.
10. Input buffer of 64KB.
11. Paper feed speed of 45msec/1/6” line or 5.0” per second continuous feed.
12. Two (2) year warranty.
13. Provide an EPSON LQ-590 or equal.

E. Provide a color printer at one (1) workstation, in addition to the black and white printer, for printing of graphics and any other screen displays. The owner shall choose the workstation to be connected to the color printer. The printer shall have the following requirements at a minimum:
1. 1200x1200 DPI (Dot/Inch) color print resolution.
2. 600DPI black and white print resolution.
3. Draft and letter quality print selection for alpha-numeric operations.
4. Four (4) color mix capability to provide true color printing of screen graphics.
5. Three (3) built-in letter quality fonts from selectable front panel buttons.
6. 2MB memory to store complete graphics for printing.
7. Color print speed of .3 – 3 ppm.
8. Black and white print speed of 2.9 – 12 ppm.
9. Duty cycle of 2,000.

2.14 OPERATOR WORKSTATION SOFTWARE

A. General
1. Provide software which includes the following:
a. Scheduling and override of building operations.
b. Collection and analysis of historical data.
c. Editing, programming, storage and downloading of controller databases, programs and parameters.
d. Latest Microsoft Windows operating system and latest Microsoft Office at a minimum.
e. A 64-bit, multi-tasking Microsoft Windows environment that allows the user to run several applications simultaneously. Other Windows applications shall run simultaneously with the BMS software including, but not limited to, Word, Excel, Access, etc.
f. Provide a user interface that shall minimize the use of a typewriter style keyboard through the use of a mouse or similar pointing device and "point and click" approach to menu selection.
g. The operator shall be able to drag and drop information between applications (e.g., click on a point in the alarm screen and drag it into the dynamic trend graph screen to initiate a dynamic trend).
h. Operator specific password access protection shall allow the user to limit workstation control, display and data base manipulation capabilities for each object in the system. An object shall be defined as any input or output point, setpoint, system program, etc. The operator privileges shall “follow” the operator to any workstation or primary control panel that the operator logs on to. Provide a minimum of 1000 passwords.
i. Operators will be able to perform only those commands on the objects available based on their respective passwords. Menu selections displayed shall be limited to only those items defined for the access level of the password used to log-on.
j. An audit trail report to track system object changes that shall record operator initiated actions. These actions shall include, but not be limited to, changes made by a particular person, changes made to a specific piece of equipment and/or changes made during a designated time frame. The changes shall be printed and archived for future reference either on command or automatically, at the operator’s option. The operator activity tracking data shall be stored in a tamper proof buffer.
k. Software shall allow the operator to perform commands including, but not limited to:
1) Start up and shutdown of equipment.
2) Setpoint adjustment.
3) Add/modify/delete time programming.

4) Enable/disable process execution.
5) Lock/unlock alarm reporting.
6) Enable/disable totalization and/or trending.
7) Override PID loop setpoints.
8) Enter temporary override schedules.
9) Define holiday schedules.
10) Change time/date.
11) Automatic daylight savings time adjustments.
12) Enter/modify analog warning and alarm limits.
    (a) Reporting.
    (b) Reports shall be generated and directed to LCD displays, printers or disk. As a minimum, the system shall allow the user to easily obtain the following types of reports:
        (1) A general listing of all points in the network.
        (2) List of all points currently in alarm.
        (3) List of all points currently in override status.
        (4) List of all disabled points.
        (5) List of all points currently locked out.
        (6) DDC Controller trend overflow warning.
        (7) List all weekly schedules.

l. Scheduling
    1) Provide a graphical spreadsheet-type format for simplification of time-of-day scheduling and overrides of building operations. Provide schedules for 365 days in advance.
    2) Weekly schedules shall be provided for each building zone or piece of equipment with a specific occupancy schedule. Temporary overrides and associated times may be inserted into blocks for modified operating schedules. After overrides have been executed, the original schedule will automatically be restored.
    3) Zone schedules shall be provided for each building zone as previously described. Each schedule shall include all points that can be commanded residing within the zone. Each point may have a unique schedule of operation relative to the zone's occupancy schedule, allowing for sequential starting and control of equipment within the zone. Scheduling and rescheduling of points may be accomplished easily via the zone schedule graphic.

m. Collection and Analysis of Historical Data
    1) Provide trending capabilities that allow the user to easily monitor and preserve records of system activity over an extended period of time. Any system point may be trended automatically at time-based intervals or changes of value, both of which shall be user-definable. Trend data shall be stored on hard disk for future diagnostics and reporting.
    2) Trend data report graphics shall be provided to allow the user to view all trended point data. Reports may be customized to include individual points or pre-defined groups of at least 6 points. Provide additional functionality to allow any trended data to be transferred directly to an off-the-shelf spreadsheet package such as Excel. This shall allow the user to perform custom calculations such as energy usage, equipment efficiency and energy costs and shall allow for generation of these reports on high-quality plots, graphs and charts.
    3) Provide additional functionality that allows the user to view trended data on trend graph displays. Displays shall be actual plots of both historical and/or real-time dynamic point data. A minimum of 10 points shall be viewed simultaneously on a single graph. The user may pause the graph and take "snapshots" of screens to be stored on the hard disk for future recall and analysis. Displays shall include an 'X' axis indicating elapsed time and a 'Y' axis indicating a range scale in engineering units for each point. The 'Y' axis shall have the ability to be manually or automatically scaled at the user's option. Different ranges for each

point may be used with minimum and maximum values listed at the bottom and top of the 'Y' axis. All 'Y' axis data shall be color-coded to match the line color for the corresponding point.

4) Static graphs shall represent actual point data that has been trended and stored on disk. Exact point values may be viewed on a data window by pointing or scrolling to the place of interest along the graph. Provide capability to print any graph on the system printer for use as a building management and diagnostics tool.
5) Dynamic graphs shall represent real-time point data. Any point or group of points may be graphed, regardless of whether they have been predefined for trending. The graphs shall continuously update point values. At any time the user may redefine sampling times or range scales for any point. In addition, the user may pause the graph and take "snapshots" of screens to be stored on the workstation disk for future recall and analysis. As with static graphs, exact point values may be viewed and the graphs may be printed.

n. Dynamic Color Graphic Displays
1) All workstation(s) shall be provided with color graphics. All workstation(s) software shall include a graphical viewing and control environment and definition and construction of dynamic color graphic displays.
2) Provide system color graphics for each HVAC system and for each electrical, plumbing and/or piping system that is monitored and/or controlled by the BMS. Provide scaled floor plans indicating equipment location, service and system data as required.
3) Provide color graphic floor plan displays and system schematics for each piece of mechanical equipment, including but not limited to air handling units, chilled water systems and hot water systems to optimize system performance analysis and speed alarm recognition.
4) Provide links on each graphic to PDF files of the associated sequence of operation, flow diagram, and wiring diagram.
5) The operator interface shall allow users to access the various system schematics and floor plans via a graphical penetration scheme, menu selection or text-based commands.
6) Dynamic temperature values, humidity values, flow values and status indication shall be shown in their actual respective locations and shall automatically update to represent current conditions without operator intervention.
7) The windowing environment of the PC operator workstation(s) shall allow the user to simultaneously view several graphics at a time to analyze total building operation or to allow the display of a graphic associated with an alarm to be viewed without interrupting work in progress.
8) Graphic generation software shall be provided. This shall enable the modification, addition or deletion of system graphics via an off the shelf graphics package similar to MicroGraphix Designer.
9) Provide libraries of pre-engineered screens and symbols depicting standard air handling unit components (e.g., fans, cooling coils, filters, dampers, etc.), complete mechanical systems (e.g., constant volume-terminal reheat, VAV, etc.) and electrical symbols.
10) Graphical displays can be created to represent any logical grouping of system points or calculated data based upon building function, mechanical system, building layout, or any other logical grouping of points that aids the operator in the analysis of the facility.
11) Graphical displays shall contain animation to assist the operator in determining status of the equipment being displayed (e.g., a fan that is energized shall rotate).
12) Provide an automatically updated, dynamic display of the site-specific BMS architecture indicating the status of primary and secondary controllers, PC workstation(s) and networks.

13) Provide a separate dynamic display page of each HVAC (AHU, AC, chiller, cooling tower, fuel oil, etc.), electrical and/or plumbing system connected to the BMS.
14) Provide a separate dynamic display page of each piece of terminal equipment (VAV box, fan coil unit, etc.) connected to the BMS.
15) Provide a separate dynamic display page for each floor or zone. At a minimum, each page shall display the associated space temperature readings and links to equipment located on the floor or in the zone.
16) Provide an additional (10) separate dynamic, graphic display pages at each workstation as required by the operating staff to further assist in daily system operations.
17) Graphics shall incorporate all system integration points communicated via hardware or software gateways and/or interfaces. Origin of information shall be transparent to the operator and shall be controlled, displayed, trended, etc. as if the points were hardwired to the BMS.

2. System Configuration and Definition
   a. All temperature and equipment control strategies and energy management routines shall be definable by the operator. System definition and modification procedures shall not interfere with normal system operation and control.
   b. The system shall be provided complete with all equipment and documentation necessary to allow an operator to independently add, delete or modify any system object including primary control panel(s), operator workstations(s), secondary control panels, reporting definitions, control loops, energy management applications, time and calendar-based programming, totalization, historical data trending, custom control processes, graphic displays, operator passwords, alarm messages, etc.
   c. Definition of operator device characteristics for individual points, applications and control sequences shall be performed using instructive prompting software.
   d. Programming shall be performed with the BMS system online and shall not interfere with BMS system operation.
   e. Inputs and outputs for any process shall not be restricted to a single primary control panel, but shall be able to include data from any and all other network panels to allow the development of network-wide control strategies. Processes shall also allow the operator to use the results of 1 process as the input to any number of other processes (cascading).
   f. Provide the capability to backup and store all system databases on the workstation hard disk. In addition, all database changes shall be performed while the workstation(s) are on-line without disrupting other system operations. Changes shall be automatically recorded and downloaded to the appropriate primary control panel. Similarly, changes made at the primary control panels shall be automatically uploaded to the workstation, ensuring system continuity. The user shall also have the option to selectively download changes as desired.
   g. Provide context-sensitive help menus to provide instructions appropriate with operations and applications currently being performed.

2.15 WEB BASED OPERATOR INTERFACE

A. Operator Interface. Web server shall reside on high-speed network with primary controllers. Each standard browser connected to server shall be able to access all system information. In addition to the primary operator interface, the system shall include a secondary interface compatible with a locally available commercial wireless network and viewable on a commercially available wireless device such as a Wireless Access Protocol (WAP) enabled cellular telephone. This secondary interface may be text-based and shall provide a summary of the most important data. As a minimum, the following capabilities shall be provided through this interface:
   1. An operator authentication system that requires an operator to log in before viewing or editing any data and which can be configured to limit the privileges of an individual operator.

2. The ability to view and acknowledge any alarm in the system. Alarms or links to alarms shall be provided on a contiguous list so the operator can quickly view all alarms.
3. A summary page or pages for each piece of equipment in the system. This page shall include the current values of all critical I/O points and shall allow the operator to lock binary points on or off and to lock analog points to any value within their range.
4. Navigation links that allow the operator to quickly navigate from the home screen to any piece of equipment in the system and then return to the home screen. These links shall be arranged in a hierarchical fashion, such as navigating from the home screen to a particular building, then to a specific floor in the building and then to a specific room or piece of equipment.

B. Communication. Web server or workstation and controllers shall communicate using BACnet protocol. Web server or workstation and control network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing as specified in the latest version of ANSI/ASHRAE 135, BACnet Annex J.

C. Hardware. Each workstation or web server shall consist of the following:
1. Industry-standard hardware shall meet or exceed DDC system manufacturer's recommended specifications and shall meet requirements included herein. Hard disk shall have sufficient memory to store system software, 1 year of data for trended points and a system database at least twice the size of the existing database at system acceptance. Configure computers and network connections if multiple computers are required to meet specified memory and performance.

D. Operator Functions. Operator interface shall allow each authorized operator to execute the following functions as a minimum:
1. Log In and Log Out. System shall require user name and password to log in to operator interface.
2. Point-and-click Navigation. Operator interface shall be graphically based and shall allow operators to access graphics for equipment and geographic areas using point-and-click navigation.
3. View and Adjust Equipment Properties. Operators shall be able to view controlled equipment status and to adjust operating parameters such as setpoints, PID gains, on and off controls and sensor calibration.
4. View and Adjust Operating Schedules. Operators shall be able to view scheduled operating hours of each schedulable piece of equipment on a weekly or monthly calendar-based graphical schedule display, to select and adjust each schedule and time period and to simultaneously schedule related equipment. System shall clearly show exception schedules and holidays on the schedule display.
5. View and Respond to Alarms. Operators shall be able to view a list of currently active system alarms, to acknowledge each alarm and to clear (delete) unneeded alarms.
6. View and Configure Trends. Operators shall be able to view a trend graph of each trended point and to edit graph configuration to display a specific time period or data range. Operator shall be able to create custom trend graphs to display on the same page data from multiple trended points.
7. View and Configure Reports. Operators shall be able to run preconfigured reports, to view report results and to customize report configuration to show data of interest.
8. Manage Control System Hardware. Operators shall be able to view controller status, to restart (reboot) each controller and to download new control software to each controller.
9. Manage Operator Access. Typically, only a few operators are authorized to manage operator access. Authorized operators shall be able to view a list of operators with system access and of functions they can perform while logged in. Operators shall be able to add operators, to delete operators and to edit operator function authorization. Operator shall be able to authorize each operator function separately.

E. System Software.
1. Operating System. Web server shall have an industry-standard professional-grade operating system. Acceptable systems include latest Microsoft Windows.

2. System Graphics. Operator interface shall be graphically based and shall include at least one (1) graphic per piece of equipment, air handling unit or occupied zone, graphics for each chilled water and hot water system and graphics that summarize conditions on each floor. The BMS contractor shall review and standardize these graphics with the owner on site team.
3. Provide links on each graphic to PDF files of the associated sequence of operation, flow diagram, and wiring diagrams.
4. Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point-and-click navigation between zones or equipment and to edit setpoints and other specified parameters.
5. Animation. Graphics shall be able to animate by displaying different image files for changed object status.
6. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
7. Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Macromedia Flash).

F. System Tools. System shall provide the following functionality to authorized operators as an integral part of the operator interface or as stand-alone software programs. If furnished as part of the interface, the tool shall be available from each workstation or web browser interface. If furnished as a stand-alone program, software shall be installable on standard IBM-compatible PCs with no limit on the number of copies that can be installed under the system license.
1. Automatic System Database Configuration. Each workstation or web server shall store on its hard disk a copy of the current system database, including controller firmware and software. Stored database shall be automatically updated with each system configuration or controller firmware or software change.
2. Controller Memory Download. Operators shall be able to download memory from the system database to each controller.
3. System Configuration. Operators shall be able to configure the system.
4. Online Help. Context-sensitive online help for each tool shall assist operators in operating and editing the system.
5. Security. System shall require a user name and password to view, edit, add or delete data.
6. Operator Access. Each user name and password combination shall define accessible viewing, editing, adding and deleting functions in each system application, editor and object.
7. Automatic Log Out. Automatically log out each operator if no keyboard or mouse activity is detected. Operators shall be able to adjust automatic log out delay.
8. Encrypted Security Data. Store system security data including operator passwords in an encrypted format. System shall not display operator passwords.
9. System Diagnostics. System shall automatically monitor controller and I/O point operation. System shall annunciate controller failure and I/O point locking (manual overriding to a fixed value).
10. Alarm Processing. System input and status objects shall be configurable to alarm on departing from and on returning to normal state. Operator shall be able to enable or disable each alarm and to configure alarm limits, alarm limit differentials, alarm states and alarm reactions for each system object. Configure and enable alarm points as specified.
11. Alarm Messages. Alarm messages shall use an English language descriptor without acronyms or mnemonics to describe alarm source, location and nature.
12. Alarm Reactions. Operator shall be able to configure (by object) actions workstation or web server shall initiate on receipt of each alarm. As a minimum, workstation or web server shall be able to log, print, start programs, display messages, send e-mail, send page and audibly annunciate.

13. Alarm Maintenance. Operators shall be able to view system alarms and changes of state chronologically, to acknowledge and delete alarms and to archive closed alarms to the workstation or web server hard disk from each workstation or web browser interface.
14. Trend Configuration. Operator shall be able to configure trend sample or change of value (COV) interval, start time and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk. Configure trends as specified or required by the Owner.
15. Object and Property Status and Control. Operator shall be able to view and to edit if applicable, the status of each system object and property by menu, on graphics or through custom programs.
16. Reports and Logs. Operator shall be able to select, to modify, to create and to print reports and logs. Operator shall be able to store report data in a format accessible by standard spreadsheet and word processing programs.
17. Objects. System objects and current values filtered by object type, by status (in alarm, locked, normal), by equipment, by geographic location or by combination of filter criteria.
18. Alarm Summary. Current alarms and closed alarms. System shall retain closed alarms for an adjustable period.
19. Logs. System shall log the following to a database or text file and shall retain data for an adjustable period:
    a. Alarm History.
    b. Trend Data. Operator shall be able to select trends to be logged.
    c. Operator Activity. At a minimum, system shall log operator log in and log out, control parameter changes, schedule changes and alarm acknowledgment and deletion. System shall date and time stamp logged activity.
20. Custom Reports. Operator shall be able to create custom reports that retrieve data, including archived trend data, from the system, that analyze data using common algebraic calculations and that present results in tabular or graphical format. Reports shall be launched from the operator interface.
21. Graphics Generation. Graphically based tools and documentation shall allow Operator to edit system graphics, to create graphics and to integrate graphics into the system. Operator shall be able to add analog and binary values, dynamic text, static text and animation files to a background graphic using a mouse.
22. Graphics Library. Complete library of standard HVAC equipment graphics shall include equipment such as chillers, boilers, air handlers, terminals, fan coils and unit ventilators. Library shall include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers and ductwork. Library graphic file format shall be compatible with graphics generation tools.
23. Custom Application Programming. Operator shall be able to create, edit, debug and download custom programs. System shall be fully operable while custom programs are edited, compiled and downloaded. Programming language shall have the following features:
24. Language. Language shall be graphically based and shall use function blocks arranged in a logic diagram that clearly shows control logic flow. Function blocks shall directly provide functions listed below and operators shall be able to create custom or compound function blocks.
25. Programming Environment. Tool shall provide a full-screen, cursor-and-mouse-driven programming environment that incorporates word processing features such as cut and paste. Operators shall be able to insert, add, modify and delete custom programming code and to copy blocks of code to a file library for reuse in other control programs.
26. Independent Program Modules. Operator shall be able to develop independently executing program modules that can disable, enable and exchange data with other program modules.
27. Debugging and Simulation. Operator shall be able to step through the program observing intermediate values and results. Operator shall be able to adjust input variables to simulate actual operating conditions. Operator shall be able to adjust each step's time

increment to observe operation of delays, integrators and other time-sensitive control logic. Debugger shall provide error messages for syntax and for execution errors.

28. Conditional Statements. Operator shall be able to program conditional logic using compound Boolean (AND, OR and NOT) and relational (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
29. Mathematical Functions. Language shall support floating-point addition, subtraction, multiplication, division and square root operations, as well as absolute value calculation and programmatic selection of minimum and maximum values from a list of values.
30. Variables: Operator shall be able to use variable values in program conditional statements and mathematical functions.
    a. Time Variables. Operator shall be able to use predefined variables to represent time of day, day of the week, month of the year and date. Other predefined variables or simple control logic shall provide elapsed time in seconds, minutes, hours and days. Operator shall be able to start, stop and reset elapsed time variables using the program language.
    b. System Variables. Operator shall be able to use predefined variables to represent status and results of Controller Software and shall be able to enable, disable and change setpoints of Controller Software as described in Controller Software section.

2.16 BACNET DEVICE OBJECTS

A. The BAS manufacturer's representative shall submit a BACnet Device Object Naming Convention Plan (DONCP) to the owner and consulting engineer during the submittal process. The plan must be approved by the owner and consulting engineer prior to implementation. It is the responsibility of the BAS contractor to coordinate the DONCP with the owner and consulting engineer.

B. The DONCP shall be designed to eliminate any confusion between individual points in a facility BMS system. It will also be designed to allow for future expansion and consistency. Each device on the BACnet network (including other manufacturer's devices) must have a unique device instance. This is a major consideration when adding to an existing system or interconnecting networks. Thorough and accessible site documentation is critical.

C. A consistent object (point) naming convention shall be used to facilitate familiarity and operational ease across an eventual large campus or inventory of facilities. The following section is designed as recommendations only. It is the responsibility of the BMS contractor to coordinate the DONCP with the owner and consulting engineer

D. BACnet requires that all devices have a Device object name that is unique throughout the entire network. To comply with this requirement, all BACnet devices shall be configured with a Device Object Name that is based on the naming conventions described in this section. This includes all physical devices as well as any logical BACnet devices that are represented by gateways. The BMS contractor shall coordinate with the Owner's staff to ensure that the correct names are used. Device Object Name properties shall support strings of at least 50 characters in length.

E. Every system device has addresses by which any other BACnet device can identify it and route information to and from it. The BMS contractor shall document all addresses and utilize a logical addressing scheme that is coordinated with the Owner.

F. Adopt a hierarchical and uniform addressing scheme for device instances to help quickly identify the function and location of different devices when troubleshooting. Additionally, document every element of the addressing scheme and update the site documentation with any changes.

G. Standard BACnet object types supported shall include as a minimum: Analog value, Binary value, Calendar, Device, File, Group, Notification Class, Program and Schedule object types.

2.17 REMOTE NOTIFICATION PAGING SYSTEM

A. Workstations shall be configured to send out messages to numeric pagers, alphanumeric pagers, phones (via text to speech technology), SMS (Simple Messaging Service, text messaging) Devices and email accounts based on a point's alarm condition.

B. There shall be no limit to the number of points that can be configured for remote notification of alarm conditions and no limit on the number of remote devices that can receive messages from the system.

C. On a per point basis, system shall be configurable to send messages to an individual or group and shall be configurable to send different messages to different remote devices based on alarm message priority level.

D. Remote devices may be scheduled as to when they receive messages from the system to account for operators' work schedules.

E. System must be configurable to send messages to an escalation list so that if the first device does not respond, the message is sent on to the next device after a configurable time has elapsed.

F. Message detail shall be configurable on a per user basis.

G. During a "flood" of alarms, remote notification messages shall have the ability to optimize several alarms into an individual remote notification message.

H. Workstation shall have the ability to send manual messages allowing an operator to type in a message to be sent immediately.

I. Workstation shall have a feature to send a heartbeat message to periodically notify users that they have communication with the system.

2.18 SENSORS

A. Electronic Sensors: Vibration and corrosion resistant; for wall, immersion or duct mounting as required.

B. Instruments and control devices shall be provided for all required points detailed herein. Instruments shall have accuracies as stated herein. Instrument characteristics such as hysteresis, relaxation time, span, and maximum and minimum limits, shall be accounted for in applications of instruments and controls. Not all devices specified may be required for this project.

C. Field wiring for each digital device shall be as per the manufacturer’s standard. The details of the wiring shall be included in the submittal.

D. Sensors for duct locations shall not be affected by vibrations encountered in normal duct systems.

E. Outside Air Stations: Assembly shall consist of capacitive type humidity sensing element with 1000 ohm platinum RTD and a solid-state, 2 wire, 4-20 mA transmitter mounted in an integrated ventilated radiation shield suitable for outdoor installation. Assembly shall be factory calibrated to an accuracy of ±2% RH over a range of 0%-90% RH and ±3% over a range of 90-100% RH and an accuracy of ±0.54°F over entire operating span. Assembly shall be provided with a 3-point NIST traceable calibration certificate. Assembly shall be Vaisala HMS110 Series or pre-approved equal.

F. Temperature Sensors
   1. Temperature sensors used in water sensing applications shall be 1k ohm platinum resistance temperature detectors. Platinum RTDs must be installed with a transmitter if the controller cannot accept a direct platinum RTD input. Temperature sensors used in duct or space sensing applications shall be thermistors. Temperature sensors shall have the following characteristics.
      a. Accuracy: +0.5ºF.
      b. Wire: Twisted, shielded-pair cable.
   2. Insertion Elements in Ducts: Single point; use where not affected by temperature stratification or where ducts are smaller than 9sq ft. (1sq m). The length of the sensor shall be a minimum of one-third of the width of the duct with a maximum length of eighteen (18) inches. Provide duct mounted metal housing with conduit entrance.
   3. Averaging Elements in Ducts: Use where prone to temperature stratification or where ducts are larger than 9sq ft (1sq m); length as required. The length of the sensor shall be

twelve (12) feet minimum or one (1) linear foot per every one (1) sq ft of cut cross section, whichever is greater. Provide duct mounted metal housing with conduit entrance and mounting clips.

4. Provide one (1) averaging temperature sensor for each preheat or heating coil section in an air handling unit. The sensor shall be installed on the discharge side of each preheat coil.
5. Insertion Elements for Liquids: Provide 304 stainless steel thermowell with tapered pattern, 3/4 inch NPT external connection, 1/2 inch internal thread. Include lagging extension equal to insulation thickness where installed in insulated piping. Insertion length shall be a minimum of 1/3 of pipe diameter but in no case shall be less than 2-1/2 inches and a maximum of 3/4 pipe diameter or 6 inches, whichever is smaller.
6. Space sensors:
   a. Set-Point Adjustment: Concealed.
   b. Set-Point Indication: Concealed.
   c. Color: White.
   d. Orientation: Vertical.
   e. Space sensors provided for existing facilities shall match existing site standard.
   f. Provide a communication port for connection of a laptop or other portable interface device.

G. Humidity Sensors: Bulk polymer sensor element
   1. Room Humidity Sensors:
      a. Factory calibrated to an accuracy of ±1.7% RH over a range of 0%-90% RH and ±2.5% over a range of 90-100% RH
      b. With locking cover matching room thermostats, span of 0 to 100% RH.
      c. Sensors shall be Vaisala HUMICAP HMW90 or pre-approved equal.
   2. Duct and Outside Humidity Air Sensors:
      a. Factory calibrated to an accuracy of ±2% RH over a range of 0%-100% RH
      b. With element guard and mounting plate, span of 0 to 100% RH.
      c. Sensors shall be Vaisala HMD60/70 Series or pre-approved equal.
   3. Sensors shall be provided with a 3-point NIST traceable calibration certificate.

H. Static Pressure Transmitter: Nondirectional sensor with suitable range for expected input and temperature compensated.
   1. Accuracy: 1% of full scale with repeatability of 0.1%.
   2. Output: 4 – 20 mA.
   3. Building Static-Pressure Range: 0-0.25” wg (0-62 Pa).
   4. Duct Static-Pressure Range: 0-5” wg (0-1243 Pa).
   5. Provide a Setra M264 or pre-approved equal.
   6. Provide static pressure sensing probe for the application.
      a. Aluminum alloy construction
      b. 1/4" barb connection for transducer or switch
      c. Gasketed mounting flange to seal off the mounting hole.
   7. These sensors shall be used for control of fan VFDs, monitoring of filter DP, etc.

I. Pressure Transmitters: Direct acting for gas, liquid or steam service; range suitable for system; proportional output 4-20 mA.
   1. 2-wire variable capacitance.
   2. NEMA 4X enclosure.
   3. Rated for 0% to 100% RH and -40ºF – 185ºF.
   4. Dual component housing with a moisture barrier completely isolating the electronic circuitry from the field wiring and calibration terminals.
   5. Operates with a 10 – 55 VDC power supply.
   6. Zero and span adjustments.
   7. Accuracy shall be + 0.075% of calibrated span.
   8. Transmitter shall be furnished complete with coplanar style factory mounted 5-valve manifold and mounting bracket manufactured by Rosemount Model 305 or pre-approved

equal.

9. Provide Rosemount 2051 or pre-approved equal.

J. Damper End Switches
   1. Provide a compact, SPDT switch for sensing of damper position. Shall be rated to operate from -13°F – 158°F. Shall have a side rotary switch for use with interchangeable levers. Shall be Telemechanique XCKL series or pre-approved equal.

K. Water Differential Pressure Switches
   1. Low Rise: Hermetically sealed SPDT contacts; stainless steel bourdon tube (or bellows) sensing element; fixed deadband; setpoint shall be at about midpoint of operating range; electrical rating of 5A at 120 VAC; manual adjustable setpoint; vibration resistant; weatherproof enclosure; snap-acting switch type. Switch shall be capable of sustaining 75 psig in either direction. High and low ports shall be 1/4 inch NPT.
   2. High Rise: Hermetically sealed SPDT contacts; stainless steel bourdon tube (or bellows) sensing element; fixed deadband; setpoint shall be at about midpoint of operating range; electrical rating of 5A at 120 VAC; manual adjustable setpoint; vibration resistant; weatherproof enclosure; snap-acting switch type. Switch shall be capable of sustaining 125 psig (adj.) in either direction. High and low ports shall be 1/4 inch NPT.

L. Air Differential Pressure Switches
   1. Diaphragm type air differential pressure switches with die-cast aluminum housing, adjustable setpoint and minimum 5A switch rating at 120 VAC, SPST switches and the switch pressure range shall be suited for the application. Switch shall be automatic or manual reset type. Air differential pressure switch shall be Dwyer or pre-approved equal.. High and low ports shall be 1/8 inch NPT connected to angle type tips designed to sense pressure.

M. Point Leak Detector
   1. Leak detector shall have mounting feet with legs adjustable up to 1-1/2”, gold-plated water detection probes, adjustable height, a green LED to indicate power, a red LED to indicate water detected, SPDT alarm contacts. The enclosure shall be cast aluminum, weatherproof with adjustable legs. The leak detector shall operate between 11 and 27 VAC/DC. Provide Kele and Associates WD-1B, Liebert LT 410 or preapproved equal.

N. Current Switch
   1. Provide and install current switches for all motor status points. Current switch shall be split core and sized for expected amperage. Unit shall be UL listed. Provide status LEDs for current sensed below setpoint and current sensed above setpoint. The current switch shall be field calibrated to detect belt loss, coupling shear and mechanical failure. The current switch output shall be N.O., solid state and rated for 1.0A at 30 VAC/DC. Current switch shall be manufactured by Hawkeye or pre-approved equal.

O. Control Relays
   1. Mechanical relay: The control relay shall be rated for 24 Vac or 24vdc; maximum contact rating of 10 amp at 30 Vdc or 250 Vac. Outputs shall be true Form C type contacts; solid state relays are not acceptable.

P. Control Transformer
   1. Control transformers shall be UL listed. Furnish class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity. Provide step-down transformer for each control panel. Step-down transformer shall be 277/24 Vac or 120/24 Vac. Coordinate with the electrical contractor for available circuit.

2.19 THERMOSTATS

A. Combination Thermostat and Fan Switches: Line-voltage thermostat with 2-, 3-, or 4-position, push-button or lever-operated fan switch.
   1. Label switches "FAN ON-OFF," "FAN HIGH-LOW-OFF," "FAN HIGH-MED-LOW-OFF." Provide unit for mounting on 2-gang switch box.

B. Electric, solid-state, microcomputer-based room thermostat with remote sensor.

1. Automatic switching from heating to cooling.
2. Preferential rate control to minimize overshoot and deviation from set point.
3. Set up for four (4) separate temperatures per day.
4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
5. Short-cycle protection.
6. Programming based on [weekday, Saturday and Sunday] [every day of week].
7. Selection features include °F or °C display, 12- or 24-hour clock, keyboard disable, remote sensor and fan on-auto.
8. Battery replacement without program loss.
9. Thermostat display features include the following:
    a. Time of day.
    b. Actual room temperature.
    c. Programmed temperature.
    d. Programmed time.
    e. Duration of timed override.
    f. Day of week.
    g. System mode indications include "heating," "off," "fan auto," and "fan on."

C. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater.

D. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, integral manual on-off-auto selector switch.
1. Equip thermostats, which control electric heating loads directly, with off position on dial wired to break ungrounded conductors.
2. Dead Band: Maximum 2ºF.

E. Electric Low-Limit Duct Thermostat (Freezestat): Snap-acting, single-pole, single-throw, automatic-reset switch that trips if temperature sensed across any 12” of bulb length is equal to or below set point. Setpoint shall be adjustable.
1. Bulb Length: Minimum 20’.
2. Quantity: one (1) thermostat for each cooling coil or for every 20 sq ft of coil surface, whichever is greater.
3. Each freezestat shall be an input to the BMS and shall be separately alarmed.
4. Provide JCI A70 series or pre-approved equal.

2.20 WATER ENERGY AND FLOW METERS

A. Temperature Sensor/Transmitters for CW & HW
1. Temperature sensors shall be loop-powered current based (mA) sensors and shall be bath-calibrated and matched (NIST* traceable) for the specific temperature range for each application. The calculated differential temperature used in the energy calculation shall be accurate to within +0.15°F (including the error from individual temperature sensors, sensor matching, input offsets, and calculations). The temperature sensors shall be manufactured by Badger.

B. Electromagnetic Meters
1. The electromagnetic flowmeters (mag meter) shall be used for the chilled water, hot water and steam condensate applications where flow or BTU measurements are required.
2. Provide Badger Meter ModMag M2000 Electromagnetic Flow Meter complete with integral or remote electronics module.
    a. Metering Tube: 316 Stainless steel tube from 1/4” to 54”.
    b. Flanges: Select One:
    c. Standard Class 150 cast steel ANSI B16.5
    d. Class 300 cast steel
    e. Class 300 316 stainless steel.
    f. Liner Material: (standard: Hard Rubber for 1” to 54”, optional: PTFE for pipe size 1/4”to 24”, HALAR for 14” to 24”).

g. Electromagnetic coil: Two DC powered electromagnetic coils positioned opposite of each other at 90 degree and 270 degree.
h. Electrode: Two (standard: Alloy C, optional: 316 stainless steel, gold/platinum plated, tantalum, or platinum/rhodium) electrodes installed perpendicular to the coils.
i. Accuracy: ±0.25% of reading for velocities higher than 1.64 ft/s and for flow below 1.64 ft/s is ±0.004 ft/s.
j. Flow Range: 0.10…39.4 ft/s (0.03…12 m/s) 400 to 1 turndown.
k. Fluid Conductivity: Minimum 5.0 microohms/cm
l. Flow Direction: Unidirectional or bidirectional two separate totalizers (programmable)
m. Display: Integral or Remote Amplifier with 4x20 character backlit display.
n. Analog Output: isolated 4-20 ma output signal, proportioned to flow, and be able to drive a restive load of up to 800ohms Range: Appropriate for application.
o. Digital: Modbus RTU or BACnet MSTP
p. Misc Output: High/low flow alarm (0…100% of flow), error alarm, empty pipe alarm, flow direction, preset batch alarm, 24V DC supply, ADE
q. Installation: Inline per manufacturer's recommendations
r. Enclosure: NEMA 4X or NEMA 6P for submersible remote amplifier.
s. Electrical: 120 VAC or 24 VDC

C. Energy BTU Meter / Flow computer
1. Provide Badger Meter FC30 BTU Meter. The BTU meter shall provide the following points both at the integral LCD and as outputs to the building control system: Energy Total, Energy Rate, Flow Rate, Supply Temperature and Return Temperature. Output signals shall be either serial network (protocol conforming to BACnet® MS/TP, BACnet/IP, LONWORKS®, MODBUS RTU TCP/IP,) and/or via individual analog and pulse outputs. Each BTU meter shall be factory programmed for its specific application and shall be reprogrammable using the front panel keypad (no special interface device or computer required). Electromagnetic meter shall be Badger Meter ModMag M2000 or pre-approved equal.

D. Engage a factory -authorized service representative to perform startup service. The factory authorized service representative shall review the meter location prior installation.

2.21 AIRFLOW MEASURING STATIONS/DEVICES

A. Airflow/Temperature Measurement Device
1. Provide airflow/temperature measurement devices (ATMD) where specified and/or indicated on the plans.
2. Fan inlet measurement devices shall not be substituted for duct or plenum measurement devices unless an authorized EBTRON representative deems duct work to be too restrictive for probes. Written authorization is required by EBTRON and the specifying engineer.
3. Each ATMD shall consist of one (1) or more sensor probes and a single, remotely mounted, microprocessor-based transmitter capable of independently processing up to 16 independently wired sensor assemblies.
a. Each sensor assembly shall contain 2 individually wired, hermetically sealed bead-in-glass thermistors.
b. Thermistors shall be mounted in the sensor assembly using a marine-grade, waterproof epoxy. Thermistor leads shall be protected and not exposed to the environment.
c. The airflow rate of each sensor assembly shall be equally weighted and averaged by the transmitter prior to output.
d. The temperature of each sensor assembly shall be velocity weighted and averaged by the transmitter prior to output.
e. Each transmitter shall have a 16-character alpha-numeric display capable of displaying airflow, temperature, system status, configuration settings and diagnostics.
f. Devices using chip-in-glass or diode-case chip thermistors are not acceptable.

g. Devices using less than two (2) thermistors in each sensor assembly are not acceptable.
h. Devices using platinum wire RTDs are not acceptable.
i. Devices having electronic circuitry mounted in or at the sensor probe are not acceptable.
j. Pitot tubes and arrays are not acceptable.
k. Vortex shedding devices are not acceptable.

4. All Sensor Probes
   a. Each sensor assembly shall independently determine the airflow rate and temperature at each measurement point.
   b. Each sensor assembly shall be calibrated at a minimum of 16 airflow rates and 3 temperatures to standards that are traceable to the National Institute of Standards and Technology (NIST).
   c. Airflow accuracy shall be + 2% of reading over the entire operating airflow range.
      1) Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this specification throughout the measurement range.
   d. Temperature accuracy shall be +0.15°F over the entire operating temperature range of -20°F to 160°F.
   e. The operating humidity range for each sensor probe shall be 0-99% RH (non-condensing).
   f. Each sensor probe shall have an integral, U.L. listed, plenum rated cable and terminal plug for connection to the remotely mounted transmitter. All terminal plug interconnecting pins shall be gold plated.
   g. Each sensor assembly shall not require matching to the transmitter in the field.
   h. A single manufacturer shall provide both the airflow/temperature measuring probe(s) and transmitter for each measurement location.
5. Duct and Plenum Probes
   a. Probes shall be constructed of extruded, gold anodized, 6063 aluminum tube. All wires within the aluminum tube shall be Kynar coated.
   b. Probe assembly mounting brackets shall be constructed of 304 stainless steel. Probe assemblies shall be mounted using 1 of the following options:
      1) Insertion mounted through the side or top of the duct.
      2) Internally mounted inside the duct or plenum.
      3) Standoff mounted inside the plenum.
   c. The number of sensor housings provided for each location shall be as follows:

Duct or Plenum Area (sq. ft)	Total # Sensors/Location
(a) <2	4
(b) >2 and <4	6
(c) >4 and <8	8
(d) >8 and <16	12
(e) >16	16

   d. The operating airflow range shall be 0 to 5,000 FPM unless otherwise indicated on the plans.
6. Fan Inlet Probes
   a. Sensor assemblies shall be mounted on 304 stainless steel housings.
   b. Mounting rods shall be field adjustable to fit the fan inlet and constructed of nickel plated steel.
   c. Mounting feet shall be constructed of 304 stainless steel.
   d. The operating airflow range shall be 0 to 10,000 FPM unless otherwise indicated on the plans.
7. Transmitters
   a. The transmitter shall have an integral LCD display capable of simultaneously displaying airflow and temperature. The LCD display shall be capable of displaying individual airflow and temperature readings of each independent sensor assembly.

b. The transmitter shall be capable of field configuration and diagnostics using an on-board pushbutton interface and LCD display.
c. The transmitter shall have a power switch and operate on 24 VAC (isolation not required).
    1) The transmitter shall use a switching power supply fused and protected from transients and power surges.
    2) The transmitter shall use “watch-dog” circuitry to assure reset after power disruption, transients and brown-outs.
d. All interconnecting pins, headers and connections on the main circuit board, option cards and cable receptacles shall be gold plated.
e. The operating temperature range for the transmitter shall be -20°F to 120°F. The transmitter shall be installed at a location that is protected from weather and water.
f. The transmitter shall be capable of communicating with other devices using 1 of the following interface options:
    1) Linear analog output signals for airflow and temperature: Field selectable, fuse protected and isolated, 0-10 VDC/4-20 mA (4-wire).
    2) RS-485: Field selectable BACnet-ARCNET, BACnet-MS/TP, Modbus-RTU or Johnson Controls N2-Bus
        (a) BACnet devices shall provide analog variables for airflow and temperature containing individual sensor airflow rate and temperature data.
        (b) 10 Base-T Ethernet: Field selectable BACnet Ethernet, BACnet-IP, Modbus-TCP and TCP/IP
            (1) Provide dynamic link libraries and VBA functions to interface Ethernet devices to Microsoft Excel for remote monitoring of airflow and temperature using a Windows based PC.
        (c) LonWorks Free Topology
g. The transmitter shall be capable of accepting an infra-red interface card for downloading airflow and temperature data or uploading transmitter configuration data using a handheld PDA (Palm or Microsoft Windows Mobile operating systems).
    1) Provide PDA upload/download software.
        (a) Download software shall be capable of displaying and saving individual sensor airflow rates, the average airflow rate, individual sensor temperatures and the average temperature received from the transmitter.
        (b) Upload software shall be capable of displaying and saving all setup parameters that can be configured using the on-board pushbutton interface and LCD display.
        (c) Provide a Microsoft Excel file capable of creating balance reports from PDA data files transferred to a Windows based PC.
        (d) Provide a Microsoft Excel file to create configuration data files that can be transferred from a Windows based PC to a PDA for upload to 1 or more transmitters.

8. The ATMD shall be UL listed as an entire assembly.
9. The manufacturer’s authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated on the plans.
    a. A written report shall be submitted to the consulting mechanical engineer if any measurement locations do not meet the manufacturer’s placement requirements.
10. Integral sleeve for outside air measurement:
    a. Provide an extruded aluminum (6063T5) sleeve. Sleeve depth shall be 15” for ducted applications and 18” for un-ducted applications. Unducted applications shall include a 3” radius aluminum entry flair. Provide an additional 7” (10” for ducted applications) between the downstream edge of an intake louver and the leading edge of the entry flair for outside air intake applications that are close coupled to intake louvers.
11. Provide Ebtron Model GTx116-P, GTx116-F or pre-approved equal.

2.22 AUTOMATIC CONTROL VALVES

A. All automatic control valves shall meet the following requirements:
   1. Fully proportioning.
   2. Capable of operating at varying rates of speed to correspond to the exact dictates of the controllers and variable load requirements.
   3. Body pressure rating and connection type construction shall conform to piping and fittings in which the valve is to be installed and to the valve schedules.
   4. Isolation valves shall be line size, full port ball valve with stainless steel ball and stem. Isolation valves 4” and larger shall be butterfly valves.
   5. Control valves 2” and smaller shall have screwed connections.
   6. Control valves larger than 2-1/2” shall have flanged connections.

B. Water Control Valves: Chilled water, hot water, glycol, and condenser water
   1. Two-position valves shall be quick opening type with the following characteristics:
      a. Valves shall have replaceable seat, plug, or disc.
      b. Valves shall be line size.
      c. Valve body shall be bronze, cast iron, forged brass, or red brass.
      d. Ball valves shall have stainless steel stem, stainless steel ball, and PTFE seats.
      e. Globe valves shall have stainless steel stem and single stainless steel seat.
      f. The pressure drop shall not exceed 10-20% of the piping system pressure differential, leaving the other 80-90% for the load and piping connections.
      g. Two-Way Valve
         1) Valve actuator and trim shall provide close-off (differential) pressure ratings greater than or equal to 150% of the total system (pump) head.
      h. Three-Way Valve
         1) Valve actuator and trim shall provide close-off (differential) pressure ratings greater than or equal to 300% of pressure differential between ports A and B at design flow or 150% of total system (pump) head.
   2. Modulating control valves shall have the following characteristics:
      a. Valve shall be one size below pipe size.
      b. Valve shall have replaceable seat, plug, or disc.
      c. Equal percentage flow characteristic (characterized ball or globe type valves).
      d. Valve body shall be bronze, cast iron, forged brass or red brass.
      e. Ball valves shall have stainless steel stem, stainless steel ball, and PTFE seats.
      f. Globe valves shall have stainless steel stem and single stainless steel seat.
      g. Two-Way Valve
         1) Calculate Cv based upon maximum design flow and a pressure drop equal to the pressure drop through the coil with a maximum of 5 psi (35 kPa).
         2) Valve actuator and trim shall provide close-off (differential) pressure ratings greater than or equal to 115% of the total system (pump) head.
      h. Three-Way Valve
         1) Calculate Cv based upon maximum design flow and a pressure drop equal to the pressure drop through the coil with a maximum of 5 psi (35 kPa). Pressure drop shall be referenced from port A to port B.
         2) Valve actuator and trim shall provide close-off (differential) pressure ratings greater than or equal to 300% of pressure differential between ports A and B at design flow or 115% of total system (pump) head.
      i. Differential Pressure Bypass Valve
         1) Calculate Cv based upon 80% of the pump flow for a constant volume system or flow provided by pump at minimum speed for a variable volume system and a pressure drop shall be equal to 50% of the total dynamic head. If a valve is being used as a differential pressure bypass valve and chiller minimum flow valve, calculate the Cv based on the minimum flow required by the chiller.
         2) Valve actuator and trim shall provide close-off (differential) pressure ratings greater than or equal to 115% of the total system (pump) head.
      j. Chiller Minimum Flow Valve

1) Calculate Cv based upon flow required by chiller and pressure drop equal to that across chiller.
2) Valve actuator and trim shall provide close-off (differential) pressure ratings greater than or equal to 115% of the total system (pump) head.

C. Steam Control Valves
1. Control valves shall be globe type with linear flow characteristic.
2. Valves shall have replaceable seat or plug.
3. Valve body shall be bronze, cast iron, or brass.
4. Globe valves shall have stainless steel stem, single stainless steel seat, and stainless steel plug.
5. Sizing:
a. Two-position service: valve shall be line size with maximum pressure drop equal to 10-20% of inlet pressure (psig).
b. Modulating service at 15 psig (100 kPa) or less: Calculate Cv based upon maximum flow and pressure drop equal to 80% of inlet pressure (psig) or as required to provide design inlet pressure to coil.
c. Modulating service at 16-50 psig (101-350 kPa): Calculate Cv based upon maximum flow and pressure drop equal to 42% of inlet pressure (psig) or as required to provide design inlet pressure to coil.
d. Modulating service at over 50 psig (350 kPa): Calculate Cv based upon maximum flow and pressure drop as scheduled on drawings or as required to provide design inlet pressure to coil.
6. Close-off (differential) pressure rating: Valve actuator and trim shall provide minimum close-off pressure rating equal to 115% of operating (inlet) pressure.
7. Whenever the steam flow rate requires a single valve larger than 2 ½", provide two (2) valves in parallel, sized for 1/3, 2/3 capacity, operating sequentially.

D. Provide one (1) control valve for each preheat or heating coil section at a minimum.

E. Control valves shall be Belimo, Honeywell, Johnson Controls, Siemens or pre-approved equal.

F. Control valves 4" and larger shall be butterfly valves for isolation applications and globe valves for modulating applications.

G. All valve actuators shall meet the following requirements:
1. All valve actuation shall be electric. Pneumatic actuation is not acceptable.
2. Valve actuator shall be by same manufacturer as valve body unless pre-approved.
3. Valve actuators shall:
a. Be quiet in operation.
b. Provide smooth modulation at design flow and pressure conditions.
c. Be capable of operating in sequence with other valves and/or damper actuators when required by the sequence of operation.
d. Be sized to close against a differential pressure equal to the design pump head plus 15% for modulating and plus 50% for isolation. Where pressure and flow combinations exceed ratings for commercial valves and actuators, industrial class valves and actuators shall be provided.
e. Valve actuators shall fail-safe in either the open or closed position. In the event of power failure, signal failure, Fail Safe positions are as follows:

1) Air-Handling Unit Preheat Valves	Fail Open
2) Air-Handling Unit Cooling Valves	Fail Closed
3) Air-Handling Unit Heating Valves	Fail Open
4) Duct-mounted Reheat Coil Valves	Fail Closed
5) All Humidification Valves	Fail Closed
6) Radiation Valves	Fail Open
7) Unit Heater Valves	Fail Closed
8) Cabinet Unit Heater Valves	Fail Closed
9) Differential Pressure Bypass Valves	Fail-In-Place

10) Minimum Flow Bypass Valve Fail Open
11) Heat Exchanger Steam Control Valve Fail Closed
12) Isolation Valve Fail Closed

4. Incremental Electronic Actuator for Terminal Equipment Valve Actuation
   a. Incremental actuators shall be allowed for terminal equipment only.
   b. Actuators shall be proportional, electronic, direct-coupled actuators used for modulating service. Actuators shall be equipped with metal housings and visual stroke indicators.
   c. Actuators shall be equipped with a permanent manual adjustment.
   d. Minimum Torque: 35” lb.
   e. Operating Voltage: 24 VAC.
   f. Input Signal: 3-wire floating, 0 – 10 VDC or 4 – 20 mA.
   g. Frequency: 50 – 60 Hz.
   h. Power Consumption: 1.5VA maximum.
   i. Spring Return Time: 20 sec maximum.
   j. Spring return position should be field adjustable with a switch.
   k. Nominal Force: 90lb Minimum.
   l. Stroke: 7/32" (5.5mm) maximum.
   m. For use when the maximum media temperature is 230°F.
5. Electric Valve Actuation
   a. Actuator shall have electronic, proportional control and shall be direct-coupled with spring return.
   b. Actuators shall be equipped with a permanent manual override hand wheel and visual and electronic stroke indicators.
   c. Operating Voltage: 24 VAC.
   d. Input Signal: 0-10 VDC, 4 – 20 mA.
   e. Power Consumption: 18VA maximum (valves 2” and under), 28VA maximum (valves 2-1/2” – 4”)
   f. Spring Return Time: 15 seconds maximum
   g. Spring return position should be field adjustable with a switch.
   h. Nominal Force: 225lb Minimum (valves 2” and under), 610lb. (valves 2-1/2”-4”)
   i. Stroke: 3/4" (20mm) maximum (valves 2” and under), 1-1/2” (valves 2-1/2”-4”)
   j. For use when the maximum media temperature is 300ºF.
6. All valve actuation shall be electric. Pneumatic actuation is not acceptable.
7. Valve actuator shall be by same manufacturer as valve body unless pre-approved.
8. All valve actuation shall be pneumatic except for terminal equipment valves which shall be electric. Terminal equipment includes:
   a. Cabinet Unit Heaters.
   b. Constant Air Volume (CAV) boxes.
   c. Duct-mounted reheat coils.
   d. Fan Coil Units.
   e. Fan-Powered Variable Air Volume (VAV) Boxes.
   f. Radiation.
   g. Supplemental AC units.
   h. Unit Heaters.
   i. Variable Air Volume (VAV) boxes.
9. Valve actuators shall:
   a. Be quiet in operation.
   b. Provide smooth modulation at design flow and pressure conditions.
   c. Be capable of operating in sequence with other valves and/or damper actuators when required by the sequence of operation.
   d. Be sized to close against a differential pressure equal to the design pump head plus 15% for modulating and plus 50% for isolation. Where pressure and flow combinations exceed ratings for commercial valves and actuators, industrial class

valves and actuators shall be provided.

e. Valve actuators shall fail-safe in either the open or closed position. In the event of power failure, signal failure, Fail Safe positions are as follows:

1)	Air-Handling Unit Preheat Valves	Fail Open
2)	Air-Handling Unit Cooling Valves	Fail Closed
3)	Air-Handling Unit Heating Valves	Fail Open
4)	Duct-mounted Reheat Coil Valves	Fail Closed
5)	All Humidification Valves	Fail Closed
6)	Radiation Valves	Fail Open/Closed
7)	Unit Heater Valves	Fail Open/Closed
8)	Cabinet Unit Heater Valves	Fail Open/Closed
9)	Differential Pressure Bypass Valves	Fail-In-Place
10)	Minimum Flow Bypass Valve	Fail Open
11)	Heat Exchanger Steam Control Valve	Fail Closed
12)	Isolation Valve	Fail Closed/Open/Fail-In-Place

10. Incremental Electronic Actuator for Terminal Equipment Valve Actuation
    a. Incremental actuators shall be allowed for terminal equipment only.
    b. Actuators shall be proportional, electronic, direct-coupled actuators used for modulating service. Actuators shall be equipped with metal housings and visual stroke indicators.
    c. Actuators shall be equipped with a permanent manual adjustment.
    d. Minimum Torque: 35” lb.
    e. Operating Voltage: 24 VAC.
    f. Input Signal: 3-wire floating, 0 – 10 VDC or 4 – 20 mA.
    g. Frequency: 50 – 60 Hz.
    h. Power Consumption: 1.5VA maximum.
    i. Spring Return Time: 20 sec maximum.
    j. Spring return position should be field adjustable with a switch.
    k. Nominal Force: 90lb Minimum.
    l. Stroke: 7/32" (5.5mm) maximum.
    m. For use when the maximum media temperature is 230°F.
11. Electric Valve Actuation
    a. Actuator shall have electronic, proportional control and shall be direct-coupled with spring return.
    b. Actuators shall be equipped with a permanent manual override hand wheel and visual and electronic stroke indicators.
    c. Operating Voltage: 24 VAC.
    d. Input Signal: 0-10 VDC, 4 – 20 mA.
    e. Power Consumption: 18VA maximum (valves 2” and under), 28VA maximum (valves 2-1/2” – 4”)
    f. Spring Return Time: 15 seconds maximum
    g. Spring return position should be field adjustable with a switch.
    h. Nominal Force: 225lb Minimum (valves 2” and under), 610lb. (valves 2-1/2”-4”)
    i. Stroke: 3/4" (20mm) maximum (valves 2” and under), 1-1/2” (valves 2-1/2”-4”)
    j. For use when the maximum media temperature is 300ºF.

2.23 BUTTERFLY CONTROL VALVES

A. All butterfly control valves, where shown on the drawings or specified herein, shall be butterfly type with lug ends and shall be furnished with electric actuators.

B. The valve shall meet the following minimum requirements:
   1. Valve body: Carbon steel.
   2. Valve disc: 316 stainless steel.
   3. Valve shaft: 17-4ph stainless shaft.

4. Valve seat: RTFE.
5. Bubble-tight closure at 285 psi or the required differential pressure across the disc.
6. Maximum system operating temperature: minimum of 250ºF.
7. Valves shall be full-bodied, full lug type only (Wafer type or semi-lugged valves will not be permitted).
8. Valves shall be bolted from both ends of the flanges.
9. Valve shall be manufactured by Bray or pre-approved equal.

C. All valve actuators shall be electric type and shall meet the following minimum requirements:
1. Input: Modulating actuators require 4 – 20 mA or 0 – 10 VDC.
2. Gear housing material: Cast iron with double reduction type gear reduction consisting of worm and helical gearing.
3. Worm gear: Alloy bronze.
4. Worm: Alloy steel.
5. Helical gears: Heat-treated steel.
6. Seal materials shall be Viton.
7. Temperature rating shall be -20° – 150ºF.
8. Actuator shall be provided with a manually operated handwheel for overriding the spring and actuator position.
9. Actuator shall have an external position indicator and open/close end switches.
10. Actuator motor shall meet the following minimum requirements:
    a. Single phase, 115V type.
    b. Nominal duty of 15min.
    c. Dynamic torque nominal 20% of start torque.
    d. Class B standard insulation.
    e. Maximum current of 3A.
    f. 120 VAC heater.
    g. Limit switch shall be gear driven.
    h. Snap-acting switch with 16 contacts rated at 600V 6A resistive.
    i. 60A inrush at 120 VAC.
11. Actuator shall be manufactured by Bray or pre-approved equal.

D. All valve actuators shall be pneumatic and shall meet the following requirements:
1. Hard anodized aluminum body.
2. Steel pinion shaft.
3. Full bearing support on all moving parts.
4. Seal materials shall be Viton.
5. Temperature rating shall be -20° – 150ºF.
6. Actuator shall be provided with a manually operated handwheel for overriding the actuator position.
7. Actuator shall include a speed control device (adjustable) to prevent the valve from too rapid a closure rate.
8. Actuator shall have an external position indicator and open/close end switches.
9. Actuator shall be manufactured by Bray or pre-approved equal.

2.24 DAMPERS

A. Dampers: AMCA-rated design; 0.1084” minimum, galvanized-steel frames with holes for duct mounting; damper blades shall not be less than 0.0635” galvanized steel with maximum blade width of 8”.

B. Blades shall be secured to 1/2” diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings and thrust bearings at each end of every blade.

C. Operating Temperature Range: From -40ºF – 200ºF.

D. For standard applications, include optional closed-cell neoprene edging.

E. For low-leakage applications, use parallel- or opposed-blade design with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10CFM/sq ft of damper area, at differential pressure of 4” wg when damper is being held by torque of 50 in x lb; when tested according to AMCA 500D.

F. Dampers used in a 2-position application shall be parallel blade design. Dampers used in a modulating application shall be opposed blade design.

2.25 DAMPER ACTUATION

A. All damper actuation shall be electric. Pneumatic actuation is not acceptable.

B. Damper actuators used for emergency generator intake or exhaust applications shall be fast-acting type.

C. Size actuators for running torque calculated as follows:
1. Parallel-Blade Damper with Edge Seals: 7”-lb/sq. ft. (86.8 kg-cm/sq. m) of damper.
2. Opposed-Blade Damper with Edge Seals: 5”-lb/sq. ft. (62 kg-cm/sq. m) of damper.
3. Parallel-Blade Damper without Edge Seals: 4”-lb/sq. ft (49.6 kg-cm/sq. m) of damper.
4. Opposed-Blade Damper without Edge Seals: 3”-lb/sq. ft. (37.2 kg-cm/sq. m) of damper.
5. Dampers with 2” to 3” wg (500 to 750 Pa) of Pressure Drop or Face Velocities of 1000 to 2500 fpm (5 to 13 m/s): Increase running torque by 1.5.
6. Dampers with 3” to 4” wg (750 to 1000 Pa) of Pressure Drop or Face Velocities of 2500 to 3000 fpm (13 to 15 m/s): Increase running torque by 2.0.

D. All damper actuators shall meet the following requirements:
1. Damper actuators shall have external adjustable stops to limit the stroke in either direction.
2. All damper actuators shall have sufficient power to overcome friction of damper linkage and air pressure acting on louvers and to operate the damper smoothly throughout the entire damper range.
3. Actuators shall be sized with a torque greater than 150% of the design damper torque.
4. Actuators shall have mounting arrangement for location outside of the air stream. The damper actuators shall be mounted on the damper extension so that it is not buried in the wall construction.
5. Damper actuators shall fail-safe in either the normally open or normally closed position in the event of power failure, signal failure or compressed air failure. Fail Safe Positions are as follows:
   a. Outside Air Dampers — Normally Closed
   b. Return Air Dampers — Normally Open
   c. Exhaust Air Dampers — Normally Closed
   d. Emergency Generator Dampers — Normally Open
6. Incremental Electronic Actuator for Terminal Equipment Damper Actuation
   a. Incremental actuators shall be allowed for terminal equipment only.
   b. Actuators shall be proportional, electronic, direct-coupled actuators used for modulating service. Actuators shall be equipped with metal housings and visual stroke indicators.
   c. Actuators shall be equipped with a permanent manual adjustment.
   d. Minimum Torque: 35” lb.
   e. Operating Voltage: 24 VAC.
   f. Input Signal: 3 wire floating, 0 – 10 VDC, or 4 – 20 mA.
   g. Frequency: 50 – 60 Hz.
   h. Power Consumption: 1.5VA maximum.
   i. Spring Return Time: 20sec maximum.
   j. Spring return position should be field adjustable with a switch.
   k. Nominal Force: 90lb Minimum.
   l. Stroke: 7/32" (5.5mm) maximum.

m. For use when the maximum media temperature is 230°F.

7. Electric Damper Actuation
   a. Provide proportional, electronic, direct-coupled spring return actuators for all automatic dampers used for modulating service. Each actuator shall be equipped with a brushless DC motor, self centering shaft coupling, metal housing, permanent manual override, visual stroke indicators and built in adjustable start and span controls with the following specifications:
      1) Operating Voltage: 24 VAC./ 120 VAC (Hardwired to starter circuit)
      2) Input Signal: 0-10 VDC, 4 – 20 mA (modulating), on/off (2 position).
      3) Frequency: 50 – 60 Hz.
      4) Power Consumption: 9 VA Maximum.
      5) Spring Return Time: 15 seconds Maximum.
      6) Spring return position should be field adjustable with a switch.
      7) Minimum Torque: 133” lb.
      8) Angular Rotation: 90°.

E. Damper actuators shall be Belimo or pre-approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.

B. Connect and configure equipment and software to achieve sequence of operation specified.

C. All control components including automatic control valves, dampers, instruments, sensors, etc. shall be tagged for identification. Acceptable methods of tagging are: laminated plastic, stamped metal and engraved plastic.

D. Install equipment level and plumb.

E. Verify location of temperature sensors, humidity sensors and other exposed control sensors with plans and room details before installation. Locate all 60” above the floor or as otherwise required by ADA.
   1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

F. Install guards on thermostats in the following locations:
   1. Entrances.
   2. Public areas.
   3. Where indicated.

G. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

H. Install automatic dampers according to Division 23 Section.

I. Install hydronic instrument wells, valves and other accessories according to Division 23.

J. Install refrigerant instrument wells, valves and other accessories according to Division 23.

K. Install duct volume-control dampers according to Division 23.

L. Install electronic cables according to Division 26.

M. Water line mounted sensors shall be removable without shutting down the system in which they are installed.

N. For duct static pressure sensors, the high pressure port shall be connected to a metal static pressure probe inserted into the duct pointing upstream. The low pressure port shall be left open to the plenum area at the point that the high pressure port is tapped into the ductwork.

O. Averaging temperature sensors (i.e. freezestats, mixed air temperature sensor, etc.) shall be provided with fasteners or mounting clips to prevent shearing due to vibrations in the ductwork.

3.02 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install, connect and wire the items included under this Section. This work includes providing required conduit, wire, fittings and related wiring accessories.

B. All exposed wiring and wiring in mechanical equipment rooms shall be installed in conduit.

C. Plenum rated cable shall be acceptable in hung ceilings, walls and raised floors.

D. All wiring located outside shall be installed in rigid conduit, seal tite or EMT with compression fittings.

E. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.

F. Install cable in raceway.

G. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.

H. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.

I. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.

J. Wires and cables shall be as follows:
   1. Single Conductor (120 VAC): Type THWN 12AWG stranded copper with 600V insulation.

K. Primary and Secondary Communications Network Cabling
   1. Primary network shall be Ethernet based and shall utilize CAT5, CAT6 or fiber optic cable. All wiring runs longer than 300’ shall utilize fiber optic cable.
   2. Cable shall be of type recommend by the DDC System Manufacturer and 20AWG at a minimum.
   3. Cable shall be shielded.
   4. Multimode OM4, 50/125-micrometer, 12-fiber at a minimum (or per design), armored, tight buffer, laser-optimized optical fiber cable. Shall comply with TIA/EIA-568-B.3 for performance specifications. Shall be listed by NRTL as compliant with UL 444, UL 1651, and NFPA 70 as OFNR or OFNP. Maximum attenuation 3.5 dB/km at 850 nm; 1.5 dB/km at 1300 nm. Minimal modal bandwidth 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm. Aqua colored jacket. Provide 100% spare capacity. Industry standard ST style connectors shall be used, with a hot melt or glue and polish termination. Use of mechanical crimp type connectors is not acceptable.

L. Room Sensor Cabling
   1. Cable shall consist of copper conductors not less than No. 20 AWG.

M. Cables for 120 VAC wiring and low level signal wiring (i.e., 4 – 20 mA analog) shall always be run in separate raceways.

3.03 PNEUMATIC PIPING INSTALLATION

A. No air lines are to be hidden within duct insulation. All piping and tubing shall be properly supported using straps, cleats or hangers as approved. Use of wire will not be permitted. Tubing shall be supported with pipe rests or other supporting methods as to prevent the lines from stress conditions.

B. Air tubing for low and high pressure mains shall be copper.

C. Polyethylene plastic tubing will be permitted in lieu of copper, except for high pressure mains or smoke control, in the following locations:
   1. Within control panels only.
   2. Above suspended ceilings.

D. Install piping in mechanical equipment rooms inside mechanical equipment enclosures, in pipe chases or suspended ceilings with easy access.

E. Install copper tubing with maximum unsupported length of 36” (915 mm), for tubing exposed to view.

1. Install polyethylene tubing in metallic raceways or electrical metallic tubing. Electrical metallic tubing materials and installation requirements are specified in Division 26.

F. Install terminal single-line connections, less than 18” (460 mm) in length, with copper or polyethylene tubing run inside flexible steel protection.

G. In concealed locations such as pipe chases and suspended ceilings with easy access, install [copper] [polyethylene bundled and sheathed] [polyethylene tubing in electrical metallic] tubing. Electrical metallic tubing materials and installation requirements are specified in Division 26 Section "Raceways and Boxes."

H. In concrete slabs, furred walls or ceilings with no access, install copper or polyethylene tubing in electrical metallic tubing or vinyl-jacketed polyethylene tubing.

I. Protect embedded-copper and vinyl-jacketed polyethylene tubing with electrical metallic tubing extending 6” (150 mm) above finished slab and 6” (150 mm) into slab. Pressure test tubing before and after pour for leak and pinch.
   1. Install polyethylene tubing in electrical metallic tubing extending 6” (150 mm) above floor line; pull tubing into electrical metallic tubing after pour.

J. Install tubing with sufficient slack and flexible connections to allow for vibration of piping and equipment.

K. Purge tubing with dry, oil-free compressed air before connecting control instruments.

L. Bridge cabinets and doors with flexible connections fastened along hinge side; protect against abrasion. Tie and support tubing.

M. Number-code or color-code control air piping for future identification and service of control system, except local individual room control tubing.

N. Pressure Gages or Test Plugs: Install on branch lines at each receiver controller and on signal lines at each transmitter, except individual room controllers.

3.04 CONNECTIONS

A. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

B. Connect HOA selector switches to override automatic interlock controls when switch is in hand position.

C. Ground equipment.

3.05 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
   1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units and retest.
   2. Test and adjust controls and safeties.

B. Factory-authorized service representative shall perform startup service.

C. Replace damaged or malfunctioning controls and equipment.
   1. Start, test and adjust control systems.
   2. Demonstrate compliance with requirements, including calibration and testing and control sequences.
   3. Adjust, calibrate and fine tune circuits and equipment to achieve sequence of operation specified.

D. Verification
   1. Verify that instruments are installed before calibration, testing and loop or leak checks.
   2. Check end devices for location and accessibility.
   3. Check end device installation for flow direction, and other considerations associated with the specific end device installation.

4. Check flow instruments. Inspect tag number and line and bore size and verify that inlet side is identified and that meters are installed correctly.
5. Check temperature instruments and material and length of sensing elements.
6. Check control valves. Verify that they are in correct direction.
7. Check DDC system as follows:
    a. Verify that DDC controller power supply is from emergency power supply, if applicable.
    b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
    c. Verify that spare I/O capacity has been provided.
    d. Verify that DDC controllers are protected from power supply surges.

3.06 COMMISSIONING

A. Prior to full operation, the contractor in the presence of the owner's representative and engineer shall perform a complete demonstration and testing of the system operating functions and alarms. This testing shall take place after having satisfactorily met the requirements of shop drawing acceptance. Upon successful completion of system operation, the contractor shall submit a statement in writing stating that the full operation of all systems, functions and alarms has been demonstrated and are operational as well as a listing of all systems, alarms and functions that have been commissioned. All items shall be submitted for review and acceptance to the owner, owner's representative and engineer before final acceptance can take place.

3.07 DEMONSTRATION

A. Engage a factory representative to train Owner's personnel to operate and maintain HVAC instrumentation and controls. Refer to Division 1 Section "Closeout Procedures" and "Demonstration and Training."

3.08 TRAINING

A. The BMS contractor shall provide competent instructors to give full instruction to designated personnel in the adjustment, operation and maintenance of the system installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. All training shall be held during normal work hours of 8:00 a.m. to 4:30 p.m. weekdays.

B. Provide sixteen (16) hours of training for Owner's operating and maintenance personnel. All training shall be on-site training. Videotape all sessions and edit each session to 1-hour DVDs. Turn over two (2) copies each unedited and edited DVD to the Owner. Training shall include:
    1. Explanation of drawings, operators and maintenance manuals.
    2. Walk-through of the job to locate all control components.
    3. Operator workstation and peripherals.
    4. DDC Controller operation/function.
    5. Operator control functions including graphic generation, if design includes color graphics and field panel programming.
    6. Explanation of adjustment, calibration and replacement procedures.

C. The BMS contractor shall also create a color PDF reference guide for the use of the Owner and the operating staff which provide graphical step-by-step instructions on how to perform basic tasks at the BMS that are part of the owner's operating staff's daily duties. This shall include, but not be limited to, navigating the BMS screens, setpoint adjustment, turning units on/off, turning systems on/off, overriding commands, acknowledging alarms, adjusting time schedules, etc. Coordinate with the Owner's operating staff as required.

D. Since the Owner may require personnel to have more comprehensive understanding of the hardware and software, additional training must be available from the Contractor. If the Owner requires such training, it will be contracted at a later date. Provide description of available local and factory customer training. Provide costs associated with performing training at an off-site classroom facility and detail what is included in the manufacturer's standard pricing such as transportation, meals, etc.

3.09 ON-SITE ASSISTANCE

A. Within 1 year of date of Substantial Completion, provide up to three (3) Project-site visits, when requested by Owner, to adjust and calibrate components and to assist Owner's personnel in making program changes and in adjusting sensors and controls to suit actual conditions.

3.10 RECORD DOCUMENTATION

A. Operation and Maintenance Manuals
   1. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media and include the following for the BMS provided:
      a. Table of contents.
      b. As-built system record drawings. Record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
         1) BMS network riser diagram
         2) Wiring diagrams
         3) Electrical drawings
         4) Flow diagrams and device locations
         5) Hardware and software points list
         6) Bill of materials
         7) Sequence of operations.
         8) I/O point lists
         9) Cut sheets of all equipment installed
      c. Manufacturer’s product data sheets or catalog pages for all products including software.
      d. System Operator’s manuals.
      e. Archive copy of all site-specific databases and sequences.
      f. BMS network diagrams.
      g. Interfaces to all third-party products and work by other trades.
      h. Training course list.

B. The Operation and Maintenance Manual CD shall be self-contained and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom and search all documents.

C. Software and Hardware Licenses
   1. Provide control system software licenses. All software and hardware (i.e. Server and PC) shall be registered under the Owner, not the BMS vendor.
   2. Provide owner with all software license agreements.

3.11 WARRANTY

A. The BMS shall include a one (1) year parts and labor warranty to begin upon system acceptance that covers the entire system to correct any operational issues at no additional cost to the Owner. The warranty shall cover adjustment and calibration of components and assistance to building personnel in making program changes and in adjusting sensors and controls to suit actual conditions. System acceptance shall be determined by the Owner.

B. During the warranty period, the Contractor shall guarantee the following in a form satisfactory to the Owner:
   1. All work installed will be free from any and all defects in workmanship and or materials.
   2. All devices will operate as per the capacities and performance characteristics specified.
   3. The systems shall operate without malfunction.

C. Maintain an adequate supply of materials within 100 miles of the Project site

D. The BMS contractor shall provide alternate yearly costs for an on-going service contract for years 2 through 5 from the date the original warranty ends. This shall include spare parts, board repairs and software revisions.

E. Provide specific warranty details as part of the proposal and submittal.

END OF SECTION 230900

SECTION 230934
VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 2 PRODUCTS

1.01 VARIABLE-FREQUENCY MOTOR CONTROLLERS

A. Provide variable-frequency motor control system consisting of required controller assemblies, operator interfaces, control power transformers, instrumentation and control wiring, sensors, accessories, system programming, etc. as necessary for complete operating system.

B. Provide products listed, classified, and labeled as suitable for purpose intended.

C. Controller Assemblies: Comply with NEMA ICS 7, NEMA ICS 7.1, and NEMA ICS 61800-2; list and label as complying with UL 61800-5-1 or UL 508A as applicable.

D. Provide controllers selected for actual installed motors and coupled mechanical loads in accordance with NEMA ICS 7.2, NEMA MG 1 Part 30, and recommendations of manufacturers of both controller and load, where not in conflict with specified requirements; considerations include, but are not limited to:
   1. Motor type (e.g., induction, reluctance, and permanent magnet); consider NEMA MG 1 design letter or inverter duty rating for induction motors.
   2. Motor load type (e.g., constant torque, variable torque, and constant horsepower); consider duty cycle, impact loads, and high inertia loads.
   3. Motor nameplate data.
   4. Requirements for speed control range, speed regulation, and braking.
   5. Motor suitability for bypass starting method, where applicable.

E. Devices on Load Side of Controller: Suitable for application across full controller output frequency range.

F. Operating Requirements:
   1. Input Voltage Tolerance: Plus/minus 10 percent of nominal.
   2. Input Frequency Tolerance: Plus/minus 5 percent of nominal.
   3. Efficiency: Minimum of 96 percent at full speed and load.
   4. Input Displacement Power Factor: Minimum of 0.96 throughout speed and load range.
   5. Overload Rating:
      a. Variable Torque Loads: Minimum of 110 percent of nominal for 60 seconds.
      b. Constant Torque Loads: Minimum of 150 percent of nominal for 60 seconds.

G. Power Conversion System: Microprocessor-based, pulse width modulation type consisting of rectifier/converter, DC bus/link, and inverter.
   1. Rectifier/Converter: Diode-based, 6-pulse type unless otherwise indicated.

H. Control System:
   1. Provide microprocessor-based control system for automatic control, monitoring, and protection of motors. Include sensors, wiring, and connections necessary for functions and status/alarm indications specified.
   2. Provide integral operator interface for controller programming, display of status/alarm indications, fault reset, and local control functions including motor run/stop, motor forward/reverse selection, motor speed increase/decrease, and local/remote control selection.
   3. Control Functions:
      a. Control Method: Selectable vector and scalar/volts per hertz unless otherwise indicated.
         1) Scalar/Volts per Hertz Control: Provide IR compensation for improved low-speed torque.
         2) Vector Control: Provide selectable autotuning function.
      b. Adjustable acceleration and deceleration time; linear and S-curve ramps; selectable coast to stop.
      c. Selectable braking control; DC injection or flux braking.
      d. Adjustable minimum/maximum speed limits.

e. Adjustable pulse width modulation switching carrier frequency.
f. Adjustable motor slip compensation.
g. Selectable autorestart after noncritical fault; programmable number of time delay between restart attempts.

4. Status Indications:
   a. Motor run/stop status.
   b. Motor forward/reverse status.
   c. Local/remote control status.
   d. Output voltage.
   e. Output current.
   f. Output frequency.
   g. DC bus voltage.
   h. Motor speed.
5. Protective Functions/Alarm Indications:
   a. Overcurrent.
   b. Motor overload.
   c. Undervoltage.
   d. Overvoltage.
   e. Controller overtemperature.
   f. Input/output phase loss.
   g. Output short circuit protection.
   h. Output ground fault protection.
6. Inputs:
   a. Digital Input(s): Three.
   b. Analog Input(s): Two.
7. Outputs:
8. Features:
   a. Password-protected security access.
   b. Event log.

I. Power Conditioning/Filtering:
   1. Provide DC link choke or input/line reactor for each controller unless otherwise indicated or required.
   2. Reactor Impedance: 3 percent, unless otherwise indicated or required.

J. Packaged Controllers: Controllers factory-mounted in separate enclosure with externally operable disconnect and specified accessories.
   1. Disconnects: Circuit breaker or disconnect switch type.
      a. Disconnect Switches: Fusible type or nonfusible type with separate input fuses.
      b. Provide externally operable handle with means for locking in OFF position. Provide safety interlock to prevent opening cover with disconnect in ON position with capability of overriding interlock for testing purposes.
      c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
   2. Provide door-mounted remote operator interface.

K. Service Conditions:
   1. Provide controllers and associated components suitable for operation under following service conditions without derating:
      a. Altitude: Less than 3,300 feet.
      b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
   2. Provide controllers and associated components suitable for operation at indicated ratings under service conditions at installed location.

L. Short Circuit Current Rating:
   1. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:

a. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
b. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
c. Label equipment utilizing series ratings as required by NFPA 70.

M. Conductor Terminations: Suitable for use with conductors to be installed.

N. Enclosures:
1. Comply with NEMA ICS 6.
2. NEMA 250 Environment Type or Equivalent IEC 60529 Rating: Unless otherwise indicated, as specified for following installation locations:
3. Finish: Manufacturer's standard unless otherwise indicated.
4. Cooling: Forced air or natural convection as determined by manufacturer.

1.02 OVERCURRENT PROTECTIVE DEVICES

END OF SECTION 230934

SECTION 230993
SEQUENCE OF OPERATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Mechanical, Electrical, Plumbing and Fire Protection drawings

B. General conditions

C. Supplementary Conditions

D. Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This specification includes control sequences for HVAC systems and other supporting equipment as defined herein.

1.03 DEFINITIONS

A. AHU: Air Handling Unit.

B. AI: Analog Input.

C. AO: Analog output.

D. ATC: Automatic Temperature Control.

E. BMS: Building Management System.

F. CFM: Cubic Feet per Minute.

G. DDC: Direct-digital controls.

H. DI: Digital Input.

I. DO: Digital Output.

J. FAS: Fire Alarm System.

K. HVAC: Heating, Ventilating and Air Conditioning.

L. LAN: Local area network.

M. LCD: Liquid Crystal Display

N. MER: Mechanical Equipment Room.

O. PID: Proportional Integral Derivative.

P. POT: Portable Operators Terminal.

Q. RAHU: Rooftop Air Handling Unit.

R. VAV: Variable air volume.

S. VFD: Variable Frequency Drive.

1.04 GENERAL

A. All safety devices shall be hardwired to the starter and shall have a second contact for monitoring via the BMS.

B. A failure alarm, as included in the point list, shall indicate the type of equipment that has failed (pump, fan, valve, etc.) including the specific designation of the piece of equipment (e.g., supply fan SF-1). It is not acceptable to generate a general failure alarm.

C. Alarming devices such as freezestats, pressure safeties, etc. shall be wired so the contacts open in the alarm condition. All alarm points shall be annunciated at the BMS audibly and visually. All alarm points associated with varying values shall be provided with adjustable limits.

D. Freezestats shall be automatic reset type and shall be installed with time delay and latching relays. A freezestat must sense a temperature below 40°F (adj.) for a period of 180 seconds (adj.) prior to initiating a response to a freeze condition. Once the freezestat condition response has been activated, manual reset at the BMS panel shall be required to allow the

system to return to normal.

E. Air pressure switches shall be manual reset type and a manual reset at the switch shall be required to allow the system to restart.

F. All setpoints including setpoints internal to control algorithms shall be adjustable from all BMS operator interfaces. All commands shall be overrideable from all BMS operator interfaces. All control points shall be adjustable or overrideable from the same graphic page that displays the points.

G. All points for a specific mechanical system shall be connected to and controlled by the same DDC controller unless otherwise specified. For example, it is not acceptable to control a supply fan with one (1) DDC controller located at a motor control center and to control the rest of the air-handling unit points with a DDC controller located at the air-handling unit.

H. All points required by the sequence of operation including, but not limited to, the points listed in the sequences of operation below, as well as all of the points' associated values, shall be connected to the BMS and available to the BMS operators on all operator workstations and all operator interface devices as part of a graphical display that depicts the mechanical system controlled.

I. The installed BMS shall have dedicated, LAN based communication buses independent of the building IT network for both primary and secondary buses.

J. All valves, dampers, controllers, control devices, etc. exposed to outside air conditions shall be specifically designed for outside air conditions including, but not limited to, NEMA 4 enclosures, weatherproof enclosures and all other weather precautions recommended by the manufacturer.

K. No part of the programming specified herein shall be programmed into operator priority.

L. All alarms associated with equipment that is disabled shall be inhibited.

M. All initial field settings applied shall be saved as the default values. These values shall be downloaded to the controller such that they are the default value if the controller loses power. A printed copy shall also be provided to the owner as part of the O & M manuals.

N. When the motor controller is equipped with an HOA, the motors shall only be controlled by the BMS when the HOA switch is in the auto position.

O. Freezestats, pressure safeties, interlocked dampers, etc. shall be wired to shutdown motors when the HOA switch is in both the hand and auto positions. It shall not be possible to override these or any other safety devices or any fire alarm system control functions, except in the case of an engineered smoke control system in which case freeze protection safeties shall be overridden.

P. Where fans and dampers are to be hardwire interlocked, provide hardwire interlocks between the motor terminal strip and dampers such that the damper shall be driven open then the motor is required to start. Motor start-up shall not occur until the damper end switch indicates the damper is in the full open position. Where fans and dampers are hardwire interlocked, the interlocks shall apply in both the "hand" and "auto" positions of the HOA switch at the motor controller.

Q. The point lists are provided for convenience and are not intended to be all-inclusive. All points required to provide the Sequence of Operation shall be included as if listed.

1.05 AUTOMATIC STAGGERED START AFTER A POWER FAILURE

A. The BMS contractor shall submit an automatic restart sequence of operation that prioritizes the loads to be restarted, in order of importance, when a changeover in power occurs, either from normal power to emergency power or from emergency power to normal power and when there is more than one (1) piece of mechanical equipment to start at the same time (e.g., at the beginning of a normally scheduled occupied cycle). The automatic restart sequence of operation shall also show the time delays between the startup of each piece of mechanical equipment.

B. Simultaneous starting of motors shall be prevented by a sequential start program in the BMS system. This program shall also provide sequential restart after power failure of motors that

were running prior to power failure.

C. Software time delay relays shall be provided in the BMS to allow fan motors to cool down before restarting. Motors shall have both a minimum interval time (between consecutive starts) and a minimum off time (between stop and start).

1.06 VARIABLE FREQUENCY DRIVE (VFD) INTEGRATION

A. The BMS Contractor shall provide and wire a communication interface to each VFD via BACnet to monitor all points available via the interface. The BMS contractor shall provide all required interconnecting control wiring to interface all variable frequency drives to the BMS. The integration is in addition to the hardwired points listed in the points list for each system. VFD integration shall be provide whether it is listed in the individual sequence of operation of not.

B. In addition to the communication interface, all VFD shall be provided with the following points hardwired to the BMS:
   1. AI – VFD speed feedback (0-100%).
   2. AO – VFD speed control (0-100%).
   3. DI – VFD common alarm.
   4. DI – VFD status (via current sensing relay, monitoring VFD status is not acceptable).
   5. DO – VFD command (on/off).

C. Provide the following points on the associated equipment graphic in addition to the hardwired points indicated above:
   1. VFD failure.

1.07 OUTSIDE AIR STATION

A. The BMS contractor shall furnish an outside air temperature and humidity monitoring station as specified in Section 230900. Verify location with the Owner and Engineer.

B. Outside air temperature and humidity shall be displayed on each BMS graphic.

C. Provide the following points hardwired to the BMS:
   1. AI - Outside air humidity.
   2. AI - Outside air temperature.

D. Provide the following points on the associated equipment graphic in addition to the hardwired points indicated above:
   1. Outside air enthalpy.
   2. Outside air wet bulb temperature
   3. Outside air dew point temperature

END OF SECTION 230993

SECTION 232113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.
B. Heating water piping, above grade.
C. Equipment drains and overflows.
D. Pipe hangers and supports.
E. Unions, flanges, mechanical couplings, and dielectric connections.

1.02 RELATED REQUIREMENTS

A. Section 083100 - Access Doors and Panels.
B. Section 099123 - Interior Painting.
C. Section 230516 - Expansion Fittings and Loops for HVAC Piping.
D. Section 230523 - General-Duty Valves for HVAC Piping.
E. Section 230547 - Vibration Controls for HVAC
F. Section 230553 - Identification for HVAC Piping and Equipment.
G. Section 230719 - HVAC Piping Insulation.
H. Section 232114 - Hydronic Specialties.
I. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME B31.1 - Power Piping 2022.
B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
F. ASME B31.9 - Building Services Piping 2020.
G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
H. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023a.
I. ASTM B32 - Standard Specification for Solder Metal 2020.
J. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
K. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
L. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers 1992 (Reapproved 2022).
M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.
N. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).
O. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

1.04 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the minimum working pressure and temperature of the systems listed in the PIPING APPLICATIONS section in Part 3, the documents and as follows:
   1. Hot-Water Heating Piping: 150 psig at 200 deg F
   2. Makeup-Water Piping: 80 psig at 150 deg F
   3. Air-Vent Piping: 200 deg F

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.

C. Product Data:
   1. Include data on pipe materials, pipe fittings, valves, and accessories.
   2. Provide manufacturers catalog information.
   3. Indicate valve data and ratings. Include flow and pressure drop curves based on manufacturer's testing for calibrated -orifice balancing valves and automatic flow-control valves.
   4. Submit a schedule indicating the following:
      a. System service, operating temperature, operating pressure pipe material, fittings, methods of joining gaskets, specialties, Test Pressure, flange gaskets, unions, dielectric unions, suction diffusers, ring spacers and test blanks
      b. Air control devices
      c. Chemical treatment
      d. Hydronic specialties

D. Detail, at 3/8 inch scale piping layout with fittings, valves and equipment, use single line for pipe sizes 3 inches and smaller, and double line for pipe sizes 4 inches and greater. Fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops

E. Project Record Documents: Record actual locations of valves.

F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views, as well as operation and maintenance manuals.

G. Field quality control test reports. Written reports of tests specified in Part 3 of this section include the following:
   1. Test procedures used
   2. Test results that comply with requirements
   3. Failed test results and corrective action taken to achieve requirements

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

B. Welder Qualifications: Certify in accordance with ASME BPVC-IX.
   1. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.
   2. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
   3. Qualify processes and operators according to ASME BPVC-IX.
   4. Welders shall be qualified forall required pipe sizes, materials, wall thickness, and position in accordance with ASME BPVC-IX.
   5. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
   6. Copies of the certified welder qualification reports shall be maintained by the responsible welding agency and the company performing the welding and shall be submitted to the owner and/or Inspector upon request.

7. Steel Support Welding:Qualify processes and operators according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
    a. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 01.

D. Steel Pipe Welding:
1. All defective welds shall be chipped out and repaired at no cost to the Owner, based on procedure to be specified at the time.
2. The contractor shall bear the cost of reinspection of the repaired welds and the inspection of two (2) additional welds, as selected by the owner, for each failed weld.
3. Field Procedures:
    a. Clean pipe free from rust, scale and oxide.
    b. Bevel pipe on each end per acceptable procedures.
    c. Contractor is responsible for preparation of pipe in accordance with ASME B31.1, Chapter V and for visual inspection during the welding operation and for all required welding examinations with certified welding inspector(s), in accordance with ANSI/AWS B.1.10-86 or latest issue section 3.1, 3.1.1, 3.1.2, and 3.1.3.

E. Copper Tube Brazing
1. Qualify process and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, “Welding and Brazing Qualifications”
2. Brazers shall be qualified for all required tube sizes, material, wall thickness, and position in accordance with the American Society of Mechanical Engineering (ASME), Section IX, boiler and Pressure Vessel Code.
3. Brazing qualification testing shall be performed an agency/laboratory certified by ASME.
4. Copies of the certified brazer qualification reports shall be maintained by the responsible brazing agency and the company performing the brazing, and shall be submitted to the owner and/or Inspector.
5. All defective brazements shall be chipped out and repaired at no cost to the Owner, based on procedure to be specified at the time.
6. The contractor shall bear the cost of re-inspection of the repaired brazements and the inspection of two (2) additional brazements, as selected by the owner, for each failed brazement.
7. Field Procedures:
    a. Clean tubing free from surface oxidation on the O.D.
    b. Ream all tubes and remove burrs created by the cutting operation, on each end per acceptable procedures.
    c. Contractor is responsible for preparation of tubes and for visual inspection during the brazing operation in accordance with all applicable ASME, ANSI and AWS standards.

1.07 COORDINATION

A. Coordinate layout and installation of hydronic piping and suspension system components with other construction, including light fixtures, HVAC equipment, fire-suppression-system components, structure and partition assemblies.

B. Coordinate piping installation with roof curbs, equipment supports, and roof penetrations. Roof specialties are specified in Division 7 Sections.

C. Coordinate pipe fitting pressure classes with products specified in related Sections.

D. Coordinate installation of pipe sleeves for penetrations through exterior walls and floor assemblies. Coordinate with requirements for firestopping for fire and smoke wall and floor assemblies.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
   2. Use non-conducting dielectric connections whenever jointing dissimilar metals. Use of bronze valves is not acceptable as a dielectric.
   3. Wrought steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
      a. Elbows: Long radius welded; Radius equals 1 1/2 times nominal diameter.
      b. Straight Tee: Butt welding, branch size is same as run line size.
      c. Reducing Tee: Butt welding, branch size shall be one two, three, or four pipe sizes smaller than run line size. For five times smaller branches use weld-o-let or thread-o let
   4. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
   5. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
   6. Threaded Joints: ASME B16.3, malleable iron fittings. Do not used threaded joints for glycol systems.

C. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

D. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges or unions to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

E. Valves: Provide valves where indicated:
   1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
   2. Install shutoff duty valves at each branch connection to supply and return mains, and at supply and return connection to each piece of equipment.
   3. Install calibrated orifice balancing valves in the return pipe of each heating or cooling terminal.
   4. Install calibrated orifice balancing valves at each branch connection to return main at riser.
   5. Install pressure reducing valves at make-up water connection to regulated systme fill pressure.
   6. For throttling, bypass, or manual flow control services, use globe, ball, or butterfly valves.
   7. In heating water systems, butterfly valves may be used interchangeably with gate and globe valves.
   8. For shut-off and to isolate parts of systems or vertical risers, use gate, ball, or butterfly valves.

F. Welding Materials and Procedures: Comply with ASME BPVC-IX.

2.02 HEATING WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, ASTM A 106 or A 53, Grade B seamless, using one of the following joint types:
   1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
      a. For Low Temperature Water System, IN EXCESS of 100 psig up to 300 PSIG, except as noted and 40 to 220 deg F supply temperature for hot water systems:
         1) To 2 inch: Schedule 80 with threaded ends or Schedule 40 with socket weld ends.
         2) 2-1/2 inch to 10 inch: Schedule 40, butt weld ends only.
      b. For Low Temperature Water System, NOT IN EXCESS of 100 psig and -20 to 220 deg F supply temperature for hot water heating, condenser water, chilled water, primary and secondary brine and glycol systems use the following:
         1) To 2 inch: Schedule 40 with threaded ends or Schedule 40 with socket weld ends.
         2) 2-1/2 inch to 10 inch: Schedule 40, butt weld ends only.
   2. Threaded Joints: ASME B16.3, malleable iron fittings. No threaded joints on glycol systems.

B. Steel Pipe Sizes 12 Inches and Greater: ASTM A53/A53M, 3/8 inch wall, black, using one of the following joint types:
   1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
      a. For Low Temperature Water System, IN EXCESS of 100 psig up to 300 PSIG, except as noted and 40 to 220 deg F supply temperature for hot water, dual temperature water and glycol systems, use the following:
         1) 12 inch and larger: 0.375 inch wall thickness up to 250 psig, butt weld ends only.
      b. For Low Temperature Water System, NOT IN EXCESS of 100 psig and -20 to 220 deg F supply temperature for hot water heating, and glycol systems use the following:
         1) 12 inch and larger: 0.375 inch wall thickness up to 250 psig, butt weld ends only.

C. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
   1. For Low Temperature Water System, IN EXCESS of 100 psig, except as noted and 40 to 220 deg F supply temperature for hot water, dual temperature water and glycol systems, use the following:
      a. 4 inch and smaller up to 300 PSIG and 100 deg F or 150 PSIG and 250 deg F, Type K, drawn-temper copper tubing, wrought-copper fittings, and brazed joints
      b. No threaded joints are allowed in glycol systems
   2. For Low Temperature Water System, NOT IN EXCESS of 100 psig and -20 to 220 deg F supply temperature for hot water heating and glycol systems use the following:
      a. 4 inch and smaller Type K, drawn-temper copper tubing, wrought-copper fittings, and brazed joints
   3. No threaded joints are allowed in glycol systems
   4.
      a. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.

2.03 MAKE UP WATER PIPING

A. Make-up water piping installed aboveground shall be Type L drawn temper copper tubing, wrought copper fittings, and brazed joints.

2.04 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn; using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

2.05 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
   5. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
   6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.
   8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
   9. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.06 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches and Less:
   1. Ferrous Piping: 150 psig malleable iron, threaded.
   2. Copper Pipe: Bronze, threaded joints.

B. Flanges for Pipe 2 Inches and Greater:
   1. Ferrous Piping: 150 psig forged steel, slip-on.
   2. Copper Piping: Bronze.
   3. Gaskets: 1/16 inch thick, preformed neoprene.

C. Dielectric Connections:
   1. Waterways:
      a. Manufacturers:
         1) Capitol Manufacturing company
         2) Hart Industries International, Inc
         3) Watts Regulator Co.; a division of Watts Water Technologies Inc.
         4) Zurn Plumbing Products Group; AquaSpec Commercial Products Division
      b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      c. Dry insulation barrier able to withstand 600-volt breakdown test.
      d. Construct of galvanized steel with threaded end connections to match connecting piping.
      e. Suitable for the required operating pressures and temperatures.
   2. Flanges:
      a. Manufacturers:
         1) Advance Products & Systems Inc.
         2) Calpico Inc.
         3) Central Plastics Company
         4) Pipeline Seal and Insulator, Inc.
   3.
      a. Dielectric flanges with same pressure ratings as standard flanges.
      b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      c. Dry insulation barrier able to withstand 600-volt breakdown test.
      d. Construct of galvanized steel with threaded end connections to match connecting piping.
      e. Companion flange assembly for field assembly. Include flanges full face or ring type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment using jointing system specified.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

E. After completion, fill, clean, and treat systems. See Section 232500 for additional requirements.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install heating water, glycol, chilled water, condenser water, and engine exhaust piping to ASME B31.9 requirements.

C. Route piping in orderly manner, parallel to building structure, and maintain gradient.

D. Install piping to conserve building space and to avoid interference with use of space.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install condensate drain piping to maintain a minimum horizontal slope that in not less than 1% (1/8 unit vertical in 12 units horizontal) in the direction of discharge.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Install piping to allow application of insulation.

L. Select system components with pressure rating equal to or greater than system operating pressure.

M. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

N. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

O. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

P. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

Q. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

R. Install valves according to Division 23 Section "General-Duty Valves for HVAC Piping."

S. Install unions in piping, NPS 2 (DN 50) and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

T. Install flanges in piping, NPS 2-1/2 (DN 65) and larger, at final connections of equipment and elsewhere as indicated. Slip-on flanges shall be back welded.

U. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 (DN 20) nipple and ball valve in blowdown connection of strainers NPS 2 (DN 50) and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2 (DN 50).

V. Install expansion loops, expansion joints, anchors, and pipe alignment guides as specified in Division 23 Section "Expansion Fittings and Loops for HVAC Piping."

W. Group piping whenever practical at common elevations.

X. Sleeve pipe passing through partitions, walls, and floors.

Y. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

Z. Slope piping and arrange to drain at low points.

AA. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 230516.

BB. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
2. Support horizontal piping as scheduled.
   a. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
   b. Place hangers within 12 inches of each horizontal elbow and at concentrated loads due to valves, strainers and other similiar items.
   c. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   d. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   e. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   f. Provide copper plated hangers and supports for copper piping.
   g. Prime coat exposed steel hangers and supports. See Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
   h. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
      1) Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
      2) Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F (49 to 232 deg C) pipes, NPS 4 to NPS 16 (DN 100 to DN 400), requiring up to 4 inches (100 mm) of insulation.
      3) Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24 (DN 20 to DN 600), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
      4) Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24 (DN 15 to DN 600), if little or no insulation is required.
      5) Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
      6) Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8 (DN 20 to DN 200).
      7) Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8 (DN 15 to DN 200).
      8) Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8 (DN 15 to DN 200).
      9) Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2 (DN 15 to DN 50).
      10) Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8 (DN 10 to DN 200).
      11) Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3 (DN 10 to DN 80).
      12) U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).

13) Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14) Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange.
15) Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
16) Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36 (DN 65 to DN 900), if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
17) Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30 (DN 25 to DN 750), from 2 rods if longitudinal movement caused by expansion and contraction might occur.
18) Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20 (DN 65 to DN 500), from single rod if horizontal movement caused by expansion and contraction might occur.
19) Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42 (DN 50 to DN 1050), if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20) Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24 (DN 50 to DN 600), if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21) Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, NPS 2 to NPS 30 (DN 50 to DN 750), if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

i. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1) Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500).
2) Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500), if longer ends are required for riser clamps.

j. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1) Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2) Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3) Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4) Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5) Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

k. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1) Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2) Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
3) Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4) Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5) Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

6) C-Clamps (MSS Type 23): For structural shapes.
7) Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8) Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9) Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10) Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11) Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12) Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    (a) Light (MSS Type 31): 750 lb (340 kg).
    (b) Medium (MSS Type 32): 1500 lb (680 kg).
    (c) Heavy (MSS Type 33): 3000 lb (1360 kg).
13) Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14) Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15) Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

l. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1) Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2) Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3) Thermal-Hanger Shield Inserts: For supporting insulated pipe.

m. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1) Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2) Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
3) Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
4) Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5) Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
6) Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
7) Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
8) Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    (a) Horizontal (MSS Type 54): Mounted horizontally.
    (b) Vertical (MSS Type 55): Mounted vertically.
    (c) Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

n. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
o. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
p. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

3. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. See Section 230719.
4. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 083100 .
5. Use eccentric reducers to maintain top of pipe level.
6. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.
7. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. See Section 099123.
8. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

A. Hanger Spacing for Copper Tubing.
1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. 1-1/2 Inches and 2 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
4. 2-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
5. 3 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
6. 4 Inches: Maximum span, 12 feet; minimum rod size, 1/2 inch.

B. Hanger Spacing for Steel Piping.
1. 1/2 Inch, 3/4 Inch, and 1 Inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. 1-1/4 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
3. 1-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. 2 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. 2-1/2 Inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. 3 Inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
7. 4 Inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
8. 6 Inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
9. 8 Inches: Maximum span, 19 feet; minimum rod size, 5/8 inch.
10. 10 Inches: Maximum span, 20 feet; minimum rod size, 3/4 inch.
11. 12 Inches: Maximum span, 23 feet; minimum rod size, 7/8 inch.
12. 14 Inches: Maximum span, 25 feet; minimum rod size, 1 inch.
13. 16 Inches: Maximum span, 27 feet; minimum rod size, 1 inch.
14. 18 Inches: Maximum span, 28 feet; minimum rod size, 1-1/4 inches.
15. 20 Inches: Maximum span, 30 feet; minimum rod size, 1-1/4 inches.

3.04 PIPE JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.05 HYDRONIC SPECIALTIES INSTALLATION

A. Install automatic air vents at high points of system piping in mechanical equipment rooms only. Manual vents at heat-transfer coils and elsewhere as required for air venting.

3.06 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:
   1. Leave joints, including welds, uninsulated and exposed for examination during test.
   2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
   3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
   4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
   5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:
   1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
   2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
   3. Isolate expansion tanks and determine that hydronic system is full of water.
   4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping." Systems less than 100 psig, hydrostatically test to 150 psig.
   5. After hydrostatic test pressure has been applied for at least 4 hours, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
   6. Prepare written report of testing.

C. Perform the following before operating the system:
   1. Open manual valves fully.
   2. Inspect pumps for proper rotation.
   3. Set makeup pressure-reducing valves for required system pressure.
   4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
   5. Set temperature controls so all coils are calling for full flow.
   6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
   7. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 232114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air vents.

B. Air separators.

C. Strainers.

D. Pressure-temperature test plugs.

E. Relief valves.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

B. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2023.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

D. Project Record Documents: Record actual locations of flow controls.

E. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 AIR VENTS

A. Manufacturers:
   1. Armstrong International, Inc; _____: www.armstronginternational.com.
   2. ITT Bell & Gossett; _____: www.bellgossett.com.
   3. Taco, Inc; _____: www.taco-hvac.com.

B. Manual Type: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Type:

1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.02 STRAINERS

A. Manufacturers:
1. Armstrong International, Inc; _____: www.armstronginternational.com.
2. Mueller____.

B. Y-Pattern Strainers:
1. Chilled Water, Condenser Water and Hot Water Systems of Steel Construction:
a. Working pressure: To 250 psig, non-shock.
1) Sizes 1/4 inch to 2 inch: ANSI 250 lb. Class.
(a) Connections: Threaded.
(b) Body: Cast iron, ASTM A126, Class B. With machined seat for screen retention. Galvanized as required to match connecting piping.
(c) Cap: Bronze, gasketed.
(d) Screen: 20 mesh. 304 stainless steel, ASTM 240. Free area not less than 2-1/2 times inlet area.
(e) Blowoff outlet: With female NPT tapping.
(f) Mueller model No. 11 MFCB.
2) Sizes 2-1/2 inch to 24 inch: Class 250.
(a) Connections: Flanged.
(b) Body: Cast iron, ASTM A126, Class B. With machined seat for screen retention. Galvanized as required to match connecting piping.
(c) Cover flange: Cast iron, ASTM A126, Class B. With machined seat for screen retention. With female tapped NPT blowoff connection. With EPDM O-ring seal.
(d) Screen to 8 inch: 1/8 inch perforations. 304 stainless steel, ASTM 240. Free area not less than 2-1/2 times inlet area.
(e) Screen 10 inch and larger: 5/32 inch perforations. 304 stainless steel, ASTM 240. Free area not less than 2-1/2 times inlet area.
(f) Magnets: Provide magnets for strainers. All 8 inch and larger. At each pump suction. With continuous magnetic field around entire circumference of screen. With removable cast Alnico No. 5 channel magnets with acceptable baskets constructed of magnetic alloy. Secured with stainless steel retaining lugs and threaded rods.
(g) Blowoff outlet: With female NPT tapping.
(h) Mueller model No. 752.
2. Chilled Water, Condenser Water and Hot Water and Glycol Systems of Copper Construction:
a. Working pressure: To 250 psig, non-shock..
1) Sizes 1/4 inch to 2 inch: Class 250
(a) Connections: Threaded.
(b) Body: Bronze, ASTM B62. With machined seat for screen retention.
(c) Cap: Bronze, ASTM B62. With machined seat for screen retention.
(d) Screen: 20 mesh. 304 stainless steel, ASTM 240. Free area not less than 2-1/2 time inlet area.
(e) Blowoff outlet: With female NPT tapping.
(f) Mueller model No. 352M.

2.03 PRESSURE-TEMPERATURE TEST PLUGS

A. Manufacturers:
1. Ferguson Enterprises Inc; _____: www.fnw.com.

2. Peterson Equipment Company Inc; _____: www.petesplug.com.
3. Sisco Manufacturing Company Inc; _____: www.siscomfg.com.

B. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.

C. Application: Use extended length plugs to clear insulated piping.

2.04 RELIEF VALVES

A. Manufacturers:
1. Apollo Valves; _____: www.apollovalves.com.
2. Armstrong International, Inc; _____: www.armstronginternational.com.
3. ITT Bell & Gossett; _____: www.bellgossett.com.
4. Conbraco Industries; ____: www.apollovalves.com.

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions.

B. Provide manual air vents at system high points and as indicated.

C. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

D. Provide valved drain and hose connection on strainer blowdown connection.

E. Provide relief valves on pressure tanks, low-pressure side of reducing valves, heat exchangers, and expansion tanks.

F. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.

G. Pipe relief valve outlet to nearest floor drain.

H. Where one line vents several relief valves, make cross-sectional area equal to sum of individual vent areas.

END OF SECTION 232114

SECTION 232213
STEAM AND CONDENSATE HEATING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and pipe fittings.
B. Pipe hangers and supports.
C. Steam piping system.
D. Steam condensate piping system.
E. Strainers.
F. Thermostatic air vents and vacuum breakers.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 230523 - General-Duty Valves for HVAC Piping.
C. Section 230547 - Vibration controls for HVAC.
D. Section 230553 - Identification for HVAC Piping and Equipment.
E. Section 230719 - HVAC Piping Insulation.
F. Section 232214 - Steam and Condensate Heating Specialties.
G. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
B. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings 2018.
C. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded 2021.
D. ASME B31.1 - Power Piping 2022.
E. ASME B31.9 - Building Services Piping 2020.
F. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
H. ASTM A182/A182M - Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service 2023.
I. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes 2022a.
J. ASTM A403/A403M - Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings 2022b.
K. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
L. UL 508 - Industrial Control Equipment Current Edition, Including All Revisions.

1.04 DEFINITIONS

A. HP Systems: High-pressure piping operating at more than 15 psig (104 kPa) as required by ASME B31.1.
B. LP Systems: Low-pressure piping operating at 15 psig (104 kPa) or less as required by ASME B31.9

C. Below atmosphere Vacuum return piping is piping operating below 0 PSIG up to 29 inches of mercury .

1.05 SYSTEM DESCRIPTION

A. When more than one piping system material is selected, ensure systems components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

B. Use unions and flanges downstream of valves and at equipment or apparatus connections. Use dielectric unions where joining dissimilar materials. Do not use direct welded or threaded connections.

C. Provide pipe hangers and supports in accordance with ASME B31.9, MSS SP-58, or ASME B31.1 unless indicated otherwise.

D. Use gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Use globe valves for throttling, bypass, or manual flow control services.

1.06 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressures and temperatures:
1. LP Steam Piping: 125 psig (861 kPa).
2. Condensate Piping: Same as pressure for associated steam piping system.
3. Makeup-Water Piping: 80 psig (552 kPa) at 150 deg F (66 deg C).
4. Blowdown-Drain Piping: Equal to pressure of the piping system to which it is attached.
5. Air-Vent and Vacuum-Breaker Piping: Equal to pressure of the piping system to which it is attached.
6. Safety-Valve-Inlet and -Outlet Piping: Equal to pressure of the piping system to which it is attached.

1.07 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

C. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.

D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

E. Project Record Documents: Record actual locations of valves.

F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.
2. Valve Repacking Kits: One for each type and size of valve.

H. Shop Drawings: Detail, [3/8 inch equals 1 foot scale, flash tank assemblies and fabrication of pipe anchors, hangers, pipe, multiple pipes, alignment guides, and expansion joints and loops and their attachment to the building structure. Detail locations of anchors, alignment guides, and expansion joints and loops

I. Prepare general layout drawings as follows:
1. Minimum 3/8 inch scale piping layout with fittings, valves and equipment, use single line for pipe sizes 3 inches and smaller and double line for pipe sizes 4 inches and greater.
2. Minimum 3/8 inch scale double line layout and sections including for coordination drawings.
3. Indicate location of hangers, supports, guides and anchors, expansion joints, loops, drains, vents and sleeves.

J. Stress analysis.

K. Steam piping layout:
   1. Prepare steam piping shop drawings.
   2. Prepare stress analysis based on steam piping shop drawings.

L. Qualification Data: For Installer.

M. Field quality - control test reports.

N. Provide and perform x-ray / radiographic) testing reports to owner and authorities having jurisdiction. Submit result to owner. Provide assistance for all required special inspections.

O. Operation and Maintenance Data: For valves, safety valves, pressure-reducing valves, steam traps, air vents, vacuum breakers, and meters to include in emergency, operation, and maintenance manuals.

1.08 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section, with minimum _____ years of documented experience.

C. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

D. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code - Steel."

E. Pipe Welding: Qualify processes and operators according to the following:
   1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
   2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

F. ASME Compliance: Comply with ASME B31.1, "Power Piping and ASME B31.9, "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp flash tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1

G. Steel Pipe Welding:
   1. Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, “Welding and Brazing Qualifications.”
   2. Welders shall be qualified for all required pipe sizes, material, wall thickness, and position in accordance with the American Society of Mechanical Engineering (ASME) Section IX, boiler and pressure Vessel Code
   3. Welder qualification testing shall be performed by an independent inspection agency listed with the Agency Having Jurisdiction for testing that is by radiography. The inspector shall have a minimum radiography qualification of level II in accordance with the American Society for Non-Destructive Testing, 3200 Riverside Drive, Columbus, Ohio 43221. Recommended Practice, Document No. SNT-TC-1A-1980.
   4. Copies of the certified welder qualification reports shall be maintained by the responsible welding agency and the company performing the welding, and shall be submitted to the owner and/or Inspector upon request.
   5. All defective welds shall be chipped out and repaired at no cost to the Owner, based on procedure to be specified at the time.
   6. The contractor shall bear the cost of reinspection of the repaired welds and the inspection of two (2) additional welds, as selected by the owner, for each failed weld.
   7. Field Procedures:
      a. Clean pipe free from rust, scale and oxide.
      b. Bevel pipe on each end per acceptable procedures.
      c. Contractor is responsible for preparation of pipe in accordance with ASME B 31.1, Chapter V and for visual inspection during the welding operation and for all required welding examinations with certified welding inspector(s), in accordance with ANSI/AWS B.1.10-86 or latest issue section 3.1, 3.1.1, 3.1.2, and 3.1.3.

H. Radiographic examination.
1. All welds shall be full fusion and penetration, and be subjected to radiographic testing as follows:
a. Perform radiographic examination of butt welds in high pressure steam piping and condensate. Testing shall be performed by an independent lab hired by this contractor, submit results to owner.
b. Test welds as follows:
1) Below 90 PSIG - none
2) 90 PSIG to 150 PSIG - Test 10 percent at random
3) Above 150 PSIG - Test 100 percent
4) Testing shall be performed by an independent lab hired by this contractor, submit results to owner.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labelling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Comply with ASME B31.9 and ASME B31.1 code for installation of piping system.

B. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of welders.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

2.02 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, plain ends, Type, Grade, and Schedule as indicated in Part 3 piping applications articles.

B. Malleable-Iron Threaded Fittings: ASME B16.3; Classes 150 and 300 as indicated in Part 3 piping applications articles.

C. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3 piping applications articles.

D. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

E. Wrought-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

F. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, black steel of same Type, Grade, and Schedule as pipe in which installed.

2.03 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

c. For high pressure steam and condensate - Balforon “C” as manufactured by Balfor Industries, Inc ONLY
d. For low pressure steam and condensate - Klinger C4430
e. For joints of dissimilar metals, provide isolating gaskets, sleeves and washers between flanges, bolts and nuts. Gaskets shall be similar to Dupont Teflon.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Welding Filler Metals: Comply with AWS D10.12 (AWS D10.12M) for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

D. Welding Materials: Comply with Section II, Part C, of ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

2.04 STAINLESS STEEL PIPE:

A. Up to 15 psig including condensate: ASTM A312/A312M, Type TP304L, seamless only, Schedule 40S for pipe less than 8 inches in diameter or Schedule 30S for pipe 8 inches and larger. Maximom 0.375 inch wall thickness.

B. Fittings 2-1/2 inches and Larger:
1. Stainless steel, buttweld type.
2. ASTM A403/A403M, Class WP-S, Grade WP 304L, seamless only, and ASME B16.9 of the same thickness as the adjoining pipe.

C. Fittings 2 inches and Smaller:
1. Stainless steel, socket weld type.
2. Comply with ASME B16.11 and ASTM A182/A182M.

2.05 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Hart Industries, International Inc.
d. Watts Water Technologies, Inc.
e. Zurn Plumbing Products Group.
2. Factory-fabricated union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

D. Dielectric Flanges:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Watts Water Technologies, Inc..
2. Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

E. Dielectric-Flange Kits:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
3. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

2.06 STRAINERS

A. Y-Pattern Strainers:
1. Low pressure steam, low pressure condensate and pumped condensate systems of steel construction 15 psig and below:
a. Working pressure: To 250 psig wsp @ 406°F. Sizes 1/4 inch to 2 inches: ANSI 250 lb Class:
1) Connections: Threaded.
2) Body:
(a) Cast iron, ASTM A 126, Class B.
(b) With machined seat for screen retention.
(c) Galvanized as required to match connecting piping.
3) Cover: Cast iron gasketed.
4) Screen:
(a) 3/64 inch perforations.
(b) 304 stainless steel, ASTM 240.
(c) Free area not less than 2.5 times inlet area.
5) Blowoff outlet: With female MPT tapping.
6) Mueller Model No. 11 BC.
b. Working pressure: For sizes 2-1/2 inches to 12 inches: To 250 psig wsp @ 450°F. For sizes 14 inches to 24 inches: To 200 psig wsp @ 406°F.
1) Connections: Flanged.
2) Body:
(a) Cast iron, ASTM A 126, Class B.
(b) With machined seat for screen retention.
(c) Galvanized as required to match connecting piping.
3) Cover flange:
(a) Cast iron, ASTM A 126, Class B.
(b) With machined seat for screen retention.
(c) With female tapped NPT blowoff connection.
(d) With EPDM o-ring seal.
4) Screen:
(a) To 8 inches: 3/64 inch perforations.
(b) 10 inches and larger: 1/16 inch perforations.
(c) 304 stainless steel, ASTM 240.
(d) Free area not less than 2.5 times inlet area.
5) Blowoff outlet: With female NPT tapping.
6) Mueller Model No. 752,

2.07 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.

B. Hangers for Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.

C. Hangers for Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.

D. Multiple or Trapeze Hangers for Pipe Sizes to 4 inches: Steel channels with welded spacers and hanger rods.

E. Multiple or Trapeze Hangers for Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods; cast iron roll and stand.

F. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

G. Wall Support for Pipe Sizes 4 to 5 Inches: Welded steel bracket and wrought steel clamp.

H. Wall Support for Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll.

I. Vertical Support: Steel riser clamp.

J. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

K. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

L. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

M. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.08 THERMOSTATIC AIR VENTS AND VACUUM BREAKERS

A. Thermostatic Air Vents:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Armstrong International, Inc.
   b. Hoffman Specialty; Division of ITT Industries.
   c. Spirax Sarco, Inc.
2. Body: Cast iron, bronze or stainless steel.
3. End Connections: Threaded.
4. Float, Valve, and Seat: Stainless steel.
5. Thermostatic Element: Phosphor bronze bellows in a stainless-steel cage.
6. Maximum allowable Pressure: : 125 psig.
7. The maximum operating pressure is to be selected for the intended service.
8. Maximum Temperature Rating: 350 F.

B. Vacuum Breakers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Armstrong International, Inc.
   b. Hoffman Specialty; Division of ITT Industries.
   c. Spirax Sarco, Inc.
2. Body: Cast iron, bronze, or stainless steel.
3. End Connections: Threaded.
4. Sealing Ball, Retainer, Spring, and Screen: Stainless steel.
5. O-ring Seal: EPR.
6. Pressure Rating: 125 psig.
7. Maximum Temperature Rating: 350 F.

2.09 PIPE FLANGE GASKET MATERIALS

A. Flange gaskets shall be one-piece ring type 1/16 inch thick (minimum) except as noted, suitable for temperature, pressure (operating and test) and service of system.
1. For low pressure steam and condensate - Klinger C4430
2. For joints of dissimilar metals, provide isolating gaskets, sleeves and washers between flanges, bolts and nuts. Gaskets shall be similar to Dupont Teflon.
3. Full-Face Type: For flat-face, Class 125, cast iron and cast bronze flanges.
4. Narrow Face Type: For raised face, class 250, cast iron flanges.

2.10 RING SPACERS AND TEST BLANKS:

A. Provide between flanges where shown on drawing or where necessary to isolate equipment from the piping system, in accordance with B 3.1.1, Chapter VI, section 137.2.4. Ring spacers

to be replaced by test blanks during hydrostatic testing and/or during chemical cleaning for equipment isolation.

B. Size and rating to match companion flanges.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Whenever work is suspended during construction protect open ends with temporary plugs or caps.

E. After completion, fill, clean, and treat systems. Refer to Section 232500.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and avoid interference with use of space.

D. Sleeve pipe passing through partitions, walls, and floors.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as indicated.
   3. Place hangers within 12 inches of each horizontal elbow.
   4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Prime coat exposed steel hangers and supports. Refer to Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
   8. Install the following pipe attachments:
      a. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet (6 m) long.
      b. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet (6 m) or longer.
      c. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
      d. Spring hangers to support vertical runs.
   9. Vertical piping:
      a. Base elbow support: Provide bearing plate on structural support, similar to F&S Manufacturing Co. Fig. 720 or 721.
      b. Provide guides at every third floor but not exceed:
      c. 25 ft for piping to 2 inch.
      d. 36 ft for piping 2-1/2 inch to 12 inch.
      e. 50 ft for piping 14 inch and larger.
      f. Top support: Provide special hanger or saddle in horizontal connection and make provisions for expansion.
      g. Intermediate supports: Steel pipe clamp at floor. Bolt and weld to pipe with extension ends bearing on structural steel or bearing plates.

h. For multiple pipes, coordinate guides, bearing plates and accessory steel.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 3100.

I. Slope steam piping one inch in 40 feet in direction of flow. Use eccentric reducers to maintain bottom of pipe level.

J. Slope steam condensate piping one inch in 40 feet. Provide drip trap assembly at low points and before control valves. Run condensate lines from trap to nearest condensate receiver. Provide loop vents over trapped sections.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

L. Install valves with stems upright or horizontal, not inverted.

3.03 PIPE JOINT CONSTRUCTION

A. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

B. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

C. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints: Construct joints according to AWS D10.12 (AWS D10.12M), using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

E. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.04 TERMINAL EQUIPMENT CONNECTIONS

A. Size for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install traps and control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install vacuum breakers downstream from control valve, close to coil inlet connection.

E. Install ports for pressure and temperature gages at coil inlet connections.

F. Install a drip leg at coil outlet.

G. Equipment piping and connections: Provide steam, condensate return, drip and vent piping connections as noted and as recommended by equipment manufacturer. Verify location, number and size of connections.

3.05 FIELD QUALITY CONTROL

A. Prepare steam and condensate piping according to ASME B31.1, "Power Piping" and ASME B31.9, "Building Services Piping," and as follows:
   1. Leave joints, including welds, uninsulated and exposed for examination during test.
   2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
   3. Flush system with clean water. Clean strainers.
   4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.

B. Perform the following tests on steam and condensate piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength.
3. After hydrostatic test pressure has been applied for at least 4 hours, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks
4. Perform radiographic examination of butt welds in high pressure steam piping and condensate piping .

C. Prepare written report of testing.

3.06 STEAM PIPING APPLICATIONS

A. Low pressure steam system, 15 psig or below:
   1. Material shall be steel in accordance with ASTM A53 Grade B seamless.
   2. Wall thickness shall be:
      a. To 2 inch: Schedule 80 with threaded ends, or Schedule 40 with socket weld ends.
      b. 2-1/2 inch to 10 inch: Schedule 40, butt weld ends only.
      c. 12 inch to 24 inch: 0.375 inch wall thickness, butt weld ends only.

B. Low pressure condensate return system, below 15 psig:
   1. Material shall be steel in accordance with ASTM A53 Grade B seamless.
   2. Wall thickness shall be:
      a. To 2 inch: Schedule 80 with threaded ends, or Schedule 40 with socket weld ends.
      b. 2-1/2 inch to 10 inch: Schedule 40, butt weld ends only.
      c. 12 inch and larger: 0.375 wall thickness, butt weld ends only.

C. Pumped condensate return system:
   1. Material shall be steel in accordance with ASTM A53 Grade B seamless.
   2. Wall thickness shall be:
      a. To 2 inch: Schedule 80 with threaded ends, or Schedule 80 with socket weld ends.
      b. 2-1/2 inch to 10 inch: Schedule 40, butt weld ends only.

3.07 ANCILLARY PIPING APPLICATIONS

A. Air-Vent Piping:
   1. Inlet: Same as service where installed.
   2. Outlet: Type K annealed-temper copper tubing with soldered or flared joints.

B. Vacuum-Breaker Piping: Outlet, same as service where installed.

C. Safety-Valve-Inlet and -Outlet Piping for jurisdictions utilizing IMC 2018 and later: Same materials and joining methods as for piping specified for the service in which safety valve is installed. Steel piping shall be galvanized. Each relief valve shall be separately piped. Systems in excess of 15 psig shall be piped to the outside

3.08 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Use indicated piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install piping to allow application of insulation.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

K. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) full port-ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

L. Install steam supply piping at a minimum uniform grade of 0.2 percent downward in direction of steam flow.

M. Install condensate return piping at a minimum uniform grade of 0.4 percent downward in direction of condensate flow.

N. Reduce pipe sizes using eccentric reducer fitting installed with level side down.

O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to top of main pipe.

P. Install valves according to Division 23 Section "General-Duty Valves for HVAC Piping."

Q. Install unions in piping, NPS 2 (DN 50) and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

R. Install flanges in piping, NPS 2-1/2 (DN 65) and larger, at final connections of equipment and elsewhere as indicated.

S. Install strainers on supply side of control valves, pressure-reducing valves, traps, and elsewhere as indicated. Install NPS 3/4 (DN 20) nipple and full port ball valve in blowdown connection of strainers NPS 2 (DN 50) and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2 (DN 50).

T. Install expansion loops, anchors, and pipe alignment guides as specified in Division 23 Section "Expansion Fittings and Loops for HVAC Piping."
   1. Install piping to permit free expansion and contraction without damaging piping, equipment, or construction.
   2. Provide expansion offsets, expansion loops, anchors, guides and supports to permit expansion, within stress limits of ANSI Code for Pressure Piping for temperature range of 40 deg F to minimum of 20 deg F above maximum system temperature.
      a. Steam piping shall be cold-sprung.
         1) Piping up to 1-1/2 inch: Cold-sprung 100 percent of expansion.
         2) Piping 2 inch and larger: Cold-sprung 50 percent of expansion.
   3. Install anchors and guides on both sides of expansion loops, zees, etc., to provide safe installation and trouble-free operation

U. Identify piping as specified in Division 23 Section "Identification for HVAC Piping and Equipment."

V. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of pressure regulators, and control valves.
   1. Drips: Provide as follows:
      a. Steam piping:
         1) Maximum 75 foot intervals.
         2) At bottom of vertical lines.
         3) At rising points in piping.
   2. Provide drain valves where condensate may be pocketed.

3. Provide drip points with dirt pockets, the same size as piping, with removable caps. Welded piping shall have ends with flange. Screwed piping shall have caps screwed, made up with graphite.
4. Dirt pockets; Provide full size of riser, 12 inches long at bottom of each riser, end of mains, ends of headers, ahead of pressure regulators, control valves, isolation valves, changes of direction, pipe loops, expansion joints, and as noted
5. Connect drips to condensate return and refer to drip detail.
6. Pitch steam, condensate return and drip piping for gravity drainage.

W. Provide three elbow type swing joints on steam and condensate return connections to equipment and piping systems.

X. Provide riser shutoff valves in runout to each steam and condensate return riser.

Y. Install ring spacers and test blanks as required for hydrostatic testing

3.09 SCHEDULES

A. Hanger Spacing for Steel Steam Piping.
1. 3/4 inch and 1 inch: Maximum span, 9 feet; minimum rod size, 1/4 inch.
2. 1-1/4 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
3. 1-1/2 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
4. 2 inches: Maximum span, 13 feet; minimum rod size, 3/8 inch.
5. 2-1/2 inches: Maximum span, 14 feet; minimum rod size, 3/8 inch.
6. 3 inches: Maximum span, 15 feet; minimum rod size, 3/8 inch.
7. 4 inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
8. 6 inches: Maximum span, 21 feet; minimum rod size, 1/2 inch.
9. 8 inches: Maximum span, 24 feet; minimum rod size, 5/8 inch.

B. Hanger Spacing for Steel Steam Condensate Piping.
1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
7. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
8. 6 inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
9. 8 inches: Maximum span, 19 feet; minimum rod size, 5/8 inch.

END OF SECTION 232213

SECTION 232214
STEAM AND CONDENSATE HEATING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steam traps.

B. Steam air vents.

C. Vacuum breakers

D. Steam safety valves.

1.02 RELATED REQUIREMENTS

A. Section 230716 - HVAC Equipment Insulation.

B. Section 230719 - HVAC Piping Insulation.

C. Section 232213 - Steam and Condensate Heating Piping.

1.03 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2023.

B. ASME B31.9 - Building Services Piping 2020.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 DEFINITIONS

A. HP Systems: High-pressure piping operating at more than 15 psig (104 kPa) as required by ASME B31.1.

B. LP Systems: Low-pressure piping operating at 15 psig (104 kPa) or less as required by ASME B31.9

C. Below atmosphere Vacuum return piping is piping operating below 0 PSIG up to 29 inches of mercury.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Provide for all manufactured products and assemblies required for this project.
   2. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
   3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each specialty.
   4. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Indicate application, selection, and hookup configuration. Include pipe and accessory elevations.

D. Operation and Maintenance Data: Include installation instructions, servicing requirements, and recommended spare parts lists.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Pump Seals: One set for each type and size of pump.
   3. Steam Trap Service Kits: One for each type and size.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with State of New Jersey standard for installation of boilers and pressure vessels.
   1. Maintain one copy of each document on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum three years of documented experience.

1.07 SHORT CIRCUIT CURRENT RATING:

A. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
   2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   3. Label equipment utilizing series ratings as required by NFPA 70.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.09 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Gaskets: Furnish replacement gasket(s) for each gasketed opening.

PART 2 PRODUCTS

2.01 STEAM TRAPS

A. Manufacturers:
   1. Armstrong International, Inc; _____: www.armstronginternational.com.
   2. Spirax-Sarco; _____: www.spiraxsarco.com/us.
   3. Hoffman Specialty; Division of ITT Industries.
   4. Barnes & Jones, Inc.

B. Steam Trap Applications:
   1. Use Float and Thermostatic Traps for:
      a. Unit heaters.
      b. Converters.
      c. Heating coils.
      d. Flash tanks.
      e. Steam jacketed equipment.
      f. Direct steam injected equipment.
      g. Main headers.
      h. Branch lines.
   2. Use Inverted Bucket Steam Traps for:
      a. Main headers.
      b. Steam jacketed equipment.
      c. Direct steam injected equipment.

C. Steam Trap Performance:
   1. Select to handle minimum of two times maximum condensate load of apparatus served.
   2. Pressure Differentials:
      a. Low Pressure Systems (5 psi and less): 1/4 psi.
      b. Medium Pressure Steam (25 psi maximum): 5 psi.
      c. High Pressure Steam (100 psi maximum): 30 psi.

D. Inverted Bucket Traps:
   1. Body and Cap: Cast iron.
   2. End Connections: Threaded.

3. Head and Seat: Stainless steel.
4. Valve Retainer, Lever, and Guide Pin Assembly: Stainless steel.
5. Bucket: Stainless steel.
6. Strainer: Integral stainless-steel inlet strainer within the trap body.
7. Air Vent: Stainless-steel thermostatic vent.
8. Maximum allowable Pressure: 250 psig (1725 kPa).
9. The maximum operating pressure is to be selected for the intended service.

E. Float and Thermostatic Traps:
1. Body and Bolted Cap: ASTM A 126, cast iron.
2. End Connections: Threaded.
3. Float Mechanism: Replaceable, stainless steel.
4. Head and Seat: Hardened stainless steel.
5. Trap Type: Balanced pressure.
6. Thermostatic Bellows: Monel.
7. Thermostatic air vent capable of withstanding 45 deg F (25 deg C) of superheat and resisting water hammer without sustaining damage.
8. Vacuum Breaker: Thermostatic with phosphor bronze bellows, and stainless steel cage, valve, and seat.
9. Maximum allowable Pressure: 125 psig (860 kPa) up to 450 deg F.
10. The maximum operating pressure is to be selected for the intended service.

2.02 STEAM AIR VENTS

A. Manufacturers:
1. Armstrong International, Inc; _____: www.armstronginternational.com.
2. Bell and Gossett, a xylem brand; _____: www.bellgossett.com.
3. Spirax-Sarco; _____: www.spiraxsarco.com/us.

B. 125 psi WSP: Balanced pressure type; cast brass body and cover; access to internal parts without disturbing piping; stainless steel bellows, stainless steel valve and seat.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Install steam and steam condensate piping and specialties in accordance with ASME B31.9.

B. Install pumps according to HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation."

C. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.

D. Support pumps and piping separately so piping is not supported by pumps.

E. Install pumps on concrete bases with grouted base frame. Anchor pumps to bases using inserts or anchor bolts.

F. Install thermometers and pressure gages.

G. Steam Traps:
1. Provide minimum 3/4 inch size on steam mains and branches.
2. Install with union or flanged connections at both ends.
3. Provide gate valve and strainer at inlet, and gate valve and check valve at discharge.
4. Provide minimum 10 inch long, line size dirt pocket between apparatus and trap.

H. Rate relief valves for pressure upstream of pressure reducing station, for full operating capacity. Set relief at maximum 20 percent above reduced pressure.

I. Terminate relief valves to outdoors. Provide drip pan elbow with drain connection to nearest floor drain.

J. When several relief valve vents are connected to a common header, header cross section area shall equal sum of individual vent outlet areas.

K. Install piping adjacent to machine to allow service and maintenance.

L. Install check valve, and ball valve at pump discharge connections for each electric-driven pump.

M. Pipe drain to nearest floor drain for overflow and drain piping connections.

N. Install full-size vent piping to outdoors, terminating in 180-degree elbow at point above highest steam system connection or as indicated.

O. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

P. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.02 CONNECTIONS

A. Steam and condensate piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect steam and condensate piping to tank tappings with shutoff valves and unions or flanges at each connection.

C. Connect condensate drains, pump-discharge piping, vents, overflow drains, makeup water, steam supply, and cooling water piping.

3.03 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:
   1. Inspect field-assembled components and equipment installation, including piping and electrical connections, for compliance with requirements.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   3. Verify bearing lubrication.
   4. Verify proper motor rotation.
   5. Test Reports: Prepare a written report to record the following:
      a. Test procedures used.
      b. Test results that comply with requirements.
      c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning equipment and retest as specified above.

3.04 STEAM-TRAP INSTALLATION

A. Install steam traps in accessible locations as close as possible to connected equipment.

B. Install full-port ball valve, strainer, and union upstream from trap; install union, check valve, and full-port ball valve downstream from trap unless otherwise indicated.

END OF SECTION 232214

SECTION 232500
HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials.
   1. System cleaner.
   2. Closed system treatment (water).
   3. Steam system treatment.

B. By-pass (pot) feeder.

C. Drip feeder.

D. Solution metering pump.

E. Solution tanks.

F. Agitator.

G. Liquid level switch.

H. Conductivity controller.

I. Water meter.

J. Solenoid valves.

K. Timers.

L. Water softeners.

M. Test equipment.

N. Side-stream filtration equipment.

O. HVAC water treatment chemicals

P. Glycol feeder makeup package

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Owner furnished treatment equipment.

B. Section 016000 - Product Requirements: Owner furnished treatment equipment.

C. Section 230913 - Instrumentation and Control Devices for HVAC.

D. Section 232113 - Hydronic Piping.

E. Section 232114 - Hydronic Specialties.

F. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide Current Edition.

B. ITS (DIR) - Directory of Listed Products Current Edition.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.

C. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

D. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for the following products:
   1. Bypass feeders.
   2. Water meters.
   3. Inhibitor injection timers.
   4. pH controllers.
   5. TDS controllers.
   6. Biocide feeder timers.
   7. Chemical solution tanks.
   8. Injection pumps.
   9. Chemical test equipment.
   10. Chemical material safety data sheets.
   11. Water softeners.
   12. RO units.
   13. Multimedia filters.
   14. Self-cleaning strainers.
   15. Bag- or cartridge-type filters.
   16. Centrifugal separators.

E. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.

F. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

G. Certificate: Submit certificate of compliance from Authority Having Jurisdiction indicating approval of chemicals and their proposed disposal.

H. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.

I. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Sufficient chemicals for treatment and testing during required maintenance period.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum _____ years of experience and approved by manufacturer.

1.06 SHORT CIRCUIT CURRENT RATING:

A. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
   2. Provide controllers with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
   3. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   4. Label equipment utilizing series ratings as required by NFPA 70.

1.07 MAINTENANCE SERVICE

A. Scope of Maintenance Service: Provide chemicals and service program to maintain water conditions required above to inhibit corrosion, scale formation, and biological growth for cooling, chilled-water piping, heating, hot-water piping, heating, steam and condensate piping, condenser-water piping, and steam and condensate system for humidifier and cooking appliance applicationsheating, hot-water pipingheating, steam and condensate piping condenser-water piping steam and condensate system for humidifier and cooking appliance applications and equipment. Services and chemicals shall be provided for a period of one year from date of Substantial Completion, and shall include the following:

B. Initial water analysis and HVAC water-treatment recommendations.

C. Startup assistance for Contractor to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.

D. Periodic field service and consultation.

E. Customer report charts and log sheets.

F. Laboratory technical analysis.

G. Analyses and reports of all chemical items concerning safety and compliance with government regulations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. AmSolv-Amrep, Inc; _____: www.amsolv.com.

B. GE Water & Process Technologies; _____: www.gewater.com.

C. Nalco, an Ecolab Company; _____: www.nalco.com.

D. Substitutions: See Section 016000 - Product Requirements.

2.02 REGULATORY REQUIREMENTS

A. Comply with applicable codes for addition of non-potable chemicals to building mechanical systems and to public sewage systems.

B. Comply with UL (DIR) requirements.

C. Perform work in accordance with local health department regulations.

D. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

2.03 GENERAL REQUIREMENTS

A. A single water treatment company shall provide all products and serviced for undivided responsibility throughout the warranty period.

B. The water treatment company shall be a recognized specialist in the field of industrial water treatment for a minimum of ten (10) years.

C. The water treatment company shall have knowledgeable and experienced personnel on staff who are chemical engineers or chemists and have been in the field of industrial water treatment for over ten (10) years.

D. The water treatment company shall have a well-equipped laboratory managed by qualified personnel.

E. All products furnished shall be proven reliable and have good proven performances.

2.04 MATERIALS

A. CHEMICALS
   1. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment.

B. Manufacturers:
   1. GE Water & Process Technologies; _____: www.gewater.com.
   2. Nalco, an Ecolab Company; _____: www.nalco.com.

3. Chemtreat

C. System Cleaner:
   1. Manufacturers:
      a. GE Water & Process Technologies; _____: www.gewater.com.
      b. Nalco, an Ecolab Company; _____: www.nalco.com.
      c. Chemtreat
      d. Substitutions: See Section 016000 - Product Requirements.
   2. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.
   3. Biocide chlorine release agents such as sodium hypochlorite or calcium hypochlorite or microbiocides such as quarternary ammonia compounds, tributyltin oxide, methylene bis (thiocyanate).

D. Chilled water and hot water systems, treatment shall be as follows:
   1. For pH range, refer to Treatment Schedule at end of this section.
   2. Mixture of Molybdate, Silicate, Polymeric dispersant and Tolytriazole or equivalent non-ferrous inhibitor, maintaining minimum concentration as noted in Treatment schedule at end of this section. The inhibitor shall maintain corrosion of steel and copper below 2 mils per year and 0.2 mils per year respectively.
   3. Non-oxidizing, non-acidic and non-cationic biocide, glutaraldhyde or approved equal, to control total bacteria count below 1000 colonies per ml.
   4. Preliminary work required, but is not limited to:
      a. Refer to the drawing for additional information and clarification
      b. Provide a training manual to include operating and maintenance procedures on equipment, chemical control limits, material safety data sheets, lay-up and start-up procedures.
      c. All steps in the following cleaning and treatment procedures must be accomplished in immediate succession with no delay. Provide overtime manpower to accomplish same.
      d. Leave all valve trains in place and open for cleaning and treatment procedures and hydrostatic testing.
      e. Install drain outlets at deadends, low points and heat exchangers.
      f. Insert temporary wire screens of 140 microns or 9/64 inch perforations at chiller inlets. Use a 50 micron bag in the sidestream bag filter.
   5. Preliminary cleaning procedures:
      a. Remove all extraneous loose debris, construction material, trash and dirt from piping, filters and all equipment. Remove as much dry material as possible, for this material prevents protective coating transfer to hard to reach portions of the system.
      b. Flush water fill line separately to drain. If a new water line has been installed, be sure that rust and debris from it is not washed into the system.
      c. Fill the system piping and equipment with water and recirculate for one with the temporary bypasses at open positions.
      d. Turn on direct make-up and begin blowing down deadends, low points and y-strainers until water runs “city-water clean” as fast as make-up will allow.
      e. Remove all screens and strainers, clean and replace. Flush all temporary bypasses.
      f. Add alkaline, non-foaming, non-chlorinated detergent disinfectant plus non-foaming wetting agent to remove cutting oil, excess pipe joint compound, fine solids and other materials at a dosage of 5 lbs per 100 gallons of system water.
      g. Recirculate for 4 to 8 hours.
      h. Turn on direct make-up and begin flushing all drain outlets, y-strainers, deadends and bypasses until water meets the following parameters: Iron levels within 1 ppm, conductivity within 10 mmhs, orthophosphate within 1 ppm and turbidity within 1 FTU.
      i. Isolate tower basins to carry out vacuuming and power spray washing of tower interior. Immediately begin the “pretreatment procedure”.
   6. Pretreatment procedure:

a. Fill the system piping and equipment with water while adding non-foaming, water-based lay-up inhibitors to protect the piping as per chemical manufacturer's recommended dosage.
b. Recirculate for 2 hours. All heat exchangers and condensers must be off-line and with no heat load.
c. Stop the pumps and secure the system for hydrostatic tests.
d. If the hydrostatic test fails, refill the system and begin pretreatment procedures again from step "g".
e. After successful completion of the hydrostatic test, disconnect all apparatus and secure the system for the resumption of the pretreatment procedure.
f. Begin flushing systems as fast as make-up will allow. Continue until water is "city water clean".
g. Remove all screens, strainers and temporary bypasses. Clean and replace screens and strainers immediately and begin the "passivation procedure".

7. Passivation Procedure
   a. Fill the system piping and equipment with water while adding TWICE the regular amount of the maintenance corrosion inhibitor into the water.
   b. Recirculate for 24-72 hours.
   c. Change the filter bag to a 10 micron high efficiency bag.
   d. Keep pressure differential across the bag filter less than 15 psig by washing or replacing the filter bag.
8. Initial chilled water and hot water system treatment:
   a. Install corrosion coupons and 5 micron, high-efficiency filter bag in the sidestream filter.
   b. Test water for corrosion inhibitor level. Add corrosion inhibitor if necessary to restore the regular control range.
   c. Add biocide per water treatment contractor's recommended dosage.
   d. Record make-up water meter reading.

E. Steam System Treatment:
1. Manufacturers:
   a. AmSolv-Amrep, Inc; _____: www.amsolv.com.
   b. GE Water & Process Technologies; _____: www.gewater.com.
   c. Nalco, an Ecolab Company; _____: www.nalco.com.
   d. _____.
   e. Substitutions: See Section 016000 - Product Requirements.
2. Preliminary work required includes, but is not limited to:
   a. All steps in the following treatment procedures must be accomplished in immediate succession with no delay. Provide overtime manpower to accomplish same.
   b. Install shut off ball valves at the horizontal headers for a temporary connection with hoses, recirculating pumps and tanks.
   c. Install vent and drain outlets at the temporary piping.
   d. Clean the piping with aqueous cleaning solutions first, followed with steam blowout.
3. Cleaning procedure:
   a. Remove all lose mill scale with circulation of plain city water at 3 ft per second or higher (300 gpm in the riser) for 15 minutes.
   b. Add a liquid alkaline inhibited chelate cleaner into the piping to create a 5% cleaning solution to remove old mill scale and rust.
   c. Cleaner shall contain erythorbate as a corrosion inhibitor, sodium gluconate and EDTA as chelates, non-foaming wetting agent and low molecular weight polymeric dispersant.
   d. Circulate cleaner for 4 to 8 hours. Test for residual chelate and corrosion inhibitor levels during circulation. Add additional cleaner if necessary to maintain he strength of the cleaner AT 5% and 200 ppm of erythorbate.
   e. Drain and flush the loop with city water until it meets the following parameters: Iron levels within 1 ppm, conductivity within 10 mmhs, orthophosphate within 1 ppm and

turbidity within 1 FTU.

4. Passivation procedure:
   a. Fill the temporary piping with water while adding alkaline silicate based passivator at an amount of half a gallon to 100 gallons.
   b. Recirculate the piping for 24 to 48 hours.
   c. Drain piping and begin cleaning new pipes with steam.

PART 3 EXECUTION

3.01 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. Place terminal control valves in open position during cleaning.

C. Verify that electric power is available and of the correct characteristics.

3.02 CLEANING SEQUENCE

A. Concentration:
   1. As recommended by manufacturer.

B. Hot Water Heating Systems:
   1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.
   2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.
   3. Circulate for 6 hours at design temperatures, then drain.
   4. Refill with clean water and repeat until system cleaner is removed.

C. Steam Systems:
   1. Apply heat, slowly raising boiler temperature to 160 degrees F and maintain for 12 hours minimum.
   2. Cool, then drain as quickly as possible.
   3. Refill with clean water, drain, refill and check for sludge.
   4. Repeat until system is free of sludge.
   5. Apply heat to produce steam for piping system and maintain for 8 hours minimum. Bypass traps and waste condensate.

D. Use neutralizer agents on recommendation of system cleaner supplier and approval of Architect.

E. Flush open systems and glycol filled closed systems with clean water for one hour minimum. Drain completely and refill.

F. Remove, clean, and replace strainer screens.

G. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.04 STEAM SYSTEM TREATMENT

A. Provide bypass feeder on feed water line to each boiler.

B. Provide solution pumps to feed sequestering agent and base from solution tank into boiler. Provide minimum of one pump per boiler if treatment materials can be mixed. Provide agitator as required.

C. Provide solution pump to feed oxygen scavenger from solution tank into deaerator storage section. Provide pumps required to treat feed water. Provide agitator as required.

D. Provide solution pump to feed carbon dioxide neutralizer or filming amine from solution tank into steam header. Provide minimum of one pump per boiler. Provide agitator as required.

E. Activate solution pumps when feed water pumps are running.

F. Provide conductivity controller to sample boiler water and operate solenoid blowdown valve. Provide timer activated sampling with solenoid valve, balancing valve, and conductivity probe. Pipe to blowdown tank.

G. Provide 3/4 inch water coupon rack on each feed water pump with space for 4 test specimens.

H. Provide liquid level switch in each solution tank to deactivate solution pump and agitator and sound local alarm bell.

END OF SECTION 232500

SECTION 233100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Casings and plenums.

C. Duct cleaning.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 230593 - Testing, Adjusting, and Balancing for HVAC.

C. Section 230713 - Duct Insulation: External insulation and duct liner.

D. Section 233300 - Air Duct Accessories.

E. Section 233600 - Air Terminal Units.

F. Section 233700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

C. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2023.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.

E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2023.

H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

I. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).

L. AWS D1.2/D1.2M - Structural Welding Code - Aluminum 2014, with Errata (2020).

M. AWS D9.1/D9.1M - Sheet Metal Welding Code 2018.

N. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2018, with Editorial Revision (2020).

O. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry 2018, with Editorial Revision (2020).

P. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2017, with Editorial Revision (2020).

Q. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2023.

R. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2024.

S. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2020.

T. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual 2012.

U. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Sheetmetal shop standards shall be compiled directly from the “SMACNA DUCT CONSTRUCTION STANDARDS- Metal and Flexible” SMACNA (DCS) manual. Modifications for a specific project, if any, shall be indicated directly on the SMACNA templates. Modified shop standards not taken directly from the SMACNA templates will not be accepted. Any deviations from SMACNA shall be noted.

C. Product Data: Provide data for duct materials, duct liner, and duct connections.

D. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for low pressure class and higher systems.

E. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).

F. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

G. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from contractors for the items involved:
   1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
   2. Suspended ceiling components.
   3. Structural members to which duct will be attached.
   4. Size and location of initial access modules for acoustical tile.
   5. Penetrations of smoke barriers and fire-rated construction.
   6. Items penetrating finished ceiling including the following:
      a. Lighting fixtures.
      b. Air outlets and inlets.
      c. Speakers.
      d. Sprinklers.
      e. Access panels.
      f. Perimeter moldings.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 5 years of documented experience.

C. Welding qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M for hangers and supports.
   2. AWS D1.2/D1.2M for aluminum supports.
   3. AWS D9.1/D9.1M for duct joint and seam welding.

D. NFPA Compliance:

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

B. Ducts: Galvanized steel, unless otherwise indicated.

C. Low Pressure Supply and Return: 2 inch w.g. pressure class, galvanized steel, seal class "C", leakage class 16 (rectangular) or Class 8 (round).

D. Medium and High Pressure Supply and Return: 6 inch w.g. pressure class, seal class " A", leakage class 4 (rectangular metal or Class 2 (round), galvanized steel. All supply ductwork from discharge of fans, air handling units or AC units to inlets of terminal boxes on floor, all return ductwork from each open inlet to suction of return fan, air handling unit or AC unit, all outdoor ductwork and all ductwork running through unconditioned spaces.

E. General Exhaust: 3 inch w.g. pressure class, galvanized steel, seal class "B" leakage class 8 (rectangular metal) or Class 4 (round).

F. Formed-on Transverse Joints (Flanges): Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible,"Traverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
   1. Use the following SMACNA Transverse (Girth) Joints
      a. Duct construction as follows for 2” w.g. class:
         1) Up to 12” wide use T-6 or T-7
         2) 13” to 28” wide use T-11 or T12
         3) 29” wide and up use TDC or TDF
      b. Duct construction as follows for 3” w.g. class:
         1) Up to 12” wide use T-6 or T-7
         2) 13” to 24” wide use T-11 or T12
         3) 25” wide and up use TDC or TDF
      c. Duct construction as follows for 6” w.g. class:
         1) Up to 12” wide use T-6 or T-7
         2) 13” to 18” wide use T-11 or T12
         3) 19” wide and up use TDC or TDF

G. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

H. Outside Air Intake: 4 inch w.g. pressure class, aluminum or stainless steel, watertight, within 10 feet of louvers, glavanized steel after..

I. Transfer Air and Sound Boots: 2 inch w.g. pressure class, ____.

J. All ductwork exposed to weather, except as noted shall be as follows: Stainless Steel and watertight.

K. Ductwork at duct humidifiers shall be as follows:
   1. Stainless steel.
   2. Watertight.
   3. Minimum 2 ft. upstream.
   4. Minimum 10 ft downstream.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.

B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

C. Stainless Steel for Ducts: ASTM A666, Type 316.

D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
   3. Manufacturers:
      a. Carlisle HVAC Products; Hardcast Versa-Grip 181 Water Based Fiber Reinforced Duct Sealant: www.carlislehvac.com.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. The following fitting connections and duct construction gauges are NOT acceptable
   1. Drive slip [T-1, T-2] fitting connections
   2. 26 gauge ductwork.

C. Fittings and/or joints of two different guages, connected joint rating shall meet more stringent conditions.

D. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.

E. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

F. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline.
   1. Where not possible and where rectangular elbows must be used, provide turning vanes as indicted in Section 233300 - Air Duct Accessories.
   2. Do not use "butt flange" straight taps or bull head tees.
   3. Saddle taps are NOT permitted.
   4. Divided flow branches can be conical Tees, Y-branch or reducing Y-branch Tees.

G. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

H. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

J. Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections, including pittings, seam marks, stains, discolorations, and other imperfections. Provide finishes which will allow painting. Provide flat type seams and joints for all exposed duct construction

K. Watertight construction where noted with edges bent 1/2 inch for watertight seal. Longitudinal seam sealant shall be similar to 3M Brand No. 800; Alcoa, aluminastic Type C, or solder. Stiffeners shall be plug or spot welded. Transverse joints shall be bolted companion angles with 1/4 inch cadmium plated bolts with 6 inch minimum on centers and gasket.

L. Air tight construction where noted with longitudinal seams soldered. Stiffeners shall be plug or spot welded. Transverse joints shall be bolted companion angle with 1/4 inch cadmium plated bolts with 6 inch minimum on centers and gasket. Exposed, uninsulated ductwork shall be flush flat seam. Provide airtight concrete, masonry and other construction materials for plenums and shafts only where noted

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Double Wall Insulated Flat Oval Ducts: Machine made spiral lockseam duct with solid Galvanized steel outer wall, solid galvanized steel inner wall; fittings with solid inner wall.
   1. For Outdoor locations and where indicated: Stainless Steel steel outer wall
   2. Manufacture in accordance with SMACNA (DCS).
   3. Fittings: Manufacture with solid inner wall.
   4. Insulation:
      a. Thickness: 2 inch fiberglass.
      b. Insulation K Value: 0.23 BTU x in./hr x sq.ft.x deg. F at 75 deg. F____.
      c. Insulation Density: 6 lb per cubic feet.
   5. Manufacturers:
      a. Lindab Inc.
      b. McGill Airflow LLC.
      c. SEMCO Incorporated.

B. Double Wall Insulated Round Ducts: Machine made round spiral lockseam duct with solid galvanized steel outer wall, solid galvanized steel inner wall; fitting with solid inner wall.
   1. For Outdoor locations and where indicated: Stainless Steel steel outer wall
   2. Manufacture in accordance with SMACNA (DCS).
   3. Insulation:
      a. Thickness: ___ inch.
      b. Material: Fiberglass.
      c. Insulation K Value: 0.23 BTU x in./hr x sq.ft.x deg. F at 75 deg. F____.
      d. Insulation Density: 6 lb per cubic feet.
   4. Manufacturers:
      a. Lindab Inc.
      b. McGill Airflow LLC.
      c. SEMCO Incorporated.

C. Double Wall Insulated Rectangular Ducts: Rectangular shop fabricated duct with galvanized steel outer wall, galvanized steel inner wall; fitting with solid inner wall.
   1. For Outdoor locations and where indicated: Stainless Steel steel outer wall
   2. Manufacture in accordance with SMACNA (DCS).
   3. Insulation:
      a. Thickness: 2 inch.
      b. Material: Fiberglass.
      c. Insulation K Value: 0.23 BTU x in./hr x sq.ft.x deg. F at 75 deg. F_____.
      d. Insulation Density: 6 lb per cubic feet.

D. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).
   1. Manufacturers:
      a. Carlisle HVAC Products; Nexus Flange Connectors with Sealant Pocket: www.carlislehvac.com.
      b. Ductmate Industries, Inc, a DMI Company; _____: www.ductmate.com.
      c. Elgen Manufacturing Company, Inc; _____: www.elgenmfg.com.
      d. Substitutions: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Duct sealing:
   1. Ductwork and all plenums in all pressure class ratings shall be constructed to Seal Class A.

2. All connections shall be sealed including, but not limited to spin-ins, taps, other branch connections, access doors, access panels and duct connections to equipment.
3. Openings for rotating shafts shall be sealed with bushings or other devices that seal off air leakage.
4. Pressure sensitive tape shall not be used as the primary sealant.unless it has been certified to comply with UL-181A or UL-181B by an independent testing laboratory and the tape is used in accordance with its listing.
5. Sealing that would void product listings is not required.
6. Spiral lock seams need not be sealed.

C. Hangers, Horizontal ducts:
1. To 2 sq ft in area: Provide galvanized steel strap hangers, minimum 1 inch x 1/8 inch, maximum 8 ft - 0 inch spacing.
2. 2 to 4 sq ft in area: Galvanized steel strap hangers, minimum 1 inch x 1/8 inch, maximum 8 ft 0 inch spacing.
   a. Strap hangers shall be bent 2 inch under the bottom corner of rectangular ducts. One screw shall secure 2 inch portion of hanger to bottom of duct. Straps shall be secured to side of duct with a minimum of two screws and more, as necessary, to provide a maximum screw spacing of 12 inch. Side-of-duct screws shall be located not more than 2 inch from top and bottom of duct.
3. 4 to 10 sq ft in area: Provide galvanized steel trapeze angles from steel threaded rods with a maximum 6 ft - 0 inch spacing.
4. Over 10 sq ft in area: Provide galvanized steel trapeze angles from steel threaded rods with a maximum 4 ft - 0 inch spacing.
5. Provide stronger support to match larger and heavier ducts; provide cross-bracing, angle iron hangers, as required for rigid and adequate supports.
6. In mechanical rooms: Provide black steel painted or galvanized, vertical angles or rods and horizontal angles across ductwork.

D. Hangers, Vertical ducts:
1. At each floor, provide minimum 2 supports per duct fastened to duct and spanning shaft opening. Fasten supports to floor or structural construction. Maximum screw spacing shall be 12 inch on center and maximum shall be four screw per riser.
2. Angles and channels: Provide painted black steel or galvanized. Where angles are specified, channels of equivalent strength, material and protective coating will be permitted. Where more than one duct is supported by a common set of angles, support size shall be determined by sum of width dimensions.
3. Supports: Provide as follows, except increase supports as required for load and span where span of angles exceed 6 ft or floor-to-floor height exceeds 14 ft.
   a. Duct width to 30 inch: Provide angle size: 1-1/4 inch x 1-1/4 inch x 1/8 inch.
   b. Duct width, 31 inch to 54 inch: Angle size shall be 2 inch x 2 inch x 3/16 inch.
   c. Duct width, 55 inch to 90 inch: Angle size shall be 2 inch x 2 inch x 1/4 inch.

E. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

F. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

G. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

H. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

I. Use double nuts and lock washers on threaded rod supports.

J. Connect terminal units to ducts directly with hard ducted connections

K. Connect grilles, registers and diffusers to ducts directly with hard ducted connections

L. At exterior wall louvers, seal duct to louver frame and install blank-out panels with insulation.

M. Leakage Tests:

1. Comply with SMACNA (LEAK) – Second Edition." in accordance with the following table:

System Type	Duct Construction Classification	Test Pressure	Leakage Class	Allowable leakage (cfm/100 sq ft of duct area)
Supply Air and Return Air Systems	10 in.	10 in.	4	17.9
	6 in	6 in	4	12.8
	4 in	4 in.	4	9.8
	3 in.	3 in.	4	8.2
	2 in.	2 in.	16	25.1
	2 in. (round)	2 in.	8	12.6
General Exhaust	10 in.	10 in.	6	26.8
	6 in.	6 in.	6	19.2
	4 in	4 in.	6	14.8
	3 in.	3 in.	8	16.3
	3 in. (round)	3 in. (round)	4	8.2

2. All testing shall be done in the presence of the engineer or owner’s representative. The contractor is responsible for providing all collars, caps, electric power, etc. necessary to perform the tests. The contractor is also responsible for scheduling the test no less than three (3) business days prior to its intended occurrence. Low pressure ductwork (2” class) shall be tested on an as needed basis at the engineer’s direction. Leakage test procedure shall follow the outlines and classifications in the SMACNA HVAC duct leakage test manual. If specimen fails to meet allotted leakage level, the contractor shall modify to bring it into compliance and shall retest it until acceptable leakage is demonstrated. Tests and necessary repair shall be completed prior to concealment of ducts.
3. Test the following systems:
   a. All ductwork greater than 3 inch class as defined within and all ductwork located outdoors shall be tested.
   b. Test representative sections totaling no less than 25 percent of the total installed duct area for each pressure class to be tested.
4. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
5. Test for leaks before insulation application.
6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.

3.02 CLEANING

A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

B. Clean duct systems with high power vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

END OF SECTION 233100

SECTION 233300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.
B. Combination fire and smoke dampers.
C. Duct access doors.
D. Duct test holes.
E. Fire dampers.
F. Flexible duct connectors.
G. Smoke dampers.
H. Volume control dampers.
I. Low leakage (Class 1A) control dampers.
J. Remote damper operators
K. Miscellaneous products:
    1. Damper operators.
    2. Internal strut end plugs.
    3. Duct opening closure film.
L. Operational testing of fie dampers, smoke dampers and combination fire and smoke dampers.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 230547-Vibration Controls for HVAC.
C. Section 230548 - Vibration and Seismic Controls for HVAC.
D. Section 233100 - HVAC Ducts and Casings.
E. Section 233600 - Air Terminal Units: Pressure regulating damper assemblies.
F. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2024.
D. NFPA 92 - Standard for Smoke Control Systems 2021, with Amendment.
E. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 2024.
F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2020.
G. UL 33 - Safety Heat Responsive Links for Fire-Protection Service Current Edition, Including All Revisions.
H. UL 555 - Standard for Fire Dampers Current Edition, Including All Revisions.
I. UL 555S - Standard for Smoke Dampers Current Edition, Including All Revisions.
J. Comply with NFPA 80 and NFPA 105 for installation and operational testing of fire dampers, smoke dampers and combination fire and smoke dampers.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers and duct access doors. Include electrical characteristics and connection requirements.

C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers and duct access doors.

D. Manufacturer's Installation Instructions: Provide instructions for fire dampers and combination fire and smoke dampers.

E. Project Record Drawings: Record actual locations of access doors and test holes.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Fusible Links: One of each type and size.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Duro Dyne, Inc
   2. Metalaire, Inc.
   3. SEMCO Incorporated
   4. Ductmate Industries, Inc.

B. Turning Vanes for Metal Ducts: Double wall or single wall curved blades of galvanized sheet steel or as per duct material; support with bars perpendicular to blades set into vane runner suitable for duct mounting.
   1. Single Vane: Radius of 4.5 inches and spacing of 3.25 inches or radius of 2 inches and spacing of 1.5 inches. Maximum unsupported length of single vane turning vanes shall not exceed 36 inches.
   2. Double Vane: Radius of 4.5 inches and spacing of 3.25 inches. Maximum unsupported length of double vane shall not exceed 72 inches.
   3. Short radius vanes are not acceptable.

2.02 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers:
   1. Ruskin Company, a brand of Johnson Controls; ____ www.ruskin.com. Model FSD-60, FSD-60-3, 1-1/2 or 3 hour rated as applicable.
   2. Pottorff: a division of PCI Industries, Inc.; ____: www.pottroff.com. Model FSD-151, FSD-351, 1-1/2 or 3 hour rated as applicable.
   3. Greenheck; ____ : www.greenheck.com. Model FSD-311, FSD-331, 1-1/2 or 3 hour rated as applicable.

B. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.

C. Provide factory sleeve and collar for each damper.

D. Multiple Blade Dampers: Frame: same as duct material type with galvanized airfoil blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.

E. Operators: UL listed and labelled spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on exterior of

duct and link to damper operating shaft.

F. Resettable Fire Stat:
   1. UL classified dual temperature device allows the damper to be re-opened after initial closure from high heat.
   2. Electrically and mechanically locks damper in closed position when duct temperatures exceed 165 degrees F (74 degrees C) or 212 degrees F (100 degrees C).
   3. Allow damper to remain operable through a high limit temperature sensor for smoke management purposes while temperature is below 250 degrees F (121 degrees C) or 350 degrees F (177 degrees C).
   4. UL classified dual temperature device allows the damper to be re-opened after initial closure from high heat.
   5. Electrically and mechanically locks damper in closed position when duct temperatures exceed 165 degrees F (74 degrees C) or 212 degrees F (100 degrees C).

G. The HVAC contractor shall provide all devices, relays, end switches, e/p switches, control components, air piping, power wiring, control wiring and interlock wiring as required to accomplish the sequence of operation for these dampers.

2.03 DUCT ACCESS DOORS

A. Manufacturers:
   1. Ductmate Industries, Inc.
   2. Greenheck
   3. McGill Airflow LLC
   4. Pottorff: a division of PCI Industries, Inc.
   5. Ventfabrics, Inc.

B. Fabricate in accordance with SMACNA (DCS) and as indicated. Access doors shall be constructed oof the same material and to the design pressure class of the ductwork.

C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
   1. Less Than 12 inches Square: Secure with sash locks.
   2. Up to 18 inches Square: Provide two hinges and two sash locks.
   3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.
   4. Larger Sizes: Provide an additional hinge.

D. Same material as duct construction.

E. Locate on sides of duct. Bottom edge not less than 2 in. above bottom of duct.

F. Maximum 24 in. X 24 in. Minimum 24 in. one side, other side 2 in. less than duct height.

G. Access doors with sheet metal screw fasteners are not acceptable.

2.04 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.
   1. Manufacturers:
      a. Carlisle HVAC Products; Dynair Test Port with Red Cap with O-Ring Seal: www.carlislehvac.com.

2.05 FIRE DAMPERS

A. Manufacturers:
   1. Ruskin Company; _____: www.ruskin.com.
   2. Pottorff: a division of PCI Industries, Inc.
   3. Greenheck

B. Provide Dynamic type dampers. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Horizontal Dampers: Frame: same as duct material, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

D. Curtain Type Dampers: Frame: same as duct material with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.

E. Multiple Blade Dampers: Frame: same as duct material with galvanized steel blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

F. Fusible Links: UL 33, separate at 160 degrees F (71 degrees C) with adjustable link straps for combination fire/balancing dampers. Closing rating in ducts up to 4 inch wg static pressure class and minimum 3,000 FPM velocity

G. Provide a 10 guage welded vertical stiffener at each corner to prevent damper misalignment.

2.06 FLEXIBLE DUCT CONNECTORS

A. Manufacturers:
1. Ductmate Industries, Inc, a DMI Company; _____: www.ductmate.com.
2. Duro Dyne Inc.
3. Ventfabrics, Inc.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Maximum Installed Length: 3 inch.

D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
1. Minimum Weight: 26 oz./sq.yd. .
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 degrees F .

E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq.yd.{ch#3} .
2. Tensile Strength: 530 lbf/inch530 lbf/inch (93 N/mm) in the warp and [CHOICE TEXT] in the filling.

F. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch (6-mm) movement at start and stop.

2.07 SMOKE DAMPERS

A. Manufacturers:
1. Ruskin Company; _____: www.ruskin.com.
2. Greenheck

B. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.

C. Dampers: UL Class 1 airfoil blade type smoke damper, normally open automatically operated by electric actuator, with frame the same as duct material.

D. Operators: UL listed and labelled spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on exterior of duct and link to damper operating shaft.

E. Provide motor mount bracket strengthener for dampers over 10" in height.

F. Provide a 10 guage welded vertical stiffener at each corner to prevent damper misalignment.

G. Actuators mounted out of airstream.

H. The HVAC contractor shall provide all devices, relays, end switches, e/p switches, control components, air piping, power wiring, control wiring and interlock wiring as required to accomplish the sequence of operation for these dampers.

2.08 MANUAL VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Single Blade Dampers:
1. Fabricate for duct sizes up to 24 inches maximum.
2. Blade: Hemmed, 24 gauge, 0.0239 inch, minimum, or not less than 2 gauges thicker than duct gauge, whichever is greater thickness.

C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 48 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
1. Blade: 18 gauge, 0.0478 inch, minimum, with stiffeners.

D. Rods and End Bearings:
1. Provide continuous rods and end bearings on all damper blades installed in ducts of Pressure Class 2 or higher and in all ducts greater than 12 inches in length.
2. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

E. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
3. Where rod lengths exceed 30 inches provide regulator at both ends.

2.09 LOW LEAKAGE (CLASS 1A) CONTROL DAMPERS

A. Manufacturers:
1. Ruskin Company; CD50 (Aluminum), CD60 (Galvanized Steel), CD60SS (Stainless Steel).
2. TAMCO, T.A. Morrison Co., Inc.; Series 1000, Series 1500

B. Ratings:
1. Leakage: Damper shall have a maximum leakage of 3 cfm/sq. ft. @1 inch wg. and shall be AMCA licensed as Class 1A.
2. Differential Pressure: Damper shall have a maximum differential pressure rating of 13 in. w.g. (3.2 kPa) for a 12 inches (305 mm) blade.
3. Velocity: Damper shall have a maximum velocity rating of 6,000 fpm (1,829 m/min).
4. Temperature: Damper shall be rated for -72 to 275 degrees F (-58 to 135 degrees C).

C. Frame:
1. For Aluminum : 5" x 1" x minimum 0.125" (127 x 25 x minimum 3.2 mm) 6063-T5 extruded aluminum hat channel with reinforced corners. Flanges both sides.
2. For Galvanized Steel: 5" x 1" x minimum 16 gauge (127 x 25 x minimum 1.6 mm), hot dipped hat shaped channel with reinforced corners. Flanges both sides.
3. For Stainless Steel: 5" x 1" x minimum 16 gauge (127 x 25 x minimum 1.6 mm), roll-formed hat shaped channel with reinforced corners. Flanges both sides. Type 304.

D. Blade:
   1. Style: Airfoil shaped.
   2. Width: Nominal 6 inches (152 mm)
   3. Materials:
      a. For Aluminum: Extruded aluminum, 6063-T5.
      b. For Galvanized: Minimum 14 gauge (2.0 mm) galvanized steel.
      c. For Stainless Steel: Minimum 18 gauge (1.3 mm) stainless steel. Type 304.

E. Bearings:
   1. For Aluminum: Molded synthetic sleeve, turning in hole in frame.
   2. For Galvanized: Self-lubricating stainless steel sleeve, turning in extruded hole in frame.
   3. For Stainless Steel: Self-lubricating stainless steel sleeve, turning in extruded hole in frame.

F. Seals:
   1. Aluminum Blades: Extruded closed cell neoprene type from -22 to 122 degrees F (-30 to 50 degrees C). Mechanically attached to blade edge.
   2. Galvanized Blades: Extruded closed cell neoprene type from -76 to 350 degrees F (-60 to 177 degrees C). Mechanically attached to blade edge.
   3. Stainless Steel Blades: Extruded silicone rubber type for ultra-low leakage from -76 to 350 degrees F (-60 to 177 degrees C). Mechanically attached to blade edge.
   4. Jambs: Flexible stainless steel metal compression type.

G. Axles:
   1. For Aluminum: Minimum ½ inch (13 mm) diameter plated steel, hex-shaped, mechanically attached to blade.
   2. For Galvanized: Minimum ½ inch (13 mm) diameter plated steel, hex-shaped, mechanically attached to blade.
   3. For Stainless Steel: Minimum 7/16 inches (11 mm) diameter 300 series stainless steel, hex-shaped, mechanically attached to blade.

H. Linkage: Concealed in frame. Capable of withstanding load equal to twice maximum operating force of damper operator, without deflection

I. Operation: Unless otherwise indicated or required, provide opposed blade for modulating applications and provide parallel blade for two-position or open/closed applications.

J. Provide blades oriented vertically with thrust washers.

K. Actuator:
   1. Refer to Section 230900 - HVAC Instrumentation and Controls to be furnished and installed by Controls vendor.
   2. Submit actuator torque requirements for each damper and each damper section.
   3. Damper manufacturer shall provide actuator mounting tabs on each damper section. Coordinate final location with controls vendoor. Tabs shall be welded to frame and provide sufficient support for actuator operation. Bolt adjacent tabs together for additional rigidity.

2.10 REMOTE DAMPER MANUAL OPERATORS - GEAR OPERATED

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ventfabrics, Inc. Ventlok
   2. Young Regulator Company.

B. Description: Miter gear drive designed for remote manual damper adjustment. 1 ¼” diameter die-cast gears with bronze bushings and ¼” thick zinc plated steel angle mounting assembly. Square Rod, ½” or 3/8”, operator. Ventlok 680 or Young Regulator 927C, 927 B/C-1/4.

C. Provide universal joints and couplings to accommodate offsets in operator rods. Maximum offset of 30 degrees: Brass. Ventlok 695, 696, 601, 602-A, 602-B or Young Regulator 617, 661-B.

D. Ceiling- and Wall-Box Mountings: Stainless steel. Recessed, depth to suit ceiling or wall assembly for flush appearance. Ventlok 666, 677 or Young Regulator 301, 315.

E. Ceiling- and Wall-Box Cover-Plate Material: Stainless steel. Flush mounted with ceiling or wall assembly in which installed. Ventlok 666, 677 or Young Regulator 301, 315.

F. Provide for all duct-mounted manual balancing dampers located above drywall/plaster ceiling assemblies.

2.11 MISCELLANEOUS PRODUCTS

A. Internal Strut End Plugs: Combination end-mounting and sealing plugs for metal conduit used as internal reinforcement struts for metal ducts; plug crimped inside conduit with outside gasketed washer seal.

B. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
   1. Thickness: 2 mils.
   2. High tack water based adhesive.
   3. UV stable light blue color.
   4. Elongation Before Break: 325 percent, minimum.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 233100 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. For fire dampers, smoke dampers and combination fire smoke damper access provide minimum 12 inch x 12 inch access. Removable ducts shall utilize flanges or "Sure-Clamp Access" as manufactured by Langdon Inc. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide the following minimum access panels:
   1. One-Hand or Inspection Access: 8 by 5 inches.
   2. Two-Hand Access: 12 by 6 inches.
   3. Head and Hand Access: 18 by 10 inches
   4. Head and Shoulders Access: 21 by 14 inches
   5. Body Access: 25 by 14 inches.
   6. Body plus Ladder Access: 25 by 17 inches.

D. Review access door locations prior to fabrication.

E. Provide duct test holes where indicated and required for testing and balancing purposes.

F. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

G. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

H. Demonstrate re-setting of fire dampers to Owner's representative.

I. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

J. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
   1. Refer to Section 230548.

K. For fans developing static pressures of 5.0 inches and over, cover flexible connections with leaded vinyl sheet, held in place with metal straps.

L. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off. For interally lined ductwork provide 2 internal saddles to protect lining. Install levers to be accessible through the insulation.

M. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly. For interally lined ductwork provide 2 internal saddles to protect lining. Install levers to be accessible through the insulation.

N. Fire, smoke and fire/smoke damper testing
   1. Provide operational testing, acceptance testing and record documentation for all fire dampers, smoke dampers and combination fire and smoke dampers in accordance with NFPA 80 and NFPA 105:
      a. A qualified person shall conduct all operational and acceptance testing.
      b. Verify that dampers operate properly and are without obstruction.
      c. Verify full and unobstructed access to dampers and listed components.
      d. Verify operation of all local and remote indicating devices.
      e. Verify release elements and reset switches including prevention of reopening.
      f. Dynamic rated elements shall be tested after air balancing and during normal air flow conditions.
      g. Provide documentation of inspections and tests including location and type of damper, date(s), name of inspector and deficiencies discovered.
      h. Provide copy of documentation to Architect and AHJ as required.

END OF SECTION 233300

SECTION 233416
CENTRIFUGAL HVAC FANS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backward inclined centrifugal fans.

B. Airfoil wheel centrifugal fans.

C. Bearings and drives.

D. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 230513 - Common Motor Requirements for HVAC Equipment.

B. Section 230515 - Variable Frequency Motor Controllers.

C. Section 230547-Vibration Controls for HVAC.

D. Section 230713 - Duct Insulation.

E. Section 233100 - HVAC Ducts and Casings:

F. Section 233300 - Air Duct Accessories:

G. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).

B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings 2014 (Reaffirmed 2020).

C. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program 2015.

D. AMCA 99 - Standards Handbook 2016.

E. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.

F. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.

G. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data 2022.

H. NEMA MG 1 - Motors and Generators 2021.

I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2020.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on centrifugal fans and accessories including certified fan performance curves with specified operating point clearly plotted, power, speed, certified sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
   1. Submit the family of rpm curves indicating operating point relative to fan class.
   2. VFD application: Submit fan selection with system curve indication, operating point, family of all rpm curves in fan class and the "DO NOT SELECT TO THE LEFT OF THIS CURVE". The minimum rpm shall be indicated.
   3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
   4. Material thickness and finishes, including color charts.
   5. Dampers, including housings, linkages, and operators where provided.
   6. Fan speed controllers where provided.
   7. All selected sheave (fan and motor) calculations for belt driven fans. Include drive construction and rating.

8. Catalog cuts and dimension drawings.
9. Furnished specialties, and accessories for each fan.

C. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Wiring Diagrams: Power, signal, and control wiring.
   2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
   3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

D. Fan characteristic curves provided by manufacturer must be such that the fan operating point:
   1. Operates stably without surging at design conditions.
   2. Is non-overloading.
   3. Is to the right of peak efficiency.
   4. Is on the steep part of the fan curve such that an increase in static pressure over the specified duty results in not more than the same percent decrease in volume (CFM) and does not affect the stability of fan operation.
   5. Is no greater than 60 to 70 percent of the peak static pressure.
   6. Has the ability to provide an allowable increase in fan speed of 15 percent above the design point without surging or increasing the class of fan.

E. VFD application: Submit fan selection with system curve indication, operating point, family of all rpm curves in fan class and the "DO NOT SELECT TO THE LEFT OF THIS CURVE". The minimum rpm shall be indicated.

F. Manufacturer's Instructions: Include complete installation instructions.

G. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Fan Belts: One set for each individual fan.
   3. Sheaves: One set for each unit

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal. Test and rate all fans in accordance with the standards of AMCA. All fans shall bear the AMCA rating and seal.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. NEMA Compliance: Motors and electrical accessories shall comply with NEMA 1.

1.06 SHORT CIRCUIT CURRENT RATING:

A. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.

2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
3. Label equipment utilizing series ratings as required by NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect motors, shafts, and bearings from weather and construction dust. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.

B. Lift and support units with manufacturer's designated lifting or supporting points.

C. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

1.08 FIELD CONDITIONS

A. Permanent fans may not be used for ventilation during construction.

1.09 COORDINATION

A. Coordinate size and location of structural-steel support members

1.10 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210/ASHRAE 51, "Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating."

1.11 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Belts: [**One**] set(s) for each belt-driven unit.
2. Sheaves : [**One**] set(s) for each unit

PART 2 PRODUCTS

2.01 MANUFACTURERS BY FAN TYPE

A. Airfoil Centrifugal Fans:
1. Loren Cook Company; _____: www.lorencook.com.
2. Twin City Fan & Blower; BAESW: www.tcf.com.
3. Howden Fan Company
4. New York Blower Company
5. Greenheck

B. Backward-Inclined Centrifugal Fans:
1. Loren Cook Company; _____: www.lorencook.com.
2. Twin City Fan & Blower; TCBI: www.tcf.com.
3. Howden Fan Company
4. New York Blower Company
5. Greenheck

C. Plenum Fans:
1. Loren Cook Company; _____: www.lorencook.com.
2. Twin City Fan & Blower; EPF: www.tcf.com.
3. Howden Fan Company
4. New York Blower Company
5. Greenheck

D. Fan Arrays:
1. Nortek Air Solutions - FANWALL

2.02 PERFORMANCE REQUIREMENTS

A. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.

C. Fabrication: Comply with AMCA 99.

D. Performance Base: Sea level conditions.

E. Temperature Limit: Maximum 300 degrees F.

F. Static and Dynamic Balance Wheel: Eliminate vibration or noise transmission to occupied areas. Balancing shall be done at the factory.

G. Motor pulley shall be variable pitch diameter, for fans up to 25 hp and 1000 rpm, except fans with variable inlet vanes and VFD's use fixed pitch, and fixed pitch diameter, over 25 hp or 1000 rpm. Supply and install one fixed pitch pulley change, as required, per fan to balance systems. Companion sheaves shall maintain belts parallel. Belt guards shall be in compliance with OSHA regulations and with tachometer opening for fan speed measurements. Manufacturer shall provide replacement fixed pitched sheaves where needed to balance system.

2.03 WHEEL AND INLET

A. Backward Inclined: Steel construction with smooth curved inlet flange, heavy back plate, backwardly curved blades welded or riveted to flange and back plate; cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws.

B. Airfoil Wheel: Steel construction with smooth curved inlet flange, heavy back plate die formed hollow airfoil shaped blades continuously welded at tip flange, and back plate; cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws; and special coatings. A performance cut-off shall be furnished to prevent reicultaion of air in the fan housing.

2.04 HOUSING

A. Heavy gauge steel, spot welded for AMCA 99 Class I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut.

B. Factory finish before assembly to manufacturer's standard. For fans handling air downstream of humidifiers, provide two additional coats of paint. Prime coating on aluminum parts is not required.

C. Provide bolted construction with horizontal flanged split housing.

D. Fabricate plenum fans without volute housing, in lined steel cabinet..

E. Provide spark resistant construction fans in accordance with AMCA Standards, Type A, B or C as indicated.
   1. Type A: All where noted, parts in contact with air shall be non-ferrous.
   2. Type B: Shall be non-ferrous fan wheel and shaft rings.
   3. Type C: Shall be with non-ferrous inlet cone and rubbing plate.
   4. Motor shall be explosion proof, Class I, Group D, Division 2.
   5. Belt drive shall be non-sparking.

F. Split construction: Provide split construction for fans too large for available doorways or passageways. Split in half along center of shaft with angles, etc., to allow removal of section without disturbing inlet and discharge connection; arranged for bolting. Provide bolts with lockwashers and nuts. Construction shall be inspected by manufacturer after field assembly and certified that they have been properly assembled and ready for proper operation.

G. Unit shall bear an engraved aluminum nameplate and shall be shipped in ISTA certified transite tested packaging.

2.05 BEARINGS AND DRIVES

A. Bearings: Heavy duty pillow block type, selfgreasing roller bearings, or ABMA STD 11 life at 120,000 hours or ball bearings, with ABMA STD 9 L10 at 50,000 hours..

B. Shafts: Hot rolled steel, ground and polished, with keyway, protectively coated with lubricating oil, and shaft guard. Limit to 70percent of first critical speed at top speed range for fan.

C. Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves for motors 15 hp and under, selected so required rpm is obtained with sheaves set at mid-position. Fixed sheave for 20 hp and over and fans using VFD's, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.

D. Belt Guard: Fabricate to OSHA and SMACNA (DCS); 0.106 inch thick, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

2.06 MOTORS

A. Comply with requirements in Section 230513 - Common Motor Requirements for HVAC Equipment.

2.07 ACCESSORIES

A. Provide primed and painted structural steel base for mounting of fan housing, motor and drive assembly for mounting on vibration isolators. Refer to Section 230547.

B. Inlet/Outlet Screens: Stainless Steel welded grid.

C. Access Doors: Shaped to fit scroll, with quick opening latches and gaskets.

D. Scroll Drain: 3/4 inch steel pipe coupling welded to low point of fan scroll.

E. Companion Flanges: Rolled flanges for duct connections of same material as housing. Provide on inlets and discharge of fans.

F. Spark Resistant Construction: AMCA 99

G. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Coordinate size and location of structural-steel support members.

C. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.Section 033000 - Cast-in-Place Concrete

D. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section 077200 - Roof Accessories.

E. Install fans with resilient mountings and flexible electrical leads. Refer to Section 230548.

F. Install flexible connections between fan inlet and discharge ductwork; refer to Section 233300. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

G. Install fan restraining snubbers; refer to Section 230547. Adjust snubbers to prevent tension in flexible connectors when fan is operating.

H. Provide fixed sheaves required for final air balance.

I. Provide safety screen where inlet or outlet is exposed.

3.02 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:
   1. Balance all fan wheels and all other moving components statically and dynamically. Where a coating is specified and it affects the balance of the fan wheel, perform the balancing after the coating has been applied.

2. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
3. See Section 230593 - Testing, Adjusting, and Balancing for HVAC for testing, adjusting, and balancing procedures.
4. Disable automatic temperature-control operators, energize motor, and confirm proper motor rotation and unit operation, adjust fan to indicate RPM, and measure and record motor voltage and amperage.
5. For units with varibale frequency drives, lock out critical frequencies before initial start.
6. Operational Test: After electrical circuitry has been energzied, start units to confirm proper motor rotation and unit operation.
7. Replace fan and motor pulleys are required to achieve design airflow.
8. Shut unit down and reconnect automatic temperature controls operators.
9. Remove and replace malfunctioning units and retst as specified above.

END OF SECTION 233416

SECTION 233423
HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof exhausters.

B. Upblast roof exhausters.

C. Laboratory and fume exhaust.

1.02 RELATED REQUIREMENTS

A. Section 230513 - Common Motor Requirements for HVAC Equipment.

B. Section 230547-Vibration Controls for HVAC.

C. Section 233300 - Air Duct Accessories: Backdraft dampers.

D. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. AMCA 99 - Standards Handbook 2016.

B. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.

C. AMCA 211 - Certified Ratings Program Product Rating Manual for Fan Air Performance 2022, with Editorial Revision (2023).

D. AMCA 260 - Laboratory Methods of Testing Induced Flow Fans for Rating 2020.

E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.

F. AMCA 311 - Certified Ratings Program Product Rating Manual for Fan Sound Performance 2016.

G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

I. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 2024.

J. UL 705 - Power Ventilators Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, certified sound power levels at rated capacity, roof curbs, fan speed controllers, dimension drawings and electrical characteristics and connection requirements.

C. Fan characteristic curves provided by manufacturer must be such that that the fan operating point:
   1. Is non-overloading.
   2. Is to the right of peak efficiency.
   3. Is on the steep part of the fan curve such that an increase in static pressure over the specified duty results in not more than the same percent decrease in volume (CFM) and does not affect the stability of fan operation.
   4. Is no greater than 60 to 70 percent of the peak static pressure.
   5. Has the ability to provide an allowable increase in fan speed of 15 percent above the design point without surging or increasing the class of fan.

D. Manufacturer's Instructions: Indicate installation instructions.

E. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Fan Belts: One set for each individual fan.

G. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Wiring Diagrams: Power, signal, and control wiring.
   2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
   3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 SHORT CIRCUIT CURRENT RATING:

A. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
   2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   3. Label equipment utilizing series ratings as required by NFPA 70.

PART 2 PRODUCTS

2.01 POWER VENTILATORS - GENERAL

A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.

B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.

D. Fabrication: Comply with AMCA 99.

E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

G. Enclosed Safety Switches: Comply with NEMA 250.

H. VFD's shall use fixed pitch

I. Provide spark resistant construction fans in accordance with AMCA Standards, Type A, B or C as indicated.
   1. Type A: All where noted, parts in contact with air shall be non-ferrous.
   2. Type B shall be non-ferrous fan wheel and shaft rings.
   3. Type C shall be with non-ferrous inlet cone and rubbing plate.
   4. Motor shall be explosion proof, Class I, Group D, Division 2.
   5. Belt drive shall be non-sparking.

2.02 ROOF EXHAUSTERS

A. Manufacturers:
   1. Greenheck Fan Corporation; _____: www.greenheck.com.

B. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

C. Motors:
1. Totally enclosed fan cooled (TEFC).
2. Heavy duty ball bearing type.
3. Mount on vibration isolators or resilient cradle mounts, out of air stream.
4. Fully accessible for maintenance.

D. Housing:
1. Construct of heavy gauge aluminum including curb cap and motor compartment.
2. Rigid internal support structure.
3. One-piece fabricated or fully welded curb-cap base for leak proof construction.
4. Construct drive frame assembly of heavy gauge steel, mounted on vibration isolators.
5. Provide breather tube for fresh air motor cooling and wiring.

E. Shafts and Bearings:
1. Fan Shaft:
a. Ground and polished steel with anti-corrosive coating.
b. First critical speed at least 25 percent over maximum cataloged operating speed.
2. Bearings:
a. Permanently sealed or pillow block type.
b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
c. 100 percent factory tested.

F. Disconnect Switches:
1. Factory mounted and wired.
2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
a. Indoor Clean, Dry Locations: Type 1.
b. Outdoor Locations: Type 3R.
3. Finish for Painted Steel Enclosures: Provide manufacturer's standard, factory applied gray, or _____ unless otherwise indicated.
4. Positive electrical shutoff.
5. Wired from fan motor to junction box installed within motor compartment.

G. Roof Curb: 12 inch high insulated self-flashing of galvanized steel with continuously welded seams, built-in cant strips.

H. Damper: Aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

I. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

J. Options/Accessories:
1. Automatic Belt Tensioner: Automatic device that adjusts for correct belt tension for single drives.
2. Birdscreen:
a. Provide galvanized steel construction.
b. Protects fan discharge.
3. Dampers: Provide motorized type.
4. Drain Connection:
a. Aluminum construction.
b. Allows single-point drainage of grease, water, or other residues.
5. Finishes: Factory primed.
6. Hinge Kit:

a. Aluminum hinges.
b. Hinges and restraint cables mounted to base (sleeve).
c. Allows fan to tilt away for access to wheel and ductwork for inspection and cleaning.

7. External motor speed controllers for field mounting.

2.03 UPBLAST ROOF EXHAUSTERS

A. Manufacturers:
1. Greenheck Fan Corporation; _____: www.greenheck.com.

B. Direct Drive Fan:
1. Fan Wheel:
a. Type: Non-overloading, backward inclined centrifugal.
b. Material: Aluminum.
2. Statically and dynamically balanced.
3. Motors:
a. Totally enclosed fan cooled (TEFC).
b. Heavy duty ball bearing type.
c. Mount on vibration isolators or resilient cradle mounts, out of air stream.
d. Fully accessible for maintenance.
4. Housing:
a. Construct of heavy gauge aluminum including curb cap, windband, and motor compartment.
b. Rigid internal support structure.
c. One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
d. Construct drive frame assembly of heavy gauge steel, mounted on vibration isolators.
e. Provide breather tube for fresh air motor cooling and wiring.

C. Shafts and Bearings:
1. Fan Shaft:
a. Ground and polished steel with anti-corrosive coating.
b. First critical speed at least 25 percent over maximum cataloged operating speed.
2. Bearings:
a. Permanently sealed or pillow block type.
b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
c. 100 percent factory tested.

D. Drive Assembly:
1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
2. Belts: Static free and oil resistant.
3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
4. Motor pulley adjustable for final system balancing.
5. Readily accessible for maintenance.

E. Disconnect Switches:
1. Factory mounted and wired.
2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
a. Outdoor Locations: Type 3R.
3. Finish for Painted Steel Enclosures: Provide manufacturer's standard, factory applied gray, or _____ unless otherwise indicated.
4. Positive electrical shutoff.
5. Wired from fan motor to junction box installed within motor compartment.

F. Roof Curb: 12 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips, insulation and curb bottom, and factory installed nailer strip.

G. Options/Accessories:

1. Automatic Belt Tensioner: Automatic device that adjusts for correct belt tension for single drives.
2. Birdscreen:
   a. Provide galvanized steel construction.
   b. Protects fan discharge.
3. Roof Curb Extension: Vented curb extension where required for compliance with minimum clearances required by NFPA 96.
4. Hinge Kit:
   a. Aluminum hinges.
   b. Hinges and restraint cables mounted to base (sleeve).
   c. Allows fan to tilt away for access to wheel and ductwork for inspection and cleaning.

2.04 LABORATORY AND FUME EXHAUST

A. Manufacturers:
   1. Twin City Fan & Blower; TVIFE: www.tcf.com.
   2. Strobic Air Corporation; _____: www.strobicair.com.
   3. Greenheck.
   4. Substitutions: See Section 016000 - Product Requirements.

B. General Requirements:
   1. Provide fan types tested in accordance with AMCA 210, AMCA 260 (Induced Flow Fans) and AMCA 300 in an AMCA-accredited laboratory.
   2. Provide fan units rated in accordance with AMCA 211 and AMCA 311.

C. Fan Assemblies:
   1. Provide unit suitable for maintaining structural integrity and operation in 125 mph wind without external guy-wires or supplemental supports when mounted on manufacturer-supplied roof curbs.

D. Belt Drive Fan:
   1. Fan Wheel:
      a. Type: Non-overloading, backward inclined centrifugal.
      b. Material: Aluminum.
   2. Statically and dynamically balanced.
   3. Motors:
      a. Totally enclosed fan cooled (TEFC).
      b. Heavy duty ball bearing type.
      c. Mount on vibration isolators or resilient cradle mounts, out of air stream.
      d. Fully accessible for maintenance.
   4. Housing:
      a. Construct of heavy gauge aluminum including curb cap, windband, and motor compartment.
      b. Rigid internal support structure.
      c. One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
      d. Construct drive frame assembly of heavy gauge steel, mounted on vibration isolators.
      e. Provide breather tube for fresh air motor cooling and wiring.

E. Shafts and Bearings:
   1. Fan Shaft:
      a. Ground and polished steel with anti-corrosive coating.
      b. First critical speed at least 25 percent over maximum cataloged operating speed.
   2. Bearings:
      a. Permanently sealed or pillow block type.
      b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
      c. 100 percent factory tested.

F. Drive Assembly:
   1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
   2. Belts: Static free and oil resistant.
   3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
   4. Motor pulley adjustable for final system balancing.
   5. Readily accessible for maintenance.

G. Disconnect Switches:
   1. Factory mounted and wired.
   2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   3. Finish for Painted Steel Enclosures: Provide manufacturer's standard, factory applied gray, or _____ unless otherwise indicated.
   4. Positive electrical shutoff.
   5. Wired from fan motor to junction box installed within motor compartment.

H. High Plume Discharge Nozzle with Integral Windband:
   1. Provide combination discharge nozzle and windband to induce ambient airflow from outside fan housing and increase discharge velocities to velocities that comply with ANSI Z9.5, minimum 3,000 fpm.
   2. Provide a windband with a minimum of 120 inches discharge height above the roof surface.
   3. Provide a discharge nozzle that develops a maximum discharge air velocity of 9,500 fpm.
   4. Provide sound attenuated windband with integral closed-cell foam that does not increase overall height of fan system.
   5. Provide drain connection at lowest point of housing.

I. Roof Curb: 12 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips, insulation and curb bottom, and factory installed nailer strip.

J. Mounting Base: Provide mounting base with lifting lugs.

K. Mixing Plenum Box: Designed to secure fans for wind loads up to 125 mph, mixing plenum box features modular construction allowing for multiple configurations and retrofit installation.
   1. Match fan housing material of construction, to include integral duct flange to mate to fan inlet.
   2. Provide side intake mixing plenum box for attachment of building duct.
   3. Mount mixing box on heavy duty roof curb.
   4. Provide insulated mixing box with stainless steel liner.
   5. Provide flow straighteners.

L. Isolation Dampers:
   1. Parallel blade design, constructed of galvanized steel.
   2. Provide 24 volt-powered, modulating actuator, rated for NEMA 250, Type 2 (IP54) environment, to coordinate with fan operation.

M. Bypass Dampers:
   1. Provide modulating opposed bladebypass damper to maintain fan discharge velocity.
   2. Provided opposed blade design, constructed of galvanized steel.
   3. Provide 24 volt-powered, modulating actuator, rated for NEMA 250, Type 2 (IP54) environment, to coordinate with fan operation.

N. Piezometer Ring: Provide piezometer ring type differential pressure device with connections for field-installed flow measuring instrumentation.
   1. Pressure Transducer without Display: Provide piezometer ring and transducer to convert differential pressure readings to 4 - 20 mA DC signal proportional to flow.
   2. Pressure Transducer/Transmitter with Display:
      a. Provide piezometer ring and transducer with local digital display to convert differential pressure readings to 4 - 20 mA DC signal proportional to flow. Include two independently adjustable SPDT dry-contact outputs.

b. Provide the display in a NEMA 250, Type 4X enclosure.

O. Options/Accessories:
1. Dampers: Provide motorized type.
2. Drain Connection:
a. Aluminum construction.
b. Allows single-point drainage of grease, water, or other residues.
3. Finishes: Factory primed.
4. Tie-down Points: Four brackets located on windband secures fan in heavy wind applications.
5. External motor speed controllers for field mounting.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.

C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

D. Provide sheaves required for final air balance.

E. Install backdraft dampers on inlet to roof and wall exhausters.

F. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.

3.02 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

3.03 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:
1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Balance all fan wheels and all other moving components statically and dynamically. Where a coating is specified and it affects the balance of the fan wheel, perform the balancing after the coating has been applied.
9. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
10. Refer to Division 23 Section 230593 - Testing, Adjusting, and Balancing for HVAC for testing, adjusting, and balancing procedures.
11. Disable automatic temperature-control operators, energize motor and confirm proper motor rotation and unit operation, adjust fan to indicated rpm, and measure and record motor voltage and amperage.
12. For units with variable frequency drives lock out critical frequencies before initial start.

13. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
14. Replace fan and motor pulleys as required to achieve design airflow.
15. Shut unit down and reconnect automatic temperature-control operators.
16. Remove and replace malfunctioning units and retest as specified above.

B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 233423

SECTION 233600
AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single-duct terminal units.
   1. Single-duct, constant-volume units.
   2. Single-duct, variable-volume units.

1.02 RELATED REQUIREMENTS

A. Section 230547-Vibration Controls for HVAC.

B. Section 230548 - Vibration and Seismic Controls for HVAC.

C. Section 230993 - SEQUENCE OF OPERATIONS

D. Section 233100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils 2001, with Addenda (2011).

B. AHRI 880 (I-P) - Performance Rating of Air Terminals 2017 (Reaffirmed 2023).

C. AHRI 885 - Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets 2008, with Addendum (2011).

D. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. ASHRAE Std 130 - Laboratory Methods of Testing Air Terminal Units 2016.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

G. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements 2022.

H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.

J. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors Current Edition, Including All Revisions.

K. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.

C. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
   1. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures of 1 to 4 inch wg.

D. Certificates: Certify that coils are tested and rated in accordance with AHRI 410.

E. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.

F. Project Record Documents: Record actual locations of units and locations of access doors required for access of valving.

G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.01 SINGLE-DUCT, VARIABLE-VOLUME AND CONSTANT-VOLUME UNITS

A. Manufacturers:
   1. Price Industries, Inc; _____: www.priceindustries.com.
   2. Anemostat; a Mestek Company
   3. Titus

B. General:
   1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted pressure independent volume controller, duct collars, and all required features.
   2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.

C. Unit Casing:
   1. Minimum 22 gauge, 0.0299 inch galvanized steel.
      a. Assembled with longitudinal lock seam construction.
      b. Casing leakage to meet ASHRAE Std 130.
   2. Air Inlet Collar: Provide round, suitable for standard flexible duct sizes.
   3. Unit Discharge: Rectangular, with slip-and-drive connections.
   4. Acceptable Liners:
      a. 1 inch thick polyurethane foam adhesive complying with UL 181 erosion requirements in accordance with ASHRAE Std 62.1, and having a maximum smoke developed index of 50 for both insulation and adhesive, when tested in accordance with ASTM E84.
      b. Liner shall be hospital grade and in compliance with ASHRAE Standard 170, latest edition.
      c. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.

D. Sound Attenuator:
   1. Provide if required to meet scheduled acoustical performance requirements.
   2. Construction to consist of a continuous extension of the casing and liner as required to achieve required attenuation.
   3. Refer to Section 230549 - Noise Control and Acoustical Performance for Sound Attenuator requirements.

4. At 2000 fpm inlet velocity, the minimum operating pressure with attenuator added not to exceed 0.14 inch wg.
5. Acoustical fill shall be hospital grade and in compliance with ASHRAE Standard 170, latest edition.

E. Damper Assembly:
1. Heavy-gauge, galvanized steel or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
3. Incorporate low leak damper blades for tight airflow shutoff.
   a. Air Leakage Past Closed Damper: Maximum two percent of unit maximum airflow at 3 inch wg inlet static pressure, tested in accordance with ASHRAE Std 130.

F. Hot Water Heating Coil:
1. Coil Casing: Minimum 22 gauge, 0.0299 inch galvanized steel, factory-installed on terminal discharge with rectangular outlet, duct connection type.
   a. Access Door: Gasketed and insulated located on bottom and downstream of coils.
   b. Right or left coil inlets.
2. Coil Fins: Aluminum or aluminum plated fins, mechanically-bonded to seamless copper tubes.
   a. Fins to be formed in a high heat transfer sine wave configuration.
3. Coil leak tested to minimum 350 psig.
4. Base performance data on tests run in accordance with AHRI 410 and units to bear AHRI 410 label.

G. Controls:
1. DDC (Direct-Digital Controls):
   a. Refer to Division 23 Section 230900 and 230993 for terminal unit controllers and sequences of operation.
2. Airflow Sensor: Differential pressure airflow device measuring total, static, and wake pressures.
   a. Signal accuracy: Plus/minus five percent throughout terminal operating range.
3. Control Sequence:
   a. See section 230993 - SEQUENCE OF OPERATIONS for terminal unit sequences of operation.

2.02 SINGLE-DUCT, VARIABLE-VOLUME AND CONSTANT-VOLUME UNITS - EXHAUST/RETURN AIR

A. Manufacturers:
1. Price Industries, Inc: Model RDV, RDVQ, SDE, SDEQ.
2. Anemostat; a Mestek Company: Model XAFT.
3. Titus: Model DECV.

B. Acoustic Performance Requirements:
1. Use attenuation values found in appendix E of AHRI 885.

C. General:
1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.
3. Configurable for horizontal or verticle air flow, up or down as required by application.
4. Applications:
   a. Non-hazardous air/systems.
   b. Non-corrosive air/systems.
   c. Non-high humidity air/systems.

d. General Purpose exhaust air.
e. General Purpose return air.

D. Unit Casing:
1. Minimum 22 gauge, 0.0299 inch galvanized steel.
a. Assembled with longitudinal lock seam construction.
b. Casing leakage to meet ASHRAE Std 130.
2. Air Inlet Collar: round, suitable for standard duct sizes.
3. Air Discharge Collar: Round, with slip-and-drive connections or flanged.

E. Damper Assembly:
1. Heavy-gauge, galvanized steel construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
3. Incorporate low leak damper blades with blade seals for tight airflow shutoff.
a. Air Leakage Past Closed Damper: Maximum two percent of unit maximum airflow at 3 inch wg inlet static pressure, tested in accordance with ASHRAE Std 130.

F. Airflow Sensor: Differential pressure airflow device measuring total, static, and wake pressures.
1. Removable for maintenance, servicing and/or cleaning
2. Plastic parts are fire-resistant, complying with UL 94.
3. Provides accuracy within 5 percent with a 90 degree sheet metal elbow directly at the inlet of the assembly.
4. Control tubing is protected by grommets at the wall of the air flow sensor's housing.
5. Provide sensor with a pressure transducer to interface with a DDC system.
6. Signal accuracy: Plus/minus five percent throughout terminal operating range.

G. Sound Attenuator - Absorptive Type:
1. Provide if required to meet scheduled acoustical performance requirements or as indicated. Refer to Section 230549.
2. Provide on unit air inlet.
3. Media shall be of high density acoustic glass fiber insulation with fibers bonded with a thermosetting resin. Glass fiber density shall be as required to insure conformance with laboratory test data.
4. Media shall not rot, mildew, or otherwise deteriorate .
5. Media shall not cause corrosion of aluminum or steel.
6. Media protection shall be:
a. Polymer film: to prevent shedding, erosion and impregnation.
1) The wrapped acoustic media shall be separated from the perforated metal by a factory-installed acoustically transparent spacer.
2) The spacer shall be flame retardant and erosion resistant.
3) Mesh, screen or corrugated perforated liner will not be acceptable as a substitute for the specified spacer.
4) Silencer assemblies shall have Class 1 flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84, NFPA 255 or UL 723.

H. Electrical Requirements:
1. Single-point power connection.
2. Equipment wiring to comply with requirements of NFPA 70.

I. Control Transformers: Factory supplied and mounted for electric and electronic control applications.

J. Controls:
1. DDC (Direct-Digital Controls):
a. Refer to Division 23 Section 230913 and 230993 for terminal unit controllers and sequences of operation.

2. Control Sequence:
   a. See section 230993 - SEQUENCE OF OPERATIONS for terminal unit sequences of operation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are suitable for installation.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.

C. Provide ceiling access doors or locate units above easily removable ceiling components.

D. Support units individually from structure in accordance with SMACNA (SRM). See Section 23 0548.
   1. See Section 230548.

E. Embed anchors in concrete in accordance with ASTM E488/E488M.

F. Do not support from ductwork.

G. Connect to ductwork in accordance with Section 233100.

H. Verify that electric power is available and of the correct characteristics.

3.03 ADJUSTING

A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to zero percent full flow.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Provide manufacturer's field representative to instruct and observe field-assembled components and equipment installation, including connections and to assist in field testing. Report results in writing.
   1. Leak Test:
      a. After installation, fill water coils and test for leaks.
      b. Repair leaks and retest until no leaks exist.
   2. Operational Test:
      a. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
      b. Test and adjust controls and safeties.
      c. Replace damaged and malfunctioning controls and other equipment.
      d. Remove and replace malfunctioning units and retest as specified above.

3.05 CLEANING

A. Vacuum clean coils and inside of units.

3.06 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

END OF SECTION 233600

SECTION 233700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers:
   1. Perforated face ceiling diffusers.
   2. Rectangular ceiling diffusers - Multilouvered Type.
   3. Rectangular ceiling diffusers - Plaque Type
   4. Linear Slot ceiling diffusers.
   5. Ceiling-Integral Continuous Linear Diffuser

B. Registers/Grilles:
   1. Ceiling mounted, perforated face exhaust and return registers/grilles
   2. Ceiling-mounted, exhaust and return register/grilles.

1.02 RELATED REQUIREMENTS

A. Section 230549 - Noise Control and Acoustical Performance

1.03 REFERENCE STANDARDS

A. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets 2023.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

C. Project Record Documents: Record actual locations of air outlets and inlets.

1.05 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS

2.01 RECTANGULAR CEILING DIFFUSERS - MULTI-LOUVERED TYPE

A. Manufacturers:
   1. Anemostat Products; a Mestek company.: Model EPL
   2. Titus.: Model TMS
   3. Price Industries.: Model SCD

B. Type: Provide square, stamped, multi-core and multi-louvered diffuser to discharge air in 360 degree, one way, two way, three way, and four way pattern with sectorizing baffles where indicated.

C. Connections: Round.

D. Frame: Provide surface mount and inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.

E. Fabrication: Steel with baked enamel finish.

F. Color: As selected by Architect from manufacturer's standard range.

G. Accessories: Provide radial opposed blade and butterfly volume control damper; removable core and sectorizing baffle with damper adjustable from diffuser face.

2.02 RECTANGULAR CEILING DIFFUSERS - PLAQUE TYPE

A. Manufacturers:
   1. Anemostat Products; a Mestek company.: Model PG Paragon.
   2. Titus: Model OMNI.
   3. Price Industries.: Model SPD.

4. Krueger-HVAC; _____: Model PLQ.
5. Metalaire, a brand of Metal Industries Inc; _____: Model 5750.
6. Substitutions: See Section 016000 - Product Requirements.

B. Type: Provide square, architectural plaque type diffuser to discharge air in 360 degree, one way, two way, three way, and four way pattern with sectorizing baffles where indicated.

C. Face: 22 gauge minimum, Steel with baked enamel finish.

D. Back Pan: 22 gauge, Steel with baked enamel finish.
1. Insulation: Factory installed R-6 insulation with vapor barrier.

E. Connections: Round.

F. Frame: Provide surface mount and inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.

G. Fabrication: Steel with baked enamel finish.

H. Color: As selected by Architect from manufacturer's standard range.

I. Accessories: Provide butterfly or radial opposed blade volume control damper; removable core and sectorizing baffle with damper adjustable from diffuser face.

2.03 PERFORATED FACE CEILING DIFFUSERS

A. Manufacturers:
1. Anemostat Products; a Mestek company.: Model CG.
2. Titus: Model PAS.
3. Price Industries.: Model PDF.
4. _____.
5. Substitutions: See Section 016000 - Product Requirements.

B. Type: Square, Perforated face with fully adjustable pattern and removable face.

C. Face: Perforated plate, full face size, shall be constructed of minimum 22 gauge steel with not less than a 50% free area pattern. Perforations shall be 3/16” diameter holes staggered on 1/4” centers. Face plate shall be hinged or removable from the back pan by concealed spring clips.
1. Face plate shall be flush with frame.

D. Pattern Controllers: Adjustable, attached to inside face. Configurable in the field for 1, 2, 3, or 4 way discharge air pattern. Pattern adjustment shall be made by rotating the face-mounted controllers.

E. Back Pan: Factory installed one-piece stamped back pan with a square or round neck suitable for duct connection. Include earthquake loops.
1. Insulation: Factory installed R-6 insulation with vapor barrier.

F. Frame: Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame.

G. Fabrication: Steel with steel frame and baked enamel finish.

H. Fabrication: Stainless steel.

I. Color: As selected by Architect from manufacturer's standard range.

J. Accessories:
1. Butterfly or radial opposed blade damper with damper adjustable from diffuser face.

2.04 CEILING LINEAR SLOT DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Anemostat Products; a Mestek company.: Model SLAD
2. Titus.: Model ML-37; ML-38; ML-39; ML-40
3. Price Industries.: Model SDS; SDR; SDC

B. Type: Continuous Indicated wide slot, indicated slots wide.

C. Pattern Controllers: Adjustable 180 degree, 24 to 36 inches o.c. for left and right and horizontal and vertical throw adjustment.

D. Fabrication: Aluminum extrusions with factory finish.

E. Color: To be selected by Architect from manufacturer's standard range.

F. Frame: 1 1/8 inch margin with concealed mounting and gasket, mitered end border. Other types as indicated.

G. Plenum: Integral, galvanized steel, un-insulated.

H. Other Features:
1. Painted interior.
2. Blank-offs.
3. Mitered tees
4. Mitered corners.
5. End Caps
6. Mitered End Borders
7. Spacers
8. Alignment Pins

2.05 CEILING-INTEGRAL CONTINUOUS LINEAR DIFFUSER - ARCHITECTURAL TYPE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Anemostat Products; a Mestek company.: Free Flo Model FFS, FFSR
2. Titus.: FlowBar Model FL-10; FL-15: FL-20; FL-25; FL-30
3. Price Industries.: Model CF or CFC; Styles AS or JS or RT as indicated

B. The linear diffusers shall be capable of supporting the ceiling system.
1. Linear diffusers supported by screws in the flanges or from air plenums are unacceptable.
2. For lay-in ceiling, provide hanger support clips that are integral with the linear slot diffusers to allow the linear diffusers to be supported from the building structure.
3. For hard ceilings, provide clips that are integral with the linear slot diffusers to allow the diffusers to be secured directly to the ceiling framing.

C. Slot Width: 1 inch (25 mm) or as indicated. Number of slots as indicated.

D. Straight and curved sections as required to accommodate layout.

E. Pattern Controllers: 24 inches (600 mm) o.c. for left and right and horizontal and vertical throw adjustment.

F. Material: Aluminum, extruded, heavy wall.

G. Finishes:
1. Exterior: Standard white.
2. Interior: Standard black.

H. Throw: Standard.

I. Mounting: Ceiling.

J. Plenum: Noninsulated.

K. Other Features:
1. Painted interior.
2. Blank-offs.
3. Mitered tees
4. Mitered corners.
5. End Caps
6. Mitered End Borders
7. Spacers
8. Spline Support Clips

2.06 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Manufacturers:
   1. Anemostat Products; a Mestek company.: Model 30
   2. Titus.: Model 23RL
   3. Price Industries.: Model 500

B. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, horizontal face.

C. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 0 degrees, horizontal face.

D. Frame: 1-1/4 inch margin with countersunk screw mounting.

E. Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.

F. Fabrication: All aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.

G. Fabrication: Stainless steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades.

H. Color: To be selected by Architect from manufacturer's standard range.

I. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.07 PERFORATED FACE CEILING RETURN AND EXHAUST REGISTERS/GRILLES

A. Manufacturers:
   1. Anemostat Products; a Mestek company.: Model CG, 3P.
   2. Titus: Model PAS, PAR.
   3. Price Industries.: Model PDF, 10 Series.
   4. _____.
   5. Substitutions: See Section 016000 - Product Requirements.

B. Type: Square, Perforated face.

C. Face: Perforated plate, full face size, shall be constructed of minimum 22 gauge steel with not less than a 50% free area pattern. Perforations shall be 3/16” diameter holes staggered on 1/4” centers.
   1. Face plate shall be hinged or removable from the back pan by concealed spring clips.
   2. Face plate shall be flush with frame.
   3. Face plate shall be dropped face for tegular or dropped face ceiling tiles.

D. Back Pan: Factory installed one-piece stamped back pan with a square or round neck suitable for duct connection. Include earthquake loops.

E. Frame: Inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.

F. Fabrication: Steel with steel frame and baked enamel finish.

G. Color: As selected by Architect from manufacturer's standard range.

H. Accessories:
   1. Butterfly or radial opposed blade damper with damper adjustable from diffuser face.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Only four (4) way diffusers shall be provided. Provide sheetmetal blank off as required for 1 way, 2 way or 3 way diffusers.

F. Noise level at noted capacities shall not exceed criteria specified in Section 230549 - Noise Control and Acoustical Performance. Diffusers shall be suitable for operation at 5 percent excess and 25 percent less then noted capacity. Provide blanking for proper coverage and blow without producing objectionable noise or air motion at occupied level. Finish shall match color sample as approved:

G. Linear diffusers: Frame types shall mate with ceilings. Provide means to neatly butt and align units to give continuous appearance without butting flanges. No screw holes or welded corners visible on diffusers or frames will be permitted. Air volume shall be adjustable through air supply face without requiring removal of face panel. Provide blanked sections for inactive lengths. Provide plaster frames and opposed blade volume dampers with remote cable operators where noted. Refer to Architectural Drawings for mounting details and overall lengths. Finish shall match color sample as approved:

END OF SECTION 233700

SECTION 237315
CUSTOM CENTRAL STATION AIR HANDLING UNITS

<<<< UPDATE NOTES

PART 1 GENERAL

2.01 SECTION INCLUDES

A. Custom Fabrication for Outdoor Installation
B. Casing construction.
C. Fan sections.
D. Coil sections.
E. Humidifier sections.
F. Filter and air cleaner sections.
G. Damper sections.
H. Airflow measurement.
I. Total energy recovery wheel sections.
J. Access sections.
K. Turning and discharge plenum section.

2.02 RELATED REQUIREMENTS

A. Section 230513 - Common Motor Requirements for HVAC Equipment.
B. Section 23 0515 - Variable Frequency Motor Controllers.
C. Section 23 0547 - Vibration Controls for HVAC.
D. Section 230593 - Testing, Adjusting, and Balancing for HVAC.
E. Section 230719 - HVAC Piping Insulation.
F. Section 233300 - Air Duct Accessories.
G. Section 233416 - Centrifugal HVAC Fans.
H. Section 238415 - Steam Humidifiers.
I. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

2.03 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015.
B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings 2014.
C. AHRI 260 - Sound Rating of Ducted Air Moving and Conditioning Equipment 2011.
D. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils 2001 (R2011).
E. AHRI 430 (I-P) - Performance Rating of Central Station Air-Handling Units 2014.
F. AHRI 1060 (I-P) - Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment 2014.
G. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program 2015.
H. AMCA 99 - Standards Handbook 2016.
I. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.
J. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.
K. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data 2014.
L. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating 2012.

M. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2015.

N. AMCA 611 - Certified Ratings Program for Airflow Measurement Stations 2015.

O. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size 2017, with Addendum (2022).

P. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality 2016.

Q. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings 2013, Including All Amendments and Errata.

R. ASTM B177/B177M - Standard Guide for Engineering Chromium Electroplating 2011.

S. NEMA MG 1 - Motors and Generators 2016.

T. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

U. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2015.

V. UL (DIR) - Online Certifications Directory current listings at database.ul.com.

W. UL 153 - Portable Electric Luminaries Current Edition, Including All Revisions.

X. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors current edition, including all revisions.

Y. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc. Current Edition, Including All Revisions.

Z. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.

AA. UL 1598 - Luminaires Current Edition, Including All Revisions.

BB. UL 1812 - Ducted Heat Recovery Ventilators Current Edition, Including All Revisions.

CC. UL 1995 - Heating and Cooling Equipment Current Edition, Including All Revisions.

2.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Published Literature: Indicate dimensions, weights, capacities, ratings, gauges and finishes of materials, short circuit rating, electrical characteristics and connection requirements.
      a. Include short circuit study to support AIC ratings.
   2. Unit and component equipment performance data.
   3. Filters: Data for filter media, filter performance data, filter assembly, and filter frames.
   4. Fans: Performance and fan curves with specified operating point clearly plotted, power, RPM.
   5. Sound Power Level Data: Fan outlet and casing radiation at rated capacity. Fan manufacturer shall provide sound power level ratings for fans tested and rated in accordance with AMCA Standards 300 and 301. Sound power ratings shall be in decibels (reference 10-12 watts) in eight octave bands.
   6. Electrical Requirements: Power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.

C. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.

D. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, coil support details, piping connection sizes and locations, access and door and window sizes and elevations, and electrical characteristics and connection requirements.

E. Manufacturer's Instructions: Include installation instructions.

F. Operating instructions and associated data.

G. Maintenance Data: Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

H. Ancillary manufacturer provided piping and equipment supports.

I. Drain pan configuration and details

J. Manufacturer's provided piping

K. Delegated-Design Submittal: For vibration isolation; and seismic restraints indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
   2. Design Calculations: Calculate requirements for selecting vibration isolators; and seismic restraints and for designing vibration isolation bases.

L. Seismic Qualification Certificates: For air-handling units, accessories, and components, from manufacturer. See 230548 - Vibration and Seismic Controls for HVAC, for additional requirements
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

M. Manufacturer shall submit a line by line statement of compliance or non-compliance for each clause in this specification.

N. Operating and Maintenance Data

O. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Fan Belts: for each unit of each type and size.
   3. Extra Filters: One set for each unit of each type and size.

2.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Seismic Performance: Air-handling units shall withstand the effects of earthquake motions determined according to SEI/ASCE7
   1. The term "withstand" means the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified; and the unti will be fully operational after the seismic event>>.

C. Factory Testing
   1. The units shall be tested by the unit manufacture prior to shipping for the following:
      a. Casing Leakage Test
      b. Airflow And Static Capability Test
      c. Panel Deflection Test
      d. AHU Factory Fan Vibration Test

2.06 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by UL or testing firm acceptable to authority having jurisdiction as suitable for the purpose specified and indicated.

2.07 DELIVERY, STORAGE, AND HANDLING

A. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.

B. Units shall be delivered in one piece unless indicated otherwise. Where building constraints, unit size or trucking limitations require that units ship in more than one piece, the manufacturer shall indicate all split points on the shop drawings. All items shipped loose such as filters, steam humidifier assemblies, caulking, etc. shall be itemized on the packing slip and be suitably secured in the unit or on a separate protected pallet.
   1. Each piece or assembly of pieces shall be clearly marked and refer to manufacturer assembly drawing. Provide factory personnel or factory-trained and authorized personnel to supervise. Manufacturer shall guarantee the performance of the field assembled unit. Approval by factory personnel shall confirm that installing contractor followed all assembly procedures and that unit will perform as specified.

C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

D. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

2.08 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

3.01 MANUFACTURERS

A. Venmar

B. Ventrol,

C. Temtrol

D. Huntair

3.02 REGULATORY REQUIREMENTS

A. Comply with NFPA 70 and requirements of authorities having jurisdiction.

B. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing firm acceptable to authority having jurisdiction suitable for the purpose specified and indicated.

3.03 UNIT CASING CONSTRUCTION - CUSTOM

A. Full Perimeter Support Base Rail:
   1. The unit base frame manufactured with electrostatic pre-primed powder-coated rectangular structural steel or aluminum tubing and cross support members. The base rails shall be fitted with bolted removable lifting lugs.
   2. Provide full perimeter support base rail of sufficient height to raise unit for external trapping of condensate drain pans.
   3. Air handling units are to be provided with integral or additional structural steel base to accommodate the additional height requirements for the cold and/or hot condensate piping discharge from the unit to raise the unit up to accommodate the trap height, pump inlet connection height and priming. Coordinate height requirement with field conditions but not less than 10 inches high.
   4. Where units are not mounted on curbs or where structural steel dunnage does not provide full perimeter support, base rail shall be of sufficient strength and within allowable deflection to support point loading due to mounting on vibration isolators.

B. Unit Flooring and Floorplate
   1. Construct with sufficient strength to support expected people and equipment loads associated with maintenance activities.
   2. Caulk and seal floor seams water and airtight..
   3. The entire unit floor shall be insulated between floor and underfloor liners with minimum 4 inch thick insulation.

4. The underfloor exterior liner shall be G-90 galvanized steel or aluminum and be recessed to allow for air circulation under the unit.
5. Floor Plate: Galvanized steel except provide Stainless steel for sections housing cooling coils, energy recovery equipment and humidifiers.
    a. Provide add alternate for aluminum treadplate or diamond treadplate.
    b. Provide add alternate for drainable floor sections in each section of the unit piped to the exterior (by the AHU manufacturer) to the outside of the casing.
6. Maximum deflection of floor shall be L/360 at design loading (L=span in inches). Minimum floor design load shall be at least 150 lbs/sq.ft. distributed load and maximum point load on floor shall be 300 lbs over 1 square foot.
7. Provide add alternate for drainable floor sections in each section of the unit piped to the exterior (by the AHU manufacturer) to the outside of the casing.

C. Unit Walls and Roof:
1. Construct of thermally broken, 4-inch thick, insulated, double-walled panels.
2. Provide mid-span, no through metal, internal thermal break.
3. Panel structural strength
    a. Maximum deflection of walls and roof shall be L/240 at +/- 12” w.c.
    b. Deflection is worst case at the center of wall and roof span.
    c. Minimum roof and wall load shall be 75 lbs/sq.ft. distributed load.
    d. Maximum point load on roof shall be 300 lbs over 1 square foot.
4. Casing Insulation:
    a. Provide unit with one of the following insulation types sandwiched between inner and outer cabinet layers:
        1) Polyurethane injected foam, minimum 2.5 PCF and a minimum thermal conductivity (C) of 0.154 BTU in/hr sq.ft°F. The foam insulation shall have an ozone depletion potential of 0, a global warming potential of 0 and is VOC exempt.
5. Casing Panels
    a. Formed and reinforced 4-inch thick insulated wall and roof panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.
    b. The panel outside shall be solid 16-ga, G-90 galvanized steel, double die-formed 4" thick panel secured with zinc plated fasteners.
    c. The panel inside liner shall be solid 20-ga, G-90 galvanized steel except for sections housing cooling coils, heat recovery wheels and coils and humidifiers which shall be Type 304 stainless steel. Liner shall be secured with zinc plated sheet metal screws to outside casing.
    d. The unit construction shall be thermal break design with gasket meeting NFPA 90 A and B.
    e. The insulated panels shall meet fire hazard classification of 25/50 tested per ASTM E84 for flame and smoke spread, to meet NFPA 90A.
    f. There shall be no condensation on the unit exterior at coincident ambient conditions of 105 degree F DB / 80 degree F WB.
    g. Entire unit cabinet casing shall be able to withstand 10 inches w.g. positive and negative static operating pressure.
    h. Cabinet deflection shall not exceed L/240 on 4” wall units. Provide factory testing. A written test report shall be prepared by the manufacturer and issued to the Owner’s representative.
6. Casing Leakage Requirements:
    a. Seal joints and provide airtight access doors so that air leakage does not exceed one percent of design flow at the design casing pressure. Provide factory testing. A written test report shall be prepared by the manufacturer and issued to the Owner’s representative
    b. Leakage test will be conducted at 1.5 times design static pressure to a maximum of 12 in.w.g.

D. Access Doors and Panels and Sections:
   1. Construction, thermal and air pressure performance same as casing.
      a. The door frame to include a built-in no-through-metal high density resin barrier and a perimeter gasket. The door gasket to be seamed together at each corner to prevent leakage through the door. Door is attached to the unit with 3 axes adjustable stainless steel hinges, minimum 3. Doors shall open against higher pressure side.
   2. Provide surface mounted handles on hinged, swing doors with handles on both sides of casing.
   3. Provide shatterproof viewing window designed to withstand operating pressures.
      a. Dual-paned tempered glass with vacuum seal windows, molecular sieve sealant and thermally broken frames shall be supplied.
   4. Size: At least 24 inches wide by 60 inches high or unit height if unit casing is less than 60" high.
   5. Access sections shall be a minimum of 30 inches in length unless otherwise indicated to accommodate personnel access and servicing.
   6. Locations and Applications:
      a. Fan section(s)
      b. Access section(s)
      c. Coil section(s)
      d. Energy Recovery Wheel and devices
      e. Humidifier section(s)
      f. Damper section(s)
      g. Filter section(s)

E. Outdoor Unit Roof:
   1. Factory install single layer outer roof above inner roof.
   2. Slope at a minimum of 0.125 inches per foot from one side of unit to the other side, or from center to sides of unit.
   3. Roof assembly to overhang each unit wall or base rail to facilitate water runoff and prevent water intrusion into unit.
      a. When mounted on roof curbs, roof assembly to overhang each curb to facilitate water runoff and prevent water intrusion into roof curb-to-base connection.
   4. Roof system shall support a minimum snow load of 50 lbs per sq foot or as per code requirements

F. Outside Air and Exhaust Air Weather Hood:
   1. Fabricate from same material as casing outer panel.
   2. Extend hood past perimeter of unit casing opening so as not to instruct airflow path.
   3. Paint hoods with same finish as external surface of outdoor units.
   4. Provide inlet hood for each outside air inlet with a moisture eliminator to prevent entrainment of water into the unit from outside air.
      a. Moisture Eliminator: Type 304 stainless steel mesh, 1 inch thick in rigid frame as manufactured by Mistop, Inc., or equal. All hardware is to be made of stainless steel materials. Pressure drop shall be less than 0.1" S.P. at 500 FPM with 99% moisture removal efficiency. Provide when maximum air intake face velocities exceed 500 fpm.
   5. Provide exhaust hoods for each exhaust air opening.
   6. Size each hood for 100 percent of nominal outdoor air and exhaust air damper capacities.
   7. Protect each hood with ½ inch mesh bird screen.

G. Drain Pan Construction:
   1. Provide cooling coil, humidifier, and heat recovery coil/wheel sections with an insulated, double wall, 18-ga., Type 304 stainless steel drain pan complying with ASHRAE Std 62.1 for indoor air quality and sufficiently sized to collect all condensate.
      a. All seams shall be fully and continuously welded.
   2. Pans shall extend sufficiently upstream and downstream of coils to capture all condensate and moisture carryover. But not less than 24 inch of coil and down spouts for cooling coil banks more than one coil high.

a. Pans shall extend full width of unit to catch any condensation from associated coil piping, coil return bends and coil headers.
b. For stacked coils, provide intermediate drain pans/troughs under each coil. Pipe drains, one each end of trough, to spill to main drain pan.

3. Slope in two planes to promote positive drainage and eliminate stagnate water conditions.
4. Locate outlet of sufficient diameter at lowest point of pan to prevent overflow at normal operating conditions.
   a. Drain connections shall not be less than stainless steel 1-1/4” MPT connection. Provide at least one on each side of unit at each pan.
5. Provide threaded drain connections constructed of drain pan material, extended sufficient distance beyond the base to accommodate field installed condensate drain trapping.
6. The cooling coil condensate for roof mounted units shall be routed from the drain pan outlet location within the height of the base rail, and under the maintenance vestibule corridor floor if vestibule provided, and outside of the casing for P-trap installation by the mechanical contractor for extension to appropriate drain location. Manufacturer shall provide all piping from coil internal to the unit thru casing penetration to the outside.

H. For units with ducted bottom inlets and/or outlets, provide steel or aluminum walking grate on structural supports to cover openings.

I. Louvers: Where intake and exhaust hoods are not indicated, provide 4 inch deep storm proof, drainable louvers and with 1/2 inch mesh, 0.04 inch galvanized wire bird screen in frame, and bearing AMCA Certified Ratings Seal in accordance with AMCA 500-L.

J. Marine Lights:
1. Provide factory-mounted, water- and dust-resistant LED fixture(s) for each section of unit, of non-ferrous metal housing, shield and with glass or polycarbonate lens.
   a. Factory wired to a single switch within factory provided service module.
   b. Instant on white light with minimum 8000 hour service life.
   c. Locate at ceiling or upper sidewall so as to not impinge on equipment servicing or access.
   d. Illumination level shall be 50 footcandles at floor of casing.
2. Lights shall be controlled by switches located on exterior of casing at each section. Each light will have its own switch.
3. Provide factory installed service module including GFCI receptacles independent from load side designed to receive power from field supplied 120 volt single-point power source. Provide a minimum of 3 receptacles.
4. Conduit for lights and outlets shall be electrical metallic tube (EMT). All junction boxes shall be gasketed.

K. Service Platforms
1. Service platforms where required by Code or Authority Having Jurisdiction or Owner shall be provided by work of Division 1.

L. Finish:
1. Outdoor Units:
   a. Coat external surface of unit casing with primer and baked enamel paint finish.
   b. Comply with salt spray test in accordance with ASTM B177/B177M.
   c. Color: Manufacturer's standard color.

3.04 FAN SECTIONS

A. General
1. Type: Air foil, single width, single inlet, centrifugal, plenum type fans, conforming to AMCA 99. Refer to Section 23 3416
2. Performance Ratings: Determined in accordance with AMCA 210 and labeled with AMCA Certified Rating Seal. Make appropriate allowances for the effects on fan performance of all installation conditions including plenum enclosures and inlet and discharge arrangements so that actual installed fan performance equals that specified.
3. Fans shall be non-overloading and operate stably without surging at design conditions.

4. Fan characteristic curves provided by manufacturer must be such that the fan operating point:
    a. Is to the right of the peak efficiency
    b. Is on the steep part of the fan curve, such that an increase in static pressure over the specified duty results in not more than the same percent decrease in volume (CFM) and does not affect the stability of fan operation.
    c. Is no greater than 60 to 70 percent of the peak static pressure.
    d. Has the ability to provide an allowable increase in fan speed of 15 percent above the design point without surging or increasing the class of fan.
    e. Submit fan selection with system curve indication, operating point and the "DO NOT SELECT TO THE LEFT OF THIS CURVE".
        1) In addition to operating point indication, fan curve shall also include the family of all RPM curves for selected fan and include minimum and maximum RPM operating speeds.
5. Sound Ratings: AMCA 301; tested to AMCA 300 and label with AMCA Certified Sound Rating Seal.
6. Bearings: Self-aligning, grease lubricated, with lubrication fittings extended to exterior of casing with copper or stainless steel tube and grease fitting rigidly attached to casing.
    a. Bearings are to be grease lubricated, precision anti-friction, self-aligning, foot-mounted pillow block design. Bearings shall be selected for an average minimum L-10 life of 40,000 hours (200,000 hour L-50 life) when rated at the fan's maximum cataloged operating speed.

B. Fan Arrangements
1. Fan and motor assemblies shall be designed for application in multiple fan arrays.
2. The fan array shall consist of multiple housed fans or “cells”, spaced in the air way tunnel cross section to provide a uniform air flow and velocity profile across the entire air tunnel cross section and components contained therein.
3. Provide each fan cell with spring type vibration isolators, seismically restrained when required, with required minimum deflection for mounting to fan array support structure.
4. Each fan and motor assembly shall be removable through access door(s) without removing the fan wheel from the motor. Factory mount motor on slide rails. Provide motor track or rigging davits for all AHU motors.
5. All fans in the multiple fan arrays shall be AMCA certified for performance per AMCA arrangement “A” testing configuration.
6. The submitted fan performance shall be inclusive of system effects attributed to the fan mounting arrangement, fan enclosures, back draft dampers, and all other fan appurtenances not considered when AMCA certified performance per AMCA arr. “A” is determined.

C. Fan Wheels and Assembly
1. Fans shall be plenum type consisting of housing, wheel, fan shaft, bearings, motor, drive assembly and support structure. Fans shall be selected not to exceed an RPM rating higher than 90% of the maximum class RPM.
2. Fans shall be steel airfoil wheel, Class III, direct drive arrangement and shall be individually housed. Fans shall be certified by AMCA for performance. Fan shall be housed in a “cell”.
    a. Support structures are to be fully assembled, heavy gauge, welded construction with integral mounting panel for inlet cone. Inlet cones shall be aerodynamically designed and spun providing a minimum separation of air flow.
3. Fan housing or “cell” shall be constructed of steel with perforated inner liner, melamine insulation, with either solid or perforated outer panels as required by application.
4. Each fan/motor assembly shall be statically and dynamically balanced.
5. Shafts are to be ASTM A-108 steel, grade 1040/1045, precision turned, ground and polished. The shaft's first critical speed shall be at least 120% of the fan's maximum operating speed. The drive end of the fan shaft shall be countersunk for tachometer readings.

D. Motors
   1. Motors shall comply with the requirements of Section 230513 - Common Motor Requirements for HVAC Equipment.
   2. All motors shall be standard foot mounted type, TEFC or TEAO motors selected at the specified operating voltage, RPM, and efficiency as indicated.
   3. Motors shall meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2.
   4. All motors shall include permanently sealed bearings and shaft grounding means to protect the motor bearings from electrical discharge due to stray shaft current.

E. Drives:
   1. Comply with AMCA 99.
   2. Shafts: Solid, hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil. The drive end of the fan shaft shall be countersunk for tachometer readings.
   3. Fans shall be direct drive unless otherwise indicated.
   4. For V-Belt Drives: Cast iron or steel sheaves, dynamically balanced, bored to fit shafts, and keyed. Variable and adjustable pitch sheaves for motors 15 hp and under selected so required speed is obtained with sheaves set at mid-position; fixed sheave for 20 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.
      a. Belt Guard: Fabricate to SMACNA (DCS); 0.106 inch thick, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

F. Acoustical Performance
   1. The AHU unit shall provide the specified acoustical performance for the unit supply air discharge opening(s), return air opening(s), outside air opening(s) and exhaust air opening(s) as well as radiated through casing wall(s), roof(s), and floor(s).
   2. Coplanar silencer(s) and/or sound attenuator(s) shall be provided. Losses from sound attenuating devices shall be included in the fan performance selection.

G. Backdraft dampers
   1. Each fan in the fan array shall be provided with an integral back flow damper, gravity or barometric type, that prohibits recirculation or short-circuiting of air in the event a fan or multiple fans is stopped. Motorized dampers or other motorized devices submitted for back flow prevention are not acceptable.
   2. The system effect for the submitted back flow prevention device shall be included in the calculation to determine the fan TSP for fan selection and shall be indicated as a separate line item SP loss in the submitted fan selection data.

H. Fan Airflow Monitoring
   1. Each fan in an array shall have an air flow measuring sensor station with pressure sensing taps installed in the fan inlet cone for airflow monitoring capacity.
   2. Airflow Totalization: Each fan assembly shall be supplied with a complete flow measuring system, which shall indicate airflow in Cubic Feet per Minute both for each fan as well as total for all fans. The flow measuring station shall not obstruct the inlet of the fan and shall not effect fan performance flow or static or sound power levels.
   3. A surface mounted selectable display, located on the unit exterior adjacent to the variable frequency drive, shall provide CFM readout, and will provide a 4-20 ma output control signal that is proportional to the airflow rate in CFM for interface with the Building Management System (BAS) via Modbus, BACnet IP or BACNet MSTP communication protocol.

I. Variable Frequency Drive
   1. Refer to Section 23 0515.

J. External Motor Junction Box: Factory mount NEMA 3R external junction box and connect to extended motor leads from internally mounted motors.

1. Motor Wiring Conduit: Factory wire fan motor wiring to the unit mounted controllers.
2. All wiring shall be in conduit and shall be electrical metallic tube (EMT). All junction boxes shall be gasketed. Provide flexible metal conduit for final wiring connection to motors.

K. Flexible Duct Connections:
1. Provide flex connections where fan attaches to unit casing.
2. Refer to Section 233300.

3.05 COIL SECTIONS

A. Certify capacities, pressure drops, and selection procedures in accordance with AHRI 410.

B. Provide access to both sides of coils. Enclose coils with headers and return bends fully contained within casing. Coil removal/replacement through removable access panel or doors. Provide coils with safing blank off sheets to prevent bypass of unconditioned air. Provide sealing collars at casing penetrations of all piping.

C. Coil Support Structure
1. All coils shall be installed on racks and individually self-supported and individually removable.
2. All coils shall be mounted as high as possible within unit casing to facilitate installation and piping of condensate trap assemblies.
3. Safing, Supports and fasteners for cooling coils, humidifiers and heat recovery coils shall be Type 304 Stainless Steel.
4. Safing, Supports and fasteners for heating coils shall be Galvanized.
5. AHU manufacturer to provide chilled water, steam and hot water piping and supports inside casing. Piping to extend beyond casing for connections by mechanical contractor, and casing penetrations sealed by manufacturer. Refer to piping specifications sections for requirements.

D. Moisture Eliminator for Cooling Coils
1. Type 304 stainless steel mesh, 1 inch thick as manufactured by Mistop, Inc., or equal. All hardware is to be made of stainless steel materials. The eliminator section shall drain to cooling coil drain pan and troughs. Moisture eliminator shall have less than 0.1" S.P. at 500 FPM and have 99% efficient moisture removal.
2. Provide when cooling coil face velocities exceed 500 fpm or operating conditions create moisture carryover.

E. Refrigerant Evaporator Coils:
1. Performance Ratings: Tested and rated according to AHRI 410.
2. Casing: Die formed channel frame of ASTM A666, Type 316 stainless steel, minimum 0.0625 inch thick for flanged mounting, 3/8 inch mounting holes on 3 inch centers. Provide tube supports for coils longer than 36 inches.
3. Tubes: 5/8 inch OD ASTM B 743 seamless copper arranged in parallel or staggered pattern, expanded into fins, brazed joints.
4. Fins: Aluminum continuous plate type with full fin collars
5. Headers: Seamless copper tubes with silver brazed joints.
6. Liquid Distributors: Copper venturi type distributor with ASTM B88, Type L (ASTM B88M, Type B) seamless copper distributor tubes, 5/16 inch outside diameter, brazed joints; maximum 12 circuits per distributor.
7. Configuration: Down feed with bottom suction.
8. Testing: Air test under water at 450 psi for working pressure of 300 psi; clean, dehydrate, and seal with dry nitrogen charge.
9. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

F. Electric Coils:
1. Assembly: UL (DIR) listed and labeled, with terminal control box and cover, splice box, coil, casing, and controls.

2. Coil: Enclosed stainless steel tube, stainless steel fins, element of grade A coiled 80% nickel-20% chromium resistance wire centered in tubes and embedded in magnesium oxide or refractory material.
3. Coil: Exposed helical coil of 80% nickel-20% chromium resistance wire with refractory ceramic support bushings.
4. Casing: Die formed channel frame of minimum 16 gauge, 0.0598 inch galvanized steel with 3/8 inch mounting holes on 3 inch centers. Provide tube supports for coils longer than 36 inches.
5. Controls: Automatic reset thermal cut-out, built-in magnetic or mercury contactors control circuit transformer and fuse, manual reset thermal cut-out; air flow proving device; fused disconnect; load fuses.
6. Provide SCR for modulating control of heat output.

3.06 AIR COOLED DX HEAT PUMP & CONDENSING SECTION

A. GENERAL
1. Provide as part of the unit a fully integrated and fully functional air cooled heat pump cooling and heating system. Section and/or sections shall consist of evaporator cooling/heating coil, air cooled condensing unit, interconnecting insulated refrigerant piping internally routed, and interfacing operational controls. Refer to and coordinate with Controls Sections 230900 and 230993.

B. CONDENSER COILS
1. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits. Air test under water to 425 psig, and vacuum dehydrate. Seal with holding charge of nitrogen.
2. Coil Guard: PVC coat steel wire with lint screens.

C. FANS AND MOTORS
1. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Equip with roller or ball bearings with grease fittings extended to outside of casing.
2. Weatherproof TEAO motors suitable for outdoor use, single phase permanent split capacitor or 3 phase, with permanent lubricated ball bearings and built in current and thermal overload protection. Refer to Section 23 0513.

D. COMPRESSORS
1. Compressor: Hermetic scroll type.
2. Mounting: Statically and dynamically balance rotating parts and mount on spring vibration isolators.
   a. Internally isolate hermetic units on springs.
3. Lubrication System: Reversible, positive displacement oil pump with oil charging valve, oil level sight glass, and magnetic plug or strainer.
4. Motor: Constant speed 3600 rpm suction gas cooled with electronic sensor and winding over temperature protection, designed for across-the-line starting. Furnish with starter.
5. Capacity Reduction Equipment: Suction valve unloaders, with lifting mechanism operated by electrically actuated solenoid valve, with unloaded compressor start; controlled from suction pressure.
6. Sump Oil Heater: Evaporates refrigerant returning to sump during shut down. Energize heater continuously when compressor is not operating.

E. REFRIGERANT CIRCUIT
1. Provide each unit with two independent refrigerant circuits, factory supplied and piped inside unit.
2. PIPING
   a. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
      1) Type ACR
      2) ASTM B88 - Type K
      3) Fittings: ASME B16.22 wrought copper.
      4) Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy

3. For each refrigerant circuit, provide:
   a. Filter dryer replaceable core type.
   b. Liquid line sight glass and moisture indicator.
   c. Thermal expansion valve for maximum operating pressure.
   d. Insulated suction and liquid lines.
   e. Suction and liquid line service valves and gauge ports.
   f. Liquid line solenoid valve.
   g. Charging valve.
   h. Discharge line check valve.
   i. Compressor discharge service valve.
   j. Condenser pressure relief valve.
4. For heat pump units, provide reversing valve, suction line accumulator, discharge muffler, flow control check valve, and solid-state defrost control utilizing thermistors.

F. CONTROLS
1. On unit, mount weatherproof steel control panel, NEMA 250, containing power and control wiring, molded case disconnect switch, factory wired with single point power connection.
   a. Factory mount disconnect switch on unit under provisions of Section 260583.
2. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection. For each condenser fan, provide across-the-line starter with starter relay.
3. Provide safety controls arranged so any one will shut down machine:
   a. High discharge pressure switch (manual reset) for each compressor.
   b. Low suction pressure switch (automatic reset) for each compressor.
   c. Oil Pressure switch (manual reset).
4. Provide the following operating controls:
   a. Refer to Section 230993.

3.07 HUMIDIFIER SECTION

A. General: Capacities and selection in accordance with AHRI 610.

B. Steam Distribution : Short absorption manifold type humidifiers as manufactured by Vapac, or approved equal:
1. Manifold header: Constructed of type 304 stainless steel and installed at the center of the duct or air handler for a horizontal airflow installation. The header shall be mounted on Type 304 stainless steel support brackets, sloped to ensure condensate removal through the steam inlet connection without the use of a separate condensate connection/leg.
2. Dispersion tubes: The dispersion tubes constructed of type 304 stainless steel and welded to the header, closely spaced and spanning the width of the air handler or duct. The dispersion tubes spacing shall be optimized to provide uniform steam dispersion, and the required absorption distance. Each tube shall contain a single row of integrally formed holes facing the airflow for shorter absorption distances. The dispersion tubes shall be supplied with adjustable stainless steel support brackets.
3. Tube holes: Each hole shall be formed to extend the tube material internally in a cylindrical shape to get the driest steam from the center of the tube and prevent any condensation entrainment through the holes. Added plastic/resin nozzles are not acceptable. The spacing between holes shall be optimized, spanning the height of the tube and sized to ensure constant pressure inside every tube for even steam distribution.
4. Pressurized Manifold Steam Accessories:
   a. The appropriate steam valve, actuator, steam trap and strainer shall be shipped loose for field installation.
   b. The steam valve body should be made of bronze and the valve trim should be made of stainless steel for extended life.
   c. The valve modulating actuator should be electrical (24 Vdc). For electric valve actuators, the control signal should be 0-10 Vdc or 4-20 mA.

d. The steam trap should be of the Float and Thermostatic (F&T) type with a cast iron body. When using treated water (DI or RO), the trap should be of the stainless steel Inverted Bucket type.
e. The Y strainer should be made of cast iron, except when using treated water (DI or RO) where stainless steel Y strainer should be supplied.

3.08 FILTER AND AIR CLEANER SECTIONS

A. General:
1. Provide filter sections with filter racks, access door(s) for filter removal, and filter block-offs to prevent air bypass.
2. Filters shall be arranged in flat banks and with upstream servicing.

B. Filter Frame Assemblies
1. Construct of galvanized steel, designed and sized to have matching mounting holes so frames may be fastened together in a bank.
2. Frames shall have pre-installed closed cell neoprene gasketing so the filter will self-seal against. Provide latches, 4 per frame minimum to positively secure filters in frames.
3. Filter frames shall be provided with stiffeners for installation between each column of filter frames.
4. All filter holding frames in bank shall be sealed with caulk or gaskets in between them to prevent bypass air through the frames.
5. Provide additional structural support for reinforcement for attaching frame assembly to AHU casing, ductwork or building structure as well as complete safing and proper air seal.

C. Pleated Media Filters:
1. Media: 2 inch, 100 percent synthetic fibers, continuously laminated to a grid with water repellent adhesive, and capable of operating up to a maximum of 500 fpm without loss of efficiency and holding capacity.
2. Frame: Steel wire grid.
3. Minimum Efficiency Reporting Value: 8 MERV when tested in accordance with ASHRAE Std 52.2.

D. HEPA Filters:
1. Media: 12 inch continuously pleated, waterproof, micro-fiberglass; enclosed in a galvanized, steel frame with neoprene rubber seal applied to leaving air side, and capable of operating up to a maximum of 500 fpm without loss of efficiency and holding capacity.
2. Frame: Continuously welded, gasketed, front loaded filter frames, mounted inside section casing along with filter holding clips, requiring tooling to tighten and hold filter cells.
3. Minimum Efficiency: Not less than: 99.97 percent when tested in accordance with ASHRAE Std 52.2.
4. Refer to Section 234000.

E. Differential Pressure Gauges:
1. Provide factory installed dial type differential pressure gauge, mounted on casing outer wall, and fully piped to both sides of each filter to indicate status.
2. Provide each filter bank with pressure gauges across each bank, Dwyer Instruments Inc Series 2000 Magnehelic.
3. Maintain plus/minus 5 percent accuracy.

3.09 AUTOMATIC DAMPERS

A. Outside Air Intake, Exhaust/Relief Air, Return Air, Bypass Air: Provide functional section(s) to support the damper assembly for modulating the volume of outdoor; return; exhaust; and bypass air.

B. Dampers:
1. Low leakage Class 1A aluminum dampers as made by TAMCO or Ruskin CD50
2. Low leakage, double-skin, aluminum, airfoil design with metal or TPE compressible jamb seals and extruded-vinyl or EPDM blade-edge seals on each blade.

3. Provide with square or hexagonal blade shafts, frame-mounted linkage crank arms, jack shafts.
4. Frame of extruded aluminum channel, 12 gauge minimum.
5. Self-lubricating stainless steel or synthetic sleeve bearings.
6. Comply with ASHRAE Std 90.1 I-P for rated maximum leakage rate.
7. Provide leakage testing and pressure ratings in compliance with AMCA 500-D test methods.
8. Arrange in opposed-blade configuration unless otherwise noted.

3.10 AIRFLOW MEASUREMENT

A. Flow Meter:
1. Provide airflow measurement system to directly measure fan airflow or measure differential pressure that can be used to calculate airflow without interfering with submitted airflow performance and noise levels.
2. Accuracy: Plus/minus 5 percent (device and transmitter) when operating within the stable operating region of the fan curve.

B. Air Flow Measurement Station:
1. Provide factory installed, airflow measurement station tested in accordance with AMCA 611 and bearing the AMCA Ratings Seal for Airflow Measurement Performance.
2. Station Location: Install in outdoor; return; and exhaust opening to measure airflow.
3. Measurement Range: Minimum of 100 percent of unit nominal flow.
4. Operation: Provide low voltage signal corresponding to actual airflow for controlling and documenting airflow.
5. Accuracy: Plus/minus 5 percent;.
6. Thermal dispersion measurement system (Ebtron) or approved equal.
7. Provide air straightener if necessary to accommodate airflow conditions.
8. Provide in addition to airflow measuring stations as specified for plenum fans.
9. Refer to Controls Sections 230900 and 230993 for requirements.

3.11 HEAT RECOVERY WHEEL SECTIONS

A. General
1. Furnish and install the total energy recovery wheel, as manufactured by Innergy Tech Inc. or approved equal
2. The energy recovery wheel shall transfer both sensible and latent energies between outgoing and incoming air streams in a counter flow arrangement.
3. The energy recovery wheel shall be labeled for direction of air flow, exhaust and supply inlets and outlets.
4. The energy recovery wheel shall be a UL recognized component and bear the ULmark.
5. The energy recovery wheel shall comply with the requirements of UL723.
6. The energy recovery wheel shall bear the ARI 1060-2005 Standard Certified Product Seal.
7. Sensible, latent and total effectiveness along with pressure drop, EATR and OACF ratings, shall be clearly documented in the ARI Certified Product Directory (Standard 1060-2005).
8. Performance tests shall be conducted in accordance with AHSRAE Standard 84-91.

B. Media
1. The rotor media shall be made of aluminum with a minimum thickness of 2 mil.
2. All surfaces shall be coated with a non-migrating desiccant specifically developed for the water vapor transfer.
3. Desiccant to be a polymer hygroscopic coating with bactericide and be non-corrosive
4. The rotor shall be constructed of equal width alternate layers of corrugated and flat aluminum sheet material to create a flat and smooth surface.
5. MERV 8 type filters shall be used to protect inlet faces of the wheel.

C. Purge and Casing Assembly
1. The unit shall be provided with a factory set, but field adjustable, purge section designed to limit cross contamination.

2. The rotor shall be have a structural frame to limit deflection of the rotor due to air pressure differential to less than 1/16 of an inch.
3. The framing shall be made of heavy-duty welded tubular steel construction.
4. Framing shall be painted with polyester based enamel.
5. The cover panels shall be made of galvanized steel to prevent corrosion.
6. The cassette shall be mounted with removable cover panels for service access to the motor and drive.
7. The rotor shall be supported by pillow block bearings which can be maintained or replaced without removal of the rotor from its casing or the media from its spoke system.

D. Rotor seals
1. The rotor shall be supplied with non-contact labyrinth seals facing the media and with nylon contact seals on all other surfaces.
2. The seals shall be specifically designed to compensate for pressure fluctuations.
3. The seals shall be adjustable to ensure proper sealing.

E. Rotor frame system
1. Rotor spoke system shall be a segmented design.
2. The rotor spoke system shall be made of aluminum materials providing the structural integrity required at design pressure differentials.
3. The rotor hub shall be made of extruded aluminum, without welding, for precision machining and stiffness.

F. Drive system
1. The rotor shall be driven by a high performance link belt made of polyurethane elastomer reinforced with polyester.
2. An A/C inverter duty motor shall drive the rotor.
3. Wheel shall be perimeter driven.
4. Speed reduction is by controlling the motor frequency via VFD controllers.
5. Speed reducer shall be permanently lubricated.

3.12 TURNING AND DISCHARGE PLENUM SECTION

A. Provide plenum to efficiently turn and discharge air.
1. Scale plenum vertical height to accommodate discharge duct height.
2. Scale plenum horizontal length to accommodate required dimensional constraints.

B. Provide all openings for ductwork connections with gasketed channel or angle iron framing for flanged connections of ductwork.

3.13 ELECTRICAL AND CONTROLS

A. Refer to Section 230900 - HVAC INSTRUMENTATION AND CONTROLS and Section 230993 - SEQUENCE OF OPERATIONS for air handling unit control systems.

B. Short Circuit Current Rating:
1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
3. Label equipment utilizing series ratings as required by NFPA 70.
4. Provide internal ground fault protection such that a ground fault in any of the motor circuits does not cause a system shutdown.

C. Control Panel
1. Each fan motor shall be individually wired to a motor control panel containing motor overloads and VFD(s). VFD configuration shall be such that each motor shall have its own VFD as required for FANWALL System Optimization Controls.
2. As an alternate provide two VFDs, each of which shall control all fans in array in parallel. The VFDs shall be arranged for lead/lag operation such that the failure of one VFD shall switch operation to the other VFD. Lead/lag operation shall also enable continued operation of fans while other VFD is offline for maintenance, servicing and the like.

3. Each control panel shall have a single point electrical power connections. Units with supply and return fan walls will have two power connections.
4. Wire sizing shall be determined, and installed, in accordance with applicable NEC standards and local code requirements.
5. The multiple fan array electrical panel shall continuously monitor required flow and pressure and include system optimization controls to actively control fan speed and to enable and disable fans in the multiple fan array to achieve peak efficiency for the fan system at any given point of system operation.
6. Multiple fan array system optimization controls shall be provided by the AHU unit manufacturer for multiple fan array flow and pressure controls, to accept an input control signal from the BMS for static pressure and/or flow for proper operation of the system optimization controls.
7. The AHU unit manufacturer shall provide a single communication interface with the BAS, utilizing BacNet or Lon.
8. Means for monitoring and controlling individual fan and motor status for each of the multiple fans and motors in the array shall be provided.
9. The multiple fan array control panel(s) shall be provided with means to indicate fan and motor status, operating mode, system flow rate and fan total static pressure, as well as connected and required HP at the current system flow and pressure conditions.
10. Status shall be displayed at the unit control panel and/or at the remote location of the building automation system control panel and interface screens.
11. The AHU unit shall be completely factory-wired, requiring only field wiring of main power wiring to the line side of the main power disconnect switch, and a separate 120/60/1 power supply with disconnect switch for receptacles and light fixtures.
12. Redundancy in the variable frequency drives shall be included, along with all necessary controls and devices to assure that in a fault condition for any drive, whether internal or external to the drive, the fan array shall maintain flow and pressure at the required fan operating speed at the time of the fault with no interruption in flow to the system affected.

D. Combination VFD - Disconnects:
1. Provide factory mounted, combination VFD - disconnect for each fan motor.
2. Refer to and provide in accordance with Section 23 0515 - Variable Frequency Motor Controllers
3. Factory mount in full metal enclosure and wire to fan motor.
4. Mount VFD-disconnect on fan section in a NEMA 3R enclosure within a dedicated controls section or housed fan section.
   a. Internal Enclosure Construction Characteristics:
      1) Integral part of unit casing to allow for thermal venting to casing interior.
      2) Accessible from unit exterior via access door.
      3) Construction of access doors same throughout unit.
5. Include circuit breaker disconnect with through-the-door interlocking handle for externally mounted starters; beside--the-door interlocking handle for internally mounted; spring loaded, and designed to rest only in the full and lockable ON or OFF state.
6. Allow enclosure entry via a concealed defeater mechanism when the handle is in the ON position.
7. Include control transformer with sufficient capacity to support the following items:
   a. VFD and controls.
   b. Binary output on-off wiring.
   c. Analog output speed-signal wiring.
   d. Wires that interface between VFD and direct digital controller.
8. Provide bypass relays and bypass circuitry with VFD-OFF-BYPASS selector switch.

PART 3 EXECUTION

4.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine casing materials and equipment before air-handling unit installation. Reject materials and equipment that are damaged. Replace with new.

C. Examine roughing-in for piping systems and electrical services to verify actual locations of connections before installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

4.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Bolt sections together with gaskets.

C. Unit Support: Install unit level. Coordinate wall penetrations and flashing with wall construction. Secure AHUs to structural support with anchor bolts.

D. Install wind and seismic restraints according to manufacturer's written instructions. Wind and seismically restrained vibration isolation roof-curb rails are specified in Section 230548 - Vibration and Seismic Controls for HVAC - Mason

E. If fans do not have internal flex duct, Install flexible duct connections between discharge ductwork and air handling unit sections. Ensure that metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

F. Install assembled unit on vibration isolators. Install isolated fans with resilient spring mountings and flexible electrical leads. Install restraining snubbers as required. Adjust snubbers to prevent tension in flexible connectors when fan is operating.

G. Arrange installation of units to provide access space around air-handling units for service and maintenance.

H. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with new, clean filters.

I. Provide fixed sheaves required for final air balance for belt-driven fans.

J. Install piping adjacent to air-handling unit to allow service and maintenance. Make connections to coils with unions or flanges.

K. Connect condensate drain lines and extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

L. Humidifiers
   1. Install gate valve and inlet strainer at supply connection of dry steam humidifiers, and inverted bucket steam trap to condensate return connection.

M. Refrigerant Coils:
   1. Provide sight glass in liquid line within 12 inches of coil.
   2. Install shutoff valve and union or flange at each supply and return connection.
   3. Provide connection to refrigeration piping system and evaporators. Comply with ASHRAE Std 15.
   4. Provide manual shutoff valves at each refrigeration system component (condenser, condensing unit, evaporator, branch controller, etc..) for service

N. Electric Duct Coils:
   1. Wire in accordance with manufacturer’s instructions and NFPA 70.

O. Field-wire each factory provided control for field installation.

4.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:
   1. Charge refrigerant coils with refrigerant and test for leaks.

2. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. HEPA-Filter Operational Test: Pressurize housing to a minimum of 3-inch wg (750 Pa) or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter for air leaks according to ASME N510, pressure-decay method.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
5. Air-handling unit or components will be considered defective if unit or components do not pass tests and inspections.
6. Prepare test and inspection reports.

4.04 CLEANING

A. Clean air-handling units internally on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils entering air face.

B. After completing system installation and testing, adjusting, and balancing air-handling unit and air-distribution systems, clean filter housings and install new, clean filters.

C. Replace filters immediately prior to occupancy according to the LEED EQ Credit 3.1, "Construction IAQ Management Plan."

4.05 ADJUSTING

A. Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

4.06 SYSTEM STARTUP

A. Provide manufacturer's field representative to perform systems startup.

B. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.

C. Adjust for proper operation within manufacturer's published tolerances.

D. Verify that shipping, blocking, and bracing are removed.

E. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.

F. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.

G. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.

H. Verify and adjust damper and valves for proper operation.

I. Comb coil fins for parallel orientation.

J. Verify that proper thermal-overload protection is installed for electric coils.

K. Install new, clean filters.

L. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.

M. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.

N. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.

O. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

P. Provide cooling season start-up, and winter season shut-down for first year of operation.

4.07 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Conduct walking tour of project.
   3. Briefly describe function, operation, and maintenance of each component.

D. Training: Train Owner's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of one day of training.
   3. Instructor: Manufacturer's training personnel.
   4. Location: At project site.

END OF SECTION 237315

SECTION 238415
STEAM HUMIDIFIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dry steam humidifiers.

B. Stainless steel piping

1.02 RELATED REQUIREMENTS

A. Section 230993 - SEQUENCE OF OPERATIONS

B. Section 232213 - Steam and Condensate Heating Piping.

C. Section 232214 - Steam and Condensate Heating Specialties.

1.03 REFERENCE STANDARDS

A. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings 2018.

B. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded 2021.

C. ASTM A182/A182M - Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service 2023.

D. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes 2022a.

E. ASTM A403/A403M - Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings 2022b.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog data indicating rated capacity, dimensions, duct and service connections, electric nameplate data and wiring diagrams.

C. Shop Drawings: Indicate layout of system and components.

D. Manufacturer's Instructions: Indicate installation instructions and recommendations.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 SHORT CIRCUIT CURRENT RATING:

A. All electrical equipment, starters and controller assemblies shall be provided with short circuit rating as follows:
   1. Provide controllers with listed short circuit current rating not less than.100,000 AIC unless approved by the engineer based on submitted short circuit study.
   2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   3. Label equipment utilizing series ratings as required by NFPA 70.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide two year manufacturer warranty for humidifier unit except the cylinder.

PART 2 PRODUCTS

2.01 HUMIDIFIER DISPERSION TUBES AND MANIFOLD ASSEMBLY

A. Manufacturers
1. Armstrong
2. DriSteem Corporation:
3. Nortec Industries
4. Substitutions: See Section 016000 - Product Requirements.

B. General
1. Humidifier dispersion tubes shall be multi-tube type mounted in a stainless steel panel. Tubes shall be arranged vertically or horizontally.
2. The humidifier shall be capable of removing condensate from the steam by means of a 304L stainless steel supply header/separator, for the purpose of providing condensate free steam.
3. A packaged steam injection type humidifier or multiple tube dispersion assembly ready for insertion into the duct or air handling unit.
4. The injection tubes shall be completely factory assembled and welded to a 304L stainless steel header/separator, ready for installation and piping connections.
5. Each segment is designed for duct mounting including stacking of header/separator/dispersion tube segments when necessary. For applications with horizontal dispersion tubes, all piping to be on one side of the duct or air handling unit.

C. Headers and Dispersion Tubes
1. Fabricated separator/header and multiple dispersion tube design of all welded stainless steel construction, O-rings or slip couplings are not permitted.
2. Each active tube is fitted with a series of stainless steel nozzles extending from the center of the tube. The nozzles are sized and spaced to accept steam from the separator/header and provide a dry and uniform discharge of steam.
3. The header/separator shall be designed with an internal baffle to assure equal steam flow to the injection tubes. The header/separator shall include an internal stainless steel screen to prevent objectionable noise due to pressure drop across the valve.
4. Steam shall be injected into the air stream through 304L stainless steel steam jacketed injection tubes. The tubes shall be steam jacketed to assure condensate-free vapor. The jacketing shall only be hot during a call for humidity, eliminating unwanted heat gain when no humidification is required. The steam emission ports shall be precision punched and shall be of sufficient size and number to provide constant and uniform distribution of steam over the entire width of the duct or air handling unit.

2.02 STAINLESS STEEL PIPE:

A. Up to 15 psig including condensate: ASTM A312/A312M, Type TP304L, seamless only, Schedule 40S for pipe less than 8 inches in diameter or Schedule 30S for pipe 8 inches and larger. Maximom 0.375 inch wall thickness.

B. Fittings 2-1/2 inches and Larger:
1. Stainless steel, buttweld type.
2. ASTM A403/A403M, Class WP-S, Grade WP 304L, seamless only, and ASME B16.9 of the same thickness as the adjoining pipe.

C. Fittings 2 inches and Smaller:
1. Stainless steel, socket weld type.
2. Comply with ASME B16.11 and ASTM A182/A182M.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide stainless steel rods to support distribution manifolds and mount in air system plenums.

C. Connect dry steam humidifiers to steam supply and to condensate piping. Provide gate valve, inlet strainer, and inverted bucket steam trap. Refer to Section 232213 and Section 232214.

END OF SECTION 238415

SECTION 260001
GENERAL PROVISIONS FOR ELECTRICAL WORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work in this Section includes the providing of labor, materials, equipment and services necessary for a complete and safe installation in accordance with the contract documents and all applicable codes and authorities having jurisdiction for electrical work covered by all sections within the specifications (including but not limited to electrical systems and equipment).

As a condition of Contractor's use of these specifications, Contractor agrees to: (i) name AKF as additional insured on Contractor's insurance policies wherever permitted, including but not limited to Contractor's General Liability policy, which shall be primary and non-contributory, (ii) provide AKF, upon request, with a certificate of insurance and copies of specific endorsements to Contractor's insurance policies evidencing said additional insured status, and (iii) waive all rights of recovery against AKF by way of subrogation, assignment, or otherwise with regard to insured claims.

B. Where Divisions of Work 01 thru 14 are referenced herein and are not provided elsewhere in the project documents, refer to this section.

C. For Firestopping, refer to section 26 0300.

D. For Demonstration and Training refer to section 26 04000.

E. Provide cutting and patching

F. Related Work And Requirements
   1. Requirements of general conditions, supplementary conditions for mechanical and electrical work and Division No. 1.
   2. Requirements noted under other Divisions of Work

1.02 WORK NOT INCLUDED

A. Providing temporary light and power

B. Providing finish painting.

C. Providing access doors and filler.

D. Installing access door and providing filler.

E. Supplying and setting motors.

F. Cutting and patching, except as noted in "AIA Document A201" and "Supplementary Conditions for Mechanical and Electrical Work." See section 23 0002

G. Excavating and backfilling under building.

H. Excavating and backfilling.

I. Providing flashing.

J. Providing shaft gratings.

K. Providing equipment platforms.

1.03 DESCRIPTION OF BID DOCUMENTS

A. Specifications, in general, describe quality and character of materials and equipment.

B. Drawings, in general are diagrammatic and indicate sizes, locations, connections to equipment and methods of installation. Provide additional offsets, fittings, hangers, supports, valves, drains as required for construction and coordination with work of other trades.

C. Scaled and indicated dimensions are approximate and are for estimating purposes only. Before proceeding with work, check and verify all dimensions.

D. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.

E. Typical details, where shown on the drawings, apply to each and every item of the project where such items are applicable. Typical details are not repeated in full on the plans, and are diagrammatic only, but with the intention that such details shall be incorporated in full.

F. If any part of Specifications or Drawings appears unclear or contradictory, consult Architect and/or Engineer for interpretation and decision as early as possible during bidding period. Do not proceed with work without the Architect's and/or Engineer's decision.

1.04 DEFINITIONS

A. "Furnish": To supply, deliver, unload, and inspect for damage.

B. "Install": To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. "Provide": To furnish and install.

D. "Supply": Same as Furnish.

E. "Work": includes labor, materials, equipment, services, and all related accessories necessary for the proper and complete installation of complete systems.

F. "Piping": includes pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, unions, traps, drains, insulation, and all related accessories.

G. "Wiring": includes raceway, fittings, wire, boxes, and all related accessories.

H. "Concealed": not in view, installed in masonry or other construction, within furred spaces, double partitions, hung ceilings, trenches, crawl spaces, or enclosures.

I. "Exposed": in view, not installed underground or "concealed" as defined above.

J. "Indicated," "shown," or "noted": as indicated, shown or noted on drawings or specifications.

K. "Similar" or "equal": of base bid manufacturer, equal in quality, materials, weight, size, performance, design and efficiency of specified product, conforming with "Base Bid Manufacturers."

L. "Reviewed," "satisfactory," "accepted," or "directed": as reviewed, satisfactory, accepted, or directed by or to Architect and/or Engineer.

M. "Motor Controllers": includes manual or magnetic starters with or without switches, individual pushbuttons or hand-off-automatic (HOA) switches controlling the operation of motors.

N. "Control or Actuating Devices": includes automatic sensing and switching devices such as thermostats, pressure, float, flow, electro-pneumatic switches and electrodes controlling operation of equipment.

O. "Finished Spaces": Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

P. "Exposed, Interior Installations": Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

Q. "Exposed, Exterior Installations": Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

R. "Concealed, Interior Installations": Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

S. "Concealed, Exterior Installations": Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.05 QUALITY ASSURANCE

A. All work shall combine with National Electrical Code and all applicable local codes.

B. All equipment and accessories shall be the product of manufacturers regularly engaged in their manufacture. All items of a given type shall be the products of the same manufacturer.

C. Furnish all materials, equipment and accessories new and free from defects.

D. All electrical equipment shall be listed by Underwriters' Laboratories, Inc. (UL) or bear UL labels.

E. Supply all equipment and accessories in complete compliance with and in accordance with the applicable standards listed in reference standards of this Section and with all applicable national, state and local codes.

F. Equipment ampere ratings shall be for continuous operation in 104oF (40oC) ambient temperature unless otherwise indicated.

G. Provide the following heights of outlets and verify with Architect and/or Engineer prior to installation:
   1. From finished floor to centerline of outlets for:
      a. Receptacles and telephones:
         1) Generally 1'-6"
         2) Over work benches 3'-6"
      b. Wall switches:
         1) Generally 4'-0"
      c. Wall fixtures 7'-0"
      d. Motor controllers 5'-0"
      e. Gongs and horns 7'-6"
      f. FA Gongs and horns (NYC) 8’-0”
      g. Fire alarm stations 3'-6"
      h. Clocks 7'-6"
      i. Strobe lights 6’-8” or 6 in below ceiling (whichever is lower)
   2. Provideoutlets to match existing.
   3. The following are exceptions to specified height of outlets:
      a. At junction of different wall finish materials.
      b. On molding or break in wall surface.
      c. In violation of Code.
      d. As noted or directed.

1.06 JOB CONDITIONS

A. Inspection of Site Conditions:
   1. Before starting work, visit the site and examine the conditions under which the work has to be performed. Report in writing any conditions which might adversely affect the work.

B. Connections to existing work:
   1. Install new work and connect to existing work with minimum interference to existing facilities.
   2. Provide temporary shutdown of existing services at no additional charges and only with written consent of Owner. Schedule shutdowns not to interfere with normal operation of existing facilities.
   3. Alarm and emergency systems shall not be interrupted.
   4. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.
   5. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition.

C. Removal and relocation of existing work.
   1. Disconnect, remove, or relocate electrical material, equipment, and other work noted and required by alterations, modifications, or changes in existing construction.
   2. Provide new material and equipment required for relocated equipment.
   3. Disconnect load and line end of conductor feeding existing equipment.
   4. Tape both ends of abandoned conductors and cap outlets and abandoned raceways.
   5. Remove any raceway no longer required for removed or relocated equipment.

6. Cut and cap abandoned floor raceways flush with concrete floor or behind walls and ceilings.
7. Dispose of removed Electrical equipment as directed.
8. Return removed Electrical equipment to Owner as directed and dispose of other equipment.

1.07 REFERENCE STANDARDS

A. Published specifications, standards tests, or recommended methods of trade, industry or governmental organizations apply to work in all Sections as noted below:
1. NEMA - National Electrical Manufacturers' Association.
2. ANSI - American National Standards Institute.
3. IEEE - Institute of Electrical and Electronics Engineers.
4. ASTM - American Society for Testing and Materials.
5. NEC - National Electrical Code.
6. NFPA - National Fire Protection Association.
7. UL - Underwriters' Laboratories, Inc.
8. OSHA - Occupational Safety and Health Administration Regulations.

1.08 SUBMITTALS

A. Submit shop drawings product data, samples and certificates of compliance required by contract documents.

B. Operating instructions, maintenance manuals and parts lists.
1. Provide manufacturer's equipment brochures and service manuals consisting of the following:
a. Descriptive literature for equipment and components.
b. Model number and performance data.
c. Installation and operating instructions.
d. Maintenance and repair instructions.
e. Recommended spare parts lists.
2. Assemble manufacturers' equipment manuals in chronological order following the specifications' numbering system using heavy duty three ring binders.
3. Submit threedetailed and simplified one line, color coded wiring diagrams.
4. Submit field test reports.

1.09 ELECTRONIC COPIES OF AKF DRAWINGS

A. If the contractor requires (.dwg) format, after preparation the drawings will be forwarded only upon receipt of signed acceptance of terms form. Permission from the architect must first be obtained for AKF to include the architectural background as reference. The contractor is to obtain the architects latest drawings directly from the architect.

B. These files are being issued for the convenience of the contractor and the contractor remains responsible for all contract requirements related to the normal shop drawing preparation process.

1.10 SUBMISSIONS:

A. Provide all coordination drawings, ductwork and piping shop drawings in ‘AutoCad” format, version compatible with owner. All catalog cuts and submittals to be provided in electronic “PDF” format the architect will forward all submissions to the engineer.

B. If paper submissions are to be provided the following shall be adhered to.
1. Submissions 11 in. X 17 in. or smaller: If the submission is a catalog cut, then the contractor shall submit one original and one copy. Otherwise, they shall submit two copies. The architect will forward the original and one copy (two copies when no original is received) to the engineer. All catalog cuts shall be complete.
2. Submissions larger than 11 in. X 17 in.: submit two copies to the architect. The architect will forward to the engineer.

C. Indicate on each submission: project name and location, architect and engineer, item identification and approval stamp of prime contractor, subcontractor names and phone numbers, reference to the applicable design drawing or specification article, date and scale.

D. The work described in all shop drawing submission shall be carefully checked for all clearances (including those required for maintenance and servicing), field conditions, maintenance of architectural conditions and proper coordination with all trades on the job.

E. Each submitted shop drawing is to include a certification that all related job conditions have been checked and verified and that there are no conflicts.

F. All shop drawings are to be submitted to allow ample time for checking in advance of field requirements. All submittals to be complete and contain all required and detailed information. Shop drawings with multiple parts shall be submitted as a package.

G. If submittals differ from the contract document requirements, make specific mention of such difference in a letter of transmittal, with request for substitution, together with reasons for same.

1.11 AS-BUILTS AND EQUIPMENT OPERATION INSTRUCTIONS

A. Provide all coordination drawings, ductwork and piping shop drawings in AutoCad format, version compatible with owner. All catalog cuts and submittals to be provided in electronic “PDF” format the architect will forward all submissions to the engineer.

B. On completion and acceptance of work, this contractor shall furnish written instructions, equipment manuals and demonstrate to the owner the proper operation and maintenance of all equipment and apparatus furnished under this contract.

C. The contractor shall give one copy of the instructions to the owner and one copy to the engineer. .

D. Final “as-built” drawings indicating as installed conditions shall be provided to the architect and engineer after completion of the installation.

1.12 OPERATING & MAINTENANCE INSTRUCTION

A. Prepare operating and maintenance instructions manual including operating instructions, maintenance instructions, manufacturer's data, specific equipment data.

B. Provide an alphabetical list of all system components, with the name, address, and 24-hour phone number of the company responsible for servicing each item during the first year of operation.

C. Provide operating instructions for complete system, including:
1. Normal starting, operating, and shut-down
2. Emergency procedures for fire or failure of major equipment
3. Summer and winter special procedures
4. Day and night special procedures

D. Provide maintenance instructions, including:
1. Detailed and simplified one line, color coded wiring diagrams.
2. Proper lubricants and lubricating instructions for each piece of equipment, and date when lubricated
3. Required cleaning, replacement and/or adjustment schedule

E. Provide manufacturer's data on each piece of equipment, including:
1. Installation instructions.
2. Drawings and specifications.
3. Parts list, including recommended items to be stocked.
4. Complete wiring and temperature control diagrams.
5. Marked or revised prints locating all concealed parts and all variations from the original system design.
6. Test and inspection certificates.

F. Provide specific equipment data including, but not limited to, the following:
1. For Communications Systems:

a. RACEWAY
b. WIRE AND CABLE
c. LOW VOLTAGE DISTRIBUTION EQUIPMENT
d. MOTOR CONTROL CENTERS
e. MOTOR CONTROLLERS
f. POWER, CONTROL AND ALARM WIRING SYSTEMS
g. GROUNDING SYSTEM
h. DEVICES
i. LIGHTING FIXTURES
j. DIMMING SYSTEMS
k. TELEPHONE CONDUIT SYSTEM
l. ELECTRICAL PROVISIONS FOR SECURITY AND BUILDING AUTOMATION SYSTEMS
m. ELECTRICAL PROVISIONS FOR FIRE AND LIFE SAFETY
n. CODED - FIRE ALARM SYSTEM
o. MULTIPLEXED FIRE AND LIFE SAFETY SYSTEM (FLSS)
p. TESTING

2. For Fire Alarm System
   a. Drawings and description of system controlled.
   b. Sequence of operation for each system.
   c. Data on components.
   d. Wiring and piping, schematic any layout, for panels and panelboards.
   e. System operating manual, including set points.

G. Provide instruction of operating personnel.
   1. Instruct Owner's operating personnel in proper starting sequences, operation, shutdown, and maintenance procedures, including normal and emergency procedures.
   2. Instruction to be by personnel skilled in operation of equipment. Instructions for major equipment to be by equipment manufacturers' representatives.
   3. Make arrangements to give instructions by system and not by building areas.
   4. Instructions on fire alarm systems to be by manufacturer's representative.

1.13 STAIRWAYS

A. Electrical equipment and distribution is prohibited in egress stairways unless serving the stairway.

1.14 PRODUCT, DELIVERY, HANDLING AND STORAGE

A. Ship materials and equipment in crated sections of sizes to permit passing through available space, where required

B. Deliver equipment with protective crating and shrink-wrapped covering.

C. Receive and accept materials and equipment at the site, properly handle, house, and protect them from damage and the weather until installation. Replace equipment damaged in the course of handling without additional charge.

D. Store to prevent damage and protect from weather, dirt, fumes, water, and construction debris in clean dry space

E. Arrange for and provide storage space or area at the job site for all materials and equipment to be received and/or installed in this project

F. All exposed openings of equipment and materials are to be covered

G. Handle according to manufacturer's written rigging and installation instructions for unloading, transporting, and setting in final location

H. Protect units from physical damage. Leave factory shipping covers in place until installation

1.15 ACCESSIBILITY

A. Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made without written approval.

B. Group concealed valves, expansion joints, controls, dampers, and equipment requiring access, so as to be freely accessible through access doors.

1.16 SPECIAL TOOLS

A. Provide one set of any special tools required to operate, adjust, dismantle or repair equipment furnished under this Division for the Owner's use at the completion of the work.

B. Provide one suitable tool case for special tools.

1.17 CUTTING AND PATCHING

A. Provide all carpentry, cutting and patching required for proper installation of materials and equipment specified. Do not cut or drill structural members without review by Architect and Structural Engineer.

1.18 UTILITY CONNECTIONS

A. Arrange for and pay costs for all specified utilities including the following:
   1. Connection to utility company mains.
   2. Payment of service charges.
   3. Provision for temporary utilities.
   4. Connect in accordance with authority having jurisdiction.

1.19 PROTECTION OF MATERIALS

A. Protect from damage, water, dust, etc., materials, equipment and apparatus provided under this trade, both in storage and installed

1.20 SUBSTITUTIONS

A. No substitute material or manufacturer of equipment shall be permitted without a formal written submittal to the engineer which includes all dimensional, performance and material specifications and is approved in writing by the engineer. Any changes in layout or design brought about by the use of a substitution shall be submitted to the engineer fully designed for review in conjunction with the submittal of the alternate. Any substitution must be submitted with an explanation why a substitution is being utilized. If the substitute is being utilized for financial reasons, the associated credit must be simultaneously submitted. Final acceptance or rejection of any substitution is subject to the owner's review.

B. Contractor to be responsible for the additional cost relating to the substitution, including but not limited to space requirements, structural support, utilities including electrical power, gas, water, etc.

1.21 STANDARDS:

A. If any item in the specification, as furnished by the contractor, is manufactured in a location which does not certify UI/ASME/ANSI standards, the contractor is to pay the Owner for ALL expenses incurred by the Owner for an outside testing company to confirm such compliance.

1.22 COORDINATION

A. Arrange for distribution spaces, space for equipment, chases, slots, and openings in building structure during progress of construction, to allow for electrical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for electrical items requiring access that are concealed behind finished surfaces.

D. Do not install conduits, wiring, equipment or other materials in locations that block access to items and equipment requiring access or removal including items of other trades.

E. Provide coordination drawing for all areas of the work. The drawings shall have the following qualities:

1. Minimum 3/8” scale
2. Clearly show all the work for each trade including, but not limited to hangers, valves, dampers, actuators, access doors and service access requirements for all items.
3. Indicate bottom elevations of all ductwork, electrical conduit, raceways, cable trays, control wiring and piping.
4. Ductwork, piping, and conduit 3 inches and smaller may be shown in single line.
5. Ductwork, piping, and conduit greater than 3 inches shall be shown in double line.
6. Color scheme:
    a. Architectural and structural background: Light grey.
    b. Ductwork: Black.
    c. Equipment and pads: Purple.
    d. HVAC piping and equipment: Green.
    e. Electrical conduits and equipment: Blue.
    f. Plumbing: Orange.
    g. Fire protection: Red.
    h. Control wiring: Pink.

1.23 GUARANTEE

A. The Contractor shall furnish a written guarantee to replace or repair promptly and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within one year form the date of final certificate for payment and/or from date or actual use of equipment or occupancy of spaces by Owner included under the various parts of work, whichever date is earlier. This work shall be done as directed by the Owner. This guarantee shall also provide that where defects occur, the Contractor will assume responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by the Contractor.

1.24 PERMITS AND FEES

A. The Contractor shall give necessary notice, file drawings and specifications with the department having jurisdiction, obtain permits or licenses necessary to carry out this work and pay all fees therefore. The Contractor shall arrange for inspection and test of any or all parts of the work if so required by authorities and pay all charges for same. The Contractor shall pay all costs for, furnish to the Owner before final billing, all certificates necessary as evidence that the work installed conforms with all regulations where they apply to this work.

B. This contractor shall prepare or hire the necessary consultants to prepare and file all plans, calculation, forms, etc.. required for filing with all agencies required for this work including but not limited to FDNY, etc..

C. The electrical contractor shall prepare the as-built drawings to comply with the FDNY requirements and send electronic copy to AKF for use in preparing the as-built FDNY drawing as the engineer of record. The electrical contractor shall sign and seal the AKF drawing, for the functional statement part of the as-built requirements. AKF will sign and seal for the engineer of record.

1.25 SPECIAL INSPECTION

A. Special inspection shall be provided by the owner. This contractor shall provide all required services to accomplish these inspections.

1.26 SERVICE AND WARRANTY (MAINTENANCE CONTRACT)

A. This contract shall provide a full year service and warranty of all electrical components and systems, with add alternate prices for years 2, 3 and 4 following this first year. At the time of acceptance of project, the tenant or owner’s representative will decide to accept which alternate, if any.

1.27 RIGGING

A. This contractor shall provide all required rigging, hoisting and bracing to install the equipment as indicated on the plans. This work shall be performed by an insured certified licensed rigging company that is experienced in rigging equipment of the type indicated for the

areas shown on the construction documents. This contractor shall submit rigging plans for approval prior to proceeding with the work.

B. All permits required from the authorities and agencies involved to perform the rigging are the responsibilities of this contractor.

C. All structural supports, modifications or additions are to be submitted to the structural engineer for approval prior to proceeding with the work. All supplemental structural supports, elevator charges /modifications, bracing and protection required for the rig is the responsibility of this contractor

D. The rigging contractor shall hire and pay for all charges and services of the building elevator contractor for the rigging of the equipment

1.28 FIELD QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

H. See individual specification sections for testing and inspection required.

I. Replace Work or portions of the Work not complying with specified requirements.

J. Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

PART 2 PRODUCTS

2.01 BASE BID MANUFACTURERS

A. Base bid on materials or equipment are specified by name of manufacturer, brand or trade name and catalog reference.

B. The choice will be optional with bidder where two or more manufacturers are named.

C. The following are base bid manufacturers for items under this Section:
1. Access doors: Karp Associates, Inc., Higgins Mfg. Co., Milcor Steel Co., and Walsh-Spencer Co.
2. Paint: Sherwin-Williams, Pittsburgh Plate Glass Co., Pratt and Lambert, and Rust-Oleum.
3. Gratings: Irving Grating IKG Industries and Ryerson - Inland Steel Co.

2.02 ACCESS TILE IDENTIFICATION:

A. In removable ceiling tiles, provide buttons, tabs, and markers to identify location of concealed work. Submit for review.

2.03 NAMEPLATES

A. Provide nameplates with inscriptions, subject to review, indicating equipment and voltage. Fasten with epoxy cement or chrome plated screws. Nameplate shall be black Lamicoid sheet with white lettering.

B. Provide nameplates for the following:
1. Disconnect switches.

2. Individual circuit breakers.
3. Panels.
4. Cabinets
5. Switchboards.
6. Motor Controllers.
7. Motor Control Centers.

PART 3 - EXECUTION

3.01 CUTTING THROUGH CELLULAR FLOORING

A. Cut openings for reception of work in accordance with manufacturer's recommendations and approval and in a manner not to interrupt continuity of electrical raceways.

3.02 ELECTRICAL IDENTIFICATION

A. Refer to identification Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. Perform tests as noted, and in the presence of Architect and/or Engineer and authorities having jurisdiction.

B. Provide required labor, material, equipment, and connections necessary for tests and submit results for review.

C. Repair or replace defective work and pay for restoring or replacing damaged work due to tests, as directed.

3.04 START-UP

A. Properly lubricate all pieces of equipment.

B. Check and clean all pipes and ducts of dirt and debris.

C. Prepare each piece of equipment in accordance with manufacturer's installation instructions and have a copy at the equipment.

D. Check rotation on each motor.

E. Have representatives of each manufacturer present when hereinafter specified, so that equipment will be started up by manufacturer.

3.05 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.

B. Clean and repair painted exposed work, soiled or damaged, to match adjoining work before final acceptance.

C. Remove debris from inside and outside of material and equipment.

3.06 PROJECT CLOSEOUT PROCEDURES

A. It shall be each contractor's responsibility to personally hand-deliver all of the required project closeout checklist items and to obtain Owner's authorized representative(s) signed receipt on all items requiring Owner sign-off.

B. Review requirements of each section of the specifications and submit for approval to Architect the sign-off forms which shall become the project closeout checklist. These, at a minimum, shall include the following information shown in attached Project Closeout Checklist Example. The Architect and/or Owner may incorporate additional specific items to the following checklist which shall become part of the project requirements.

C. Closeout Checklist Example:

	DATES		
ITEM	**COMPLETED**	**RECEIVED BY OWNER**	**OWNER'S SIGNOFF**
PERMITS			

CITY AND COUNTY INSPECTION			
MANUFACTURER'S WARRANTIES			
CONTRACTOR'S WARRANTIES			
STATE FIRE RATING DATA			
COPY OF FINAL SHOP DRAWINGS			
LIST AND POSSESSION OF SPARE PARTS			
PRESSURE TESTS			
EQUIPMENT TESTS REQUIRED BY SPECS			
O & M MANUALS			
RECORD DOCUMENTS			
COORDINATION DRAWINGS			
FIELD TEST REPORTS			
COMMISSIONING REPORTS/LETTERS/FORMS			
ON-SITE TRAINING COMPLETE			
PROTECTIVE DEVICE SETTINGS			
TAGS AND CHARTS			
FINAL FA INSTALLATION DRAWINGS			
INSURANCE UNDERWRITERS APPROVALS			
FINAL PUNCH LIST (INITIALED BY CONTRACTOR THAT ITEMS ARE COMPLETE)			
BUILDING CERTIFICATE OF OCCUPANCY (C.O.)			
24-HOUR PHONE NO. FOR SERVICE DURING GUARANTEE PERIOD			

END OF SECTION 260001

SECTION 260300
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

1.02 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2023a.

B. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems 2020a.

C. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers 2020a.

D. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).

E. ITS (DIR) - Directory of Listed Products Current Edition.

F. FM 4991 - Approval Standard of Firestop Contractors 2013.

G. FM (AG) - FM Approval Guide Current Edition.

H. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2022).

I. UL (DIR) - Online Certifications Directory Current Edition.

J. UL (FRD) - Fire Resistance Directory Current Edition.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Sustainable Design Submittal: Submit VOC content documentation for all non-preformed materials.

E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Installer Qualification: Submit qualification statements for installing mechanics.

1.04 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. Trained by manufacturer.
   2. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
   3. Verification of minimum three years documented experience installing work of this type.
   4. Verification of at least five satisfactorily completed projects of comparable size and type.
   5. Licensed by local authorities having jurisdiction (AHJ).

1.05 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:
   1. 3M Fire Protection Products; _____: www.3m.com/firestop.
   2. Hilti, Inc; _____: www.us.hilti.com.
   3. Specified Technologies Inc; _____: www.stifirestop.com.

2.02 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

C. Mold and Mildew Resistance: Provide firestoppping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

A. Penetrations Through Floors or Walls By:
   1. Multiple Penetrations in Large Openings:
      a. 3 Hour Construction: UL System C-AJ-8093; Specified Technologies Inc. SSB Intumescent Firestop pillows.
      b. 3 Hour Construction: UL System C-AJ-8099; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      c. 3 Hour Construction: UL System C-AJ-8110; Hilti CFS-BL Firestop Block.
      d. 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      e. 2 Hour Construction: UL System C-AJ-8035; Specified Technologies Inc. SSM mortar.
      f. 2 Hour Construction: UL System C-AJ-8055; Specified Technologies Inc. SSP Firestop Putty.
      g. 2 Hour Construction: UL System C-AJ-8093; Specified Technologies Inc. SSB Intumescent Firestop pillows.
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 3 Hour Construction: UL System C-AJ-1079; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
      b. 3 Hour Construction: UL System C-AJ-1184; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      c. 3 Hour Construction: UL System C-AJ-1198; Specified Technologies Inc. SIL silicone sealant.

d. 3 Hour Construction: UL System C-AJ-1215; Specified Technologies Inc. LC Endothermic Firestop Sealant.
e. 3 Hour Construction: UL System C-AJ-1217; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
f. 3 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
g. 3 Hour Construction: UL System C-AJ-1353; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
h. 3 Hour Construction: UL System C-AJ-1421; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 604 Self-Leveling Firestop Sealant.
i. 3 Hour Construction: UL System C-AJ-1425; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade.
j. 2 Hour Construction: UL System C-AJ-1090; Specified Technologies Inc. SSP Firestop Putty.
k. 2 Hour Construction: UL System C-AJ-1198; Specified Technologies Inc. SIL silicone sealant.
l. 2 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
m. 2 Hour Construction: UL System C-AJ-1240; Specified Technologies Inc. LC Endothermic Firestop Sealant.

3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
   a. 3 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
   b. 3 Hour Construction: UL System C-AJ-2220; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   c. 3 Hour Construction: UL System C-AJ-2297; Specified Technologies Inc. SSC collars.
   d. 2 Hour Construction: UL System C-AJ-2167; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   e. 2 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
   f. 2 Hour Construction: UL System C-AJ-2297; Specified Technologies Inc. SSC collars.
   g. 2 Hour Construction: UL System C-AJ-2298; Specified Technologies Inc. LCC Intumescent Firestop Collars.
   h. 2 Hour Construction: UL System C-BJ-2021; Hilti CP 643N Firestop Collar.
4. Electrical Cables Not In Conduit:
   a. 3 Hour Construction: UL System C-AJ-3085; Specified Technologies Inc. LC Endothermic Firestop Sealant.
   b. 3 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   c. 3 Hour Construction: UL System C-AJ-3154; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
   d. 3 Hour Construction: UL System C-AJ-3231; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
   e. 3 Hour Construction: UL System C-AJ-3312; Specified Technologies Inc. FP Intumescent Firestop Plug.
   f. 2 Hour Construction: UL System C-AJ-3216; Hilti CFS-PL Firestop Plug.
   g. 2 Hour Construction: UL System C-AJ-3283; Hilti CP653 Speed Sleeve.
   h. 2 Hour Construction: UL System W-J-3198; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.
   i. 2 Hour Construction: UL System W-J-3199; Hilti CFS-SL SK Firestop Sleeve Kit.
5. Cable Trays with Electrical Cables:
   a. 3 Hour Construction: UL System C-AJ-4029; Specified Technologies Inc. SSB Intumescent Firestop pillows.
   b. 3 Hour Construction: UL System C-AJ-4093; Hilti CFS-BL Firestop Block.
   c. 2 Hour Construction: UL System C-AJ-4094; Hilti CFS-BL Firestop Block.

6. Electrical Busways:
   a. 3 Hour Construction: UL System C-AJ-6017; Hilti FS-ONE MAX Intumescent Firestop Sealant.
7. HVAC Ducts, Uninsulated:
   a. 3 Hour Construction: UL System C-AJ-7051; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   b. 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE MAX Intumescent Firestop Sealant.

B. Penetrations Through Floors By:
1. Multiple Penetrations in Large Openings:
   a. 3 Hour Construction: UL System F-A-1023; Hilti CP 680-P/M Cast-In Device.
   b. 2 Hour Construction: UL System F-A-8012; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade or CFS-S SIL SL Firestop Silicone Sealant Self-Leveling.
2. Uninsulated Metallic Pipe, Conduit, and Tubing:
   a. 3 Hour Construction: UL System F-A-1017; Hilti CP 680-P/M Cast-In Device.
   b. 3 Hour Construction: UL System F-A-1110; Specified Technologies Inc. CID cast-in devices.
   c. 2 Hour Construction: UL System F-A-1016; Hilti CP 680-P/M Cast-In Device.
   d. 2 Hour Construction: UL System F-A-1110; Specified Technologies Inc. CID cast-in devices.
3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
   a. 3 Hour Construction: UL System F-A-2054; Hilti CP 680-P Cast-In Device.
   b. 3 Hour Construction: UL System F-A-2066; Hilti CP 680-P Cast-In Device.
   c. 3 Hour Construction: UL System F-A-2213; Hilti CFS-DID Drop-In Device.
   d. 3 Hour Construction: UL System F-A-2192; Specified Technologies Inc. CID cast-in devices.
   e. 3 Hour Construction: UL System F-A-2246; Specified Technologies Inc. CID cast-in devices.
   f. 2 Hour Construction: UL System F-A-2065; Hilti CP 680-P Cast-In Device.
   g. 2 Hour Construction: UL System F-A-2213; Hilti CFS-DID Drop-In Device.
   h. 2 Hour Construction: UL System F-A-2053; Hilti CP 680-P Cast-In Device.
4. Electrical Cables Not In Conduit:
   a. 3 Hour Construction: UL System F-A-3021; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
   b. 3 Hour Construction: UL System F-A-3029; Specified Technologies Inc. Ready-Sleeve.
   c. 3 Hour Construction: UL System F-A-3037; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
   d. 3 Hour Construction: UL System F-A-3054; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
   e. 3 Hour Construction: UL System F-A-3033; Hilti CP 680-P/M Cast-In Device.
   f. 2 Hour Construction: UL System F-A-3033; Hilti CP 680-P/M Cast-In Device.
   g. 2 Hour Construction: UL System F-A-3032; Specified Technologies Inc. Ready Split Sleeve.
   h. 2 Hour Construction: UL System F-A-3058; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.

C. Penetrations Through Walls By:
1. Uninsulated Metallic Pipe, Conduit, and Tubing:
   a. 2 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   b. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
2. Electrical Cables Not In Conduit:

a. 4 Hour Construction: UL System W-J-3142; Specified Technologies Inc. Ready-Sleeve.
b. 4 Hour Construction: UL System W-J-3157; Specified Technologies Inc. Ready Split Sleeve.
c. 4 Hour Construction: UL System W-J-3195; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
d. 2 Hour Construction: UL System C-AJ-3095; Hilti FS-ONE MAX Intumescent Firestop Sealant.
e. 2 Hour Construction: UL System C-AJ-3216; Hilti CFS-PL Firestop Plug.
f. 2 Hour Construction: UL System W-J-3098; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
g. 2 Hour Construction: UL System W-J-3130; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
h. 2 Hour Construction: UL System W-J-3138; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
i. 2 Hour Construction: UL System W-J-3141; Specified Technologies Inc. Ready-Sleeve.
j. 2 Hour Construction: UL System W-J-3156; Specified Technologies Inc. Ready Split Sleeve.
k. 2 Hour Construction: UL System W-J-3158; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
l. 2 Hour Construction: UL System W-J-3180; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
m. 2 Hour Construction: UL System W-J-3182; Specified Technologies Inc. Ready Split Sleeve.
n. 2 Hour Construction: UL System W-J-3182; Specified Technologies Inc. Ready-Sleeve.

2.05 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

A. Penetrations By:
1. Multiple Penetrations in Large Openings:
a. 2 Hour Construction: UL System W-L-8013; Hilti CFS-BL Firestop Block.
b. 2 Hour Construction: UL System W-L-8025; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
c. 2 Hour Construction: UL System W-L-8050; Specified Technologies Inc. SSB Intumescent Firestop pillows.
d. 2 Hour Construction: UL System W-L-8071; Hilti FS-ONE MAX Intumescent Firestop Sealant.
e. 2 Hour Construction: UL System W-L-8079; Hilti FS-ONE MAX Intumescent Firestop Sealant.
f. 1 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
g. 1 Hour Construction: UL System W-L-8013; Hilti CFS-BL Firestop Block.
h. 1 Hour Construction: UL System W-L-8025; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
i. 1 Hour Construction: UL System W-L-8050; Specified Technologies Inc. SSB Intumescent Firestop pillows.
j. 1 Hour Construction: UL System W-L-8071; Hilti FS-ONE MAX Intumescent Firestop Sealant.
k. 1 Hour Construction: UL System W-L-8079; Hilti FS-ONE MAX Intumescent Firestop Sealant.
2. Uninsulated Metallic Pipe, Conduit, and Tubing:
a. 2 Hour Construction: UL System W-L-1033; Specified Technologies Inc. SIL silicone sealant.
b. 2 Hour Construction: UL System W-L-1049; Specified Technologies Inc. SSS Intumescent Firestop Sealant.

c. 2 Hour Construction: UL System W-L-1090; Specified Technologies Inc. LC Endothermic Firestop Sealant.
d. 2 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
e. 2 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
f. 2 Hour Construction: UL System W-L-1222; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
g. 1 Hour Construction: UL System W-L-1049; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
h. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
i. 1 Hour Construction: UL System W-L-1090; Specified Technologies Inc. LC Endothermic Firestop Sealant.
j. 1 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
k. 1 Hour Construction: UL System W-L-1222; Specified Technologies Inc. LCI Intumescent Firestop Sealant.

3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
   a. 2 Hour Construction: UL System W-L-2074; Specified Technologies Inc. SSC collars.
   b. 2 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
   c. 2 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   d. 2 Hour Construction: UL System W-L-2237; Specified Technologies Inc. LCC Intumescent Firestop Collars.
   e. 2 Hour Construction: UL System W-L-2493; Specified Technologies Inc. RTC range-taking collar.
   f. 1 Hour Construction: UL System W-L-2074; Specified Technologies Inc. SSC collars.
   g. 1 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
   h. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   i. 1 Hour Construction: UL System W-L-2237; Specified Technologies Inc. LCC Intumescent Firestop Collars.
   j. 1 Hour Construction: UL System W-L-2241; Specified Technologies Inc. WF300 Intumescent Firestop Caulk (for wood frame construction).
   k. 1 Hour Construction: UL System W-L-2493; Specified Technologies Inc. RTC range-taking collar.
4. Electrical Cables Not In Conduit:
   a. 4 Hour Construction: UL System W-L-3276; Specified Technologies Inc. Ready-Sleeve.
   b. 4 Hour Construction: UL System W-L-3304; Specified Technologies Inc. Ready Split Sleeve.
   c. 4 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
   d. 3 Hour Construction: UL System W-L-3276; Specified Technologies Inc. Ready-Sleeve.
   e. 3 Hour Construction: UL System W-L-3304; Specified Technologies Inc. Ready Split Sleeve.
   f. 3 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
   g. 2 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
   h. 2 Hour Construction: UL System W-L-3076; Specified Technologies Inc. SSS Intumescent Firestop Sealant.

i. 2 Hour Construction: UL System W-L-3084; Specified Technologies Inc. SSB Intumescent Firestop pillows.
j. 2 Hour Construction: UL System W-L-3169; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
k. 2 Hour Construction: UL System W-L-3218; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
l. 2 Hour Construction: UL System W-L-3255; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
m. 2 Hour Construction: UL System W-L-3256; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
n. 2 Hour Construction: UL System W-L-3265; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
o. 2 Hour Construction: UL System W-L-3303; Specified Technologies Inc. Ready Split Sleeve.
p. 2 Hour Construction: UL System W-L-3306; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
q. 2 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
r. 2 Hour Construction: UL System W-L-3350; Specified Technologies Inc. LC Endothermic Firestop Sealant.
s. 2 Hour Construction: UL System W-L-3357; Specified Technologies Inc. FP Intumescent Firestop Plug.
t. 2 Hour Construction: UL System W-L-3358; Specified Technologies Inc. Ready Split Sleeve.
u. 2 Hour Construction: UL System W-L-3358; Specified Technologies Inc. Ready-Sleeve.
v. 2 Hour Construction: UL System W-L-3374; Specified Technologies Inc. FP Intumescent Firestop Plug.
w. 2 Hour Construction: UL System W-L-3376; Specified Technologies Inc. Ready-Sleeve.
x. 2 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
y. 2 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
z. 2 Hour Construction: UL System W-L-3390; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
aa. 2 Hour Construction: UL System W-L-3393; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.
bb. 2 Hour Construction: UL System W-L-3395; Hilti CP653 Speed Sleeve.
cc. 1 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
dd. 1 Hour Construction: UL System W-L-3076; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
ee. 1 Hour Construction: UL System W-L-3084; Specified Technologies Inc. SSB Intumescent Firestop pillows.
ff. 1 Hour Construction: UL System W-L-3169; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
gg. 1 Hour Construction: UL System W-L-3218; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
hh. 1 Hour Construction: UL System W-L-3255; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
ii. 1 Hour Construction: UL System W-L-3256; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
jj. 1 Hour Construction: UL System W-L-3265; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.

kk. 1 Hour Construction: UL System W-L-3303; Specified Technologies Inc. Ready Split Sleeve.
ll. 1 Hour Construction: UL System W-L-3306; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
mm. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
nn. 1 Hour Construction: UL System W-L-3350; Specified Technologies Inc. LC Endothermic Firestop Sealant.
oo. 1 Hour Construction: UL System W-L-3357; Specified Technologies Inc. FP Intumescent Firestop Plug.
pp. 1 Hour Construction: UL System W-L-3358; Specified Technologies Inc. Ready Split Sleeve.
qq. 1 Hour Construction: UL System W-L-3358; Specified Technologies Inc. Ready-Sleeve.
rr. 1 Hour Construction: UL System W-L-3374; Specified Technologies Inc. FP Intumescent Firestop Plug.
ss. 1 Hour Construction: UL System W-L-3376; Specified Technologies Inc. Ready-Sleeve.
tt. 1 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
uu. 1 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
vv. 1 Hour Construction: UL System W-L-3390; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
ww. 1 Hour Construction: UL System W-L-3393; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.

5. Cable Trays with Electrical Cables:
   a. 2 Hour Construction: UL System W-L-4008; Specified Technologies Inc. SSB Intumescent Firestop pillows.
   b. 2 Hour Construction: UL System W-L-4011; Hilti CFS-BL Firestop Block.
   c. 2 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   d. 1 Hour Construction: UL System W-L-4008; Specified Technologies Inc. SSB Intumescent Firestop pillows.
   e. 1 Hour Construction: UL System W-L-4011; Hilti CFS-BL Firestop Block.
   f. 1 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.

C. Do not cover installed firestopping until inspected by authorities having jurisdiction.

D. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174, and ASTM E2393.

B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 260300

SECTION 260400
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. Electrical systems and equipment.
   3. Items specified in individual product Sections.

1.02 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Architect for transmittal to Owner.
   2. Submit to Commissioning Authority for review and inclusion in overall training plan.
   3. Submit not less than four weeks prior to start of training.
   4. Revise and resubmit until acceptable.
   5. Provide an overall schedule showing all training sessions.
   6. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Training Reports:
   1. Identification of each training session, date, time, and duration.
   2. Sign-in sheet showing names and job titles of attendees.
   3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
   4. Include Commissioning Authority's formal acceptance of training session.

E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
   1. Format: DVD Disc.
   2. Label each disc and container with session identification and date.

1.03 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

B. Conduct training on-site unless otherwise indicated.

C. Owner will provide classroom and seating at no cost to Contractor.

D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

E. Provide training in minimum two hour segments.

F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

I. Product- and System-Specific Training:

1. Review the applicable O&M manuals.
2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION 260400

SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building wires, cable, connectors, splices, terminations, etc., rated 600V or less. These items are as follows:
   1. Single conductor building wire.
   2. Metal-clad cable.
   3. Wiring connectors.
   4. Electrical tape.
   5. Heat shrink tubing.
   6. Wire pulling lubricant.
   7. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

G. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable 2018.

H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.

I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.

K. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.

L. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.

M. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.

N. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.

O. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.

P. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
      b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
         1) Exception: Provide wires in raceway for circuit homerun from the first junction box located in the nearest concealed location to panelboard.
   2. In addition to other applicable restrictions, may not be used:
      a. Unless approved by Owner.
      b. Where exposed to damage.
      c. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.

2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

H. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
a. Exceptions:
1) 20 A, 120 V circuits longer than 55 feet: 10 AWG, for 3% voltage drop.
2) 20 A, 120 V circuits longer than [95] feet ([29] m): 8 AWG, for 2% voltage drop.
3) 20 A, 120 V circuits longer than 145 feet: 6 AWG, for 3% voltage drop.
4) 20 A, 277 V circuits longer than 125 feet: 10 AWG, for 3% voltage drop.
5) 20 A, 277 V circuits longer than [210] feet ([64] m): 8 AWG, For 3% voltage drop.
2. Control Circuits: 14 AWG.

I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

J. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
3. Color Code:
a. 480Y/277 V, 3 Phase, 4 Wire System:
1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.
4) Neutral/Grounded: Gray.
b. 208Y/120 V, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.
c. Equipment Ground, All Systems: Green.
d. Isolated Ground, All Systems: Green with yellow stripe.
e. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN, except as indicated below.

2.04 METAL-CLAD CABLE

A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

B. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

E. Grounding: Full-size integral equipment grounding conductor.

F. Provide UL listed 2-hour fire rated cable where indicated or required by code.

G. Armor: Steel, interlocked tape.

H. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 260526.

C. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.

E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

F. Mechanical Connectors: Provide bolted type or set-screw type.

G. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.06 ACCESSORIES

A. Electrical Tape:
1. Manufacturers:
a. 3M: www.3m.com.
2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated without specific routing, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
   5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   6. Maintain separation of wiring for emergency, legally required, and optional standby systems [essential system branches] in accordance with NFPA 70.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable pulling means and wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors in Multiset Feeders: Install conductors of the same length and terminate in the same manner.

G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

H. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

I. Install conductors with a minimum of 12 inches of slack at each outlet.

J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

K. Group or otherwise identify neutral and equipment grounding conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

L. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

N. Insulate ends of spare conductors using vinyl insulating electrical tape.

O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION 260519

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. NFPA 99 - Health Care Facilities Code; 2018 [2005 in NYC].

C. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
   3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

END OF SECTION 260526

SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.

D. MFMA-4 - Metal Framing Standards Publication 2004.

E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. All hangars, supports and anchorage to structure shall be selected by the manufacturer's authorized representative and approved by the project structural engineer.

D. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

E. Installer Qualifications for Field-Welding: As specified in Section 055000. Qualify processes and operators acording to AWS D1.1/D1.1M "Structural Welding Code - Steel.

F. Certify that each welder has passed AWS qualification tests for welding processesinvolved and that certification is current.

G. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.04 SUPPLEMENTARY STEEL

A. Furnish supplementary steel as required for proper installation, mounting and support of electrical work.

B. Connect supplementary steel firmly to building construction in an acceptable manner.

C. Determine type and size of supplementary steel. Supplementary steel shall be of sufficient strength and size to allow a minimum deflection of the span and in conformance with manufacturer's requirements of loading.

D. Install supplementary steel in a neat and workmanlike manner parallel to walls, floors and ceiling construction.

E. All supplementary steel and channel supports shall be submitted to the structural engineer for review

1.05 EXPANSION ANCHORS

A. Provide spacing and install anchors in accordance with manufacturer's recommendations.

B. Comply with ACI 318 as amended by the authority having jurisdiction.

C. All expansion anchors shall be submitted to the structural engineer for review.

D. File all post installed anchors and assist with special inspections where required by the authority having jurisdiction.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 4.0. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Comply with MFMA-4.
   2. Minimum Channel Thickness: 1/8 inch.
   3. Minimum Channel Dimensions: 1-1/2 inch width by 1-1/2 inch height.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Equipment Support and Attachment:
   1. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

G. Remove temporary supports.

END OF SECTION 260529

SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).
B. Intermediate metal conduit (IMC).
C. Flexible metal conduit (FMC).
D. Liquidtight flexible metal conduit (LFMC).
E. Electrical metallic tubing (EMT).
F. Conduit fittings.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 260526 - Grounding and Bonding for Electrical Systems.
C. Section 260529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
H. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
I. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
J. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
K. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
L. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
M. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

D. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

E. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

F. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

G. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

H. Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors.

2.02 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4 inch (21 mm) trade size.
   2. Control Circuits: 3/4 inch (21 mm) trade size.

D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com.
   2. Nucor Tubular Products: www.nucortubular.com.
   3. Western Tube, a division of Zekelman Industries: www.westerntube.com.
   4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com.
c. Thomas & Betts Corporation: www.tnb.com.
d. Substitutions: See Section 016000 - Product Requirements.
2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Manufacturers:
1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com.
2. Nucor Tubular Products: www.nucortubular.com.
3. Western Tube, a division of Zekelman Industries: www.westerntube.com.
4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com.

B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com.
c. Thomas & Betts Corporation: www.tnb.com.
2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Description: , Type FMC standard wall steel flexible metal conduit listed and labeled as complying with , and listed for use in classified firestop systems to be used.NFPA 70UL 1

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: , Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with .NFPA 70UL 360

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com.
2. Nucor Tubular Products: www.nucortubular.
3. Western Tube, a division of Zekelman Industries: www.westerntube.com.
4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com.
c. Thomas & Betts Corporation: www.tnb.com.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use compression (gland) or double set-screw type.
a. Do not use indenter type connectors and couplings.
b. Single set screw fittings are not permitted.cut

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Conduit Routing:
1. Unless dimensioned, conduit routing indicated is diagrammatic.
2. When conduit destination is indicated without specific routing, determine exact routing required. The final routing shall be coordinated with other trades and architects.

F. Conduit Support:
1. Secure and support conduits in accordance with and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.NFPA 70
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

G. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.

3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where conduits are subject to earth movement by settlement or frost.

J. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

K. Provide grounding and bonding in accordance with Section 260526.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION 260533.13

SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Floor boxes.

1.02 RELATED REQUIREMENTS

A. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260533.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

D. Section 262726 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013 (Reaffirmed 2020).

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

I. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades and architect to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.

5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades and architect to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use suitable concrete type boxes where flush-mounted in concrete.
4. Use suitable masonry type boxes where flush-mounted in masonry walls.
5. Use raised covers suitable for the type of wall construction and device configuration where required.
6. Use shallow boxes where required by the type of wall construction.
7. Do not use "through-wall" boxes designed for access from both sides of wall.
8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
12. Wall Plates: Comply with Section 262726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:

1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

D. Floor Boxes:
1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 262726; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
2. Manufacturer: Same as manufacturer of floor box service fittings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency, legally required, optional standby, and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Where floor mounted power receptacle outlet and low voltage system outlet (IT, audio, video, etc.) occur at the same location, power and low voltage system devices shall be provided with a multiple gang box under a single cover plate as required.

G. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

H. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

I. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
2. Unless dimensioned, box locations indicated are approximate.
3. Locate boxes so that wall plates do not span different building finishes.
4. Locate boxes so that wall plates do not cross masonry joints.
5. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
7. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
8. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
    a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
    b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100

square feet of wall area.

9. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.

J. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

K. Install boxes plumb and level.

L. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

M. Install boxes as required to preserve insulation integrity.

N. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

O. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

Q. Close unused box openings.

R. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

S. Provide grounding and bonding in accordance with Section 260526.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION 260533.16

SECTION 260533.23
SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface raceway systems.

B. Wireways.

Wall duct.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260533.13 - Conduit for Electrical Systems.

D. Section 260533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of raceways with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate rough-in locations of outlet boxes provided under Section 260533.16 and conduit provided under Section 260533.13 as required for installation of raceways provided under this section.
3. Verify minimum sizes of raceways with the actual conductors and components to be installed.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install raceways until final surface finishes and painting are complete.
2. Do not begin installation of conductors and cables until installation of raceways is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

See Section 013000 - Administrative Requirements, for submittal procedures.

A. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.

1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

A. Provide all components, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 WIREWAYS

A. Manufacturers:
1. Cooper B-Line, a division of Cooper Industries; _____: www.cooperindustries.com.
2. Hoffman, a brand of Pentair Technical Products; _____: www.hoffmanonline.com.
3. Schneider Electric; Square D Products; _____: www.schneider-electric.us.

B. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870.

C. Wireway Type, Unless Otherwise Indicated:

D. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.

C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install raceways plumb and level.

D. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.

E. Secure and support raceways in accordance with Section 260529 at intervals complying with NFPA 70 and manufacturer's requirements.

F. Close unused raceway openings.

G. Provide grounding and bonding in accordance with Section 260526.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect raceways for damage and defects.

C. Correct wiring deficiencies and replace damaged or defective raceways.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 PROTECTION

A. Protect installed raceways from subsequent construction operations.

END OF SECTION 260533.23

SECTION 260547
VIBRATION CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.

B. Vibration-isolated equipment support bases.

C. Vibration isolators.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

B. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

C. Section 260529 - Hangers and Supports for Electrical Systems.

1.03 DEFINITIONS

A. Electrical Component: Where referenced in this section in regards to seismic controls, applies to any portion of the electrical system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., conduit, cable tray).

1.04 REFERENCE STANDARDS

A. ASCE 19 - Structural Applications of Steel Cables for Buildings 2016.

B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.

C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2022.

D. MFMA-4 - Metal Framing Standards Publication 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.

1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
2. Seismic Controls: Include seismic load capacities.

D. Shop Drawings - Vibration Isolation Systems:
1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.
2. Vibration-Isolated Equipment Support Bases: Include base weights, including concrete fill where applicable; indicate equipment mounting provisions.

E. Evaluation Reports: For products specified as requiring evaluation and recognition by a qualified evaluation service, provide current evaluation reports.

F. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Evidence of qualifications for manufacturer.

H. Manufacturer’s detailed field testing and inspection procedures.

I. Field quality control test reports.

1.07 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION SYSTEM MANUFACTURERS

A. Kinetics Noise Control, Inc; _____: www.kineticsnoise.com.

B. Mason Industries; _____: www.mason-ind.com.

C. Vibration Eliminator Company, Inc; _____: www.veco-nyc.com.

D. Vibration Mountings & Controls, Inc., Bloomingdale, NJ

E. Amber Booth, Houston, TX

2.02 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing electrical equipment and/or electrical connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
1. Select vibration isolators to provide required static deflection.
2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
3. Select seismic type vibration isolators to comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
4. Select vibration isolators for outdoor equipment to comply with wind design requirements.
5. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2-inch operating clearance beneath base unless otherwise indicated.

D. Equipment Isolation:
1. Transformers:
a. Specified vibration isolators are in addition to any factory-installed internal core and coil assembly vibration isolators unless otherwise indicated.
b. Floor-Mounted Transformers, Nonseismic Applications: Use resilent material isolator pads, resilient material isolator mounts, or open (unhoused) spring isolators.
c. Floor-Mounted Transformers, Seismic Applications: Use seismic type resilient material isolator mounts or seismic type restrained spring isolators.
d. Suspended Transformers, Nonseismic Applications: Use resilient material isolator hangers, spring isolator hangers, or combination resilient material/spring isolator hangers.
e. Suspended Transformers, Seismic Applications: Use seismic type resilient material isolator hangers, seismic type spring isolator hangers, or seismic type combination resilient material/spring isolator hangers.
f. Wall-Mounted Transformers, Nonseismic Applications: Use resilient material isolator mounts.
g. Wall-Mounted Transformers, Seismic Applications: Use seismic type resilient material isolator mounts.
h. Minimum Static Deflection:
1) Transformers Mounted on Grade-Level Slabs: 0.25 inch deflection unless otherwise indicated.
2) Transformers Mounted at Above-Grade Levels: 0.5 inch deflection unless otherwise indicated.

2.03 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

A. Vibration-Isolated Structural Steel Bases:
1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.

2.04 VIBRATION ISOLATORS

A. General Requirements:
1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
2. Spring Elements for Spring Isolators:
a. Color code or otherwise identify springs to indicate load capacity.
b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
f. Selected to function without undue stress or overloading.

B. Vibration Isolators for Nonseismic Applications:
1. Resilient Material Isolator Pads:
a. Description: Single or multiple layer pads utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material.
b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
2. Resilient Material Isolator Mounts, Nonseismic:
a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material; fail-safe type.
3. Open (Unhoused) Spring Isolators:

a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
b. Bottom Load Plate: Nonskid, molded, elastomeric isolator material or steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.
c. Furnished with integral leveling device for positioning and securing supported equipment.

4. Housed Spring Isolators:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
   b. Furnished with integral elastomeric snubbing elements, nonadjustable type, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
   c. Bottom Load Plate: Steel with nonskid, elastomeric isolator pad with provisions for bolting to supporting structure as required.
   d. Furnished with integral leveling device for positioning and securing supported equipment.
5. Restrained Spring Isolators, Nonseismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.
   b. Bottom Load Plate: Steel with nonskid, elastomeric isolator pad with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
6. Resilient Material Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material for the lower hanger rod connection.
7. Spring Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
8. Combination Resilient Material/Spring Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g., neoprene, rubber) or fiberglass isolator material for the upper hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 CODE-REQUIRED SPECIAL INSPECTIONS

A. Arrange work to accommodate tests and/or inspections performed by Special Inspection Agency employed by Owner or Architect in accordance with Section 014533 and statement of special inspections as required by applicable building code.

B. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
   1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

C. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.

D. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install products in accordance with applicable requirements of NECA 1 (general workmanship).

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Secure fasteners according to manufacturer's recommended torque settings.

E. Install flexible conduit and cable connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

F. Vibration Isolation Systems:
   1. Vibration-Isolated Equipment Support Bases:
      a. Provide specified minimum clearance beneath base.
   2. Spring Isolators:
      a. Position equipment at operating height; provide temporary blocking as required.
      b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
      c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
   3. Isolator Hangers:
      a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
      b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
   4. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
   5. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
   6. Adjust isolators to be free of isolation short circuits during normal operation.
   7. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Provide services of a manufacturer's authorized representative for vibration isolation systems to observe installation and assist in inspection and testing. Include manufacturer's detailed testing and inspection procedures and field reports with submittals.

D. Vibration Isolation Systems:
   1. Verify isolator static deflections.

2. Verify required clearance beneath vibration-isolated equipment support bases.
3. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

E. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION 260547

SECTION 260548
VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.

B. Seismic control requirements.
   1. Includes requirements for seismic qualification of equipment not specified in this section.

C. Vibration-isolated equipment support bases.

D. Vibration isolators.

E. External seismic snubber assemblies.

F. Seismic restraint systems.

1.02 RELATED REQUIREMENTS

A. Section 014533 - Code-Required Special Inspections and Procedures.

B. Section 033000 - Cast-in-Place Concrete.

C. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

D. Section 260529 - Hangers and Supports for Electrical Systems.

1.03 DEFINITIONS

A. Electrical Component: Where referenced in this section in regards to seismic controls, applies to any portion of the electrical system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., conduit, cable tray).

B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings 2016.

C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2022.

E. MFMA-4 - Metal Framing Standards Publication 2004.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Seismic Controls:

a. Coordinate the arrangement of seismic restraints with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
b. Coordinate the work with other trades to accommodate relative positioning of essential and nonessential components in consideration of seismic interaction.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
2. Seismic Controls: Include seismic load capacities.

D. Shop Drawings - Vibration Isolation Systems:
1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.
2. Vibration-Isolated Equipment Support Bases: Include base weights, including concrete fill where applicable; indicate equipment mounting provisions.

E. Shop Drawings - Seismic Controls:
1. Include dimensioned plan views and sections indicating proposed electrical component locations and distributed system routing, with locations and details of gravity supports and seismic restraints and associated attachments.
2. Identify mounting conditions required for equipment seismic qualification.
3. Identify anchor manufacturer, type, minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
4. Indicate proposed arrangement of distributed system trapeze support groupings.
5. Indicate proposed locations for distributed system flexible fittings and/or connections.
6. Indicate locations of seismic separations where applicable.

F. Seismic Design Data:
1. Compile information on project-specific characteristics of actual installed electrical components necessary for determining seismic design forces required to design appropriate seismic controls, including but not limited to the following.
a. Component operating weight and center of gravity.
b. Component elevation in the building in relation to the roof elevation (z/h).
c. Component importance factor (Ip).
d. For distributed systems, component materials and connection methods.
e. Component amplification factor (ap) and component response modification factor (Rp), determined in accordance with ASCE 7 tables.
f. Applicability of overstrength factor (for certain anchorage in concrete and masonry).
2. Include structural calculations, stamped or sealed by seismic controls designer, demonstrating suitability of seismic controls for seismic design forces.

G. Certification for seismically qualified equipment; identify basis for certification.

H. Evaluation Reports: For products specified as requiring evaluation and recognition by a qualified evaluation service, provide current evaluation reports.

I. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination,

preparation, and installation of product.

J. Evidence of qualifications for seismic controls designer.

K. Evidence of qualifications for manufacturer.

L. Manufacturer's detailed field testing and inspection procedures.

M. Field quality control test reports.

1.07 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Seismic Controls Designer Qualifications: Registered professional engineer licensed in the State in which the Project is located and with minimum five years experience designing seismic restraints for nonstructural components.
   1. Designer may be employed by the manufacturer of the seismic restraint products.

E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION SYSTEM MANUFACTURERS

A. Kinetics Noise Control, Inc; _____: www.kineticsnoise.com.

B. Mason Industries; _____: www.mason-ind.com.

C. Vibration Eliminator Company, Inc; _____: www.veco-nyc.com.

D. Vibration Mountings & Controls, Inc., Bloomingdale, NJ

E. Amber Booth, Houston, TX

2.02 SEISMIC CONRTOLS SYSTEM MANUFACTURERS

A. Kinetics Noise Control, Inc; _____: www.kineticsnoise.com.

B. Mason Industries; _____: www.mason-ind.com.

C. Vibration Eliminator Company, Inc; _____: www.veco-nyc.com.

D. Vibration Mountings & Controls, Inc., Bloomingdale, NJ

E. Amber Booth, Houston, TX

F. ISAT, La Mirada, CA, http://www.isatsb.com/seismic-bracing.php

G. TOLCO by Eaton, Highland, IL

2.03 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing electrical equipment and/or electrical connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
   1. Select vibration isolators to provide required static deflection.
   2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
   3. Select seismic type vibration isolators to comply with seismic design requirements, including conditions of equipment seismic certification where applicable.

4. Select vibration isolators for outdoor equipment to comply with wind design requirements.
5. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2-inch operating clearance beneath base unless otherwise indicated.

D. Equipment Isolation:
1. Transformers:
a. Specified vibration isolators are in addition to any factory-installed internal core and coil assembly vibration isolators unless otherwise indicated.
b. Floor-Mounted Transformers, Nonseismic Applications: Use resilent material isolator pads, resilient material isolator mounts, or open (unhoused) spring isolators.
c. Floor-Mounted Transformers, Seismic Applications: Use seismic type resilient material isolator mounts or seismic type restrained spring isolators.
d. Suspended Transformers, Nonseismic Applications: Use resilient material isolator hangers, spring isolator hangers, or combination resilient material/spring isolator hangers.
e. Suspended Transformers, Seismic Applications: Use seismic type resilient material isolator hangers, seismic type spring isolator hangers, or seismic type combination resilient material/spring isolator hangers.
f. Wall-Mounted Transformers, Nonseismic Applications: Use resilient material isolator mounts.
g. Wall-Mounted Transformers, Seismic Applications: Use seismic type resilient material isolator mounts.
h. Minimum Static Deflection:
1) Transformers Mounted on Grade-Level Slabs: 0.25 inch deflection unless otherwise indicated.
2) Transformers Mounted at Above-Grade Levels: 0.5 inch deflection unless otherwise indicated.

2.04 SEISMIC CONTROL REQUIREMENTS

A. Design and provide electrical component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor electrical components.

B. Seismic Design Criteria: Obtain from project Structural Engineer of Record including Seismic Risk Category.

C. Component Importance Factor (Ip): For Seismic Risk Category IV, all electrical components to be assigned a component importance factor (Ip) of 1.5 unless otherwise indicated.

D. Component Importance Factor (Ip): Electrical components essential to life safety to be assigned a component importance factor (Ip) of 1.5 as indicated or as required. This includes but is not limited to:
1. Electrical components required to function for life safety purposes after an earthquake.
2. Electrical components that support or otherwise contain hazardous substances.

E. Seismic Restraints:
1. Provide seismic restraints for electrical components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
2. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
a. ASHRAE (HVACA).
b. SMACNA (SRM).
3. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third-party registered professional engineer acceptable to authorities having jurisdiction.
4. Seismic Type Vibration Isolators:

a. Comply with seismic design requirements, including conditions of equipment seismic certification where applicable.

5. External Seismic Snubber Assemblies:
   a. Provide quantity and arrangement of external seismic snubber assemblies as required to restrain equipment in all directions (both lateral and vertical).
   b. Do not use external seismic snubber assemblies that restrain equipment only in one or more lateral directions (but not vertical) except where uplift forces are zero or are addressed by other restraints.
6. Seismic Restraint Systems:
   a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.
   b. Use only cable restraints to restrain vibration-isolated electrical components, including distributed systems.
   c. Use only one restraint system type for a given electrical component or distributed system (e.g., conduit, cable tray) run; mixing of cable and rigid restraints on a given component/run is not permitted.
   d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain electrical component in all lateral directions; consider bracket geometry in anchor load calculations.
   e. Use rod stiffener clips to attach bracing to hanger rods as required to prevent rod buckling from vertical (upward) compressive load introduced by cable or rigid restraints loaded in tension, in excess of downward tensile load due to supported electrical component weight.
   f. Select hanger rods and associated anchorage as required to accommodate vertical (downward) tensile load introduced by rigid restraints loaded in compression, in addition to downward tensile load due to supported electrical component weight.
   g. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.
   h. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.
   i. Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.

F. Seismic Attachments:
1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
3. Do not use power-actuated fasteners.
4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
6. Concrete Housekeeping Pads:
   a. Increase size of pad as required to comply with anchor requirements.
   b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.

G. Seismic Interactions:
1. Include provisions to prevent seismic impact between electrical components and other structural or nonstructural components.
2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.

3. Comply with minimum clearance requirements between electrical equipment, distribution systems, and associated supports and fire protection sprinkler system drops and sprigs.

H. Seismic Relative Displacement Provisions:
1. Use suitable fittings or flexible connections to accommodate:
a. Relative displacements at connections between components, including distributed systems (e.g., conduit, cable tray); do not exceed load limits for equipment utility connections.
b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
c. Design displacements at seismic separations.
d. Anticipated drifts between floors.
2. For seismic risk category, include provisions to prevent interruption of utility service due to seismic displacements.

2.05 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

A. Vibration-Isolated Structural Steel Bases:
1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.

2.06 VIBRATION ISOLATORS

A. General Requirements:
1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
2. Spring Elements for Spring Isolators:
a. Color code or otherwise identify springs to indicate load capacity.
b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
f. Selected to function without undue stress or overloading.
3. Seismic Snubbing Elements for Seismic Isolators:
a. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
b. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

B. Vibration Isolators for Nonseismic Applications:
1. Resilient Material Isolator Pads:
a. Description: Single or multiple layer pads utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material.
b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
2. Resilient Material Isolator Mounts, Nonseismic:
a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material; fail-safe type.
3. Open (Unhoused) Spring Isolators:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
b. Bottom Load Plate: Nonskid, molded, elastomeric isolator material or steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.

c. Furnished with integral leveling device for positioning and securing supported equipment.

4. Housed Spring Isolators:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
   b. Furnished with integral elastomeric snubbing elements, nonadjustable type, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
   c. Bottom Load Plate: Steel with nonskid, elastomeric isolator pad with provisions for bolting to supporting structure as required.
   d. Furnished with integral leveling device for positioning and securing supported equipment.
5. Restrained Spring Isolators, Nonseismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.
   b. Bottom Load Plate: Steel with nonskid, elastomeric isolator pad with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
6. Resilient Material Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material for the lower hanger rod connection.
7. Spring Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
8. Combination Resilient Material/Spring Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g., neoprene, rubber) or fiberglass isolator material for the upper hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

C. Vibration Isolators for Seismic Applications:
1. Restrained Spring Isolators, Seismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) in series with elastomeric (e.g., neoprene, rubber) isolator material within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop; specifically designed and rated for seismic applications with integral snubbing in all directions.
   b. Bottom Load Plate: Steel with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
2. Resilient Material Isolator Hangers, Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g., neoprene, rubber) isolator material for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.

3. Spring Isolator Hangers, Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
4. Combination Resilient Material/Spring Isolator Hangers, Seismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g., neoprene, rubber) isolator material for the upper hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

2.07 EXTERNAL SEISMIC SNUBBER ASSEMBLIES

A. Description: Steel snubbing assemblies designed for external attachment to both equipment and supporting structure that, as part of a complete system, restrain equipment motion in all directions during a seismic event while maintaining vibration isolation during normal operation.

B. Seismic Snubbing Elements:
   1. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
   2. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

2.08 SEISMIC RESTRAINT SYSTEMS

A. Manufacturers:
   1. Source Limitations: Furnish seismic restraint system components and accessories produced by a single manufacturer and obtained from a single supplier.

B. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.

C. Cable Restraints:
   1. Comply with ASCE 19.
   2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
   3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
   4. Use protective thimbles for cable loops where potential for cable damage exists.

D. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 CODE-REQUIRED SPECIAL INSPECTIONS

A. Arrange work to accommodate tests and/or inspections performed by Special Inspection Agency employed by Owner or Architect in accordance with Section 014533 and statement of special inspections as required by applicable building code.

B. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
   1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

C. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.

D. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install products in accordance with applicable requirements of NECA 1 (general workmanship).

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Secure fasteners according to manufacturer's recommended torque settings.

E. Install flexible conduit and cable connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

F. Vibration Isolation Systems:
   1. Vibration-Isolated Equipment Support Bases:
      a. Provide specified minimum clearance beneath base.
   2. Spring Isolators:
      a. Position equipment at operating height; provide temporary blocking as required.
      b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
      c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
   3. Isolator Hangers:
      a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
      b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
   4. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
   5. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
   6. Adjust isolators to be free of isolation short circuits during normal operation.
   7. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

G. Seismic Controls:
   1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris or other obstructions.
   2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
   3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.
   4. Equipment with Sheet Metal Housings:
      a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.

b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.

5. Concrete Housekeeping Pads:
   a. Size in accordance with seismic design to meet anchor requirements.
   b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.
6. Seismic Restraint Systems:
   a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
   b. Install restraints within permissible angles in accordance with seismic design.
   c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
   d. Install cable restraints for vibration-isolated components slightly slack to prevent short-circuiting of isolation.
   e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Provide services of a manufacturer's authorized representative for vibration isolation systems and seismic controls to observe installation and assist in inspection and testing. Include manufacturer's detailed testing and inspection procedures and field reports with submittals.

D. Vibration Isolation Systems:
   1. Verify isolator static deflections.
   2. Verify required clearance beneath vibration-isolated equipment support bases.
   3. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

E. Seismic Controls:
   1. Verify snubbing element air gaps.

F. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

G. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION 260548

SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 099113 - Exterior Painting.

B. Section 099123 - Interior Painting.

C. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

D. Section 262726 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs 2011 (Reaffirmed 2017).

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011 (Reaffirmed 2017).

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 70E - Standard for Electrical Safety in the Workplace 2024.

E. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    a. Switchgear:
        1) Identify power source and circuit number. Include location when not within sight of equipment.
        2) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
    b. Switchboards:
        1) Identify power source and circuit number. Include location when not within sight of equipment.
        2) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
    c. Panelboards:
        1) Identify power source and circuit number. Include location when not within sight of equipment.
        2) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
        3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
    d. Transformers:
        1) Identify kVA rating.
        2) Identify K-factor rating.
        3) Identify voltage and phase for primary and secondary.
        4) Identify power source and circuit number. Include location when not within sight of equipment.
    e. Enclosed switches, circuit breakers, and motor controllers:
        1) Identify voltage and phase.
        2) Identify power source and circuit number. Include location when not within sight of equipment.
        3) Identify load(s) served. Include location when not within sight of equipment.
2. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
    a. Service equipment.
    b. Industrial control panels.
    c. Motor control centers.
    d. Elevator control panels.
    e. Industrial machinery.
3. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
    a. Minimum Size: 3.5 by 5 inches.
    b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
   a. At each source and load connection.
   b. Within boxes when more than one circuit is present.
   c. Within equipment enclosures when conductors and cables enter or leave the enclosure.

C. Armored and Metal-Clad Identification Materials
1. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
2. Colors for cables carrying circuits at 600V and Less:
   a. Black letters on an orange field.
   b. Legend: Indicate voltage and system or service type.

D. Identification for Raceways:
1. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
   a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
      1) Color Code:
      2) Field-Painting: Comply with Section 099123 and 099113.
      3) Vinyl Color Coding Electrical Tape: Comply with Section 260519.

E. Identification for Boxes:
1. Use voltage markers to identify highest voltage present.
2. Use voltage markers or color coded boxes to identify systems other than normal power system.
   a. Color-Coded Boxes: Field-painted in accordance with Section 099123 and 099113 per the same color code used for raceways.

F. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 262726.
2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
3. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
4. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.
5. Use identification label to identify automatically controlled receptacles by time switch, occupancy sensor device, etc.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
   a. Indoor Clean, Dry Locations: Use plastic nameplates.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.

2. Legend:
   a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. Equipment Designation: 1/2 inch.
   b. Other Information: 1/4 inch.
5. Color:
   a. Normal Power System: White text on black background.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch.

F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

C. Minimum Size:
   1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
   2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
   3. Markers for Junction Boxes: 1/2 by 2 1/4 inches.

D. Legend:
   1. Markers for Voltage Identification: Highest voltage present.
   2. Markers for System Identification:

E. Color: Black text on orange background unless otherwise indicated.

2.05 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
   2. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Conduits: Legible from the floor.
   8. Boxes: Outside face of cover.
   9. Conductors and Cables: Legible from the point of access.
   10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 260553

SECTION 260573
POWER SYSTEM STUDIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Short-circuit study.

B. Protective device coordination study.

C. Arc flash and shock risk assessment.
   1. Includes arc flash hazard warning labels.

D. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.

1.02 RELATED REQUIREMENTS

A. Section 260553 - Identification for Electrical Systems: Additional requirements for arc flash hazard warning labels.

1.03 REFERENCE STANDARDS

A. IEEE 141 - IEEE Recommended Practice for Electric Power Distribution for Industrial Plants 1993 (Reaffirmed 1999).

B. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems 2001, with Errata (2003).

C. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis 1997.

D. IEEE 551 - IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems 2006.

E. IEEE 1584 - IEEE Guide for Performing Arc-Flash Hazard Calculations 2018, with Errata (2019).

F. NEMA MG 1 - Motors and Generators 2021.

G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.

H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.
   2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Submit study reports prior to or concurrent with product submittals.
   2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Study reports, stamped or sealed and signed by study preparer.

C. Product Data: In addition to submittal requirements specified in other sections, include manufacturer's standard catalog pages and data sheets for equipment and protective devices indicating information relevant to studies.
   1. Include characteristic time-current trip curves for protective devices.
   2. Include impedance data for busway.

3. Include impedance data for engine generators.
4. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
5. Include documentation of listed series ratings upon request.
6. Identify modifications made in accordance with studies that:
   a. Can be made at no additional cost to Owner.
   b. As submitted will involve a change to the contract sum.

D. Project Record Documents: Revise studies as required to reflect as-built conditions.
1. Include hard copies with operation and maintenance data submittals.
2. Include computer software files used to prepare studies with file name(s) cross-referenced to specific pieces of equipment and systems.

1.06 POWER SYSTEM STUDIES

A. Scope of Studies:
1. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).
2. Include in analysis alternate sources and operating modes (including known future configurations) to determine worst case conditions.

B. General Study Requirements:
1. Comply with NFPA 70.
2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.

C. Data Collection:
1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.
   a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device information.
      1) Obtain up-to-date information from Utility Company.
   b. Generators: Include manufacturer/model, kW and voltage ratings, and impedance.
   c. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 1 code letter designation.
   d. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.
   e. Protective Devices:
      1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).
      2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).
   f. Protective Relays: Include manufacturer/model, type, settings, current/potential transformer ratio, and associated protective device.
   g. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.

D. Short-Circuit Study:
1. Comply with IEEE 551 and applicable portions of IEEE 141, IEEE 242, and IEEE 399.
2. For purposes of determining equipment short circuit current ratings, consider conditions that may result in maximum available fault current, including but not limited to:
   a. Maximum utility fault currents.

b. Maximum motor contribution.
c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).

3. For each bus location, calculate the maximum available three-phase bolted symmetrical and asymmetrical fault currents. For grounded systems, also calculate the maximum available line-to-ground bolted fault currents.

E. Protective Device Coordination Study:
1. Comply with applicable portions of IEEE 242 and IEEE 399.
2. Analyze alternate scenarios considering known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
3. Analyze protective devices and associated settings for suitable margins between time-current curves to achieve full selective coordination while providing adequate protection for equipment and conductors.

F. Arc Flash and Shock Risk Assessment:
1. Comply with NFPA 70E.
2. Perform incident energy and arc flash boundary calculations in accordance with IEEE 1584 (as referenced in NFPA 70E Annex D), where applicable.
3. Analyze alternate scenarios considering conditions that may result in maximum incident energy, including but not limited to:
a. Maximum and minimum utility fault currents.
b. Maximum and minimum motor contribution.
c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).

G. Study Reports:
1. General Requirements:
a. Identify date of study and study preparer.
b. Identify study methodology and software product(s) used.
c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.
d. Identify base used for per unit values.
e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.
f. Include conclusions and recommendations.
2. Short-Circuit Study:
a. For each scenario, identify at each bus location:
1) Calculated maximum available symmetrical and asymmetrical fault currents (both three-phase and line-to-ground where applicable).
2) Fault point X/R ratio.
3) Associated equipment short circuit current ratings.
b. Identify locations where the available fault current exceeds the equipment short circuit current rating, along with recommendations.
3. Protective Device Coordination Study:
a. For each scenario, include time-current coordination curves plotted on log-log scale graphs.
b. For each graph include (where applicable):
1) Partial single-line diagram identifying the portion of the system illustrated.
2) Protective Devices: Time-current curves with applicable tolerance bands for each protective device in series back to the source, plotted up to the maximum available fault current at the associated bus.
3) Conductors: Damage curves.
4) Transformers: Inrush points and damage curves.
5) Generators: Full load current, overload curves, decrement curves, and short circuit withstand points.
6) Motors: Full load current, starting curves, and damage curves.

7) Capacitors: Full load current and damage curves.

c. For each protective device, identify fixed and adjustable characteristics with available ranges and recommended settings.
   1) Circuit Breakers: Include long time pickup and delay, short time pickup and delay, and instantaneous pickup.
   2) Include ground fault pickup and delay.
   3) Include fuse ratings.
   4) Protective Relays: Include current/potential transformer ratios, tap, time dial, and instantaneous pickup.

d. Identify cases where either full selective coordination or adequate protection is not achieved, along with recommendations.

4. Arc Flash and Shock Risk Assessment:
   a. For the worst case for each scenario, identify at each bus location:
      1) Calculated incident energy and associated working distance.
      2) Calculated arc flash boundary.
      3) Bolted fault current.
      4) Arcing fault current.
      5) Clearing time.
      6) Arc gap distance.
   b. For purposes of producing arc flash hazard warning labels, summarize the maximum incident energy and associated data reflecting the worst case condition of all scenarios at each bus location.
   c. Identify locations where the calculated maximum incident energy exceeds 40 calories per sq cm.

1.07 QUALITY ASSURANCE

A. Study Preparer Qualifications: Professional electrical engineer licensed in the State in which the Project is located and with minimum five years experience in the preparation of studies of similar type and complexity using specified computer software.

B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.

PART 2 PRODUCTS

2.01 ARC FLASH HAZARD WARNING LABELS

A. Provide warning labels complying with ANSI Z535.4 to identify arc flash hazards for each work location analyzed by the arc flash and shock risk assessment.
   1. Materials: Comply with Section 260553.
   2. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data as determined by arc flash and shock risk assessment.
      a. Include the following information:
         1) Arc flash boundary.
         2) Available incident energy and corresponding working distance.
         3) Site-specific PPE (personnel protective equipment) requirements.
         4) Nominal system voltage.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Adjust equipment and protective devices for compliance with studies and recommended settings.

D. Notify Architect of any conflicts with or deviations from studies. Obtain direction before proceeding.

END OF SECTION 260573

SECTION 260583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

1.04 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Comply with NEMA WD 1.
   2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

B. Disconnect Switches: As specified in Section 262816.16 and in individual equipment sections.

C. Wiring Devices: As specified in Section 262726.

D. Flexible Conduit: As specified in Section 260533.13.

E. Wire and Cable: As specified in Section 260519.

F. Boxes: As specified in Section 260533.16.

2.02 EQUIPMENT CONNECTIONS

PART 3 EXECUTION

3.01 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using rigid or flexible conduit as required. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION 260583

SECTION 260650.16
LIGHTING FIXTURE SCHEDULE

SECTION 260916
ELECTRIC CONTROLS AND RELAYS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pushbutton and selector switches.

B. Control stations and panels.

C. Relays and time-delay relays.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. NEMA ICS 1 - Industrial Control and Systems General Requirements 2022.

B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Submit to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, dimensions, support points.

C. Product Data: Provide for each component showing electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of Project.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 COMPONENTS

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install individual relays and time-delay relays in enclosures.

C. Make electrical wiring interconnections as indicated.

END OF SECTION 260916

SECTION 260918
REMOTE CONTROL SWITCHING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

A. Section 260533.13 - Conduit for Electrical Systems.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data showing dimensions and ratings for components.

C. Shop Drawings: Indicate site specific detailed wiring diagrams of system, showing interface with branch circuit wiring.

D. Submit floor plans showing all lighting control system components, control zones and control intent.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 POWER LIMITED WIRE AND CABLE

A. Remote Control Cable: Copper conductor, 300 volt insulation rated 60 degrees C, individual conductors twisted together and covered with PVC jacket.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install wiring in the following locations in conduit in accordance with Section 260533.13:
   1. Within walls.
   2. Above inaccessible ceilings.
   3. Within hollow spaces used as air handling ducts and plenums.
   4. Exposed along surfaces.

B. Install relays to be accessible. Allow space for adequate ventilation and circulation of air.

3.02 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of system.

END OF SECTION 260918

SECTION 260923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Occupancy sensors.

B. Time switches.

C. Outdoor photo controls.

D. Daylighting controls.

E. Lighting contactors.

F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 260529 - Hangers and Supports for Electrical Systems

B. Section 260533.16 - Boxes for Electrical Systems.

C. Section 262726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1472 - Solid-State Dimming Controls Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
   3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
   4. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
   5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

B. Sequencing:

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
   1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

C. Shop Drawings:
   1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.

D. Field Quality Control Reports.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

A. Manufacturers:
   1. Hubbell Incorporated; _____: www.hubbell.com.
   2. Lutron Electronics Company, Inc; _____: www.lutron.com.
   3. Sensor Switch Inc; _____: www.sensorswitch.com.
   4. WattStopper; _____: www.wattstopper.com.

B. All Occupancy Sensors:
   1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
   2. Sensor Technology:
      a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
      b. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
   3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
   4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
   5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
   6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
   7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
   8. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.

C. Wall Switch Occupancy Sensors:
   1. All Wall Switch Occupancy Sensors:

a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
b. Unless otherwise indicated or required to control the load indicated on drawings, provide line voltage units with self-contained relay.
c. Where indicated, provide two-circuit units for control of two separate lighting loads, with separate manual controls and separately programmable operation for each load.
d. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
e. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.

D. Wall Dimmer Occupancy Sensors:
1. General Requirements:
a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.
b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
c. Manual-Off Override Control Capability: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
d. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
2. Passive Infrared (PIR) Wall Dimmer Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.

E. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
a. Description: Low profile occupancy sensors designed for ceiling installation.
b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
c. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
2. Passive Infrared (PIR) Ceiling Mounted Occupancy Sensors:
a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
3. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.

F. Power Packs for Low Voltage Occupancy Sensors:
1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
3. Input Supply Voltage: Dual rated for 120/277 V ac.
4. Load Rating: As required to control the load indicated on drawings.

G. Power Packs for Wireless Occupancy Sensors:
1. Description: Plenum rated, self-contained relay compatible with specified wireless occupancy sensors for switching of line voltage loads.
2. Input Supply Voltage: Dual rated for 120/277 V ac.
3. Load Rating: As required to control the load indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of lighting control devices provided under this section.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 262726.

G. Provide required supports in accordance with Section 260529.

H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

I. Occupancy Sensor Locations:
   1. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each lighting control device for damage and defects.

C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.

D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
   4. Location: At project site.

END OF SECTION 260923

SECTION 262416
PANELBOARDS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

1.02 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

E. NEMA PB 1 - Panelboards 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.

G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.

H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

K. UL 67 - Panelboards Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
   4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, surge protection devices, finishes, and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, enclosure types, and installed features and accessories.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space that is continuously under normal control of temperature and humidity. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with NECA 407, NEMA PB-1 and manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: www.geindustrial.com/#sle.

B. Eaton Corporation: www.eaton.com/#sle.

C. Schneider Electric; Square D Products; _____: www.schneider-electric.us/#sle.

D. Siemens Industry, Inc; _____: www.usa.siemens.com/#sle.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductor material and sizes to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
   3. Fronts:
      a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
      b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
   4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, bus connectors, filler plates, mounting hardware and all other required provisions.

2.03 POWER OR DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Copper, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase and Neutral Bus Material: Copper.
   2. Ground Bus Material: Copper.

D. Circuit Breakers:
   1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.

E. Enclosures:
   1. Provide surface-mounted enclosures unless otherwise indicated. In no case shall the enclosure be wider than 42 inches (106 cm) or deeper than 18 inches (46 cm).

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Copper, suitable for terminating aluminum or copper conductors..
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
   2. Phase and Neutral Bus Material: Copper.
   3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures as indicated. Enclosure width and depth shall not exceed 24 inches (61 cm) by 6 inches (15 cm) respectively.
   2. Provide clear plastic circuit directory holder metal frame mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required by short circuit study performed in accordance with Section 26 0573.
      b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment in accordance with Section 260529.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

I. Provide minimum of four spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling or space designated to be accessible ceiling space in the future. Provide four 1-inch (27-mm) empty conduits [into raised floor space or] below slab not on grade.

J. Provide grounding and bonding in accordance with Section 260526.

K. Install all field-installed branch devices, components, and accessories.

L. Provide filler plates to cover unused spaces in panelboards.

3.02 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than _____ amperes. Tests listed as optional are not required.

D. Correct deficiencies and replace damaged or defective panelboards or associated components and retest to demonstrate compliance.

3.03 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

3.04 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 262416

SECTION 262726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Wall dimmers.

C. Receptacles.

D. Wall plates.

E. Poke-through assemblies.

1.02 RELATED REQUIREMENTS

A. Section 260533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification) 2014g, with Amendment (2017).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.

E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.

G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.

I. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.

J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.

K. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

L. UL 1472 - Solid-State Dimming Controls Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide GFCI protection for the following 15A and 20A, 125V receptacles:
   1. Receptacles installed in other than dwelling units at the following locations:
      a. Bathrooms.
      b. Kitchens.
      c. Rooftops.
      d. Outdoors.
      e. Receptacles installed within 6 feet (1.8 m) of sinks.
      f. Indoor wet locations.
      g. Locker rooms with showering facilities.
      h. Serving electric drinking fountains.
      i. Serving vending machines manufactured prior to 01/01/2005 (not having GFCI interrupter as integral part of the attachment plug).

2.02 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices Connected to Emergency Power: Red withengraved "Emergency" wall plate as specified for normal power devices.

C. Flush Poke-Through Service Fittings: Color and material of devices, plates, covers, etc. shall be as required by the architect.

2.03 WALL SWITCHES

A. Manufacturers:
   1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
   2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
   3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.

B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

2.04 WALL DIMMERS

A. Manufacturers:
   1. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
   2. Lutron Electronics Company, Inc; Maestro Series: www.lutron.com/#sle.
   3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.

B. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

2.05 RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
   2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
   3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
   4. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.06 WALL PLATES

A. Manufacturers:
1. Hubbell Incorporated; _____: www.hubbell-wiring.com/#sle.
2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
3. Lutron Electronics Company, Inc; _____: www.lutron.com/#sle.
4. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.

B. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
2. Size: Standard; _____.
3. Screws: Metal with slotted heads finished to match wall plate finish.

2.07 POKE-THROUGH ASSEMBLIES

A. Manufacturers:
1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
2. Thomas & Betts Corporation; _____: www.tnb.com/#sle.
3. Wiremold, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.

B. Description: Assembly comprising floor service fitting, poke-through component, fire stops and smoke barriers, and junction box for conduit termination; fire rating listed to match fire rating of floor and suitable for floor thickness where installed.

C. Above-Floor Service Fittings:
1. Single Service Pedestal Convenience Receptacles:
a. Configuration: One standard convenience duplex receptacle.
2. Single Service Pedestal Communications Outlets:
a. Configuration: One 1 inch bushed opening.
b. Voice and Data Jacks: Provided by others.
3. Single Service Pedestal Furniture Feed:
a. Configuration: One 3/4 inch knockout.
4. Dual Service Pedestal Combination Outlets:
a. Configuration:
1) Power: One standard convenience duplex receptacle.
2) Communications: One 1 inch bushed opening.
3) Voice and Data Jacks: Provided by others.
b. Provide barrier to separate line and low voltage compartments.

D. Flush Floor Service Fittings:
   1. Single Service Flush Convenience Receptacles:
      a. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
   2. Single Service Flush Communications Outlets:
      a. Configuration: _____.
      b. Voice and Data Jacks: Provided by others.
   3. Single Service Flush Furniture Feed:
      a. Configuration: One 2 inch by 1-1/4 inch combination threaded opening(s).
   4. Dual Service Flush Combination Outlets:
      a. Cover: Hinged door(s).
      b. Configuration:
         1) Power: One standard convenience duplex receptacle(s).
         2) Communications: _____.
         3) Voice and Data Jacks: Provided by others.
   5. Dual Service Flush Furniture Feed:
      a. Configuration:
         1) Power: One 3/4 inch threaded opening(s).
         2) Communications: Two 1/2 inch threaded opening(s).
   6. Accessories:
      a. Closure Plugs: Size and fire rating as required to seal unused core hole and maintain fire rating of floor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install wall switches with OFF position down.

J. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

K. Do not share neutral conductor on branch circuits utilizing wall dimmers.

L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

O. Install poke-through closure plugs in each unused core holes to maintain fire rating of floor.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 262726

SECTION 262816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.

D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.

E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

H. UL 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space having uniform temperature to prevent condensation. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between -22 degrees F and 104 degrees F.

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:

G. Provide with switch blade contact position that is visible when the cover is open.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

J. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

K. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

L. Heavy Duty Switches:
   1. Comply with NEMA KS 1.
   2. Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed safety switches.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 260529.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 260526.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.05 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 262816.16

SECTION 26 51 00 (A) – ARCHITECTURAL LIGHTING FIXTURE SPECIFICATIONS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver, and install all work of this section as shown on the drawings, as specified herein, and/or as required by job conditions. The work shall include but not be limited to the following:

1. Complete shop fabrication
2. Delivery to job site
3. Installation at designated location, and controls as noted
4. Lamping and lamps
5. Lamp focusing
6. Cleaning and protection

1.2 DESCRIPTION OF WORK

A. Furnish and install a lighting fixture of the type indicated by letter at each location shown on the drawings.

B. All materials, accessories, and any other equipment necessary for the complete and proper installation of all lighting fixtures included in this Contract shall be furnished by the Contractor.

C. Conformance: Fixtures shall be manufactured in strict accordance with the Contract Drawings and Specifications.

D. Codes: Materials and installation shall be in accordance with the latest revision of the National Electrical Code and any applicable Federal, State, and local codes and regulations.

E. U.L. Listing: All fixtures shall be manufactured in strict accordance with the appropriate and current requirements of the Underwriters' Laboratories, Inc. "Standards for Safety," and others as they may be applicable. A UL listing shall be provided for each fixture type, and the appropriate label or labels shall be affixed to each fixture in a position concealing it from normal view.

F. Specifications and scale drawings are intended to convey the salient features, function and character of the fixtures only, and do not undertake to illustrate or set forth every item or detail necessary for the work.

G. Minor details, not usually indicated on the drawings nor specified, but that are necessary for the proper execution and completion of the fixtures, shall be included, the same as if they were herein specified or indicated on the drawings.

H. Omissions: The Owner shall not be held responsible for the omission or absence of any detail, construction feature, etc. which may be required in the production of the fixtures. The responsibility of accurately fabricating the fixtures to the fulfillment of this specification rests with the Contractor.

I. The Electrical Contractor shall be responsible for:
1. Ordering the lighting equipment in advance so as not to delay the construction of the project. Most of the fixtures listed in this schedule have a 4 - 6 week delivery time, some lead times may be even longer.
2. Coordinating recessed luminaires with the ceilings into which they are to be installed, regardless of what the manufacturer's catalog numbers specifies, i.e. voltage, fixture/ceiling system compatibility, static or air handling, Chicago plenum rated.
3. Coordinating with Electrical and HVAC Engineer to purchase luminaires with correct primary voltage designation.
4. Cooperating in the coordination and scheduling of the work in this section with the work of other sections so as not to delay job progress.

J. The General Contractor shall be responsible for:
1. Verifying, by measurements of the job site, all dimensions affected by the work. Field dimensions which are at variance with those on the approved shop drawing shall be brought to the attention of the Architect. The decision regarding corrective measures shall be obtained before the start of fabrication of items affected.
2. Examining all surfaces and conditions to which work is to be attached or applied and notify the Architect in writing if any conditions or surfaces exist which the contractor feels detrimental to the proper and expeditious installation of his work. Starting on the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
3. Studying the contract drawings and specifications with regard to the work shown and as required under this section so as to ensure its completeness.

1.3 SUBMITTALS

A. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
1. Physical description of fixture, including dimensions.
2. Emergency lighting unit battery and charger for verification by Electrical Engineer.
3. Lamps.
4. Low voltage transformers.
5. Luminaire dimensions, effective projected area, details of attaching luminaires, accessories, and installation and construction details.
6.

B. Shop Drawings shall clearly indicate the contract drawing number of fixture details used as reference in the development of the shop drawings, and the names of the job, Architect and Lighting Consultant.

C. The Contractor shall coordinate all his lighting fixture drawings with the drawings and details of the Architectural, Structural, Electrical, Mechanical, and other related trades to assure a perfect and efficient installation.

D. No variation from the general arrangement and details indicated on the drawings shall be made on the shop drawings unless required to suit the actual conditions on the premises, and then only with the written approval of the Architect.

E. Catalog cuts lacking sufficient detail to indicate compliance with contract documents will not be acceptable.

F. Timely submission: Shop drawings for all lighting fixtures shall be received no later than sixty (60) days after award of Contract.

G. Review of shop drawings or samples does not waive contract requirements.

H. Photometric Data: Where indicated on the fixture schedule and contract drawings, supply complete photometric data for the fixture, including optical performance rendered by independent testing laboratory, developed according to methods of U.S.A. Illuminating Engineering Society. For down and semi-down lights used for general illumination:
   1. Coefficients of utilization.
   2. Visual Comfort Probability data, rooms with reflectances of 80 percent (ceiling), 50 percent (walls), and 20 percent (floor), including a (20 ft. by 20 ft.) room with 10 ft. ceiling and luminaires lengthwise.
   3. Candlepower data, presented graphically and numerically, in 5 degree increments (5 degree, 10 degree, 15 degree, etc.). Data developed for up and down quadrants normal, parallel, and at 22-1/2°, 45°, 167-1/2° to lamps if light output is asymmetric.
   4. Zonal lumens stated numerically in 10 degree increments (5 degree, 15 degree, etc.) as above.

I. Supply photometric data for any fixture offered in substitution for a specified fixture.

1.4 SHOP DRAWINGS

A. Submit shop drawings to the Architect for review in accordance with the requirements of the Contract Documents.

B. Shop drawings shall include details and cuts of each fixture type scheduled herein, and shall include for each type the following information.
   1. Type, lamping, size (dimensions), material exterior and interior, power supply type (where applicable), lenses, baffles, finishes, and means and methods of attachment (mounting).
   2. Include photometric data for each fixture.
   3.

C. Submit reflected ceiling plans, sections and details so as to locate and define each fixture type and its location.

D. Clearly indicate work to be provided by other trade subcontractors and coordinate accordingly. Subcontractor shall show light fixtures correctly scaled and detailed, on subcontractor shop drawings.

E. Control Zone Diagrams: Schematic control zone diagrams and zoning schedules.

F. To accommodate the seismic requirements, indicate supplementary spring type supports from the buildings structure for all fixtures 2-foot square in area and above.

G. Electrical Contractor to submit any proposed fixture substitutions, along with add or deduct prices for such substitutions, fixture cuts, descriptions and photometrics at the time of base bid only.

H. Custom fixture designs and modifications to standard products as called out in the light fixture schedule, require photometric submission, shop drawings, samples and review for approval. It is the General Contractors responsibility to coordinate these items with adequate lead time to meet the project schedule and to allow for possible modifications in design if required.

I. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
   1. Suspended ceiling components.
   2. Structural members to which lighting-fixture suspension systems will be attached.
   3. Other items in finished ceiling, including the following:
      a. Air outlets and inlets
      b. Speakers
      c. Sprinklers
      d. Access panels
   4. Perimeter moldings.

1.5 SAMPLES

A. After shop drawing approval, and prior to release for manufacturing, the Contractor shall furnish one sample of each fixture on the fixture schedule and contract drawings for which sample requirement is noted.

B. Shipping: The samples shall be complete with specified lamp(s) ready for hanging, energizing, and examining, and shall be shipped, prepaid by Contractor, to the Lighting Consultant, or as otherwise advised.

C. Sufficient time shall be allowed for thorough examination of the samples by the Lighting Consultant.

D. Samples are not returnable, nor included in quantities listed for a project.

E. Samples must be actual working unit of materials to be supplied.

F. Samples must have 120V power supply or transformer and 6’-0”long cord with NEMA5-15P plug.

1.6 QUALITY ASSURANCE

A. Qualifications

1. The Manufacturer shall be a specialty lighting firm who has been in the business of designing and manufacturing specialty lighting fixtures for not less than ten (10) years.
2. The Installer shall be a firm having trained personnel who have been in the business of installing specialty lighting for not less than seven (7) years and shall provide a full time field superintendent who shall be a representative of the installer during the installation and testing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name, and manufacturer's name. Delivered material shall be identical to the reviewed submittals.

B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged, or otherwise not suitable for installation from the job site and replace with acceptable materials.

C. The fixtures shall be delivered to the job site fully fabricated and assembled and ready for installation.

D. For luminaires incorporating Alzak cones or reflector/cones for protection pending completion of the installation: these components shall be supplied bulk packed in cartons separate from the luminaires. Unit packaging of cones or reflector/cones with luminaires is not acceptable.

1.8 WARRANTY

A. Installation checkout: Upon completion of initial system installation and fixture cleaning, the trade subcontractor shall notify the Architect that the system has been completed. At this time, the subcontractor shall verify that the installation has been done in full accordance with the design and specification and is in full and complete working order.

B. The Contractor shall warrant the fixture, its finishes, and all of its component parts, to be free from defects for a period of one year from date of acceptance if operated within rated voltage range. Replacement of faulty materials and the cost of labor required to make the replacement shall be the responsibility of the Contractor.

C. All LED Manufacturers shall provide a minimum five year warranty on LED components. Along with the standard warranty, if extreme color shift occurs (+1,000 Kelvin) or extreme color inconsistency develops (+/- 500 Kelvin) within the warrantee period, this shall be considered a failure and the Manufacturer shall be responsible for replacing all affected fixtures free of charge.

PART 2 - PRODUCTS

2.1 FIXTURE CONSTRUCTION (GENERAL)

A. All materials, accessories, and other related fixture parts shall be new and free from defects which in any manner may impair their character, appearance, strength, durability and function, and be effectively protected from any damage or injury from the time of fabrication to the time of delivery and until final acceptance of the work.

B. Enclosures: Fabricate fixture enclosures with a minimum of #20 gauge (0.0359 inch) thick cold rolled sheet steel. Enclosures may be constructed of other metals, provided they are equivalent in mechanical strength and acceptable for the purpose. Fabricate lighting fixtures to be finished in vitreous porcelain enamel from a minimum of #20 gauge enameling steel.

C. Sheet Metal Work: All sheet metal work shall be free from tool marks and dents, and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. All inter-sections and joints shall be formed true of adequate strength and structural rigidity to prevent any distortion after assembly.

D. Housings shall be so constructed that all electrical components are easily accessible and replaceable without removing fixtures from their mountings, or disassembly of adjacent construction.

E. Castings: All castings shall be exact replicas of the approved patterns and shall be free of sand pits, blemishes, scales and rust, and shall be smoothly finished. Tolerance shall be provided for any shrinkage of the metal castings in order that the finished castings will accurately fit in their designated locations.

F. All fixtures shall be completely wired at the factory.

G. Mounting Frames and Rings: If ceiling system requires, each recessed and semi-recessed fixture shall be furnished with a mounting frame or ring compatible with the ceiling in which they are to be installed. The frames and rings shall be one piece or constructed with electrically-welded butt joints, and of sufficient size and strength to sustain the weight of the fixture.

H. Light leaks between ceiling trims of recessed lighting equipment and the ceilings will not be tolerated. If fixture is used in partially transparent ceiling, light leaks above the ceiling line will not be tolerated.

I. Yokes, brackets and supplementary supporting members needed to mount lighting fixtures to carrier channels or other suitable ceiling members shall be furnished and installed by the Contractor.

J. Hardware: For steel and aluminum fixtures, all screws, bolts, nuts and other fastening and latching hardware shall be cadmium or equivalent plated. For stainless steel fixtures, all hardware shall be stainless steel. For bronze fixtures, all hardware shall be stainless steel or bronze.

K. Temperature: All fixtures and power supplies must operate within the temperature limits of their design and as specified by Underwriters' Laboratories, Inc. in the applications and mounting conditions herein specified.

L. Adjustable Angle Fixtures: Each lighting fixture which has a beam angle adjustment shall have reliable angle locking devices.

M. Metal Parts: Free of burrs and sharp corners and edges.

N. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

O. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit access without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during maintenance and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

P. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

Q. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

R. KNL Recommends contractor to provide an additional one percent of each fixture type, which shall constitute the Owner's initial attic stock. Contractor shall coordinate exact percentage of attic stock and storage location with Owner.

2.2 REFLECTORS AND TRIMS

A. Installation: Reflectors, reflector cones and visible trim of all lighting fixtures shall not be installed until completion of plastering, ceiling tile work, painting and general clean-up. They shall be carefully handled to avoid scratching or finger-printing and shall be, at the time of acceptance by the Owner, completely clean.

B. All Alzak parabolic cones shall be guaranteed against discoloration for a minimum of ten years, and, in the event of premature discoloration, shall be replaced by the Manufacturer, including materials and the cost of labor.

C. Aluminum reflectors shall be finished specular, semi-specular, or diffuse as required and shall meet or exceed Alzak specifications.

2.3 LENSES

A. Plastic for lenses and diffusers shall be formed of colorless 100 percent virgin acrylic. The quality of the raw material must exceed IES, SPI, and NEMA Specifications by at least 100 percent which, as a minimum standard, shall not exceed a yellowness factor of 3 after 2,000 hours of exposure in the Fade-meter or as tested by an independent test laboratory. Acrylic

plastic lenses and diffusers shall be properly cast, molded or extruded as specified, and shall remain free of any dimensional instability, discoloration, embrittlement, or loss of light transmittance for at least 15 years.

B. Glass used for lenses, refractors, and diffusers in incandescent lighting fixtures shall be tempered for high impact and heat resistance. The glass shall be crystal clear in quality with a transmittance of not less than 88 percent. For exterior fixtures use tempered Borosilicate glass, tempered Corning #7740, or as acceptable. For fixtures directly exposed to the elements and aimed above the horizontal with a radiant energy of 4.16 watts per square inch or greater, use Vycor glass.

C. Where optical lenses are used, they shall be free from spherical and chromatic aberrations and other imperfections which may hinder the functional performance of the lenses.

D. Mechanical: All lenses, louvers, or other light diffusing elements shall be removable, but positively held so that hinging or other normal motion will not cause them to drop out.

E. Cleaning: All lenses shall be turned over to the Owner clean and free of dust.

2.4 FINISHES

A. Painted Surfaces: Synthetic enamel, with acrylic, alkyd, epoxy, polyester, or polyurethane base, light stabilized, baked on at 350 degree Fahrenheit minimum, catalytically or photochemically polymerized after application.

B. White finishes: minimum of 85 percent reflectance.

C. Ceiling opening frames shall either be manufactured of non-ferrous metal, or be suitably rustproofed after fabrication.

D. Selection: Unless otherwise noted, finishes shall be as selected by the Architect.

E. Undercoat: Except for stainless steel, ferrous metal surfaces shall have a five stage phosphate treatment or other acceptable base bonding treatment before final painting and after fabrication.

F. Unpainted non-reflecting surfaces shall be satin finished and coated with a baked-on clear lacquer to preserve the surface. Where aluminum surfaces are treated with an anodic process, the clear lacquer coating may be omitted.

G. Unpainted Aluminum Surfaces: Finish interior aluminum trims with an anodized coating of not less than 7 mg. per square inch, of a color and surface finish as selected by the Architect. Finish exterior aluminum and aluminum trims with an anodized coating of not less than 35 mg. per square inch, of a color and surface finish as selected by the Architect.

H. Porcelain Enamel Surfaces: Apply porcelain finishes smoothly. Finish shall be not less than 7.5 mils thick of non-yellowing, white, vitreous porcelain enamel with a reflectance of not less than 85 percent.

2.5 LED FIXTURES

A. ANSI Standards: LED fixtures shall meet ANSI Standards C78.377-2008, Specifications for the Chromaticity of Solid State Lighting Products, and C82.37-2011, Harmonic Emission Limits – Related Power Quality Requirements for Lighting.

B. IES LM-79 and LM-80: LED Fixtures shall be LM-79-08, Electrical and Photometric Testing of Solid-State Lighting Devices, and LM-80-08, Measuring Lumen Depreciation of LED Light Sources, tested and approved.

C. NEMA: LED Diodes and Electronic Drivers shall comply with NEMA guideline SSL-3-2010, High-Power White LED Binning for General Illumination, and SSL-1-2010, Electronic Drivers for LED Devices, Arrays, or Systems.

D. UL Listing: LED fixtures and all components shall be UL Listed under UL 8750 as well as any other applicable UL listings required.

E. Rated Life: LED Fixtures shall be rated for 50,000 hour minimum performance on all LED diode components.

F. Color Rendering Index (CRI): All LED fixtures shall have a CRI of 80 or higher.

G. Color Consistency: All LEDs shall be matched to the highest level of color consistency (+/- 100 Kelvin).

H. LED Components: LED boards, drivers, modules and light engines shall be accessible and replaceable in the field.

2.6 BASE BID MANUFACTURERS (ALTERNATES)

A. Base bid for lighting fixtures of manufacturers listed.

B. Alternate manufacturers: Identification by means of manufacturers' names and catalog numbers is to establish basic features and performance standards. Any substitutions must meet or exceed these standards.
   1. Where a product is specified to be by a designated manufacturer with "or equal by" an alternate manufacturer, the alternate manufacturer's product must meet the specifications given for the designated product. If the alternate manufacturer listed does not have a product that will meet the specification, then his product will not be acceptable.
   2. Where a product is specified to be by a designated manufacturer with "or equal by" an alternate manufacturer, the design, including space allocation, has been performed around the designated manufacturer. It is the Contractor's responsibility to verify that the alternate manufacturer's equipment is complete with the same features, options, and photometric performance, as the designated manufacturer's equipment, and that it will fit in the available space (wall, plenum, cove, etc.).

C. Qualifications: Within 60 days of placement of order, Contractor must furnish independent photometric tests and samples for all alternative fixtures. If fixture fails to comply with

specification requirements at that time, Contractor will furnish acceptable fixture at no additional cost to the Owner, and with no delay to the project.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation: Do not scale electrical drawings for exact location of the lighting fixtures. In general, the architectural reflected ceiling plans indicate the proper locations of lighting fixtures.

B. Appurtenances: Install each fixture properly and safely. Furnish and erect hangers, rods, mounting brackets, supports, frames, and other equipment required.

C. Coordination: Furnish lighting fixtures complete with appurtenances required for the proper, safe and distortion-free installation in the various surfaces in which they appear. Determine surface types from the Architectural drawings.

D. Instructions: Each lighting fixture shall be packaged with complete instructions and illustrations showing how to install. Install lighting fixtures in strict conformance with manufacturer's recommendations and instructions.

E. Rigidly align continuous rows of lighting fixtures for true in-line appearance.

F. Do not install fixtures and/or parts such as finishing plates and trims for recessed fixtures until all plastering and painting that may mar fixtures' finish has been completed. Protective plastic sheeting provided by lighting fixture manufacturer shall not be removed until all painting and clean-up has been completed.

G. Mechanical Rooms: Lighting fixture locations in mechanical and electrical equipment rooms are approximate. Coordinate mounting height and location of lighting fixtures to clear mechanical, electrical and plumbing equipment and to adequately illuminate meters, gauges and equipment.

H. Support all lighting fixtures independently of duct work or piping.

I. Concealment: Whenever a fixture or its hanger canopy is applied to a surface mounted outlet box, a finishing ring shall be utilized to conceal the outlet box.

J. Splices in internal wiring shall be made with approved insulated "wire nut" type mechanical connectors, suitable for the temperature and voltage conditions to which they are subjected.

K. All wire utilized for connections to or between individual fixtures and fixture auxiliaries (i.e., wires which do not constitute "through circuit" wiring) shall be suitable for temperature, current, and voltage conditions to which it is subjected.

L. Install reflector cones, baffles, aperture plates, light controlling element for air handling fixtures, and decorative elements after completion of ceiling tiles, painting and general cleanup.

M. Replace blemished, damaged or unsatisfactory fixtures as directed.

N. Similar luminaire types must be supplied by the same manufacturer to assure matching cone colors and trims in their respective categories.

O. The Electrical Contractor is responsible for coordinating recessed luminaires and the ceilings into which they are to be installed, regardless of the manufacturers' catalog numbers specified.

P. It is the General, Electrical, and HVAC Contractors responsibility to cross reference the lighting, HVAC, and sprinkler plans to ensure that there are no conflicts. Lighting fixture locations take precedence over duct work and sprinkler locations. Any conflicts should be reported to the Architect. Exact locations of diffusers and sprinkler heads should be located in a symmetrical pattern in line with lighting fixtures.

Q. Manufacturer shall supply written instruction for the installation of all fixtures including custom designs and special modifications affecting installation.

3.2 AIMING AND ADJUSTMENT

A. All adjustable lighting units shall be aimed, focused, locked, etc., by the Subcontractor under the supervision of the Lighting Consultant. The Lighting Consultant shall indicate the number of crews (foreman and apprentice) required. All aiming and adjusting shall be carried out after the entire installation is complete. All ladders, scaffolds, etc. required shall be furnished by the Contractor at the direction of the Lighting Consultant. As aiming and adjusting is completed, locking set-screws and bolts and nuts shall be tightened securely.

B. Night Work: Where possible, units shall be focused during the normal working day. However, where daylight interferes with seeing, adjustment shall be accomplished at night.

3.3 CLEANUP

A. At the time of final acceptance by the Owner, all lighting fixtures shall have been thoroughly cleaned with materials and methods recommended by the manufacturers, all broken parts shall have been replaced, and all lamps shall be operative.

3.4 MAINTENANCE

A. The Contractor shall be responsible for obtaining from his supplying lighting manufacturers, for each type of lighting fixture, a recommended maintenance manual including:
   1. Tools required.
   2. Types of cleaners to be used.
   3. Replacement parts identification list.
   4. Final, as-built shop drawings.

B. The Contractor shall be responsible for ordering attic stock for ownership / end user.

GENERAL FIXTURE SCHEDULE NOTES:

A. Any discrepancies between the catalog number, fixture description, remarks, lamp and supply voltage should be brought to the attention of the lighting consultant prior to the release of a purchase order.
B. "Continuous", when noted, requires complete lengths with no gaps between fixture housings. Submit complete shop drawings with field layouts for all fixtures, indicating power entries, joiner and connection locations, supports, and lamp locations for continuous runs.
C. Catalog cuts or "Series" numbers, are intended to provide assistance in establishing general type or category of lighting fixtures only. Contractor shall provide a fixture that meets the written performance and description.
D. When custom sketches or drawings are part of the contract documents, bring any discrepancies between the drawing and specifications to the attention of the Architect before submitting bids.
E. "Remote Drivers/Transformers" when noted, require the fixture manufacturer (or E.C.) to supply low voltage drivers/transformer(s) with enclosures and to coordinate size and quantity with the Electrical Contractor (or manufacturer). Contractor to provide fuse for secondary wiring. Drivers/Transformers to be in a well ventilated and accessible remote location as selected by architect/ interior designer/EE and coordinated with the contractor. Contractor to coordinate mounting details and electrical connections, advise manufacturer of lead lengths, quantity of drivers/transformers and verify that installation complies with national and local codes. Contractor to follow manufacturer recommendations to determine required wire size required between fixture and transformer to assure that voltage drop does not exceed 5%.
F. "Custom Color", when noted, requires the Contractor to coordinate and provide special colors. Contractor to verify all occurrences with the Architect, and note identical fixtures types may be installed at different architectural ceiling or wall finishes, thus separate colors for each material may be required. Include within cost additional set-up charges for "custom colors".
G. For all LED and Fluorescent fixtures designated on electrical drawings with the suffix “EM” or “E”, refer to both the description in the fixture schedule and the E-series drawings to determine whether to provide Emergency Battery Packs or whether fixtures are connected to a central inverter of generator powering EM circuits. EE to confirm emergency requirements.
H. Focusing and aiming is required for all adjustable lighting fixtures. Contractor to provide allowance for AFTER HOURS manpower, scaffolding, and tools to adjust, aim, or install fixtures and accessories per the Lighting Consultants direction. Focusing can only occur after the Contractor has verified installation and confirmed operation of all fixtures and control systems. Installation of specific architectural ornament or art intended to be illuminated must be in place prior to the focus. The “initial” aiming angles must be approved by the client and additional re-aiming may be required. The Contractor is to provide manhour allowance for re-aiming and installation of additional accessories, as needed.
I. Submit shop drawings to the Architect and Lighting Consultant for review in accordance with the requirements of the above descriptions. Shop drawings shall include details and cuts of each fixture type, and shall include information on lamping, housing size and material, driver or transformer type (where applicable), lenses, baffles, finishes, and means and methods of attachment. Do not obtain fixtures without approval.

TYPE KA		
Amerlux GRUV2.5-GRID-A16-PL-5-359-HW-120/277-4'-0"-IND-0-10V ***EQUAL ALTERNATE: Focal Point Seem 2 LED Recessed Series***	DESCRIPTION	Linear LED slot
	MOUNTING	Recessed in ACT
	LIGHT SOURCE	5W/ft, 500 delivered lumens/ft, 90 CRI, 3500K LEDs, by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Extruded aluminum, nominally 2-11/16" W x 3-7/8" H x 4'-0" L; lengths to be confirmed with architectural drawings
	TRIM/APERTURE	2-1/2" W aperture
	FINISH	White finish to be verified by architect.
	LENS/ACCESSORIES	Snap-in high efficiency performance lens, extruded acrylic
	LOCATION	Circulation, typical throughout
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type/ceiling system and thickness, manufacturer's installation instructions, and field conditions. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. Contractor to coordinate all fixture run length configurations with architectural drawings and field conditions, and order as required.

TYPE KB		
Amerlux GRUV6-HE-GRID-A16-PL-10-359-HW-120/277-8'-0"-IND-0-10V GRUV6-HE-GRID-A16-PL-10-359-HW-120/277-6'-0"-IND-0-10V ***EQUAL ALTERNATE: Focal Point Seem 6 LED Recessed Series***	DESCRIPTION	Linear LED slot
	MOUNTING	Recessed in ACT
	LIGHT SOURCE	10W/ft, 1000 delivered lumens/ft, 90 CRI, 3500K LEDs, by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Extruded aluminum, nominally 6" W x 4-7/16" H x 8'-0" and 6'-0" L; lengths to be confirmed with architectural drawings
	TRIM/APERTURE	5-3/16" W aperture
	FINISH	White finish to be verified by architect.
	LENS/ACCESSORIES	Snap-in high efficiency performance lens, extruded acrylic
	LOCATION	Treatment Bays, Treatment Rooms
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type/ceiling system and thickness, manufacturer's installation instructions, and field conditions. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. Contractor to coordinate all fixture run length configurations with architectural drawings and field conditions, and order as required.

TYPE KC		
Amerlux EDR-1730-GRUV2.5-IS-J/GB-COVE-A16-PL-4-359-HW-120/277-length-CUS-0-10V **SHOP DRAWINGS REQUIRED SHOWING RUN LENGTH CONFIGURATIONS ***EQUAL ALTERNATE: Focal Point Seem 2 LED Perimeter Series***	DESCRIPTION	Linear LED perimeter slot
	MOUNTING	Recessed in gyp, trimless installation
	LIGHT SOURCE	4W/ft, 400 delivered lumens/ft, 90 CRI, 3500K LEDs, by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Extruded aluminum, nominally 3" W x 3-5/8" H x lengths, per architectural drawings. Overall height with regress is 6-1/8"
	TRIM/APERTURE	2-1/2" W aperture, lens is regressed 2-1/2" above finished ceiling
	FINISH	White finish to be verified by architect.
	LENS/ACCESSORIES	Snap-in high efficiency performance lens, extruded acrylic
	LOCATION	Staff Toilet; Waiting Room C329
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Fixture to be supported by wall mounting bracket system. Contractor to follow manufacturer's instructions for a complete installation. Fixture to sit flush to walls at both ends of runs, as shown in architectural drawings. Contractor to verify all fixture run lengths and configurations per architectural drawings and field conditions, and order as required. 2. Fixtures to run continuously without hot spots, dark spots or light leaks. Lens lengths to be maximized. 3. Contractor to verify fixture mounting compatibility with ceiling/wall type and thickness, manufacturer's instructions, and field conditions. 4. Contractor to order all electrical and mounting hardware required for a complete installation.

TYPE KC1		
Amerlux EDR-1730-GRUV2.5-IS-J/GB-COVE-A16-PL-4-359-HW-120/277-length-CUSTOM PATTERN-0-10V **SHOP DRAWINGS REQUIRED SHOWING RUN LENGTH CONFIGURATIONS AND ILLUMINATED CORNERS ***EQUAL ALTERNATE: Focal Point Seem 2 LED Perimeter Series***	DESCRIPTION	Same as KC except fixture to be custom pattern with illuminated corners. Refer to architectural drawings for exact pattern. Fixture mounted in wood look ceiling.
	MOUNTING	
	LIGHT SOURCE	
	CONTROL	
	HOUSING	
	TRIM/APERTURE	
	FINISH	
	LENS/ACCESSORIES	
	LOCATION	Waiting Room C329
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Fixture to be supported by wall mounting bracket system. Contractor to follow manufacturer's instructions for a complete installation. Fixture to sit flush to walls at both ends of runs, as shown in architectural drawings. Contractor to verify all fixture run lengths and configurations per architectural drawings and field conditions, and order as required. 2. Fixtures to run continuously without hot spots, dark spots or light leaks. Lens lengths to be maximized. 3. Contractor to verify fixture mounting compatibility with ceiling/wall type and thickness, manufacturer's instructions, and field conditions. 4. Contractor to order all electrical and mounting hardware required for a complete installation. 5. Manufacturer to provide system to mechanically connect fixture lengths together, ensuring continuous even runs with no gaps or light leaks. 6. Lenses at illuminated corners to be mitered with no light leaks or visible diodes.

TYPE KC2		
Amerlux EDR-1730-GRUV2.5-IS-J/GB-COVE-A16-PL-5-359-HW-120/277-length-CUS-0-10V **SHOP DRAWINGS REQUIRED SHOWING RUN LENGTH CONFIGURATIONS ***EQUAL ALTERNATE: Focal Point Seem 2 LED Perimeter Series***	DESCRIPTION	Same as KC except fixture to be 5W/ft, 500 delivered lumens/ft and mounted in millwork niche.
	MOUNTING	
	LIGHT SOURCE	
	CONTROL	
	HOUSING	
	TRIM/APERTURE	
	FINISH	
	LENS/ACCESSORIES	
	LOCATION	Radiology Waiting Room
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Fixture to be supported by wall mounting bracket system. Contractor to follow manufacturer's instructions for a complete installation. Fixture to sit flush to walls at both ends of runs, as shown in architectural drawings. Contractor to verify all fixture run lengths and configurations per architectural drawings and field conditions, and order as required. 2. Fixtures to run continuously without hot spots, dark spots or light leaks. Lens lengths to be maximized. 3. Contractor to verify fixture mounting compatibility with ceiling/wall type and thickness, manufacturer's instructions, and field conditions. 4. Contractor to order all electrical and mounting hardware required for a complete installation. 5. Manufacturer to provide system to mechanically connect fixture lengths together, ensuring continuous even runs with no gaps or light leaks.

TYPE KD		
Amerlux Housing: HDL-HP-R-NC-A17-TL-12-voltage-0-10V Trim: HDL-HP-TL-SLV-65SOL-359 ***EQUAL ALTERNATE: Focal Point ID+3.5" Downlight Trimless Series***	DESCRIPTION	Fixed recessed LED downlight
	MOUNTING	Tape-in plaster for trimless appearance in gyp board ceiling
	LIGHT SOURCE	12W, 1062 delivered lumens, 90 CRI, 3500K, 65° beam spread by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Galvanized steel, nominally 7-3/4" W 3-7/8" H x 11-1/2" L (not including mounting brackets)
	TRIM/APERTURE	Die-cast aluminum bevel trim, nominally 3-9/16" Ø overall with 2-7/16" Ø aperture
	FINISH	Matte silver trim finish to be verified by architect
	LENS/ACCESSORIES	Solite lens
	LOCATION	Restrooms, typical throughout
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type and thickness, manufacturer's installation instructions, and field conditions. 2. Fixture shall appear flush with finished ceiling plane. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail.

TYPE KD1		
Amerlux Housing: HDL-HP-R-NC-A17-T-12-voltage-0-10V Trim: HDL-HP-T-SLV-65SOL-359 ***EQUAL ALTERNATE: Focal Point ID+3.5" Downlight Series***	DESCRIPTION	Same as type KD except fixture to be overlap trim, mounted in tile ceiling.
	MOUNTING	
	LIGHT SOURCE	
	CONTROL	
	HOUSING	
	TRIM/APERTURE	
	FINISH	
	LENS/ACCESSORIES	
	LOCATION	Radiology Break Room
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type and thickness, manufacturer's installation instructions, and field conditions. 2. to refer to manufacturer's instructions to ensure an acceptable installation detail.

TYPE KE		
Amerlux Housing: HDL-HP-S-NC-A17-MWK-16-voltage-0-10V Trim: HDL-HP-MWK-finish-65SOL-359 ***EQUAL ALTERNATE: Focal Point ID+3.5"x3.5" Downlight Trimless Series***	DESCRIPTION	Fixed square recessed LED downlight
	MOUNTING	Trimless appearance in millwork ceiling
	LIGHT SOURCE	9W, 796 delivered lumens, 90 CRI, 3500K, 65° beam spread by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Galvanized steel, nominally 7-3/4" W 3-7/8" H x 11-1/2" L (not including mounting brackets)
	TRIM/APERTURE	Die-cast aluminum bevel trim, nominally 3-9/16" Ø overall with 2-7/16" Ø aperture
	FINISH	Trim finish to be specified by architect
	LENS/ACCESSORIES	Solite lens
	LOCATION	Waiting Room C329
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type and thickness, manufacturer's installation instructions, and field conditions. 2. Fixture shall appear flush with finished ceiling plane. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail.

TYPE KF		
Apogee Lighting LCS-custom shape-9-35-L-size-STD-mounting-W **SHOP DRAWINGS REQUIRED SHOWING CUSTOM SIZES AND PANELING ***NO EQUAL ALTERNATE***	DESCRIPTION	Illuminated back lit Newmat **SEE GENSLER SPEC 09 54 43 SPECIALTY CEILINGS: STRETCHED FABRIC CEILING SYSTEMS FOR MORE INFORMATION ON CEILING SYSTEM
	MOUNTING	Recessed in specialty wood look laminate/gyp ceiling
	LIGHT SOURCE	2W/sf, 170 delivered lumens/sf, 90 CRI, 3500K, by manufacturer
	CONTROL	Remote 0-10V dimming driver
	HOUSING	Die formed aluminum sheet, Newmat diffuser, nominally 6" H with dimensions per architectural drawing. Ceiling to appear panelized, 2' x 2' tiles.
	TRIM/APERTURE	N/A
	FINISH	White finish to be verified by architect
	LENS/ACCESSORIES	Newmat diffuser
	LOCATION	Waiting Room C329, Nurses' Stations
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type and thickness, manufacturer's installation instructions, and field conditions. 2. Fixture to be installed so it shall appear flush with finished ceiling plane. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. EC/GC to order all electrical and mounting hardware as required for a complete installation. 4. Remote driver to be installed in remote, well-ventilated, and accessible location. Contractor and architect to coordinate. 5. Contractor to coordinate appropriate amount and gauge of wiring required to run from fixture to remote driver. Distance between driver and fixture must not exceed manufacturers' recommendations. Refer to manufacturer's instructions to ensure that voltage drop does not exceed 5%. 6. EC/GC to coordinate quantity and size of remote drivers.

TYPE KG	**OMITTED**

TYPE KH		
Amerlux GRUV1.5-IS-A16-PL-3-359-HW-120/277-length-CUS-PC-0-10V **SHOP DRAWINGS REQUIRED SHOWING RUN LENGTH CONFIGURATIONS AND ILLUMINATED CORNERS ***EQUAL ALTERNATE: Focal Point Seem 1 Recessed Series***	DESCRIPTION	Linear LED slot in custom configurations
	MOUNTING	Independently supported between two ceiling materials and/or ceiling and soffit face (final mounting TBD)
	LAMPING	3W/ft, 277 delivered lumens/ft, 90 CRI, 3500K by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	One piece extruded aluminum, nominally 3-1/4" H x 1-1/2" W x length, per architectural drawings.
	TRIM/APERTURE	1-5/16" W aperture
	FINISH	White finish to be verified by architect
	LENS/ACCESSORIES	Snap-in high efficiency performance lens, extruded acrylic
	LOCATION	Nurses' Station
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Fixture mounted around specialty wood look metal panel/gyp ceiling. Final mount to be confirmed with architectural details. Contractor to verify fixture mounting compatibility with ceiling type/ceiling system and thickness, manufacturer's installation instructions, and field conditions. 2. Fixture shall appear flush with ceiling plane. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. Contractor to coordinate all fixture run length configurations with architectural drawings and field conditions, and order as required. 4. Fixtures to run continuously without hot spots, dark spots or light leaks. Lens lengths to be maximized. 5. Contractor shall not remove manufacturer provided spacers until fixture (and ceiling) are fully installed. Spacers maintain fixture width for lens to sit properly. 6. Manufacturer to provide system to mechanically connect fixture lengths together, ensuring continuous even runs with no gaps or light leaks. 7. Lenses at illuminated corners to be mitered with no light leaks or visible diodes.

TYPE KJ		
Signify / Day-Brite LICS100E-length-935-UNV-finish-DIM-RSHL ***EQUAL ALTERNATE: Kenall Stratalume Connects Undercabinet Series***	DESCRIPTION	Linear LED undercabinet lighting
	MOUNTING	Surface mounted to underside of upper cabinets to act as task lighting, with modular connectors.
	LAMPING	3.24W/LF, 264 delivered lumens/LF, 90 CRI, 3500K LEDs by manufacturer
	CONTROL	Integral ELV (trailing edge phase) dimming driver. Local on/off rocker switch.
	HOUSING	Extruded aluminum housing nominally 4-3/16" W x 1-3/16" H x 10", 19", or 28" L
	TRIM/APERTURE	N/A
	MATERIAL/ FINISH	Architect to verify antimicrobial white finish
	LENS/ACCESSORIES	Standard diffuser, rocker switch
	LOCATION	Med Prep, Nourishment, Radiology Break Room
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Fixture to be mounted within undercabinet detail. Contractor to coordinate installation with architectural detail drawings, elevations, and sections to ensure a complete installation. 2. Contractor to verify mounting compatibility with millwork surface type and thickness, architectural drawings and details, manufacturer's installation instructions, and field conditions, and order accordingly. 3. Fixture comes in 10", 19", and 28" lengths. Fixture shall run continuously end-to-end (no dark spots) to within 6" of end of millwork / cabinetry run. 28" L fixtures to be used throughout with 10" and 19" L fixtures used only at ends. 4. Contractor to verify all fixture run lengths and configurations per architectural drawings, details, and field conditions, and order as required. 5. EC/GC to order all mounting and electrical hardware as required for a complete installation.

TYPE KK		
Signify / Day-Brite 2-FPZ-**30L**-835-2-DS-UNV-DIM ***EQUAL ALTERNATE:*** ***Liteline Forum LED Panel Light Series***	DESCRIPTION	2x2 LED troffer
	MOUNTING	Recessed in acoustic tile ceiling
	LAMPING	**23W, 3000** nominal delivered lumens, 80 CRI, 3500K, LEDs by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Die formed galvanized steel, nominally, 23-3/4" W x 3" H x 23-3/4" L
	TRIM/APERTURE	Extruded aluminum frame
	MATERIAL/ FINISH	Architect to verify white finish
	LENS/ACCESSORIES	Flat opal lens
	LOCATION	Clean Supply, Nourishment, Equipment, Radiology Public Wait C466, Radiology Reg/Rec C467, Office C468, Radiology Break Room
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify mounting compatibility with ceiling type and thickness, architectural drawings and details, manufacturer's installation instructions, and field conditions, and order housing accordingly. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. EC/GC to order all mounting and electrical hardware as required for a complete installation.

TYPE KK1		
Signify / Day-Brite 2-FPZ-**30L**-835-2-DS-UNV-DIM Accessories (as required): FMA22 ***EQUAL ALTERNATE:*** ***Liteline Forum LED Panel Light Series***	DESCRIPTION	Same as KK except mounted in gyp board ceiling. Provide "F" mounting frame for recessing in solid ceiling.
	MOUNTING	
	LAMPING	
	CONTROL	
	HOUSING	
	TRIM/APERTURE	
	MATERIAL/ FINISH	
	LENS/ACCESSORIES	
	LOCATION	Soiled Workroom**, EVS**
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify mounting compatibility with ceiling type and thickness, architectural drawings and details, manufacturer's installation instructions, and field conditions, and order housing accordingly. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. EC/GC to order all mounting and electrical hardware as required for a complete installation.

TYPE KK2		
Signify / Day-Brite 2-FPZ-54L-835-2-DS-UNV-DIM **Accessories (as required):** **FMA22** ***EQUAL ALTERNATE:*** ***Liteline Forum LED Panel Light Series***	**DESCRIPTION**	**Same as KK except fixture to be provided by 5400 lumens, 42W.**
	MOUNTING	
	LAMPING	
	CONTROL	
	HOUSING	
	TRIM/APERTURE	
	MATERIAL/ FINISH	
	LENS/ACCESSORIES	
	LOCATION	**Med Prep, Scheduling Office**
	VOLTAGE	**By EE**
	INSTALLATION NOTES	**1. Contractor to verify mounting compatibility with ceiling type and thickness, architectural drawings and details, manufacturer's installation instructions, and field conditions, and order housing accordingly.** **2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail.** **3. EC/GC to order all mounting and electrical hardware as required for a complete installation.**

TYPE KL		
Kenall Trim: M4DL4-DCFW-14L-35K9-CD Rough-in: RIS4-voltage-DIM1 ***EQUAL ALTERNATE:*** ***Peachtree Lighting 4BLRD-BU 4" Vandal Resistant LED Downlight Series***	DESCRIPTION	Sealed LED downlight
	MOUNTING	Recessed in gyp ceiling
	LIGHT SOURCE	16W, 1268 delivered lumens, 90 CRI, 3500K, 65° beam spread by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Die-formed steel, die-cast heat sink, nominally 7.2" W x 5.4" H x 12.57" L (not including mounting brackets)
	TRIM/APERTURE	Nominally 4.5" Ø overall with 3.5" Ø aperture
	FINISH	Clear diffuse reflector with white painted trim finish to be verified by architect
	LENS/ACCESSORIES	Diffused acrylic lens
	LOCATION	**Patient** Toilet Rooms **throughout**
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type and thickness, manufacturer's installation instructions, and field conditions. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail.

TYPE KM		
Kenall BHRS4-96-TM-SYM-750LF-35K9-DIM1-DV **Accessories (as required):** **T20 – tamper resistant torx bit** ***EQUAL ALTERNATE:*** ***Fail Safe*** ***FSN6 Series with*** ***High Security Option***	DESCRIPTION	Linear LED slot, gasketed and tamper resistant
	MOUNTING	Recessed in gyp board, trimless installation
	LIGHT SOURCE	9W/ft, 636 delivered lumens/ft, 90 CRI, 3500K LEDs, by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Extruded aluminum, nominally 5.63" W (including spackle flange) x 4" H x 8'-0" L; lengths to be confirmed with architectural drawings
	TRIM/APERTURE	Nominally 3.5" W aperture
	FINISH	White finish to be verified by architect.
	LENS/ACCESSORIES	Diffuse polycarbonate lens
	LOCATION	Isolation Treatment Rooms
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type/ceiling system and thickness, manufacturer's installation instructions, and field conditions. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. Contractor to coordinate all fixture run length configurations with architectural drawings and field conditions, and order as required.

TYPE KN		
Kenall BHRS4-length-TM-SYM-500LF-35K9-DIM1-DV Accessories (as required): T20 – tamper resistant torx bit ***EQUAL ALTERNATE:*** ***Fail Safe*** ***FSN6 Series with*** ***High Security Option***	DESCRIPTION	Linear LED slot, gasketed and tamper resistant
	MOUNTING	Recessed in gyp board, trimless installation
	LIGHT SOURCE	6W/ft, 422 delivered lumens/ft, 90 CRI, 3500K LEDs, by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Extruded aluminum, nominally 5.63" W (including spackle flange) x 4" H x length, to be confirmed with architectural drawings
	TRIM/APERTURE	Nominally 3.5" W aperture
	FINISH	White finish to be verified by architect.
	LENS/ACCESSORIES	Diffuse polycarbonate lens, tamper resistant torx bit
	LOCATION	**Patient** Toilet Rooms **throughout**
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type/ceiling system and thickness, manufacturer's installation instructions, and field conditions. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. Contractor to coordinate all fixture run length configurations with architectural drawings and field conditions, and order as required.

TYPE KP		
Kirlin PRO-12035-35K Individual Room Control Accessories: PRO-WALLC (required) PRO-REMOT (optional to price out) PRO-SENSR (optional to price out) ***NO EQUAL ALTERNATE***	DESCRIPTION	Aimable LED Exam Light
	MOUNTING	Recessed in tile and gyp board ceilings
	LIGHT SOURCE	54.1W, 95 CRI, 3500K LEDs, by manufacturer; delivers up to 4000FC at task surface (aimed straight down)
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Nominally 10-3/4" H x 15" W x 16-3/4" L
	TRIM/APERTURE	Nominally 12" Ø aperture
	FINISH	White finish to be verified by architect.
	LENS/ACCESSORIES	Tempered clear glass lens, wall control panel (required for aiming), remote control and remote sensor (optional)
	LOCATION	Treatment Rooms, Treatment Bays throughout
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type/ceiling system and thickness, manufacturer's installation instructions, and field conditions. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. Contractor to coordinate all fixture run length configurations with architectural drawings and field conditions, and order as required.

TYPE KP1		
Kirlin PRV-12035-35K Individual Room Control Accessories: PRO-WALLC (required) PRO-REMOT (optional to price out) PRO-SENSR (optional to price out) ***NO EQUAL ALTERNATE***	DESCRIPTION	Same as KP except fixture is vandal / ligature resistant.
	MOUNTING	
	LIGHT SOURCE	
	CONTROL	
	HOUSING	
	TRIM/APERTURE	
	FINISH	
	LENS/ACCESSORIES	
	LOCATION	Isolation Treatment Rooms
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Contractor to verify fixture mounting compatibility with ceiling type/ceiling system and thickness, manufacturer's installation instructions, and field conditions. 2. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail. 3. Contractor to coordinate all fixture run length configurations with architectural drawings and field conditions, and order as required.

TYPE KQ		
Signify / Day-Brite CFI FSS-2-20L-835-UNV-DIM Accessories (as required): FKR-126 ***EQUAL ALTERNATE:*** ***XtraLight Slim Profile Strip Round Lens Series***	DESCRIPTION	Lensed LED strip light
	MOUNTING	Suspension mounted via chain
	LIGHT SOURCE	17W, 2049 delivered lumens, 80 CRI, 3500K LEDs, by manufacturer
	CONTROL	Integral 0-10V dimming driver
	HOUSING	Nominally 2-1/2" W x 3" H x 22-1/2" L
	TRIM/APERTURE	N/A
	FINISH	White finish to be verified by architect.
	LENS/ACCESSORIES	Contoured frosted acrylic lens, chain mount accessories
	LOCATION	Electrical Room
	VOLTAGE	By EE
	INSTALLATION NOTES	1. Architect to specify mounting height AFF. 2. Contractor to verify fixture mounting compatibility with ceiling type/ceiling system and thickness, manufacturer's installation instructions, and field conditions. 3. Contractor to refer to manufacturer's instructions to ensure an acceptable installation detail.

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv 2.5" Recessed Linear

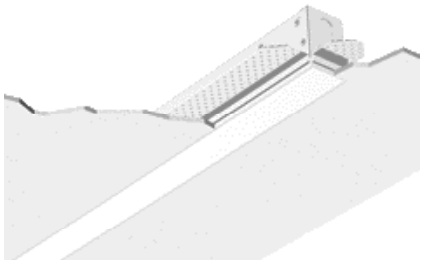
Grüv® 2.5"

Recessed Linear LED

amerlux
A Delta Group Company

Features

Small in scale, big on performance: Grüv® 2.5" LED, 5 or 10 watts/foot, delivers superior performance that makes it ideal for ambient lighting in ceiling and wall applications. At only 2.5" in width and less than 6" in depth: and providing superior visual aesthetic with snap-in hybrid micro-linear lens Grüv 2.5" LED is big enough for ambient lighting and small enough to add visual accent to your designs.



Product Overview

Type:	Recessed Direct	
Wattage:	5W/ft, 10W/ft (other Wattages available see p2)	
Color Temp:	2700K, 3000K, 3500K, 4000K; Tunable White (2700K-5700K)	
CRI:	83 or 90+ typ. (2700K, 3000K, 3500K, 4000K) 90+ (Tunable White)	
Dimming (wired):	Static White 0-10V, 1% dimming (standard) Lutron Hi-lume® 2 wire (120V only) Lutron Hi-lume® EcoSystem, 1% dim, fade to off DALI dimming, 1% dim	Tunable White 0-10V TW, 1% dimming DALI DT8, 1% digital dimming Lutron T Series 1% dimming
Dimming (wireless):	Enlighted Sensor Lutron Athena (integral wireless RF node)	Enlighted Sensor TW Lutron Athena TW (integral wireless RF node)

PROJECT: **TYPE:**

Fixture Summary *(see following pages for more information)*

Ceiling Types

4" Tech Zone	6" Tech Zone	9/16"	15/16"	Gyp Board	Millwork
No	No	Yes	Yes	Yes	Yes

Perimeter J-Mold
Yes

Performance Chart (4' Fixture)

Nominal Wattage/Foot	Delivered Lumens	LPW	Color Temp-CRI
5	2351	121.8	3500K-83
10	4374	115	3500K-83

Data is based on 3500K-83 IES files available on website
Data is based on 4' fixture with performance lens

Electrical Data

		4'		8'	
Wattage Per Foot		System Watts	Amps	System Watts	Amps
5	120V	19.3	0.16	38.6	0.32
	277V	19.3	0.07	38.6	0.14
10	120V	38	0.32	76	0.63
	277V	38	0.14	76	0.27

Electronic multi-volt (120-277VAC), constant current LED driver

Standard Patterns

"L"	"⌟"	"⊔"	"□"	"⌝"	Wall to Ceiling	Custom*
Yes	Yes	Yes	Yes	Yes	Yes	Yes

** Submit drawing, consult factory*

5 year limited warranty AMERLUX LED

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 2.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Ordering Information

_____.____.____.____.HW.120/277.____.____.____.____

1 2 3 4 5 6 7 8 9 10

1 Model
GRUV2.5-FLG-A16† - exposed flange
GRUV2.5-FLG-GRID-A16† - flange, grid mount
GRUV2.5-GB-A16† - gyp board trimless mud-in
GRUV2.5-GRID-A16† - grid mount
GRUV2.5-IS-A16† - independently suspended, millwork
GRUV2.5-J/GB-A16† - j-mold/gyp board trimless
GRUV2.5-J/GRID-A16† - j-mold/grid
GRUV2.5-J/IS-A16† - j-mold/independently suspended

2 Optics
PL - performance lens (standard)
DL - designer lens
SLDW - straight blade louver (wh) solid blades w/overlay
SLDB - straight blade louver (blk) solid blades w/overlay
SLDS - straight blade louver (slv) solid blades w/overlay
DRP1 - 1" drop lens

3 Wattage (per foot)
Standard:
5 - 5W/ft
10 - 10W/ft
Optional:
3 - 3W/ft (4' minimum length required)
4 - 4W/ft (4' minimum length required)
6 - 6W/ft
7 - 7W/ft
8 - 8W/ft
9 - 9W/ft

4 Color Temp-CRI

Static White:

27 - 2700K-83	**279** - 2700K-90+	
30 - 3000K-83	**309** - 3000K-90+	
35 - 3500K-83	**359** - 3500K-90+	
40 - 4000K-83	**409** - 4000K-90+	

Tunable White:
TW9-2757 - tunable white, 90 CRI (2700K-5700K)

5 Finish
HW - high reflectance matte white

6 Voltage
120/277

7 Length

_____x_____x_____

(Length A)	(Length B)	(Length C)
Length A (used for)	Length B (used for)	Length C (used for)
- all patterns - IND/IND-S+ - CON/CON-S+ - CUS	- all patterns - PR - 2 lengths of 2	- PU - PZ

8 Configuration
IND[1] - individual fixture, 2' to 8' in 1' increments
IND-S+ - individual with standard plus (see pg7, for GRID or J/GRID only)
CON - continuous run > than 8', specify to nearest foot
CON-S+ - continuous run with standard plus (see pg7, for GRID or J/GRID only)
CUS - custom made to measure, +/- 1/8" of customer supplied field dimensions
Standard Patterns *(see page 8 for details)*:
PLL - L left, (2) straights + (1) 90° corner, leg right
PLR - L right, (2) straights + (1) 90° corner, leg left
PU - U shape, (3) straight lengths + (2) 90° corners
PR - Rectangle, (4) straight lengths + (4) 90° corners
PZ - Z shape, (3) straight lengths + (2) 90° corners
PWC - wall to ceiling (1) 90° Corner joining 2 segments
Custom Patterns:
PC - please provide drawings and consult factory

9 Drivers/Controls
Wired - Static White:
0-10V - 1% analogue dimming, 120-277VAC, Dim to off when selected with wireless dimming control
HILUME-H-ECO - Lutron "H" Series, 1% dim, fade to off, EcoSystem
DALI - DALI Dimming 120-277VAC, 1% dim
Wired - Tunable White:
0-10V TW - 1% dimming , multi-volt (120V-277V) constant current
DALI DT8 - 1% digital dimming, CCT control per DALI DT8, (120V-277V) constant current
Lutron T - Lutron T Series, digital link 1% dimming, (120V-277V)
Wireless - Static White:
ENLS-SR - Enlighted sensor, energy metering (not available w/Gruv 1.5 FR)
ENLS-010 - Enlighted sensor with controller unit (not available w/Gruv 1.5 FR)
AWNR-WH-SR - Lutron Athena wireless node, RF only, white
AWNR-BL-SR - Lutron Athena wireless node, RF only, black
AWNR-WH-010 - Lutron Athena wireless node, RF only, white
AWNR-BL-010 - Lutron Athena wireless node, RF only, black
Wireless - Tunable White:
ENLS-SR-TW - Enlighted sensor, energy metering (not available w/Gruv 1.5 FR)
AWNR-WH-SR-TW - Lutron Athena wireless node, RF only, white
AWNR-BL-SR-TW - Lutron Athena wireless node, RF only, black

10 Options/Accessories
CP - Chicago Plenum (CCEA)
WHIP - 6' whip, 18/5 conductor
EMC-PF[2] - emergency circuit requires power feed located in last fixture section (for other locations consult factory)
PF[2] - Extra power feed for additional circuiting
EMB - emergency battery pack (not available for lengths under 4')

1 - Lengths less than 4' may have restrictions based upon wattage, lengths, drivers or other options.
2 - Not available with IND (individual) configuration.
† The "A" refers to the sequential revision in a year and "XX" refers to the year of update. Updates coincide with improved performance while not changing the overall fixture aesthetic and are reflected in the published performance data. Please contact your Amerlux representative for explanations of changes.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

Grüv® 2.5”

Recessed Linear LED

amerlux
A Delta Group Company

Grüv 2.5" Recessed Linear

PROJECT: **TYPE:**

Specifications

Application

Commercial and retail recessed ambient lighting can be customized with made to measure lengths, patterns, ceilings or wall mounted fixtures.

Construction

One piece extruded aluminum housing and trim. Die-formed, cold-rolled steel internal components and external mounting brackets. Numerous configurations accommodate most architectural ceiling conditions.

Optical

All lenses are snap-in, extruded acrylic, with a maximum length of 8'. Amerlux's proprietary acrylic lens provides excellent transmission while effectively concealing source image.
PL - Performance Lens provides high efficiency with controlled lens surface brightness (standard).
DL - Designer Lens provides flat even glow on lens. Best when lens is in direct or constant view. Such as vertical wall mounted.
SLD - Straight blade Louver Direct has ½" high blades ½" on center with overlay.
DRP1 - 1" Drop lens with illuminated end caps

LED

Amerlux's boards and patented connector design with brand name LEDs enables Amerlux fixtures to have excellent thermal management and offer a 5 year warranty. Our LED binning is within 3 MacAdam ellipse. Boards are configured for maximum flexibility resulting in even illumination no matter the fixture layout. LED boards are easily replaced in the field with just a Phillips screw driver.

	Static White	Tunable White
CCT:	2700K, 3000K, 3500K, 4000K	2700K-5700K
CRI:	83 or 90+ typical	90+ (92 typ)
R9:	16 @ CRI 83; >50 @ CRI 90+	>50

Life: 50,000+ hr., > 70% of initial lumens (L70)

Electrical

Wiring: Supply wires are easily accessible through access plate on top of fixture.
WHIP: Optional factory installed 6' Greenfield whip (18/5 conductor) simplifies installation.
Standard Wattage: 5W/ft, 10W/ft.
Optional Wattages: 3W/ft, 4W/ft, 6W/ft, 7W/ft, 8W/ft, 9W/ft. (3W & 4W have a minimum length of 4'). For other wattages consult factory.
Emergency circuit via remote inverter or auxiliary emergency power supply (by others).
This product complies with IEEE C62.41 for surge endurance up to 2.5KV. Amerlux® recommends using additional surge protection with this unit (supplied by others), surge and over voltage damage is not covered under warranty.
EMC-PF - Emergency circuit requires power feed wire harness to be located in last fixture section for continuous runs. For other locations consult factory. Not available for individual (IND) configuration.
PF - Extra power feed wire harness for additional circuiting. Not available for individual (IND) configuration.

Finish

HW - High reflectance, matte white powder coat paint. Baked on finish for maximum durability and color stability.

Configurations/Lengths

IND - Individual fixtures are made of single standard lengths of 2 ft to 8 ft (in 1' increments). These are stand alone fixtures with matching End Caps, supplied with the mounting hardware. Lengths less than 4' may have restrictions based upon wattage, lengths, drivers or other options.
CON - Continuous runs, > 8', specified to nearest whole foot length in 1' increments. Runs made from standard lengths have End Caps at the beginning and end of run. Runs > 60' may require second power feed. Each housing has factory installed alignment pins. Mating fixtures are easily aligned and joined with "catch and latch" mechanisms out of sight, on top of the Housing. Wiring is made fast and positive with molded quick connectors.
S+ - Standard Plus is a field cuttable filler bracket that can be used when an Individual fixture or a Continuous run isn't to the nearest foot (+3/4" to 6" max per end). *See page 7 for details.*
CUS - Custom made yo measure runs are made to nearest 1/8"of customer supplied field measurements or drawings. Custom lengths use the same hardware for hairline joining.
PXX - Standard Patterns consist of 90º corners with standard lengths (4' to 8' in 1' increments), continuous runs or made to measure lengths. Depending upon complexity of the pattern drawings may be required from the Customer. If ordering please give overall lengths.
A'-B'-PLL - L Left - (1) 90º Corner 2 segments. Specify overall segments: A' & B'
A'-B'-PLR - L Right - (1) 90º Corner 2 segments. Specify overall segments: A' & B'
A'-B'-PR - Rectangle - (4) 90º Corners joining 4 segments. Specify overall segments: A' & B'
A'-B'-C'-PU - U shape - (2) 90º Corners joining 3 segments. Specify overall segments: A', B', & C'
A'-B'-C'-PZ - Z shape - (2) 90º Corners joining 3 segments. Specify overall segments: A', B', & C'
A'-B'-PWC - Wall to Ceiling - 90º joining bracket. Specify overall segments: A' & B'
See page 8 for layouts.
PC - Custom Patterns may use standard lengths, Made To Measure, 90º or other corners (some limitations). Please provide drawing and consult factory.
Please note: Corners have lit mitered Lens.

Mounting

Intended for use in gypsum board, 9/16" Tee grid, 9/16" Screw Slot and millwork ceilings. Wall mounting J-Molding details available. For individual, continuous row, or pattern applications.
***Please note* - fixtures to be installed before gypsum board ceiling.**
GRUV2.5-FLG-A16 - exposed flange, fixture into gyp board ceiling
GRUV2.5-FLG-GRID-A16 - exposed flange grid mount, fixture in 9/16" Tee ceilings. *Consult factory for 15/16" ceilings.*
GRUV2.5-GB-A16 - gyp trimless mud, fixture plastered in gypsum board ceiling
GRUV2.5-GRID-A16 - grid mount, in 9/16" Screw Slot or Flat Tee ceilings
GRUV2.5-IS-A16 -independently suspended, fixture in wood ceiling
GRUV2.5-J/GB-A16 - J mold/gyp trimless, plastered in ceiling - J Channel wall side
GRUV2.5-J/GRID-A16 - J mold/grid, in 9/16" Screw Slot or Flat Tee ceiling - J Channel wall side
GRUV2.5-J-IS-A16 - J mold/independently suspended in ceiling - J Channel wall side

Options

EMB - Emergency battery pack - 10W output power, 90 min of illumination time, up to 1300 lm of initial light output. Illuminated test-switch/charging indicator light is provided. Wattage consumption by EM: 2.5W/ft (4ft fixture), 1.66W/ft (6ft fixture), 1.25W/ft (8ft fixture). Request can be made to light up 4ft section on 8ft unit.

Certifications

Approved to UL standards for damp locations as tested by CSA
Intended for indoor use only
Chicago Plenum (CCEA) optional

Warranty

Amerlux's 5 year limited warranty. Please consult Amerlux website for details.

Amerlux®, LLC • 178 Bauer Drive, Oakland, NJ 07436 • P: 973-882-5010 F: 973-882-2605 • amerlux.com

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

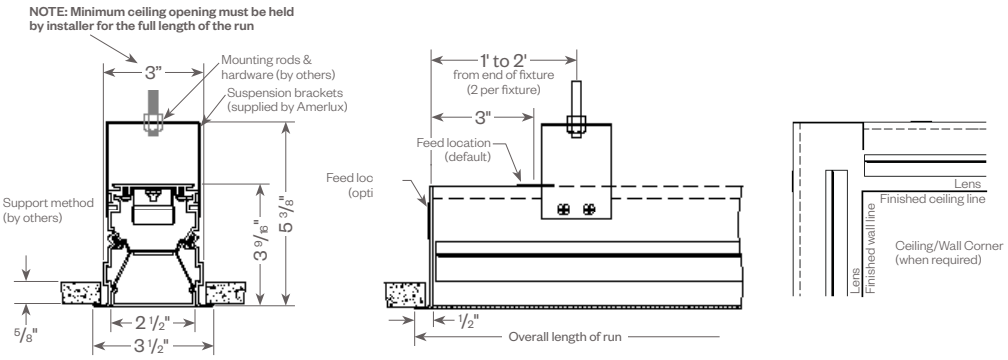
Grüv® 2.5”

Recessed Linear LED

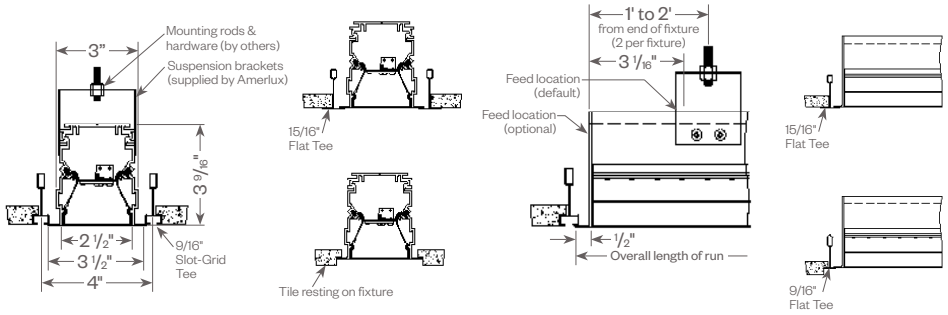
amerlux
A Delta Group Company

PROJECT: **TYPE:**

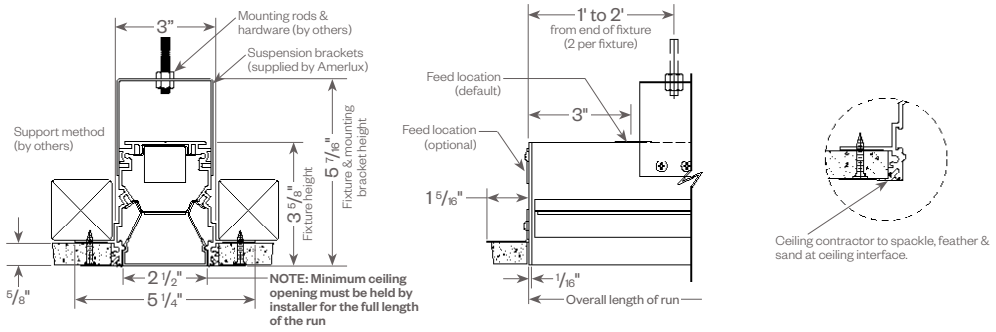
GRÜV2.5-FLG (exposed flange)



GRÜV2.5-FLG-GRID (flange, grid mount)



GRÜV2.5-GB (gyp board trimless mud-in)



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

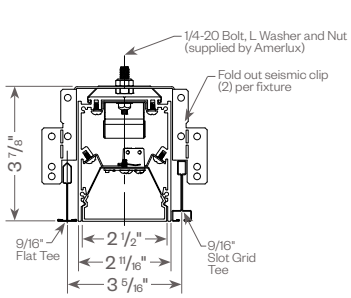
Grüv® 2.5”

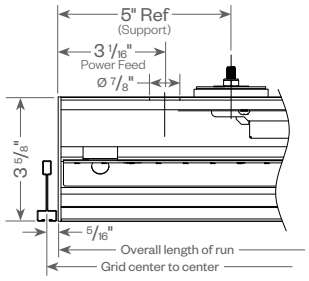
Recessed Linear LED

amerlux
A Delta Group Company

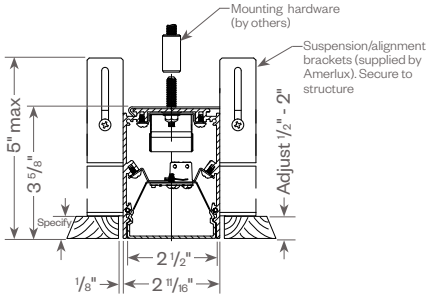
PROJECT: **TYPE:**

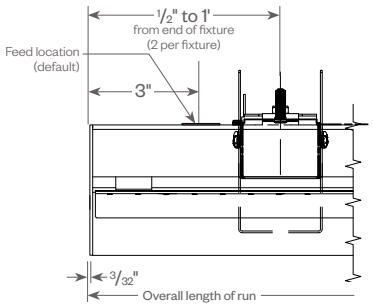
GRÜV2.5-GRID (grid mount) Compatible (see pg 7)



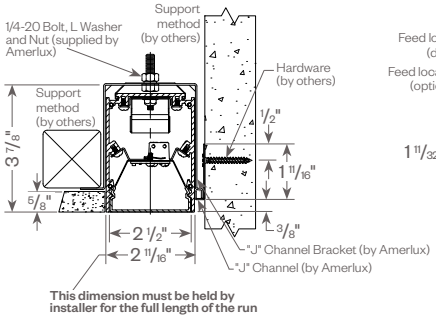


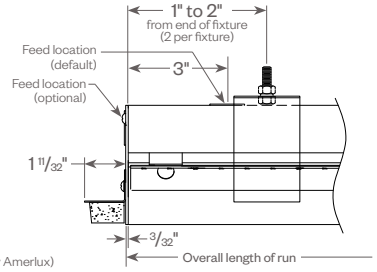
GRÜV2.5-IS (independently suspended)

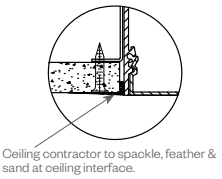




GRÜV2.5-J/GB (j-mold/gyp board trimless)







STANDARD PLUS

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

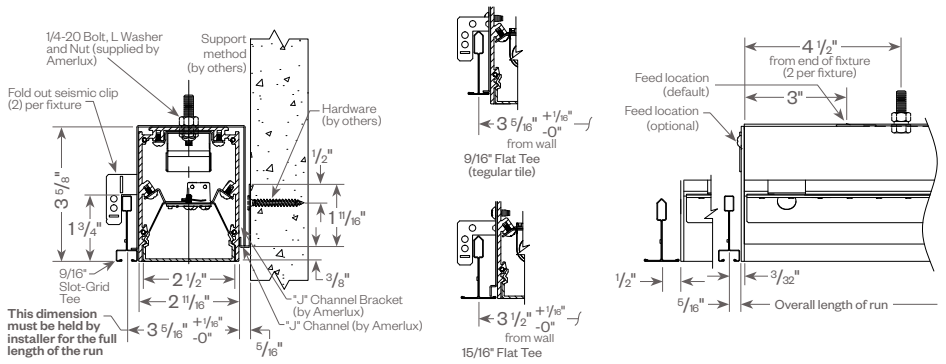
Grüv® 2.5”

Recessed Linear LED

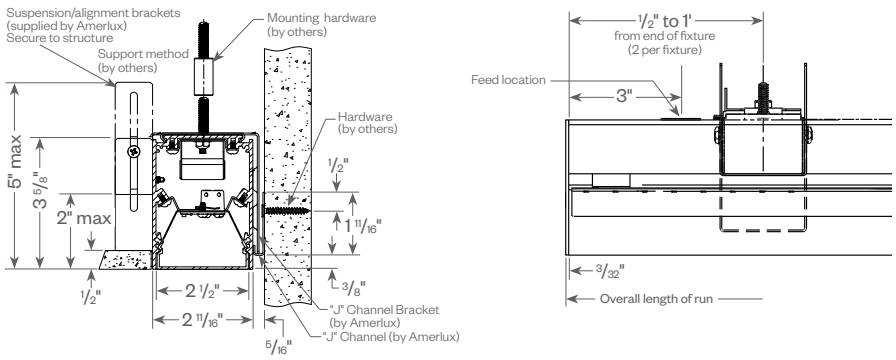
amerlux
A Delta Group Company

PROJECT: **TYPE:**

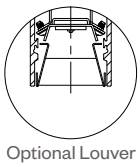
GRÜV2.5-J/GRID (j-mold/grid mount) Compatible (see pg 7)



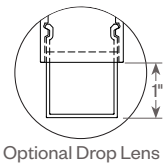
GRÜV2.5-J/IS (j-mold/independently suspended)



OPTIONAL LOUVER/DROP LENS



Optional Louver



Optional Drop Lens

STANDARD PLUS

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 2.5”

Recessed Linear LED

amerlux
A Delta Group Company

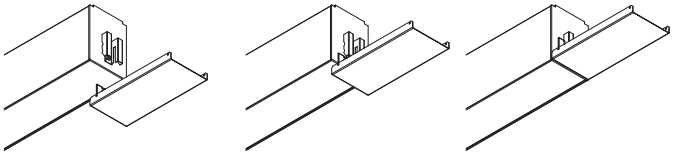
PROJECT: **TYPE:**

STANDARD PLUS

STANDARD PLUS (FILLER):

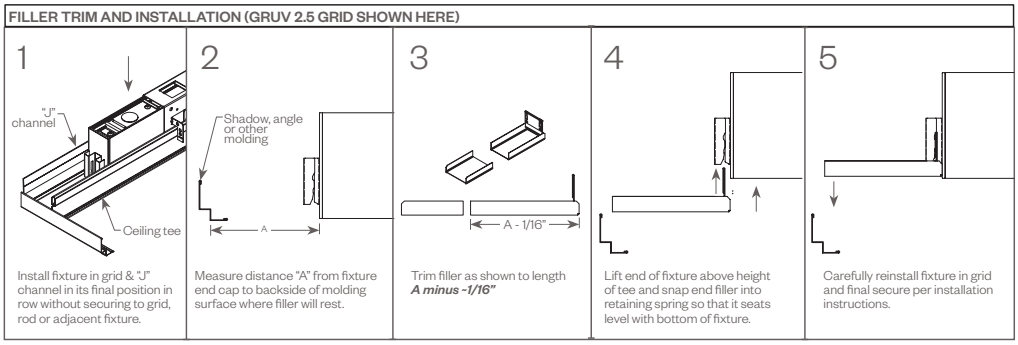
Whenever a continuous run is less than a foot to the next full foot length consider ordering Standard Plus field cuttable bracket for a perfect look. Fits 9/16" Slot Grid and 9/16" T grid. It snaps in place easily from below and gets you close to the wall with a standard fixture. Saves time and money compared to made-to-measure. (max length: 6")

GRID VERSION



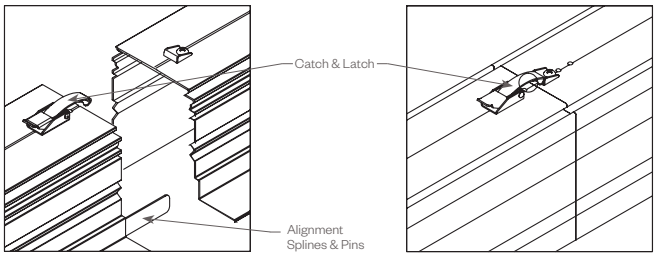
NOTE: Use with Gruv2.5-Grid and Gruv2.5-J/Grid

FILLER TRIM AND INSTALLATION (GRUV 2.5 GRID SHOWN HERE)



TOOLLESS JOINING

Line up the two housings by using the alignment splines & pins. Secure them together by using the Catch & Latch System on the top of the extrusion.



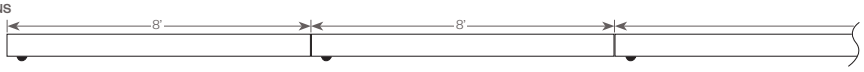
OPTIONAL SENSOR/RF NODE:

Amerlux® has partnered with control companies to create building environments that are safer, and smarter, than ever before. At the heart of our partnership is intelligent RF nodes and Smart Sensor, the most advanced digital wireless communication and sensors available today. Integrated into Amerlux products.

Minimum run length is 3' for wireless sensor and RF node.

INDIVIDUAL (MIN 3' LENGTH)

RUNS



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 2.5”

Recessed Linear LED

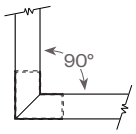
amerlux
A Delta Group Company

PROJECT: **TYPE:**

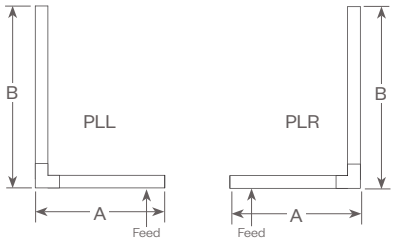
GRUV 2.5" PATTERNS:

Standard Patterns
All corners are standard 90°, standard length legs.
Use standard lengths: 4' min to 8' in 1 foot increments.
Continuous runs must be the same length in pairs for closed configuration.

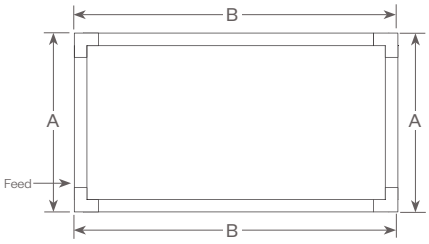
Custom Patterns
Please provide drawings of your configuration.
Made to Measure: +/- 1/8", consult factory.
PC - custom pattern, please provide drawings and consult factory



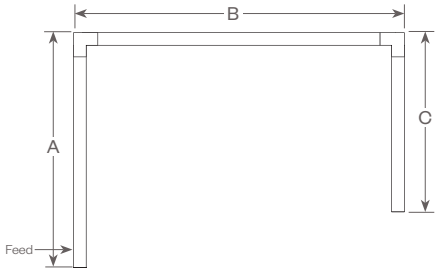
Gruv 2.5 Lens
Mitered Lens



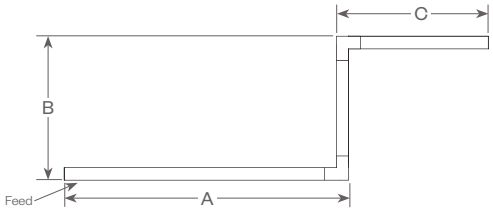
PLL - L Left, (2) straights + (1) 90° corner, leg right
PLR - L Right, (2) straights + (1) 90° corner, leg left
Provide overall lengths: A' & B'
Nomenclature: A-B-PLL A-B-PLR



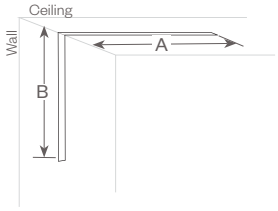
PR - Closed Rectangle, (4) straight lengths + (4) 90° corners
Provide overall lengths: A' & B'
Nomenclature: A-B-PR



PU - Open U, (3) straight lengths + (2) 90° corners
Provide overall lengths: A', B' & C'
Nomenclature: A-B-C-PU



PZ - Open Z, (3) straight lengths + (2) 90° corners
Provide overall lengths: A', B' & C'
Nomenclature: A-B-C-PZ



WC - Wall to Ceiling - 90° joining bracket, 12" leg length standard
Provide overall lengths: A' & B'
Nomenclature: A-B-PWC

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 2.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

FIXTURE DATA:

MULTIPLYING FACTORS: (Multiplying Factor is based on 3500K-83 120V IES file on website)

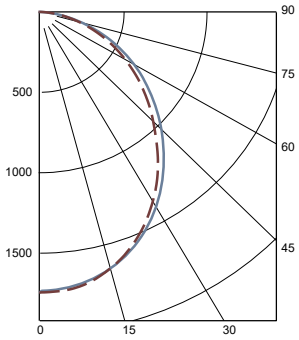
Wattage:	3W	4W	5W	6W	7W	8W	9W	10W
Factor:	0.31	0.42	0.53	0.63	0.72	0.81	0.90	1.0

CCT Factors:					TW9
CRI	2700K	3000K	3500K	4000K	(@3500K)
83	0.92	0.97	1.0	1.02	-
90	0.81	0.84	0.86	0.89	0.86

GRUV 2.5" DIRECT PERFORMANCE LENS 10W 3500K 4FT

Total Watts: 38
Total Lumens: 4374
Source: 128 White LED's

LTL# 14664757.09



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	2101	48.0
0-60	3534	80.8
0-90	4374	100.0
90-180	0	0.00

Efficacy = 115 lumens/Watt

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

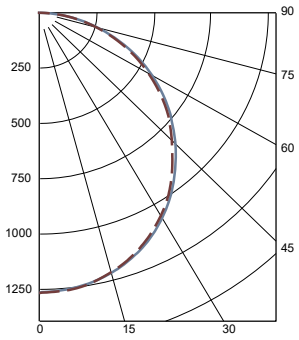
RC		80			
RW	70	50	30	10	
RCR					
0	119	119	119	119	
1	109	104	100	97	
2	100	91	85	79	
3	91	81	73	66	
4	83	72	63	57	
5	77	64	56	49	
6	71	58	49	43	
7	66	53	44	38	
8	62	48	40	34	
9	58	44	36	31	
10	54	41	33	28	

Note: Values expressed as percent of total lumen output delivered to the task surface.

GRUV 2.5" DIRECT DESIGNER LENS 10W 3500K 4FT

Total Watts: 38
Total Lumens: 3658
Source: 128 White LED's

LTL# 14664757.10



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1606	43.9
0-60	2832	77.4
0-90	3658	100.0
90-180	0	0.00

Efficacy = 96.3 lumens/Watt

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

RC		80			
RW	70	50	30	10	
RCR					
0	119	119	119	119	
1	108	103	99	95	
2	98	90	83	77	
3	90	79	70	64	
4	82	70	61	54	
5	75	62	53	46	
6	69	56	47	40	
7	64	51	42	36	
8	60	46	38	32	
9	56	42	34	29	
10	53	39	31	26	

Note: Values expressed as percent of total lumen output delivered to the task surface.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 2.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

FIXTURE DATA:

MULTIPLYING FACTORS: (Multiplying Factor is based on 3500K-83 120V IES file on website)

Wattage:	3W	4W	5W	6W	7W	8W	9W	10W
Factor:	0.31	0.42	0.53	0.63	0.72	0.81	0.90	1.0

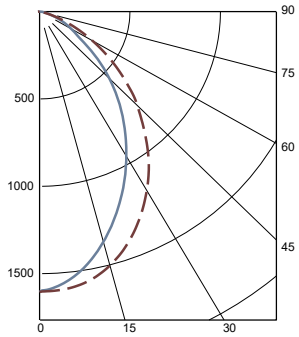
CCT Factors:					TW9
CRI	2700K	3000K	3500K	4000K	(@3500K)
83	0.92	0.97	1.0	1.02	-
90	0.81	0.84	0.86	0.89	0.86

	Louver	
Finish:	SLV	BLK
Factor:	1.0	.65

GRUV 2.5" DIRECT STRAIGHT BLADE LOUVER (SLV) 10W 3500K 4FT

Total Watts: 38
Total Lumens: 2694
Source: 128 White LED's

LTL# 14664757.11



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1663	61.7
0-60	2469	91.7
0-90	2694	100.0
90-180	0	0.00

Efficacy = 70.9 lumens/Watt

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

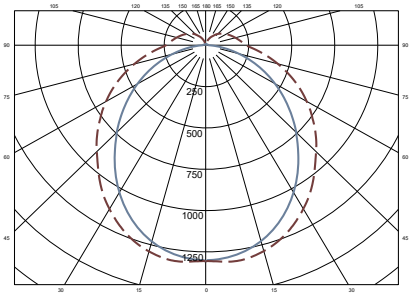
RC		80		
RW	70	50	30	10
RCR				
0	119	119	119	119
1	111	107	104	101
2	103	96	91	86
3	96	87	80	75
4	89	79	71	65
5	82	71	64	58
6	77	65	57	52
7	72	60	52	47
8	67	55	48	42
9	63	51	44	39
10	59	47	40	35

Note: Values expressed as percent of total lumen output delivered to the task surface.

GRUV 2.5" DIRECT DROP LENS 10W 3500K 4FT

Total Watts: 38
Total Lumens: 4566
Source: 128 White LED's

LTL# 14664757.12



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1661	36.4
0-60	2930	64.2
0-90	4038	88.4
90-180	528	11.6

Efficacy = 120.1 lumens/Watt

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

RC		80		
RW	70	50	30	10
RCR				
0	116	116	116	116
1	105	99	94	90
2	95	86	78	72
3	86	75	66	59
4	78	66	57	50
5	72	59	50	43
6	67	53	44	37
7	62	48	39	33
8	57	44	35	29
9	54	40	32	26
10	50	37	29	24

Note: Values expressed as percent of total lumen output delivered to the task surface.

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 2.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

STATIC WHITE - DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

0-10V - DIMMING (Standard)

Integrates into a variety of building management and daylighting controls

Notes:

- 120V or 277V*
- Dims down to 1% light output
- Requires interface to turn off power to driver
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

Compatible Dimmers†:

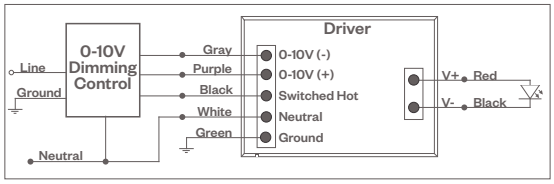
Wall Box

Lutron:	Wattstopper:	Leviton:
Diva - DVSTV	ADF-120277	Renoir II
Maestro - MS-Z101		
Nova-T - NTSTV-DV		

Center System

Lutron Grafixk Eye with GRX-TV1 Interface

0-10V Wiring Diagram



LUTRON HI-LUME ECOSYSTEM DIMMING

Integrates into Lutron EcoSystem building management

Notes:

- 120VAC or 277VAC*
- Dims down to 1% light output
- EcoSystem Control
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

Compatible Dimmers†:

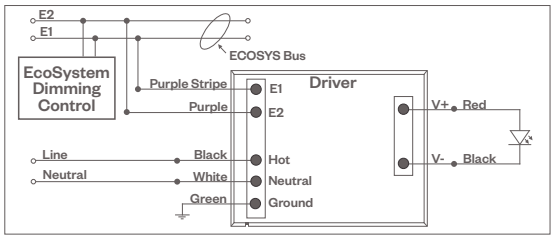
Lutron ECO System

Pow Pak Dimming Modules
Energi Savr Node
Grafik Eye QS/Homeworks
QS Control Unit
Quantum Hub
Homeworks QS/My Room

Central System

Lutron EcoSystem compatible controls

HILUME-H-ECO EcoSystem Digital Control Wiring Diagram



Notes:

* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.

† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 2.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

STATIC WHITE - DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

DALI - DALI DIMMING 120V-277V
Digital control protocol allows individual fixture control

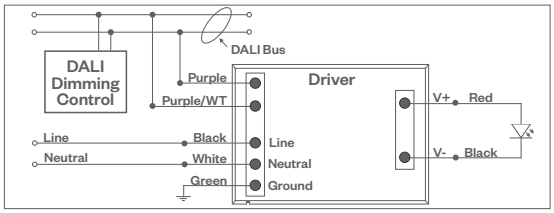
Notes:
- 120VAC - 277VAC*
- Dims down to 1% light output in most cases

Compatible Dimmers†:

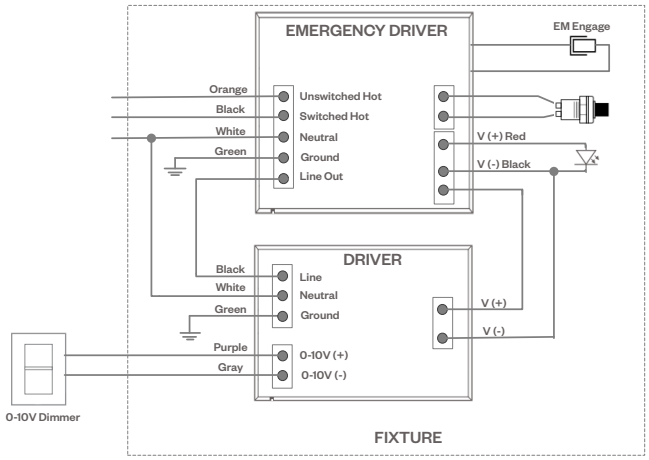
Wall Box
Leviton CD250 Controller

Center System
Dynalite
Fifth Light

DALI Wiring Diagram



EMERGENCY FIXTURE WITH BUILT-IN BATTERY PACK (EMB) WIRING:
Note: EMB not available on lengths under 4'.



Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

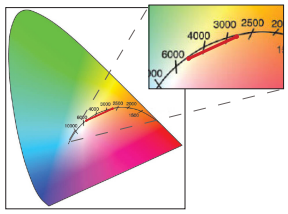
Grüv® 2.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

TUNABLE WHITE



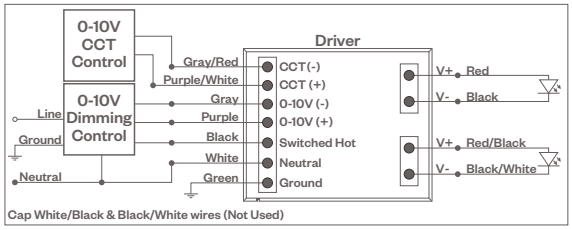
Tunable White range from 2700K-5700K, 90 CRI.
See wiring diagrams below.

TUNABLE WHITE - DIMMING COMPATIBILITY:

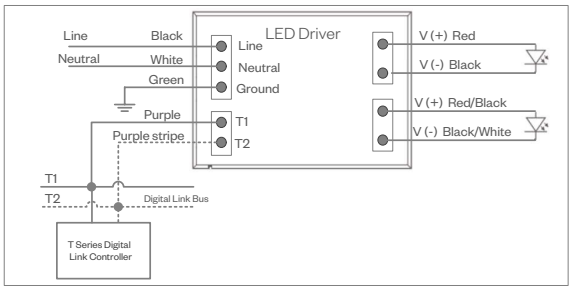
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

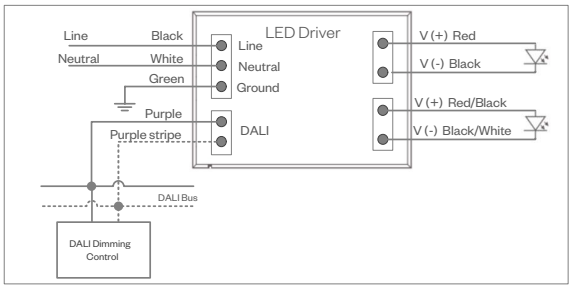
0-10V Wiring Diagram



Lutron T-Series Digital Link Wiring Diagram



DALI DT8 Wiring Diagram



Notes:

* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.

† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KA

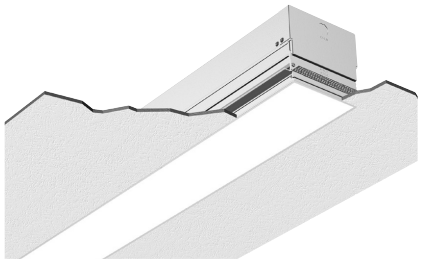
Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company



Features

Designed to provide high-performance, visually comfortable, high efficient ambient lighting with a 6" aperture for commercial and office environments. Featuring improved extruded aluminum and steel construction, superb aesthetics, lower costs and shorter lead times. Grüv 6 HE is more effective and aesthetically appealing than many recessed linear fixtures available today. Offering 5 or 10 watts per foot. Available for gyp board or grid ceilings (TechZone compatible).

Product Overview

Type:	Recessed Lens Direct	
Wattage:	5W/ft, 10W/ft (other wattages availavle see p2)	
Color Temp:	2700K, 3000K, 3500K, 4000K; Tunable White (2700K-5700K)	
CRI:	83 or 90+ typ. (2700K, 3000K, 3500K, 4000K) 90+ (Tunable White)	
Dimming (wired):	Static White 0-10V, 1% dimming (standard) Lutron Hi-lume® EcoSystem, 1% dim, fade to off DALI dimming, 1% dim	Tunable White 0-10V TW, 1% dimming DALI DT8, 1% digital dimming Lutron T Series 1% dimming
Dimming (wireless):	Enlighted Sensor Lutron Athena (integral wireless RF node)	Enlighted Sensor TW Lutron Athena TW (integral wireless RF node)

PROJECT: **TYPE:**

Fixture Summary *(see following pages for more information)*

Ceiling Types

4" Tech Zone	6" Tech Zone	9/16"	15/16"	Gyp Board	Millwork
No	Yes	Yes	CF	Yes	Yes

Perimeter J-Mold
Yes

CF = consult factory

Performance Chart (4' Fixture)

Nominal Wattage/Foot	Delivered Lumens	LPW	Color Temp-CRI
5	2,320	128.7	3500K-83
10	4,490	125.1	3500K-83

Data is based on 3500K-83 IES files available on website
Data is based on 4' fixture with Designer Lens

Electrical Data

		4'		8'	
Wattage Per Foot		System Watts	Amps	System Watts	Amps
5	120V	18	0.15	36	0.30
	277V	18	0.07	41.6	0.15
10	120V	35.9	0.30	71.8	0.60
	277V	35.9	0.15	71.8	0.30

Electronic multi-volt (120-277VAC), constant current LED driver

Standard Patterns

"L"	"⌟"	"U"	"□"	"⌝"	Wall to Ceiling	Custom*
Yes	Yes	Yes	Yes	Yes	No	Yes

** Submit drawing, consult factory*

5 year limited warranty AMERLUX LED

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Ordering Information

_____ . _____ . _____ . _____ . HW . 120/277 . _____ . _____ . _____ . _____

1	2	3	4	5	6	7	8	9	10

1 Model
GRUV6-HE-FLG-A16† - exposed flanged
GRUV6-HE-FLG-GRID-A16† - flanged, grid mount
GRUV6-HE-GB-A16† - gyp board trimless, mud-in
GRUV6-HE-GRID-A16† - grid mount
GRUV6-HE-IS-A16† - independently suspended
GRUV6-HE-J/GB-A16† - j-mold/gyp board trimless
GRUV6-HE-J/GRID-A16† - j-mold/grid
GRUV6-HE-J/IS-A16† - j-mold/independently suspended

2 Optics
PL - performance lens
DL - designer lens

3 Wattage (per foot)
Standard:
5 - 5W/ft
10 - 10W/ft
Optional:
3 - 3W/ft (4' minimum length required)
4 - 4W/ft (4' minimum length required), DLC listed *(see additional notes below)*
6 - 6W/ft
7 - 7W/ft
8 - 8W/ft
9 - 9W/ft

4 Color Temp-CRI

Static White:

27 - 2700K-83	**279** - 2700K-90+	
30 - 3000K-83	**309** - 3000K-90+	
35 - 3500K-83	**359** - 3500K-90+	
40 - 4000K-83	**409** - 4000K-90+	

Tunable White:
TW9-2757 - tunable white, 90 CRI (2700K-5700K)

5 Finish
HW - high reflectance matte white

6 Voltage
120/277

7 Length
_____ x _____ x _____

(Length A)	(Length B)	Length C)
Length A (used for)	Length B (used for)	Length C (used for)
- all patterns - IND/IND-S+ - CON/CON-S+ - CUS	- all patterns - PR - 2 lengths of 2	- PU - PZ

8 Configuration
IND[1] - individual fixture, 2' to 8' in 1' increments
IND-S+ - individual with standard plus (see pg8, for GRID or J/GRID only)
CON - continuous run > than 8', specify to nearest foot
CON-S+ - continuous run with standard plus (see pg8, for GRID or J/GRID only)
CUS - custom made to measure, +/- 1/8" of customer supplied field dimensions
Standard Patterns *(see page 8 for details)*:
PLL - L left, (2) straights + (1) 90° corner, leg right
PLR - L right, (2) straights + (1) 90° corner, leg left
PU - U shape, (3) straight lengths + (2) 90° corners
PR - Rectangle, (4) straight lengths + (4) 90° corners
PZ - Z shape, (3) straight lengths + (2) 90° corners
PWC - wall to ceiling (1) 90° Corner joining 2 segments
Custom Patterns:
PC - please provide drawings and consult factory

9 Drivers/Controls
Wired - Static White:
0-10V - 1% analogue dimming, 120-277VAC, Dim to off when selected with wireless dimming control
HILUME-H-ECO - Lutron "H" Series, 1% dim, fade to off, EcoSystem
DALI - DALI Dimming 120-277VAC, 1% dim
Wired - Tunable White:
0-10V TW - 1% dimming , multi-volt (120V-277V) constant current
DALI DT8 - 1% digital dimming, CCT control per DALI DT8, (120V-277V) constant current
Lutron T - Lutron T Series, digital link 1% dimming, (120V-277V)
Wireless - Static White:
ENLS-SR - Enlighted sensor, energy metering
ENLS-010 - Enlighted sensor with controller unit
AWNR-WH-SR - Lutron Athena wireless node, RF only, white
AWNR-BL-SR - Lutron Athena wireless node, RF only, black
AWNR-WH-010 - Lutron Athena wireless node, RF only, white
AWNR-BL-010 - Lutron Athena wireless node, RF only, black
Wireless - Tunable White:
ENLS-SR-TW - Enlighted sensor, energy metering
AWNR-WH-SR-TW - Lutron Athena wireless node, RF only, white
AWNR-BL-SR-TW - Lutron Athena wireless node, RF only, black

10 Options/Accessories
CP - Chicago Plenum (CCEA)
WHIP - 6' whip, 18/5 conductor
EMC-PF[2] - emergency circuit requires power feed located in last fixture section (for other locations consult factory)
PF[2] - Extra power feed for additional circuiting
EMB - emergency battery pack (not available for lengths under 4')

1 - Lengths less than 4' may have restrictions based upon wattage, lengths, drivers or other options.
2 - Not available with IND (individual) configuration.
† The "A" refers to the sequential revision in a year and "XX" refers to the year of update. Updates coincide with improved performance while not changing the overall fixture aesthetic and are reflected in the published performance data. Please contact your Amerlux representative for explanations of changes.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Kugler Ning Lighting

Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Specifications

Application

Commercial and retail recessed ambient lighting can be customized with made to measure lengths, patterns, ceilings or wall mounted fixtures.

Construction

Heavy gauge steel upper housing is secured to aluminum extruded trim rails. Die-formed, cold-rolled steel internal components and external mounting brackets. Numerous configurations accommodate most architectural ceiling conditions.

Optical

All lenses are snap-in, extruded acrylic, with a maximum length of 8'. Amerlux's proprietary acrylic lens provide excellent transmission while effectively concealing source image.
PL - Performance Lens provides high efficiency with controlled lens surface brightness.
DL - Designer Lens provides flat even glow on lens. Best when lens is in direct or constant view. Such as vertical wall mounted.

LED

Amerlux's boards and patented connector design with brand name LEDs enables Amerlux fixtures to have excellent thermal management and offer a 5 year warranty. Our LED binning is within 3 MacAdam ellipse. Boards are configured for maximum flexibility resulting in even illumination no matter the fixture layout. LED boards are easily replaced in the field with just a Phillips screw driver.

Static White	Tunable White
CCT: 2700K, 3000K, 3500K, 4000K	2700K-5700K
CRI: 83 or 90+ typical	90+ (92 typ)
R9: 16 @ CRI 83; >50 @ CRI 90+	>50

Life: 50,000+ hr., > 70% of initial lumens (L70)

Electrical

Wiring: Supply wires are easily accessible through access plate on top of fixture.
WHIP: Optional factory installed 6' Greenfield whip (18/5 conductor) simplifies installation.
Standard Wattage: 5W/ft, 10W/ft.
Optional Wattages: 3W/ft, 4W/ft, 6W/ft, 7W/ft, 8W/ft, 9W/ft. (3W & 4W have a minimum length of 4'). For other wattages consult factory. Emergency circuit via remote inverter or auxiliary emergency power supply (by others).
This product complies with IEEE C62.41 for surge endurance up to 2.5KV. Amerlux® recommends using additional surge protection with this unit (supplied by others), surge and over voltage damage is not covered under warranty.
EMC-PF - Emergency circuit requires power feed wire harness to be located in last fixture section for continuous runs. For other locations consult factory. Not available for individual (IND) configuration.
PF - Extra power feed wire harness for additional circuiting. Not available for individual (IND) configuration.

Finish

HW - High reflectance, matte white powder coat paint. Baked on finish for maximum durability and color stability.

Configurations/Lengths

IND - Individual fixtures are made of single standard lengths of 2 ft to 8 ft (in 1' increments). These are stand alone fixtures with matching End Caps, supplied with the mounting hardware. Lengths less than 4' may have restrictions based upon wattage, lengths, drivers or other options.
CON - Continuous runs, > 8', specified to nearest whole foot length in 1' increments. Runs made from standard lengths have End Caps at the beginning and end of run. Runs > 60' may require second power feed. Each Housing has factory installed alignment pins. Mating fixtures are easily aligned and joined with "catch and latch" mechanisms out of sight, on top of the Housing. Wiring is made fast and positive with molded quick connectors.
S+ - Standard Plus is a field cuttable filler bracket that can be used when an Individual fixture or a Continuous run isn't to the nearest foot (+3/4" to 6" max per end). *See page 7 for details.*
CUS - Custom made to measure runs are made to nearest 1/8"of customer supplied field measurements or drawings. Custom lengths use the same hardware for hairline joining.
PXX - Standard Patterns consist of 90° corners with standard lengths (4' to 8' in 1' increments), continuous runs or made to measure lengths. Depending upon complexity of the pattern drawings may be required from the Customer. If ordering please give overall lengths.
A'-B'-PLL - L Left - (1) 90° Corner 2 segments. Specify overall segments: A' & B'
A'-B'-PLR - L Right - (1) 90° Corner 2 segments. Specify overall segments: A' & B'
A'-B'-PR - Rectangle - (4) 90° Corners joining 4 segments. Specify overall segments: A' & B'
A'-B'-C'-PU - U shape - (2) 90° Corners joining 3 segments. Specify overall segments: A', B', & C'
A'-B'-C'-PZ - Z shape - (2) 90° Corners joining 3 segments. Specify overall segments: A', B', & C'
A'-B'-PWC - Wall to Ceiling - 90° joining bracket. Specify overall segments: A' & B'
See page 8 for layouts.
PC - Custom Patterns may use standard lengths, Made To Measure, 90° or other corners (some limitations). Please provide drawing and consult factory.
Please note: Corners have lit mitered Lens.

Mounting

Intended for use in gypsum board, 9/16" Tee grid and Screw Slot, and millwork ceilings. Wall mounting J-Molding details available. For individual, continuous row, or pattern applications.
Please note* - *fixtures to be installed before gypsum board ceiling.
GRUV6-HE-FLG-A16 - exposed flange, fixture into gypsum board ceiling
GRUV6-FLG-GRID-A16 - exposed flange grid mount, fixture in 9/16" Flat Tee ceilings. *Consult factory for 15/16" ceilings.*
GRUV6-HE-GB-A16 - gyp trimless mud, fixture plastered in gypsum board ceiling
GRUV6-HE-GRID-A16 - grid mount, in 9/16" Screw Slot or Flat Tee ceilings (compatible with 6" TechZone™ & other 6" wide architectural ceiling systems)
GRUV6-HE-IS-A16 - independently suspended, fixture in wood ceiling
GRUV6-HE-J/GB-A16 - J mold/gyp trimless, plastered in ceiling - J Channel wall side
GRUV6-HE-J/GRID-A16 - J mold/grid, in 9/16" Screw Slot or Flat Tee ceilings - J Channel wall side
GRUV6-HE-J-IS-A16 - J mold/independently suspended in ceiling - J Channel wall side.

Options

EMB - Emergency battery pack - 10W output power, 90 min of illumination time, up to 1300 lm of initial light output. Illuminated test-switch/charging indicator light is provided. Wattage consumption by EM: 2.5W/ft (4ft fixture), 1.66W/ft (6ft fixture), 1.25W/ft (8ft fixture). Request can be made to light up 4ft section on 8ft unit.

Certifications

Approved to UL standards for damp locations as tested by CSA
Intended for indoor use only
Chicago Plenum (CCEA) optional

Warranty

Amerlux's 5 year limited warranty. Please consult Amerlux website for details.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

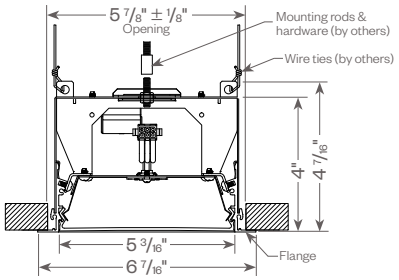
Grüv® 6" High Efficiency

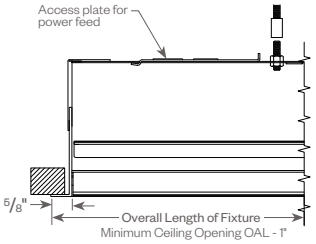
Recessed Linear LED

amerlux
A Delta Group Company

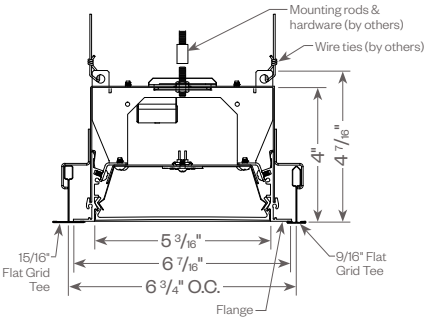
PROJECT: **TYPE:**

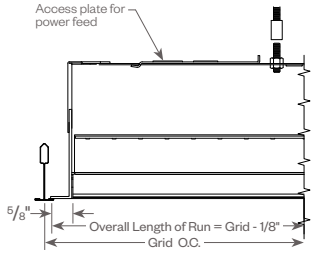
GRUV6-HE-FLG (exposed flange)



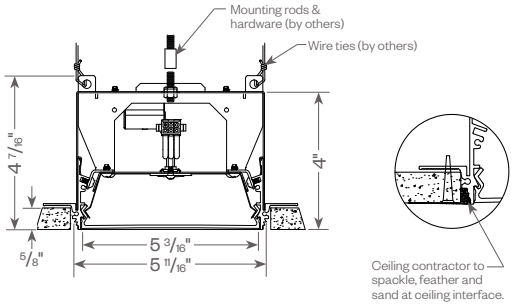


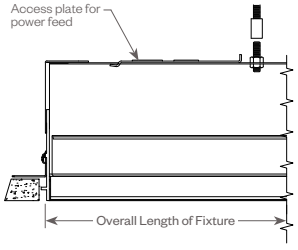
GRUV6-HE-FLG-GRID (flanged, grid mount)





GRÜV6-HE-GB (gyp board trimless mud-in)





SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

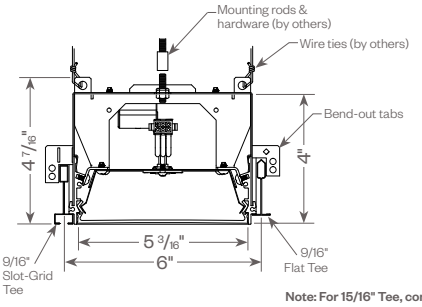
Grüv® 6" High Efficiency

Recessed Linear LED

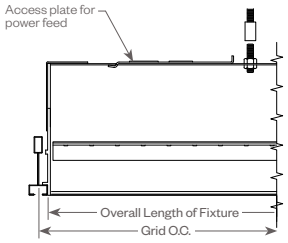
amerlux
A Delta Group Company

PROJECT: **TYPE:**

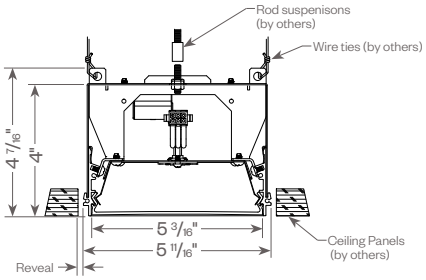
GRÜV6-HE-GRID (grid mount) Compatible (see pg 7) **6" TechZone compatible**

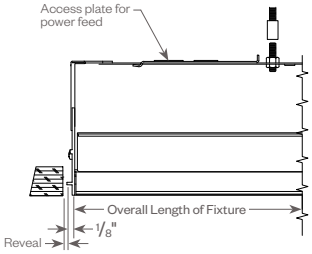


Note: For 15/16" Tee, consult factory

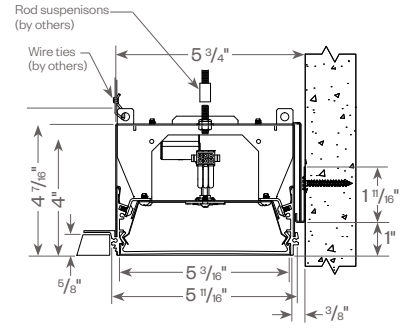


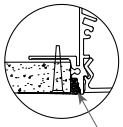
GRÜV6-HE-IS (independently suspended)



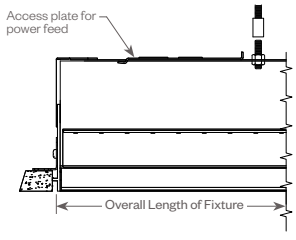


GRÜV6-HE-J/GB (j-mold/gyp board trimless)





Ceiling contractor to spackle, feather and sand at ceiling interface.



STANDARD PLUS

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

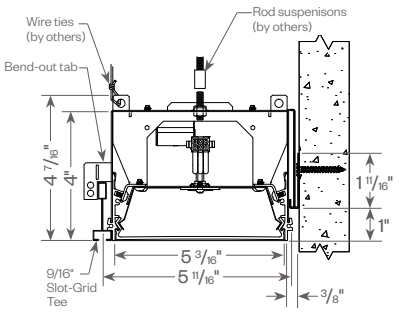
Grüv® 6" High Efficiency

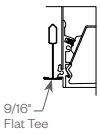
Recessed Linear LED

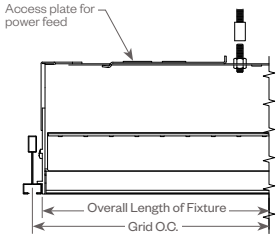
amerlux
A Delta Group Company

PROJECT: **TYPE:**

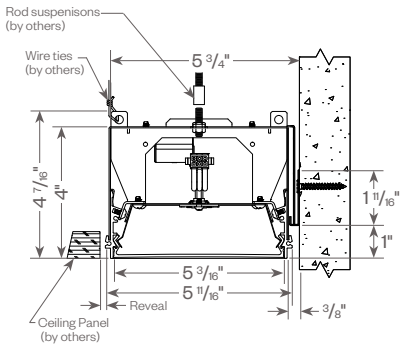
GRÜV6-HE-J/GRID (j-mold/grid mount) Compatible (see pg 7)

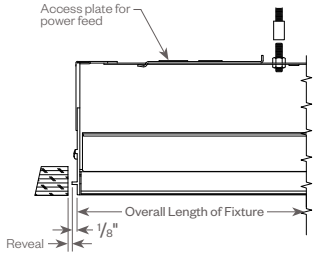






GRÜV6-HE-J/IS (j-mold/independently suspended)





STANDARD PLUS

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Kugler Ning Lighting

Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company

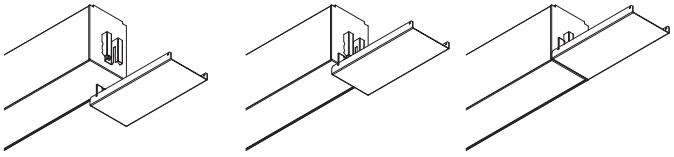
PROJECT: **TYPE:**

STANDARD PLUS

STANDARD PLUS (FILLER):

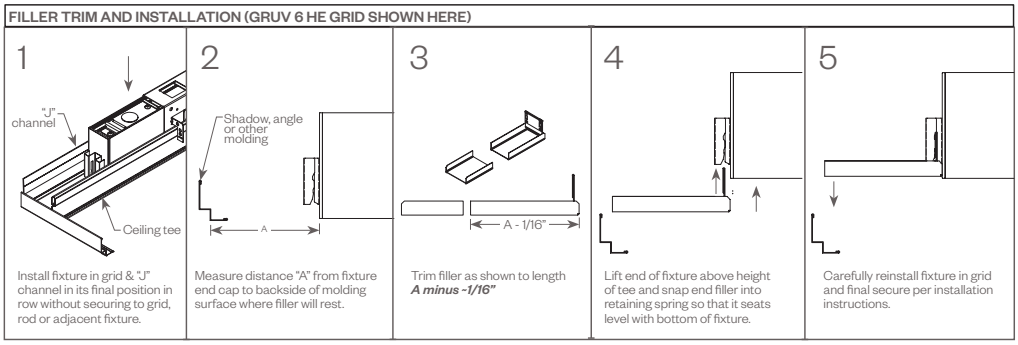
Whenever a continuous run is less than a foot to the next full foot length consider ordering Standard Plus field cuttable bracket for a perfect look. Fits 9/16" Slot Grid and 9/16" T grid. It snaps in place easily from below and gets you close to the wall with a standard fixture. Saves time and money compared to made-to-measure. (max length: 6")

GRID VERSION



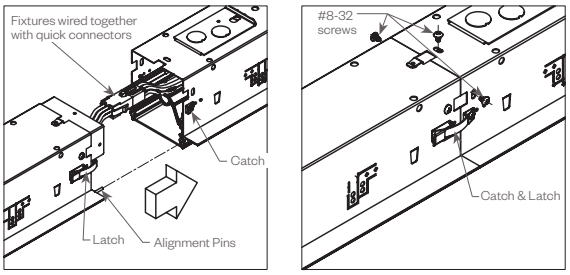
NOTE: Use with GRUV6HE-GRID and GRUV6HE-J/GRID

FILLER TRIM AND INSTALLATION (GRUV 6 HE GRID SHOWN HERE)



TOOLLESS JOINING

Line up the two housings by using the alignment pins. Secure them together by using the Catch & Latch System on the side of the extrusion.



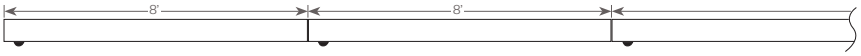
OPTIONAL SENSOR/RF NODE:

Amerlux® has partnered with control companies to create building environments that are safer, and smarter, than ever before. At the heart of our partnership is intelligent RF nodes and Smart Sensor, the most advanced digital wireless communication and sensors available today. Integrated into Amerlux products.

Minimum run length is 3' for wireless sensor and RF node.

INDIVIDUAL (MIN 3' LENGTH)

RUNS



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company

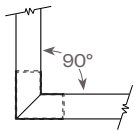
Grüv 6" HE Recessed Linear

PROJECT: **TYPE:**

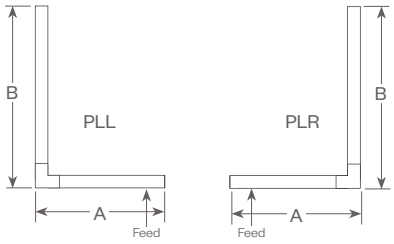
GRUV 6" PATTERNS:

Standard Patterns
All corners are standard 90°, standard length legs.
Use standard lengths: 4' min to 8' in 1 foot increments.
Continuous runs must be the same length in pairs for closed configuration.

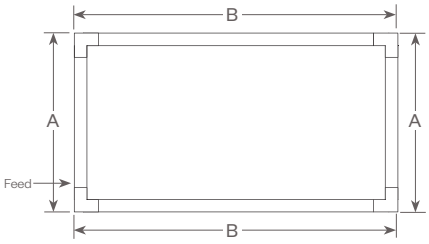
Custom Patterns
Please provide drawings of your configuration.
Made to Measure: +/- 1/8", consult factory.
PC - custom pattern, please provide drawings and consult factory



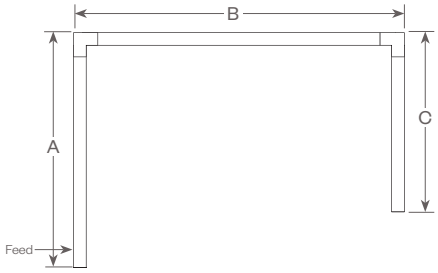
Gruv 6 Lens
Mitered Lens



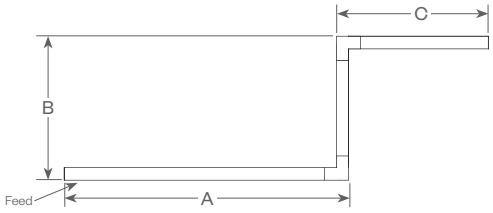
PLL - L Left, (2) straights + (1) 90° corner, leg right
PLR - L Right, (2) straights + (1) 90° corner, leg left
Provide overall lengths: A' & B'
Nomenclature: A-B-PLL A-B-PLR



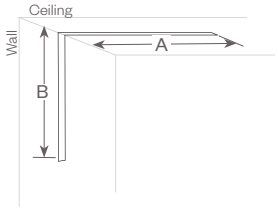
PR - Closed Rectangle, (4) straight lengths + (4) 90° corners
Provide overall lengths: A' & B'
Nomenclature: A-B-PR



PU - Open U, (3) straight lengths + (2) 90° corners
Provide overall lengths: A', B' & C'
Nomenclature: A-B-C-PU



PZ - Open Z, (3) straight lengths + (2) 90° corners
Provide overall lengths: A', B' & C'
Nomenclature: A-B-C-PZ



PWC - Wall to Ceiling - 90º joining bracket, 12" leg length standard
Provide overall lengths: A' & B'
Nomenclature: A-B-PWC

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

FIXTURE DATA:

MULTIPLYING FACTORS: (Multiplying Factor is based on 3500K-83 120V IES file on website)

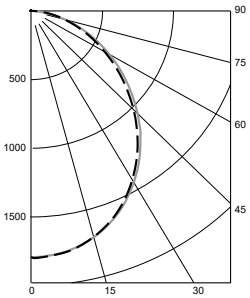
Wattage:	3W	4W	5W	6W	7W	8W	9W	10W
Factor:	0.31	0.42	0.53	0.63	0.72	0.81	0.90	1.0

CCT Factors:					TW9
CRI	2700K	3000K	3500K	4000K	(@3500K)
83	0.92	0.97	1.0	1.02	-
90	0.81	0.84	0.86	0.89	0.86

GRÜV 6" HE PERFORMANCE LENS 10W 3500K 4FT

Total Watts: 36
Total Lumens: 4,490
Source: 120 White LED's

LTL# 13170267.22



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	2174	48.4
0-60	3653	81.3
0-90	4489	100.0
90-180	0	0.0

Luminaire Efficacy = 125.1 lm/w

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

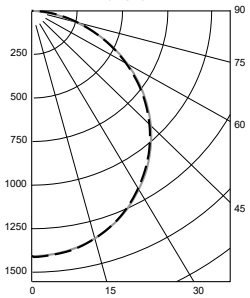
RC	80			
RW	70	50	30	10
RCR				
0	119	119	119	119
1	109	105	100	97
2	100	92	85	79
3	91	81	73	67
4	84	72	63	57
5	77	65	56	49
6	71	58	50	43
7	66	53	44	38
8	62	48	40	34
9	58	45	37	31
10	54	41	33	28

Note: Values are expressed as percent of total lumen output delivered to the task surface.

GRÜV 6" HE DESIGNER LENS 10W 3500K 4FT

Total Watts: 36
Total Lumens: 3,986
Source: 120 White LED's

LTL# 13170267.24



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1777	44.6
0-60	3132	78.6
0-90	3986	100.0
90-180	0	0.0

Luminaire Efficacy = 110.7 lm/w

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

RC	80			
RW	70	50	30	10
RCR				
0	119	119	119	119
1	109	104	99	96
2	99	90	83	78
3	90	79	71	64
4	82	70	61	55
5	76	63	54	47
6	70	56	47	41
7	65	51	42	36
8	60	47	38	32
9	56	43	35	29
10	53	40	32	26

Note: Values are expressed as percent of total lumen output delivered to the task surface.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Kugler Ning Lighting

Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

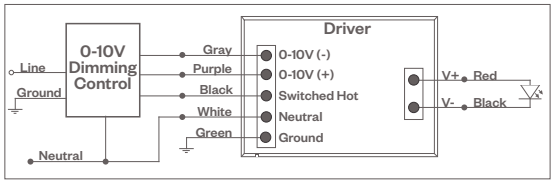
STATIC WHITE - DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

0-10V - DIMMING (Standard)
Integrates into a variety of building management and daylighting controls

Notes:
- 120V or 277V*
- Dims down to 1% light output
- Requires interface to turn off power to driver
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

0-10V Wiring Diagram



Compatible Dimmers†:

Wall Box

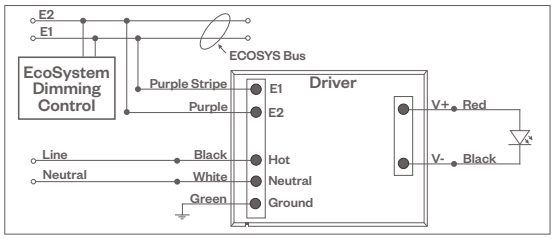
Lutron:	Wattstopper:	Leviton:
Diva - DVSTV	ADF-120277	Renoir II
Maestro - MS-Z101		
Nova-T - NTSTV-DV		

Center System
Lutron Grafixk Eye with GRX-TV1 Interface

LUTRON HI-LUME ECOSYSTEM DIMMING
Integrates into Lutron EcoSystem building management

Notes:
- 120VAC or 277VAC*
- Dims down to 1% light output
- EcoSystem Control
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

HILUME-H-ECO EcoSystem Digital Control Wiring Diagram



Compatible Dimmers†:

Lutron ECO System
Pow Pak Dimming Modules
Energi Savr Node
Grafik Eye QS/Homeworks
QS Control Unit
Quantum Hub
Homeworks QS/My Room

Central System
Lutron EcoSystem compatible controls

Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Kugler Ning Lighting

Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

STATIC WHITE - DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

DALI - DALI DIMMING 120V-277V
Digital control protocol allows individual fixture control

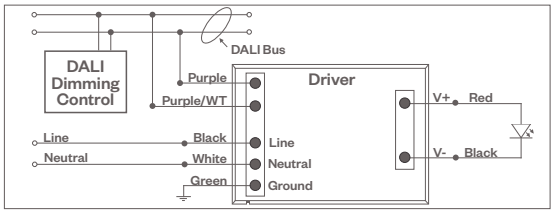
Notes:
- 120VAC - 277VAC*
- Dims down to 1% light output in most cases

Compatible Dimmers†:

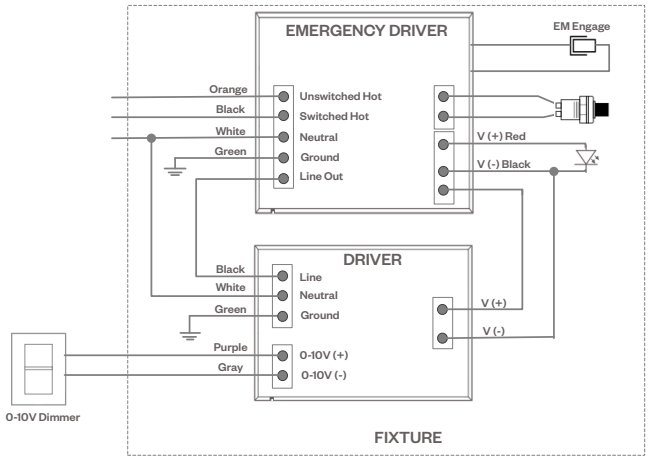
Wall Box
Leviton CD250 Controller

Center System
Dynalite
Fifth Light

DALI Wiring Diagram



EMERGENCY FIXTURE WITH BUILT-IN BATTERY PACK (EMB) WIRING:
Note: EMB not available on lengths under 4'.



Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

Kugler Ning Lighting

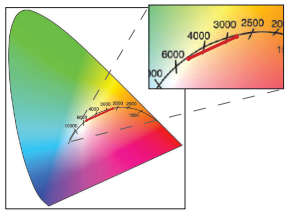
Grüv® 6" High Efficiency

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

TUNABLE WHITE



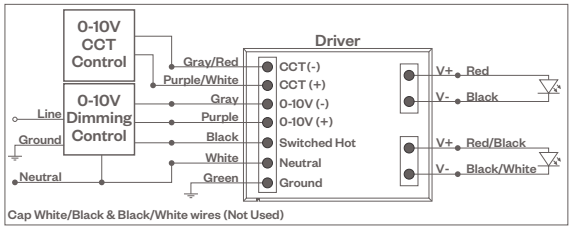
Tunable White range from 2700K-5700K, 90 CRI.
See wiring diagrams below.

TUNABLE WHITE - DIMMING COMPATIBILITY:

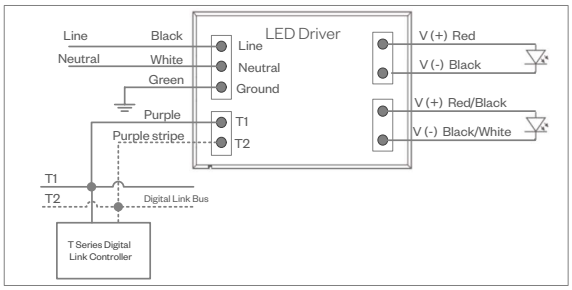
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

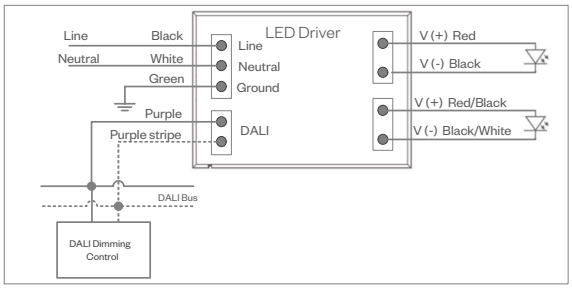
0-10V Wiring Diagram



Lutron T-Series Digital Link Wiring Diagram



DALI DT8 Wiring Diagram



Notes:

* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.

† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KB

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 2.5" Perimeter Cove

Recessed Linear LED

amerlux
A Delta Group Company

Grüv 4" HE Perimeter Cove

Features

Designed to provide high-performance, visually comfortable, high efficient comfortable perimeter ambient lighting with a 2.5" aperture for commercial and office environments. Featuring a 2.5" regress and a choice of ceiling interface options, Gruv 2.5 Cove is an effective and aesthetically pleasing way of lighting space perimeters.

Product Overview

Type:	Recessed Lens Direct
Wattage:	5W/ft, 10W/ft (other wattages available see p2)
Lumen Output:	3,662 max; 92.1 Lm/W (10W, 4ft fixture)
Color Temp:	2700K, 3000K, 3500K, 4000K
CRI:	83 typ. or 90+ typ
Dimming:	0-10V, 1% dimming (standard) Lutron Hi-lume® EcoSystem, 1% dim, fade to off DALI dimming, 1% dim

PROJECT: **TYPE:**

Fixture Summary *(see following pages for more information)*

Ceiling Types

9/16"	15/16"	Gyp Board	Millwork
Yes	CF*	Yes	Yes

**Consult factory*

Performance Chart

Wattage Per Foot	Delivered Lumens	LPW	Color Temp
5	1,972	99.5	3500K
10	3,662	92.1	3500K

Data is based on 3500K-83 IES files available on website
Data is based on 4' fixture with performance lens

Electrical Data

		4'		8'	
Wattage Per Foot		System Watts	Amps	System Watts	Amps
5	120V	22.3	0.18	41.9	0.35
	277V	22.9	0.09	41.6	0.16
10	120V	42.1	0.30	84.2	0.70
	277V	41.5	0.15	83.0	0.30

Electronic multi-volt (120-277VAC), constant current LED driver

5 year limited warranty AMERLUX LED

Amerlux®, LLC • 178 Bauer Drive, Oakland, NJ 07436 • P: 973-882-5010 F: 973-882-2605 • amerlux.com

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

Kugler Ning Lighting

Grüv® 2.5" Perimeter Cove

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Ordering Information

_____ . ____ . ____ . ____ . HW . 120/277 . _____ . _____ . _____ . _____

1 2 3 4 5 6 7 8 9 10

1 Model
EDR-1730-GRUV2.5-IS-J/GB-COVE-A16 - j-mold/gyp board trimless
EDR-1730- GRUV2.5-IS-J/GRID-COVE-A16 - j-mold/grid
EDR-1730- GRUV2.5-IS-J/FLG-COVE-A16 - j-mold/ flange

2 Optics
PL - performance lens (standard)
DL - designer lens

3 Wattage (per foot)
Standard:
5 - 5W/ft
10 - 10W/ft
Optional:
3 - 3W/ft (4' minimum length required)
4 - 4W/ft (4' minimum length required)
6 - 6W/ft
7 - 7W/ft
8 - 8W/ft
9 - 9W/ft

4 Color Temp

83 CRI:	90+ CRI:
27 - 2700K-83	**279** - 2700K-90+
30 - 3000K-83	**309** - 3000K-90+
35 - 3500K-83	**359** - 3500K-90+
40 - 4000K-83	**409** - 4000K-90+

5 Finish
HW - high reflectance white

6 Voltage
120/277

7 Length
_____ x _____ x _____
(Length A) (Length B) (Length C)

Length A (used for)	Length B (used for)	Length C (used for)
- all patterns	- all patterns	- PU
- IND	- PR - 2 lengths of 2	- PZ
- CON		
- CUS		

8 Configuration
IND[1] - individual fixture, 2' to 8' in 1' increments
CON - continuous run > than 8', specify to nearest foot
CUS - custom made to measure, +/- 1/8" of customer supplied field dimensions
Standard Patterns *(see page 8 for details)*:
PLL - L left, (2) straights + (1) 90° corner, leg right
PLR - L right, (2) straights + (1) 90° corner, leg left
PU - U shape, (3) straight lengths + (2) 90° corners
PR - Rectangle, (4) straight lengths + (4) 90° corners
PZ - Z shape, (3) straight lengths + (2) 90° corners

9 Drivers
0-10V - 1% electronic dimming , multi-volt (120-277VAC) constant current driver (standard).
HILUME-H-ECO - Lutron "H" Series, 1% dim, fade to off, EcoSystem
DALI - DALI Dimming 120-277VAC, 1% dim

10 Options/Accessories
CP - Chicago Plenum (CCEA)
WHIP - 6' whip, 18/5 conductor
EMC-PF[2] - emergency circuit requires power feed located in last fixture section (for other locations consult factory)
PF[2] - Extra power feed for additional circuiting

1 - Lengths less than 4' may have restrictions based upon wattage, lengths, drivers or other options.
2 - Not available with IND (individual) configuration.
† The "A" refers to the sequential revision in a year and "XX" refers to the year of update. Updates coincide with improved performance while not changing the overall fixture aesthetic and are reflected in the published performance data. Please contact your Amerlux representative for explanations of changes.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

Kugler Ning Lighting

Grüv® 2.5" Perimeter Cove

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Specifications

Application

Commercial and retail recessed perimeter cove ambient lighting.

Construction

Heavy gauge steel upper housing is secured to aluminum extruded trim rails. Die-formed, cold-rolled steel internal components and external mounting brackets. Numerous configurations accommodate most architectural ceiling conditions.
Die formed steel cove walls - powder coat painted.

Optical

All lenses are snap-in, extruded acrylic, with a maximum length of 8'. Amerlux's proprietary acrylic lens provide excellent transmission while effectively concealing source image.
PL - Performance Lens provides high efficiency with controlled lens surface brightness (standard).
DL - Designer Lens provides flat even glow on lens. Best when lens is in direct or constant view. Such as vertical wall mounted.

LED

Amerlux's boards and patented connector design with brand name LEDs enables Amerlux fixtures to have excellent thermal management and offer a 5 year warranty. Our LED binning is within 3 MacAdam ellipse. Boards are configured for maximum flexibility resulting in even illumination no matter the fixture layout. LED boards are easily replaced in the field with just a Phillips screw driver.
Color Temperature Options: 2700K, 3000K, 3500K, 4000K
CRI: 83 typical, 90+ typical
R9: 16 @ CRI 83
R9: >50 @ CRI 92
Life: 50,000+ hr., > 70% of initial lumens (L70)

Electrical

Wiring: Supply wires are easily accessible through access plate on top of fixture.
WHIP: Optional factory installed 6' Greenfield whip (18/5 conductor) simplifies installation.
Standard Wattage: 5W/ft, 10W/ft.
Optional Wattages: 3W/ft, 4W/ft, 6W/ft, 7W/ft, 8W/ft, 9W/ft. (3W & 4W have a minimum length of 4'). For other wattages consult factory.
Emergency circuit via remote inverter or auxiliary emergency power supply (by others).
This product complies with IEEE C62.41 for surge endurance up to 2.5KV. Amerlux® recommends using additional surge protection with this unit (supplied by others), surge and over voltage damage is not covered under warranty.
EMC-PF - Emergency circuit requires power feed to be located in last fixture section for continuous runs. For other locations consult factory. Not available for individual (IND) configuration.
PF - Extra power feed for additional circuiting. Not available for individual (IND) configuration.

Drivers

0-10V - 1% electronic dimming, multi-volt (120-277VAC) constant current driver (standard). Cap leads for non-dim applications.
Optional Drivers:
HILUME-A-LTE - Lutron "A" Series, 1% dim, 2-wire, 120V only
HILUME-H-ECO - Lutron "H" Series, 1% dim, fade to off, EcoSystem
DALI - DALI Dimming 120-277VAC, 1% dim

Finish

HW - High reflectance, matte white powder coat paint. Baked on finish for maximum durability and color stability.

Configurations/Lengths

IND - Individual fixtures are made of single standard lengths of 2 ft to 8 ft (in 1' increments). These are stand alone fixtures with matching End Caps, supplied with the mounting hardware. Lengths less than 4' may have restrictions based upon wattage, lengths, drivers or other options.
CON - Continuous runs, > 8', specified to nearest whole foot length in 1' increments. Runs made from standard lengths have End Caps at the beginning and end of run. Runs > 60' may require second power feed. Each Housing has factory installed alignment pins. Mating fixtures are easily aligned and joined with "catch and latch" mechanisms out of sight, on top of the Housing. Wiring is made fast and positive with molded quick connectors.
CUS - Custom made to measure runs are made to nearest 1/8"of customer supplied field measurements or drawings. Custom lengths use the same hardware for hairline joining.
PXX - Standard Patterns consist of 90° corners with standard lengths (4' to 8' in 1' increments), continuous runs or made to measure lengths. Depending upon complexity of the pattern drawings may be required from the Customer. If ordering please give overall lengths.
A'-B'-PLL - L Left - (1) 90° Corner 2 segments. Specify overall segments: A' & B'
A'-B'-PLR - L Right - (1) 90° Corner 2 segments. Specify overall segments: A' & B'
A'-B'-PR - Rectangle - (4) 90° Corners joining 4 segments. Specify overall segments: A' & B'
A'-B'-C'-PU - U shape - (2) 90° Corners joining 3 segments. Specify overall segments: A', B', & C'
A'-B'-C'-PZ - Z shape - (2) 90° Corners joining 3 segments. Specify overall segments: A', B', & C'
See page 8 for layouts.

Mounting

Intended for use in gypsum board, 9/16" Tee grid and Screw Slot, and millwork ceilings. Wall mounting J-Molding details available. For individual, continuous row, or pattern applications.
Please note - fixtures to be installed before gypsum board ceiling.
GRUV2.5-IS-J/GB-COVE - J mold/gyp trimless, plastered in ceiling - J Channel wall side
GRUV2.5-IS-J/GRID-COVE - J mold/grid, in 9/16" Screw Slot or Flat Tee ceilings - J Channel wall side
GRUV2.5-IS-J/FLG-COVE - J mold/flange - J Channel wall side

Certifications

Approved to UL standards for damp locations as tested by CSA Intended for indoor use only
Chicago Plenum (CCEA) optional

Warranty

Amerlux's 5 year limited warranty. Please consult Amerlux website for details.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

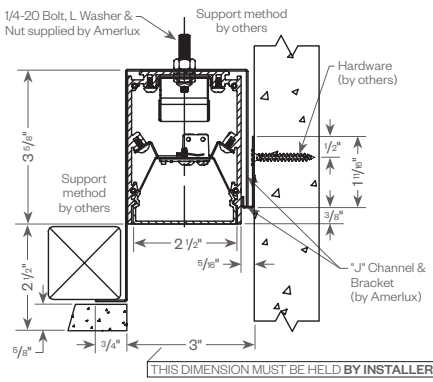
Grüv® 2.5" Perimeter Cove

Recessed Linear LED

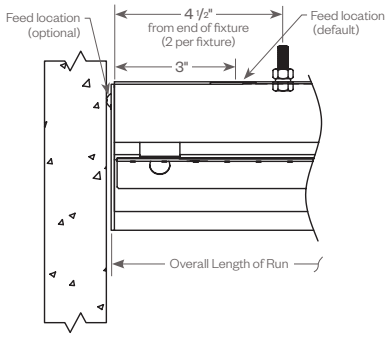
amerlux
A Delta Group Company

PROJECT: **TYPE:**

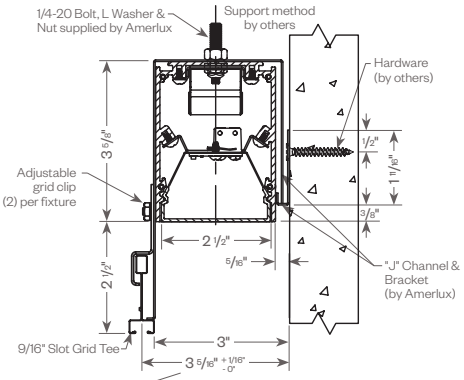
GRÜV2.5-IS-J/GB-COVE (j-mold/gyp board trimless)



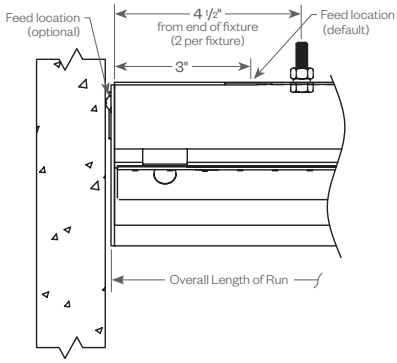
THIS DIMENSION MUST BE HELD **BY INSTALLER** FOR THE FULL LENGTH OF THE RUN



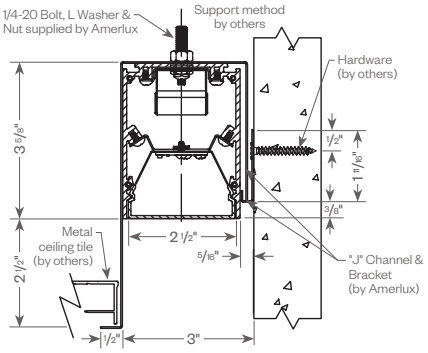
GRÜV2.5-IS-J/GRID-COVE (j-mold/grid mount)

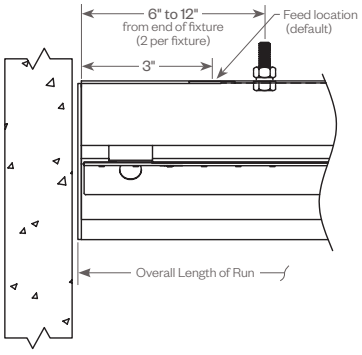


TEE MOUNTING DIMENSION MUST BE HELD **BY INSTALLER** FOR THE FULL LENGTH OF THE RUN



GRÜV2.5-IS-J/FLG-COVE (j-mold/flange)





SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 2.5" Perimeter Cove

Recessed Linear LED

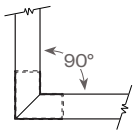
amerlux
A Delta Group Company

PROJECT: **TYPE:**

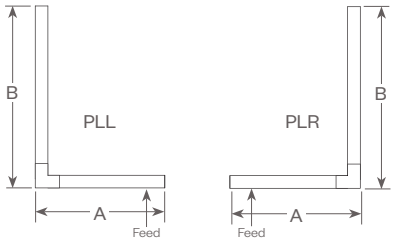
GRUV 2.5" PATTERNS:

Standard Patterns
All corners are standard 90°, standard length legs.
Use standard lengths: 4' min to 8' in 1 foot increments.
Continuous runs must be the same length in pairs for closed configuration.

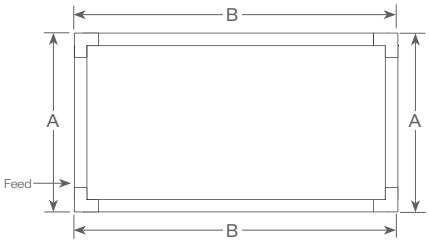
Custom Patterns
Please provide drawings of your configuration.
Made to Measure: +/- 1/8", consult factory.
PC - custom pattern, please provide drawings and consult factory



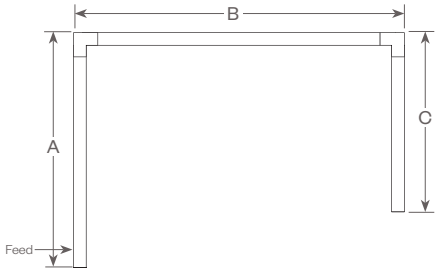
Gruv 2.5 Lens
Mitered Lens



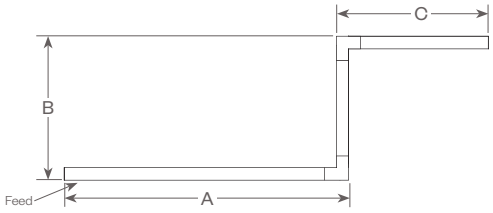
PLL - L Left, (2) straights + (1) 90° corner, leg right
PLR - L Right, (2) straights + (1) 90° corner, leg left
Provide overall lengths: A' & B'
Nomenclature: A-B-PLL A-B-PLR



PR - Closed Rectangle, (4) straight lengths + (4) 90° corners
Provide overall lengths: A' & B'
Nomenclature: A-B-PR



PU - Open U, (3) straight lengths + (2) 90° corners
Provide overall lengths: A', B' & C'
Nomenclature: A-B-C-PU



PZ - Open Z, (3) straight lengths + (2) 90° corners
Provide overall lengths: A', B' & C'
Nomenclature: A-B-C-PZ

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

Kugler Ning Lighting

Grüv® 2.5" Perimeter Cove

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

FIXTURE DATA: (Complete photometric data (.ies format) available upon request)

MULTIPLYING FACTORS: (Multiplying Factor is based on 3500K-83 120V IES file on website)

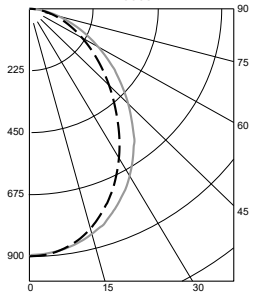
Wattage:	3W	4W	5W	6W	7W	8W	9W
Factor:	0.63	0.82	1.0	1.17	1.34	1.50	1.64

CCT-CRI:	2700K-83	3000K-83	3500K-83	4000K-83	2700K-90+	3000K-90+	3500K-90+	4000K-90+
Factor:	0.91	0.96	1.0	1.01	0.80	0.84	0.88	0.89

GRÜV 2.5" PERFORMANCE LENS 5W 3500K 4FT

Total Watts: 20
Total Lumens: 1,972
Source: 128 White LEDs

LTL# 11665872.21



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1028	52.1
0-60	1645	83.4
0-90	1971	100.0
90-180	0	0.0

Luminaire Efficacy = 99.5 lm/w

COEFFICIENTS OF UTILIZATION

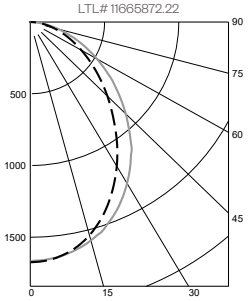
RC	80			
RW	70	50	30	10
RCR				
0	2292	2292	2292	2292
1	2108	2029	1958	1894
2	1930	1792	1677	1579
3	1770	1592	1453	1340
4	1630	1425	1273	1155
5	1507	1285	1128	1010
6	1398	1167	1008	893
7	1302	1065	909	798
8	1217	978	825	718
9	1141	903	754	652
10	1074	837	693	596

Note: Values expressed as Lumens delivered to the task surface.

GRÜV 2.5" PERFORMANCE LENS 10W 3500K 4FT

Total Watts: 40
Total Lumens: 3,662
Source: 128 White LEDs

LTL# 11665872.22



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1910	52.1
0-60	3056	83.4
0-90	3662	100.0
90-180	0	0.0

Luminaire Efficacy = 92.1 lm/w

COEFFICIENTS OF UTILIZATION

RC	80			
RW	70	50	30	10
RCR				
0	4258	4258	4258	4258
1	3915	3769	3637	3517
2	3584	3328	3115	2933
3	3288	2957	2698	2489
4	3028	2648	2365	2146
5	2799	2388	2095	1876
6	2598	2167	1873	1659
7	2419	1979	1688	1482
8	2261	1818	1533	1335
9	2121	1678	1401	1212
10	1995	1556	1288	1107

Note: Values expressed as Lumens delivered to the task surface.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

Kugler Ning Lighting

Grüv® 2.5" Perimeter Cove

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

FIXTURE DATA: (Complete photometric data (.ies format) available upon request)

MULTIPLYING FACTORS: (Multiplying Factor is based on 3500K-83 120V IES file on website)

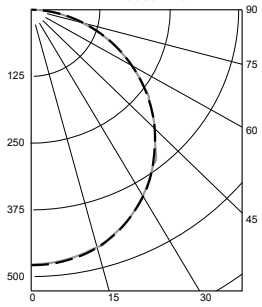
Wattage:	3W	4W	5W	6W	7W	8W	9W
Factor:	0.63	0.82	1.0	1.17	1.34	1.50	1.64

CCT-CRI:	2700K-83	3000K-83	3500K-83	4000K-83	2700K-90+	3000K-90+	3500K-90+	4000K-90+
Factor:	0.91	0.96	1.0	1.01	0.80	0.84	0.88	0.89

GRÜV 2.5" DESIGNER LENS 5W 3500K 4FT

Total Watts: 20
Total Lumens: 1383
Source: 128 White LEDs

LTL# 11665872.23



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	609	44.0
0-60	1074	77.7
0-90	1383	100.0
90-180	0	0.0

Luminaire Efficacy = 69.8 lm/w

COEFFICIENTS OF UTILIZATION

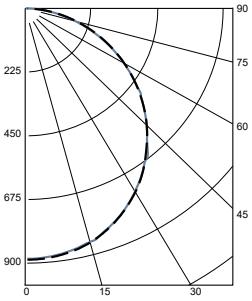
RC	80			
RW	70	50	30	10
RCR				
0	1609	1609	1609	1609
1	1462	1400	1344	1293
2	1324	1218	1129	1053
3	1205	1068	962	876
4	1102	947	831	742
5	1013	846	727	639
6	935	762	644	558
7	868	691	575	492
8	808	631	518	439
9	756	580	470	395
10	709	536	430	358

Note: Values expressed as Lumens delivered to the task surface.

GRÜV 2.5" DESIGNER LENS 10W 3500K 4FT

Total Watts: 40
Total Lumens: 2567
Source: 128 White LEDs

LTL# 11665872.24



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1130	44.0
0-60	1993	77.7
0-90	2567	100.0
90-180	0	0.0

Luminaire Efficacy = 64.6 lm/w

COEFFICIENTS OF UTILIZATION

RC	80			
RW	70	50	30	10
RCR				
0	2985	2985	2985	2985
1	2712	2597	2494	2400
2	2457	2260	2095	1954
3	2235	1983	1784	1625
4	2044	1756	1542	1376
5	1879	1570	1350	1185
6	1736	1414	1194	1034
7	1610	1283	1067	914
8	1500	1172	961	815
9	1402	1076	873	733
10	1316	994	797	665

Note: Values expressed as Lumens delivered to the task surface.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

Kugler Ning Lighting

Grüv® 2.5" Perimeter Cove

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

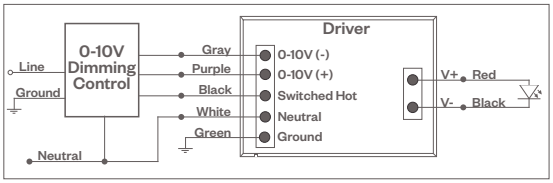
DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

0-10V - DIMMING (Standard)
Integrates into a variety of building management and daylighting controls

Notes:
- 120VAC or 277VAC*
- Dims down to 1% light output
- Requires interface to turn off power to driver
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

0-10V Wiring Diagram



Compatible Dimmers†:

Wall Box

Lutron:	Wattstopper:	Leviton:
Diva - DVSTV	ADF-120277	Renoir II
Maestro - MS-Z101		
Nova-T - NTSTV-DV		

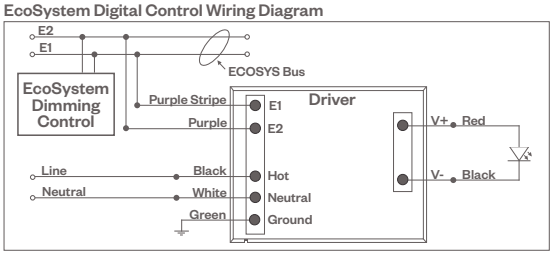
Center System

Lutron Grafixk Eye with GRX-TV1 Interface

LUTRON HI-LUME ECOSYSTEM DIMMING
Integrates into Lutron EcoSystem building management

Notes:
- 120VAC or 277VAC*
- Dims down to 1% light output
- EcoSystem Control
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

HILUME-H-ECO
EcoSystem Digital Control Wiring Diagram



Compatible Dimmers†:

Lutron ECO System	Central System
Pow Pak Dimming Modules	Lutron EcoSystem compatible controls
Energi Savr Node	
Grafik Eye QS/Homeworks	
QS Control Unit	
Quantum Hub	
Homeworks QS/My Room	

Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

Kugler Ning Lighting

Grüv® 2.5" Perimeter Cove

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

DALI - DALI DIMMING 120V-277V
Digital control protocol allows individual fixture control

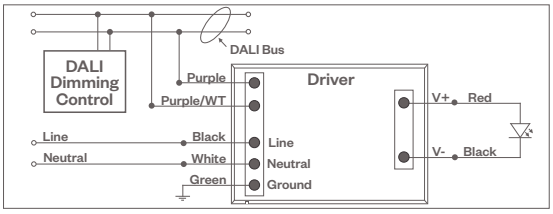
Notes:
- 120VAC - 277VAC*
- Dims down to 1% light output in most cases

Compatible Dimmers†:

Wall Box
Leviton CD250 Controller

Center System
Dynalite
Fifth Light

DALI Wiring Diagram



Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KC, KC1, KC2

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet HP RLD/RLW

Hornet® HP

Round Lensed Downlight/ Wall Wash

amerlux
A Delta Group Company

Features

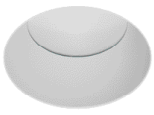
Hornet Lensed Downlights are the perfect choice for all general lighting needs. Available in Round or Square apertures, these fixtures meet the needs of commercial and hospitality markets. Optional Solite lensing provides whisper quiet aesthetics. Also available in knife-edge trimless, remodeler or millwork. Complementing Hornet Lens Wall Wash fixture available.

Product Overview

Type:	Recessed Round Lensed Downlight/Wall Wash
Wattage:	9, 12, 16, 23, 27, 30
Color Temp:	2200K, 2700K, 3000K, 3500K, 4000K
CRI:	83 typ. (2700K, 3000K, 3500K, 4000K) 90+ typ. (2200K, 2700K, 3000K, 3500K, 4000K) CrispWhite & 3K Class A available
Dimming:	TRIAC & ELV (120/277VAC) - 5% Dim Lutron Hi-lume® H Series/EcoSystem - 1% dim with soft on, fade to black, 120/277VAC 0-10V (120/277VAC) - 1% Dim DALI (120/277VAC) - 1% Dim

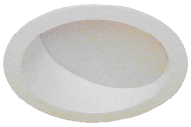
Downlight

PROJECT: **TYPE:**



Trimless version

Millwork version



Wall Wash

Performance Chart

	HDL-HP-RLD				HDL-HP-RLW		
Watts	Delivered Lumens	LPW	CBCP	Color Temp	Delivered Lumens	LPW	Color Temp
9	796	88.5	2147	3000K-83	771	85.6	3000K-83
12	1062	88.5	2862	3000K-83	1028	85.6	3000K-83
16	1409	88	3798	3000K-83	1363	85.2	3000K-83
23	2042	90.5	5504	3000K-83	1,976	87.9	3000K-83
27	2389	88.5	6440	3000K-83	2371	87.8	3000K-83
30	2654	88.5	7155	3000K-83	2569	85.6	3000K-83

Data is based on 3000K-83 IES files available on website
Data is based on 30SOL optic.
All wattage and LPW includes 2W thermal protector

Electrical Data

	9W		12W		16W	
	System Watts	Amps	System Watts	Amps	System Watts	Amps
120V	9.8	0.08	11.9	0.10	15.2	0.13
277V	9.8	0.04	11.9	0.04	15.2	0.06
	23W		27W		30W	
	System Watts	Amps	System Watts	Amps	System Watts	Amps
120V	22.8	0.19	27.3	0.23	32	0.27
277V	22.8	0.08	27.3	0.10	32	0.12

Electronic constant current LED driver
Includes thermal protector, 2W power consumption

5 year limited warranty AMERLUX LED

Title 24 Compliant

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

Hornet® HP

Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Housing/Frame Ordering Information

_____ . _____ . _____ . _____ . _____ . _____

1 2 3 4 5 6

1 Model

For New Construction

HDL-HP-R-NC-A17† (New Construction)
HDL-HP-R-CP-A17† (Chicago Plenum (CCEA) housing)
HDL-HP-R-IC-A17†* (Insulated Ceiling/air tight, 16W max)

For Existing Ceilings

HDL-HP-R-REM-A17† (Remodeler)

2 Style

T - trimmed
TL - trimless
MWK[R,T] - millwork (for 1/2" - 11/16" ceiling thickness)
[R] Not available for use with Remodeler model
[T] Consult factory for use in ceilings thicker than 11/16"

3 Wattage

9
12
16*
23††
27††
30††
†† Not available for use with IC housing

4 Voltage

120
277
120/277 (for use with IC housing only)

5 Driver (for non-dimming, select LE/TE option)

LE/TE* - TRIAC/ELV dimming
HILUME-H-ECO - Lutron Hi-lume® H Series, EcoSystem, 1% dim with soft on, fade to black
0-10V* - 0-10V dimming, 1% dim
DALI - DALI dimming, 1% dim

6 Options/Accessories

EM - emergency battery pack with remote test switch (not available for use with REM, CP or IC options)
HB49 - hanger bars from min 29" to max 49" (not available for use with REM options)

Trim Ordering Information

_____ . _____ . _____ . _____ . _____ . _____

1 2 3 4 5 6

1 Model

HDL-HP-RLD-A17† (lensed downlight)
HDL-HP-RLW-A17† (lensed wall wash)

2 Style

T - trimmed
TL - trimless
MWK - millwork

3 Finish

Trimmed	Trimless/Millwork
MBW - matte black, white flange	**MB** - matte black
MWW - matte white, white flange	**MW** - matte white
SLVW - matte silver, white flange	**SLV** - matte silver
MBB - matte black, black flange	
SLVS - matte silver, silver flange	

4 Beam Spreads (not required with RLW version)

30SOL - 30° beam with solite lens
50SOL - 50° beam with solite lens
65SOL - 65° beam with solite lens
75SAT - 75° beam with satin ice lens

5 Color Temp

83 CRI	90+ CRI	
27 - 2700K-83	**229** - 2200K-90+	**CRISP‡** - CrispWhite
30 - 3000K-83	**279*** - 2700K-90+	**3CLA‡** - 3K Class A
35 - 3500K-83	**309*** - 3000K-90+	
40 - 4000K-83	**359** - 3500K-90+	
	409 - 4000K-90+	

‡ Not available for 27W & 30W

6 Options/Accessories

WET - wet location (only available for use with trimmed style)

* Title 24 Compliant
† The "A" refers to the sequential revision in a year and "XX" refers to the year of update. Updates coincide with improved performance while not changing the overall fixture aesthetic and are reflected in the published performance data. Please contact your Amerlux representative for explanations of changes.

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Specifications

Application

Retail and commercial ambient or wall wash lighting

Construction

20 ga. galvanized steel frame
18 ga. galvanized steel splice housing and hanger brackets (not for Remodeler version)
Cast aluminum plaster frame with perforated face (for trimless version only)
Die-cast optical housing and trim
Die-cast heat sink

Optical

Lens Options (for RLD version):
Satin Ice lens for maximum source concealment and wide distribution with a visually "hotter" aperture.
Solite lens for maximum efficacy and a visually quieter aperture. 30°, 50° and 65° beam spread options. Visually best with SLV reflector finish.

Beam spreads (for RLD version):
30SOL - 30° beam with solite lens
50SOL - 50° beam with solite lens
65SOL - 65° beam with solite lens
75SAT - 75° beam with satin ice lens

Wall Wash:
Engineered nano technology lens provides high transmission while concealing LED image

LED

Color Temp Options:
2200K, 2700K, 3000K, 3500K, 4000K
CRI: 83 typ. (2700K, 3000K, 3500K, 4000K)
90+ typ. (2200K, 2700K, 3000K, 3500K, 4000K)
CrispWhite* and Class A** 3000K LEDs available
R9 Values: 11 (83 CRI), 55 (92 CRI)
Binning: 3 MacAdam (SDCM)
Life: 50,000+ hrs, > 70% of initial lumens at 50,000 hrs

**CrispWhite:* *CrispWhite Technology delivers the warmth of colors expected from a high 90 CRI solution but also creates the natural crisp white color that is pleasing to the eye. It creates the most impactful lighting ever available, by revealing the richest whites and vibrant colors that pop.*

***Class A LED: Class A LED's have a CRI > 80 and a GAI > 80. CRI defines color "Naturalness" and GAI defines color "Saturation." Both being high delivers rich colors and pure whites.*

Electrical

Wattage: 9, 12, 16, 23, 27, 30
Electronic constant current LED driver, 120/277VAC input
This product complies with IEEE C62.41 for surge endurance up to 2.5KV. Amerlux® recommends using additional surge protection with this unit (supplied by others), surge and over voltage damage is not covered under warranty.
Note: *Drivers are universal but thermal protector is voltage specific*

Drivers

LE/TE - Leading Edge, TRIAC, forward phase/Trailing Edge, ELV, reverse phase
0-10V, Lutron and DALI systems available
See pages 10-12 for more dimming information

Finish

Powder coat paint/wet paint
Consult factory for custom finishes

Mounting

26" Hanger bars included (except for Remodeler versions)
Optional **HB49** - hanger bars from min 29" to max 49" available
Trimmed Fixture:
For use in grid or sheetrock ceilings, 5/8" - 2" max (1" max for RLW trims) standard
Trimless Fixture:
For use in sheetrock ceilings, max ceiling thickness 5/8"
Millwork Fixture:
Millwork extension collars are based on ceiling material specifications and thickness. Provides flush trim appearance level with ceiling material. Ceiling thickness 1/2"-11/16". Consult factory for use in ceilings thicker than 11/16".
Not available for use with Remodeler model.

Certifications

CSA damp as tested to UL 1598 standards
CP - Chicago Plenum (CCEA) option
IC/AT rated (optional, 16W only)
Title 24 Compliant (see ordering page for options that apply)
Damp location
Wet location option

Warranty

5 year limited warranty

Emergency Battery Pack (EM)

Powers fixture at 5.1 watts (approx. 400 Lm) for 90 minutes *(not for use with REM, CP or IC/AT versions)*

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

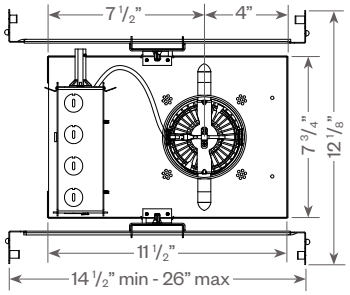
Kugler Ning Lighting

Hornet® HP

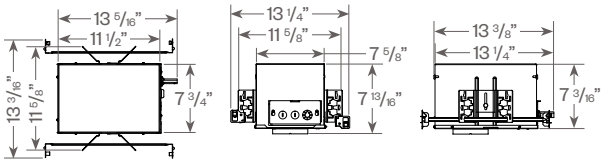
Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

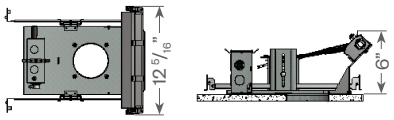
PROJECT: **TYPE:**



Optional CP or IC/AT housing

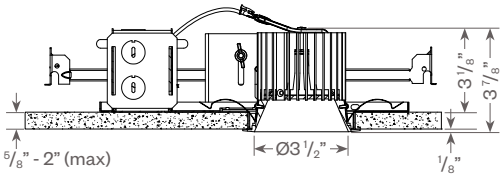


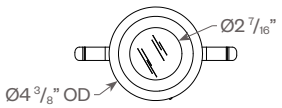
Emergency Battery Pack (EM) option



Hornet HP Round Lensed Downlight:

Trimmed

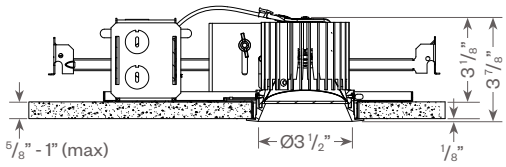


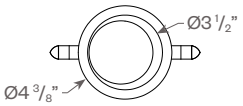


Ceiling cut out: 4" dia.

Hornet HP Round Lensed Wall Wash:

Trimmed





Ceiling cut out: 4" dia.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

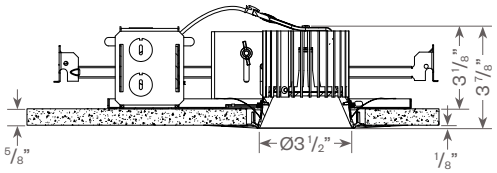
Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

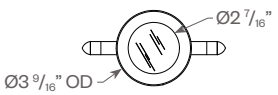
PROJECT: **TYPE:**

Hornet HP Round Lensed Downlight:

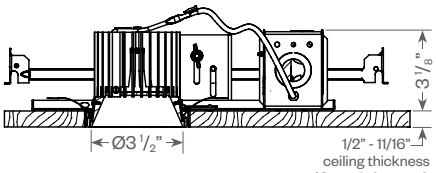
Trimless



Trimless Ceiling Cut Out: 4 1/2" dia.

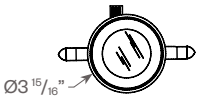


Millwork



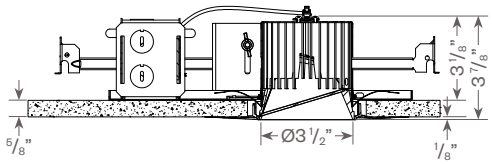
1/2" - 11/16" ceiling thickness (Consult factory for thicker ceilings)

Millwork Ceiling Cut Out: 4" dia.

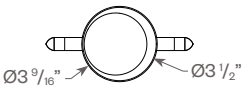


Hornet HP Round Lensed Wallwash:

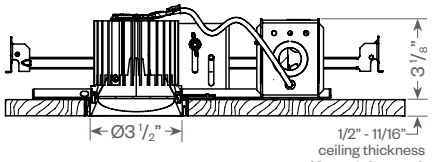
Trimless



Trimless Ceiling Cut Out: 4 1/2" dia.

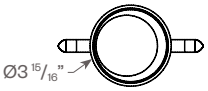


Millwork



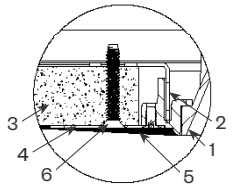
1/2" - 11/16" ceiling thickness (Consult factory for thicker ceilings)

Millwork Ceiling Cut Out: 4" dia.



Plaster Frame Installation Detail (for trimless fixture only)

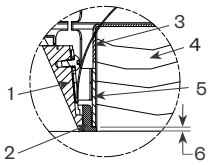
1. Reflector Trim
2. Aperture plate
3. Ceiling 5/8"
4. Cast Aluminum Plaster Frame
5. Plaster Skim Coat (by others)
6. 6-32 Type F Thread Cutting Screw



New Construction

Millwork Detail

1. Reflector Trim
2. Millwork Ring
3. Aperture Plate
4. Wood Ceiling 2" Max
5. Extension collar (see ordering information for ceiling thicknesses)
6. 1/16" required for trim to be flush with ceiling



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

Round Lensed Downlight/Wall Wash

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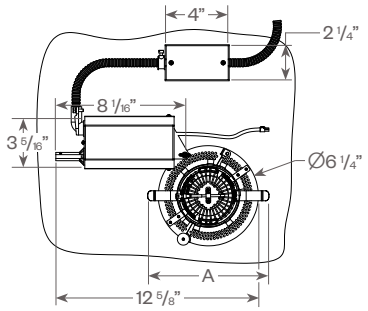
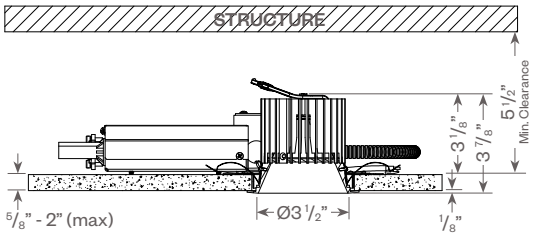
A Delta Group Company

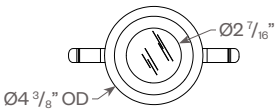
PROJECT: **TYPE:**



	RLD-REM	RLW-REM
A	7 9/16”	7”

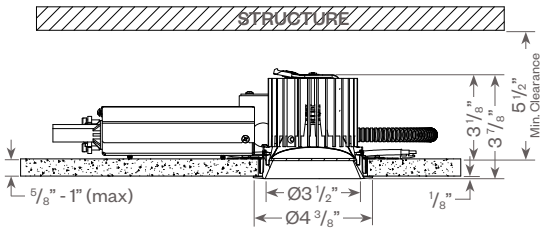
Hornet HP Round Lensed Downlight Remodeler:

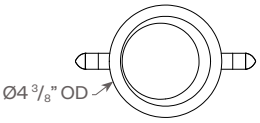




Ceiling cut out: 4” dia.

Hornet HP Round Lensed Wall Wash Remodeler:





Ceiling cut out: 4” dia.

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

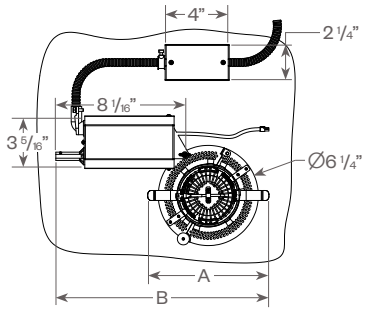
Kugler Ning Lighting

Hornet® HP

Round Lensed Downlight/Wall Wash

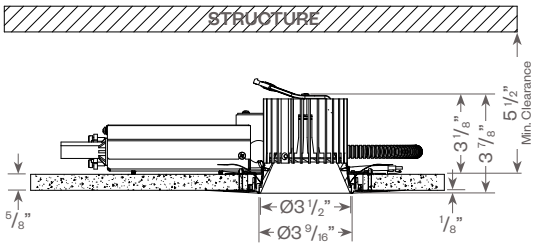
amerlux
A Delta Group Company

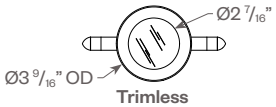
PROJECT: **TYPE:**



	RLD-REM-TL	RLW-REM-TL
A	6 13/16"	7"
B	12 15/16"	13 5/16"

Hornet HP Round Lensed Downlight Remodeler Trimless:

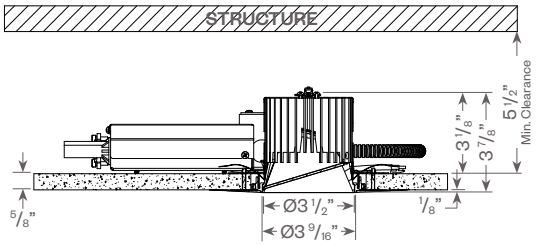


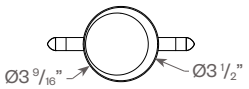


Trimless

Trimless Ceiling cut out: 4 1/2" dia.

Hornet HP Round Lensed Wall Wash Remodeler Trimless:



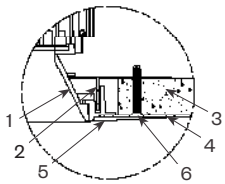


Trimless

Trimless Ceiling cut out: 4 1/2" dia.

Plaster Frame Installation Detail (for trimless fixture only)

1. Reflector Trim
2. Aperture plate
3. Ceiling 5/8"
4. Cast Aluminum Plaster Frame
5. Plaster Skim Coat (by others)
6. 6-32 Type F Thread Cutting Screw



Remodeler

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

Kugler Ning Lighting

Hornet® HP

Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Hornet HP Round Lensed Downlight:

FIXTURE DATA: (Complete photometric data (.ies format) available upon request)

MULTIPLYING FACTORS: (Multiplying Factor is based on 3000K-83 120V IES file on website)

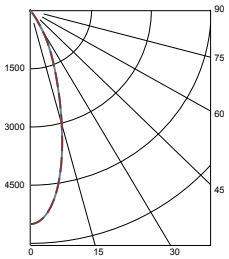
Wattage:	9W	12W	16W	23W	27W	30W
Factor:	0.39	0.52	0.69	1.0	1.2	1.3

CCT:	2700K-83	3000K-83	3500K-83	4000K-83
Factor:	0.96	1.0	1.02	1.04

CCT:	2200K-90+	2700K-90+	3000K-90+	3500K-90+	4000K-90+	CRISP	3CLA
Factor:	0.66	0.83	0.86	0.90	0.93	0.65	0.70

23W LED, 3000K

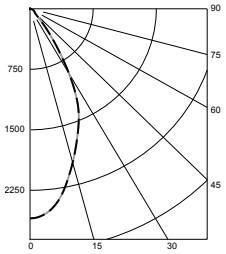
30° Solite Lens
LTL # 13408034.01
Lumens: 2042 lm; 90.5 lm/W



Candelas at Nadir

Deg	Candela
0	5504
5	5162
15	2877
25	1113
35	210
45	59

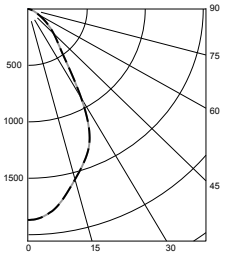
50° Solite Lens
LTL # 13408034.02
Lumens: 1923 lm; 85.2 lm/W



Candelas at Nadir

Deg	Candela
0	2597
5	2523
15	1960
25	1347
35	493
45	101

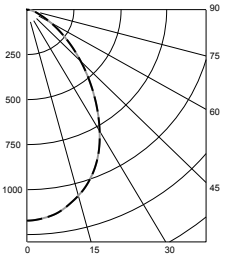
65° Solite Lens
LTL # 13408034.03
Lumens: 2027 lm; 89.9 lm/W



Candelas at Nadir

Deg	Candela
0	1869
5	1829
15	1554
25	1228
35	551
45	307

75° Satin Ice Lens
LTL # 13408034.04
Lumens: 1905 lm; 84.8 lm/W

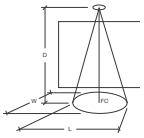


Candelas at Nadir

Deg	Candela
0	1173
5	1160
15	1069
25	900
35	650
45	410

Application Data:

Notes and Definitions:
Beam spread is to 50% center beam candlepower (CBCP).
D=Distance to floor or wall.
FC=Footcandles on floor or wall at center beam aiming location.
L=Effective Visual Beam length in feet (50% of maximum footcandle level).
W=Effective Visual Beam width in feet (50% of maximum footcandle level).
CB=Distance across or down to center beam location.



30° Solite Lens
0° Aiming Angle Horizontal Footcandles

D	FC	L	W
5.0'	221	2.7	2.7
7.5'	98	3.9	3.9
10.0'	55	5.2	5.2
12.5'	36	6.5	6.5

50° Solite Lens
0° Aiming Angle Horizontal Footcandles

D	FC	L	W
5.0'	104	3.8	3.8
7.5'	47	5.8	5.8
10.0'	26	7.8	7.8
12.5'	17	9.7	9.7

65° Solite Lens
0° Aiming Angle Horizontal Footcandles

D	FC	L	W
5.0'	75	4.5	4.4
7.5'	34	6.8	6.8
10.0'	19	9.3	9.3
12.5'	13	11.8	11.8

75° Satin Ice Lens
0° Aiming Angle Horizontal Footcandles

D	FC	L	W
5.0'	47	5.2	5.2
7.5'	21	7.9	7.9
10.0'	12	10.7	10.7
12.5'	8	14.0	14.0

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

Hornet® HP

Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Hornet HP Round Lensed Wall Wash:

FIXTURE DATA: (Complete photometric data (.ies format) available upon request)

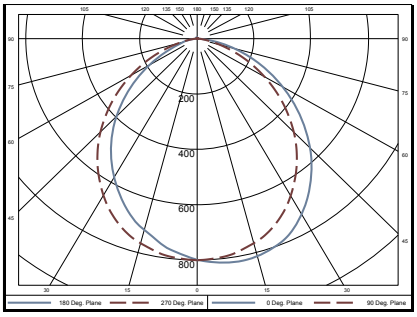
MULTIPLYING FACTORS: (Multiplying Factor is based on 3000K-83 120V IES file on website)

Wattage:	9W	12W	16W	23W	27W	30W
Factor:	0.39	0.52	0.69	1.0	1.2	1.3

CCT:	2700K-83	3000K-83	3500K-83	4000K-83
Factor:	0.96	1.0	1.02	1.04

CCT:	2200K-90+	2700K-90+	3000K-90+	3500K-90+	4000K-90+	CRISP	3CLA
Factor:	0.66	0.83	0.86	0.90	0.93	0.65	0.70

23W 3000K-83 **Wall Wash**
LTL # 13408034.05
Lumens: 1976 lm



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	992	50.2
0-60	1665	84.3
0-90	1976	100.0
90-180	0	0.0

Luminaire Efficacy: 87.9 Lm/W

Application Data: **Footcandles on Wall**

Footcandles are average and rounded off. Data for multiple units are based on a minimum of five units.

1.5 Feet from Wall

Distance from ceiling	1.5′	1.5′	1.5′
0.5′	91	95	96	95	91
1.5′	146	155	159	156	147
2.5′	104	113	115	113	104
3.5′	63	70	72	70	64
4.5′	40	43	45	44	40
5.5′	27	29	30	30	27
6.5′	20	21	22	21	20
7.5′	16	16	17	17	16

1.5 Feet from Wall

Distance from ceiling	2′	2′	2′
0.5′	37	40	37	40	37	40	36
1.5′	72	77	75	78	74	77	72
2.5′	69	73	74	75	74	73	69
3.5′	48	52	54	54	54	52	49
4.5′	33	36	37	38	37	36	33
5.5′	23	26	27	27	27	26	24
6.5′	17	19	20	20	20	19	18
7.5′	14	15	16	16	16	15	14

2 Feet from Wall

Distance from ceiling	2′	2′	2′
0.5′	39	44	42	44	43	44	41
1.5′	83	90	90	92	90	90	83
2.5′	77	83	85	87	86	84	77
3.5′	55	59	62	63	62	60	55
4.5′	38	41	43	44	43	42	38
5.5′	27	30	31	31	31	30	28
6.5′	21	22	23	23	23	22	21
7.5′	16	17	18	18	18	17	16

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

Kugler Ning Lighting

Hornet® HP

Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

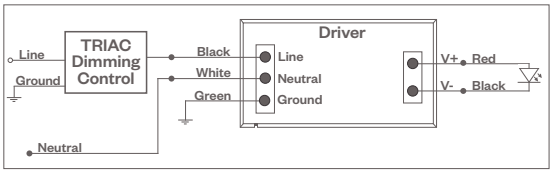
DIMMING COMPATIBILITY:
Amerlux® Hornet fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

TRIAC (Forward Phase) DIMMING (Standard)
Utilizes standard TRIAC dimmers that are in wide use in installations across the US. Best for retrofit applications where TRIAC dimmers are installed.

Notes:
- 120VAC or 277VAC*
- Dims down to 5% light output (most cases)
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!
- Must meet dimmer Minimum Load Requirements per dimming manufacturer

TRIAC Wiring Diagram



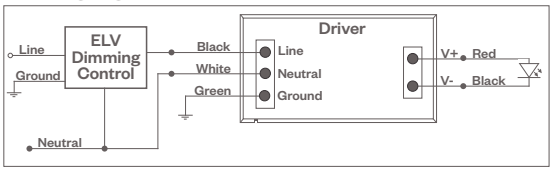
Compatible Dimmers†:

Wall Box (TRIAC 120VAC)	**Central System**
Lutron "Diva"	Lutron "GP" Panel
Lutron "Nova-T"	Lutron Grafik Eye QS
Lutron "Maestro"	
Lutron "Vareo"	
Lutron "Skylark"	

ELV - Electronic Low Voltage (Reverse Phase) DIMMING (Standard)
Utilizes specialized "ELV" dimmers.

Notes:
- 120VAC or 277VAC*
- Dims down to 5% light output (most cases)
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!
- Must meet dimmer Minimum Load Requirements

ELV Wiring Diagram



Compatible Dimmers†:

Wall Box (ELV 120VAC)	**Wall Box** (ELV 277VAC)	**Central System**
Lutron "Diva"	Leviton Revoir II AWSMT-E	Lutron "GP" Panel with PHPM-PA 120/277VAC
Lutron "Nova-T"		Lutron Grafik Eye QS with PHPM-PA 120/277VAC
Lutron "Maestro"		
Lutron "Vareo"		
Lutron "Skylark"		
Leviton "Surslide"		
Leviton "Vizio"		

Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer manufacturer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

DIMMING COMPATIBILITY:
Amerlux® Hornet fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

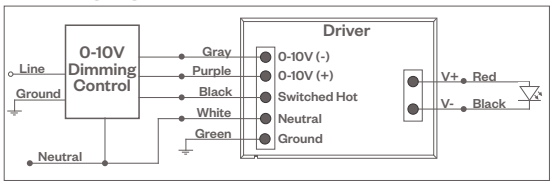
--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

0-10V DIMMING

Integrates into a variety of building management and daylighting controls

Notes:
- 120VAC or 277VAC*
- Dims down to 1% light output
- Requires interface to turn off power to driver
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

0-10V Wiring Diagram



Compatible Dimmers†:

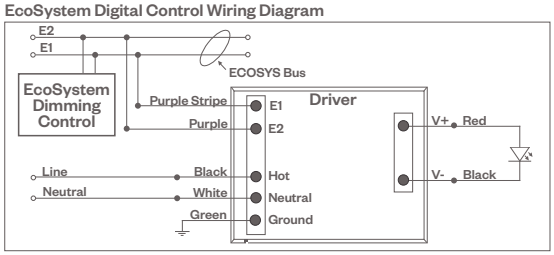
Wall Box		Central System
Lutron "Diva" - DVTV with PP-120H Interface	Leviton Renoir II 0-10V	Lutron Grafik Eye with GRX-TVI Interface

LUTRON H-SERIES / ECOSYSTEM DIMMING

Integrates into Lutron EcoSystem building management

Notes:
- 120VAC or 277VAC*
- Dims down to 1% light output
- EcoSystem Control
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

HILUME-H-ECO, HILUME-5-ECO
EcoSystem Digital Control Wiring Diagram



Compatible Dimmers†:

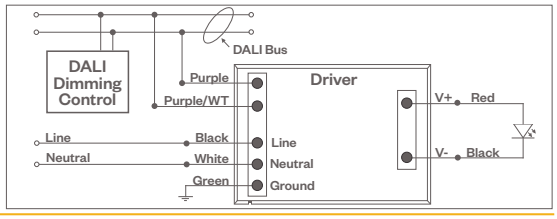
Lutron ECO System	Central System
Pow Pak Dimming Modules	Lutron EcoSystem compatible controls
Energi Savr Node	
Grafik Eye QS/Homeworks	
QS Control Unit	
Quantum Hub	
Homeworks QS/My Room	

DALI DIMMING

Digital control protocol allows individual fixture control

Notes:
- 120VAC - 277VAC*
- Dims down to 1% light output in most cases

DALI Wiring Diagram



Compatible Dimmers†:

Wall Box (3-Wire Fluorescent)	Central System
Leviton CD250 Controller	Dynalite
	Fifth Light

Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer manufacturer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

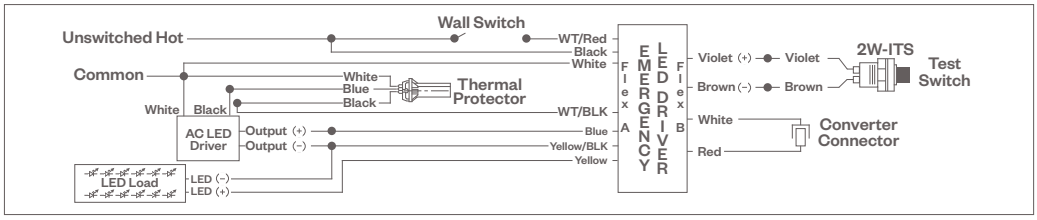
Round Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

EMERGENCY DIMMING (-EM OPTION)

Wiring Diagram



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KD, KD1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

Square Lensed Downlight/ Wall Wash

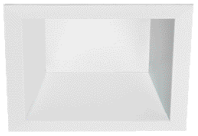
amerlux
A Delta Group Company

Features

Hornet Lensed Downlights are the perfect choice for all general lighting needs. Available in Round or Square apertures, these fixtures meet the needs of commercial and hospitality markets. Optional Solite lensing provides whisper quiet aesthetics. Also available in knife-edge trimless, remodeler or millwork. Complementing Hornet Lens Wall Wash fixture available.

Product Overview

Type:	Recessed Square Lensed Downlight/Wall Wash
Wattage:	9, 12, 16, 23, 27, 30
Color Temp:	2200K, 2700K, 3000K, 3500K, 4000K, CRISP
CRI:	83 typ. (2700K, 3000K, 3500K, 4000K) 90+ typ. (2200K, 2700K, 3000K, 3500K, 4000K) CrispWhite & 3K Class A available
Dimming:	TRIAC & ELV (120/277VAC) - 5% Dim Lutron Hi-lume® H Series/EcoSystem - 1% dim with soft on, fade to black, 120/277VAC 0-10V (120/277VAC) - 1% Dim DALI (120/277VAC) - 1% Dim

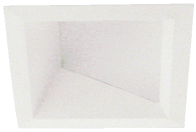


Downlight

PROJECT: **TYPE:**

Trimless version

Millwork version



Wall Wash

5 year limited warranty

Title 24 Compliant

Performance Chart

	HDL-HP-SLD				HDL-HP-SLW		
Watts	Delivered Lumens	LPW	CBCP	Color Temp	Delivered Lumens	LPW	Color Temp
9	832	92.4	1179	3000K-83	798	88.6	3000K-83
12	1109	92.4	1572	3000K-83	1063	88.6	3000K-83
16	1471	91.9	2085	3000K-83	1411	88.2	3000K-83
23	2133	94.5	3023	3000K-83	2045	90.6	3000K-83
27	2496	92.4	3537	3000K-83	2454	90.9	3000K-83
30	2773	92.4	3930	3000K-83	2659	88.6	3000K-83

Data is based on 3000K-83 IES files available on website
Data is based on 50SOL optic.
All wattage and LPW includes 2W thermal protector

Electrical Data

	9W		12W		16W	
	System Watts	Amps	System Watts	Amps	System Watts	Amps
120V	9.8	0.08	11.9	0.10	15.2	0.13
277V	9.8	0.04	11.9	0.04	15.2	0.06
	23W		27W		30W	
	System Watts	Amps	System Watts	Amps	System Watts	Amps
120V	22.8	0.19	27.3	0.23	32	0.27
277V	22.8	0.08	27.3	0.10	32	0.12

Electronic constant current LED driver
Includes thermal protector, 2W power consumption

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

Square Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Housing/Frame Ordering Information

_____ . ____ . ____ . ____ . _____ . _____

1 2 3 4 5 6

1 Model

For New Construction

HDL-HP-S-NC-A17† (New Construction)
HDL-HP-S-CP-A17† (Chicago Plenum (CCEA) housing)
HDL-HP-S-IC-A17†† (Insulated Ceiling/air tight, 16W max)

For Existing Ceilings

HDL-HP-S-REM-A17† (Remodeler)

2 Style

T - trimmed
TL - trimless
MWK[R,ŦŦ] - millwork (for 1/2" - 11/16" ceiling thickness)

[R] Not available for use with Remodeler model
[Ŧ] For SLD Trim consult factory for use in ceilings thicker than 11/16"; For SLW Trim max ceiling thickness is 11/16"

3 Wattage

9
12
16*
23††
27††
30††

†† Not available for use with IC housing

4 Voltage

120
277
120/277 (for use with IC housing only)

5 Driver (for non-dimming, select LE/TE option)

LE/TE* - TRIAC/ELV dimming
HILUME-H-ECO - Lutron Hi-lume® H Series, EcoSystem, 1% dim with soft on, fade to black
0-10V* - 0-10V dimming, 1% dim
DALI - DALI dimming, 1% dim

6 Options/Accessories

EM - emergency battery pack with remote test switch (not available for use with REM, CP or IC options)
HB49 - hanger bars from min 29" to max 49" (not available for use with REM options)

Trim Ordering Information

_____ . ____ . ____ . ____ . _____ . _____

1 2 3 4 5 6

1 Model

HDL-HP-SLD-A17† (lensed downlight)
HDL-HP-SLW-A17† (lensed wall wash)

2 Style

T - trimmed
TL - trimless
MWK - millwork (SLW trim max 3/4" thick millwork)

3 Finish

Trimmed	Trimless/Millwork
MBW - matte black, white flange	**MB** - matte black
MWW - matte white, white flange	**MW** - matte white
SLVW - matte silver, white flange	**SLV** - matte silver
MBB - matte black, black flange	
SLVS - matte silver, silver flange	

4 Beam Spreads (not required with SLW version)

30SOL - 30° beam with solite lens
50SOL - 50° beam with solite lens
65SOL - 65° beam with solite lens
75SAT - 75° beam with satin ice lens

5 Color Temp

83 CRI	90+ CRI	
27 - 2700K-83	**229** - 2200K-90+	**CRISP‡** - CrispWhite
30 - 3000K-83	**279*** - 2700K-90+	**3CLA‡** - 3K Class A
35 - 3500K-83	**309*** - 3000K-90+	
40 - 4000K-83	**359** - 3500K-90+	
	409 - 4000K-90+	

‡ Not available for 27W & 30W

6 Options/Accessories

WET - wet location (only available for use with trimmed style)

* Title 24 Compliant

† The "A" refers to the sequential revision in a year and "XX" refers to the year of update. Updates coincide with improved performance while not changing the overall fixture aesthetic and are reflected in the published performance data. Please contact your Amerlux representative for explanations of changes.

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

Kugler Ning Lighting

Hornet® HP

Square Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Specifications

Application
Retail and commercial ambient or wall wash lighting

Construction
20 ga. galvanized steel frame
18 ga. galvanized steel splice housing and hanger brackets (not for Remodeler version)
Cast aluminum plaster frame with perforated face (for trimless version only)
Die-cast optical housing and trim
Die-cast heat sink

Optical
Lens Options (for SLD version):
Satin Ice lens for maximum source concealment and wide distribution with a visually "hotter" aperture.
Solite lens for maximum efficacy and a visually quieter aperture. 30º, 50º and 65º beam spread options. Visually best with SLV reflector finish.
Beam spreads (for SLD version):
30SOL - 30º beam with solite lens
50SOL - 50º beam with solite lens
65SOL - 65º beam with solite lens
75SAT - 75º beam with satin ice lens
Wall Wash:
Engineered nano technology lens provides high transmission while concealing LED image

LED
Color Temp Options:
2200K, 2700K, 3000K, 3500K, 4000K
CRI: 83 typ. (2700K, 3000K, 3500K, 4000K)
90+ typ. (2200K, 2700K, 3000K, 3500K, 4000K)
CrispWhite* and Class A** 3000K LEDs available
R9 Values: 11 (83 CRI), 55 (92 CRI)
Binning: 3 MacAdam (SDCM)
Life: 50,000+ hrs, > 70% of initial lumens at 50,000 hrs
**CrispWhite:* *CrispWhite Technology delivers the warmth of colors expected from a high 90 CRI solution but also creates the natural crisp white color that is pleasing to the eye. It creates the most impactful lighting ever available, by revealing the richest whites and vibrant colors that pop.*
***Class A LED:* *Class A LED's have a CRI > 80 and a GAI > 80. CRI defines color "Naturalness" and GAI defines color "Saturation." Both being high delivers rich colors and pure whites.*

Electrical
Wattage: 9, 12, 16, 23, 27, 30
Electronic constant current LED driver, 120/277VAC input
This product complies with IEEE C62.41 for surge endurance up to 2.5KV. Amerlux® recommends using additional surge protection with this unit (supplied by others), surge and over voltage damage is not covered under warranty.
***Note:** Drivers are universal but thermal protector is voltage specific*

Drivers
LE/TE - Leading Edge, TRIAC, forward phase/Trailing Edge, ELV, reverse phase
0-10V, Lutron and DALI systems available
See pages 10-12 for more dimming information

Finish
Powder coat paint/wet paint
Consult factory for custom finishes

Mounting
26" Hanger bars included (except for Remodeler versions)
Optional **HB49** - hanger bars from min 29" to max 49" available
Trimmed Fixture:
For use in grid or sheetrock ceilings, 5/8" - 2" max (1" max for SLW trims) standard
Trimless Fixture:
For use in sheetrock ceilings, max ceiling thickness 5/8"
Millwork Fixture:
Millwork extension collars are based on ceiling material specifications and thickness. Provides flush trim appearance level with ceiling material.
For **SLD** trim - ceiling thickness 1/2"- 11/16", consult factory for use in thicker ceilings.
For **SLW** trim - max ceiling thickness is 11/16".
Not available for use with Remodeler model

Certifications
CSA damp as tested to UL 1598 standards
CP - Chicago Plenum (CCEA) option
IC/AT rated (optional, 16W only)
Title 24 Compliant (see ordering page for options that apply)
Damp location
Wet location option

Warranty
5 year limited warranty

Emergency Battery Pack (EM)
Powers fixture at 5.1 watts (approx. 400 Lm) for 90 minutes (not for use with REM, CP or IC/AT versions)

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

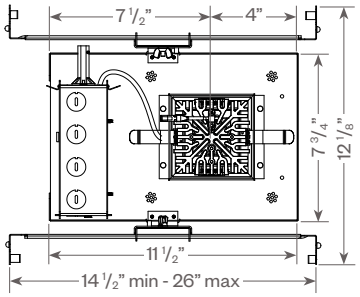
Kugler Ning Lighting

Hornet® HP

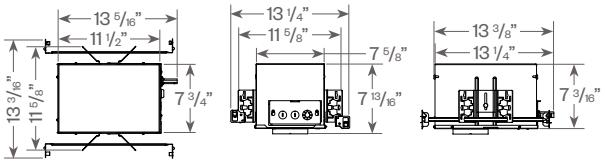
Square Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

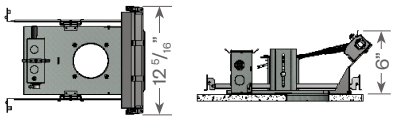
PROJECT: **TYPE:**



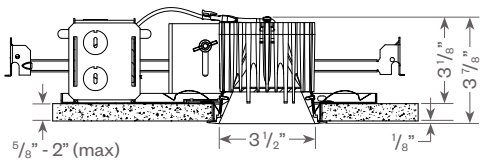
Optional CP or IC/AT housing

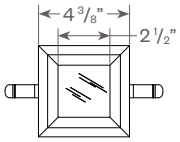


Emergency Battery Pack (EM) option



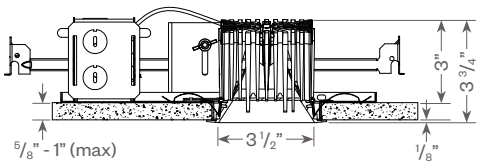
Hornet HP Square Lensed Downlight:

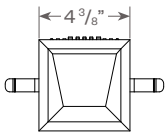




Ceiling cut out: 4" sq.

Hornet HP Square Lensed Wall Wash:





Ceiling cut out: 4" sq.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

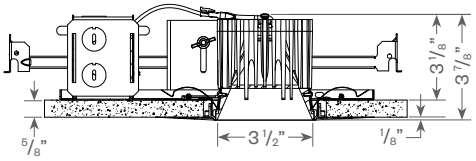
Square Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

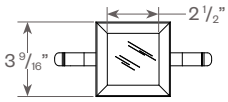
PROJECT: **TYPE:**

Hornet HP Square Lensed Downlight:

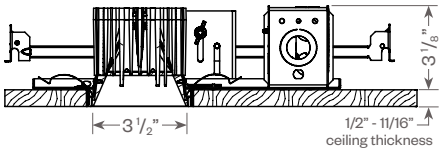
Trimless



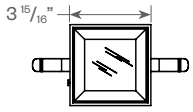
Trimless Ceiling cut out: 4 1/2" sq.



Millwork

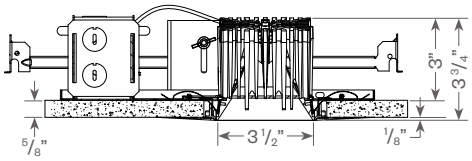


Millwork Ceiling cut out: 4" sq.

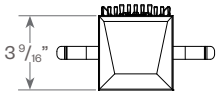


Hornet HP Square Lensed Wall Wash:

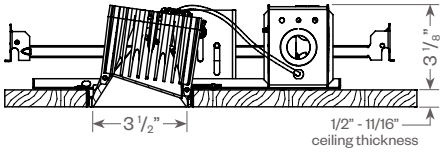
Trimless



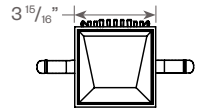
Trimless Ceiling cut out: 4 1/2" sq.



Millwork

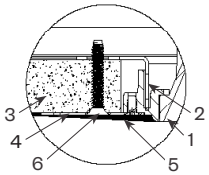


Millwork Ceiling cut out: 4" sq.



Plaster Frame Installation Detail (for trimless fixture only)

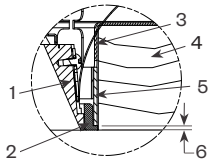
1. Reflector Trim
2. Aperture plate
3. Ceiling ⅝"
4. Cast Aluminum Plaster Frame
5. Plaster Skim Coat (by others)
6. 6-32 Type F Thread Cutting Screw



New Construction

Millwork Detail

1. Reflector Trim
2. Millwork Ring
3. Aperture Plate
4. Wood Ceiling 2" Max
5. Extension collar (see ordering information for ceiling thicknesses)
6. 1/16" required for trim to be flush with ceiling



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

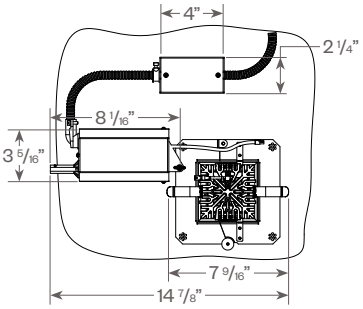
Hornet® HP

Square Lensed Downlight/Wall Wash

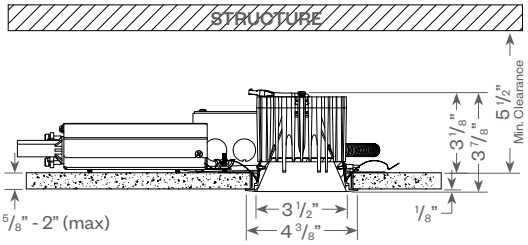
amerlux
A Delta Group Company

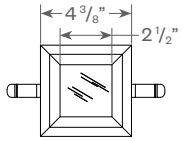
PROJECT: **TYPE:**

Remodeler:



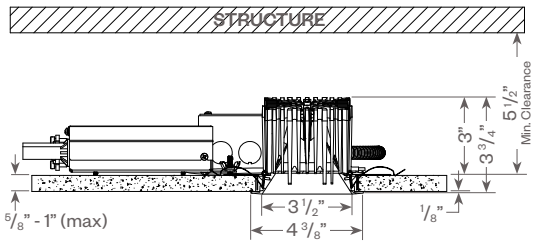
Hornet HP Square Lensed Downlight Remodeler:

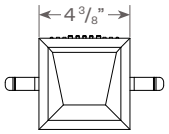




Ceiling cut out: 4" sq.

Hornet HP Square Lensed Wall Wash Remodeler:





Ceiling cut out: 4" sq.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

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UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

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Square Lensed Downlight/Wall Wash

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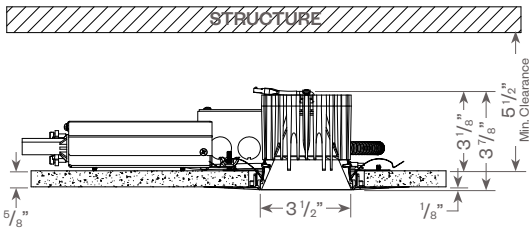
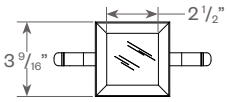
PROJECT: **TYPE:**

Hornet HP Square Lensed Downlight Remodeler:

Trimless

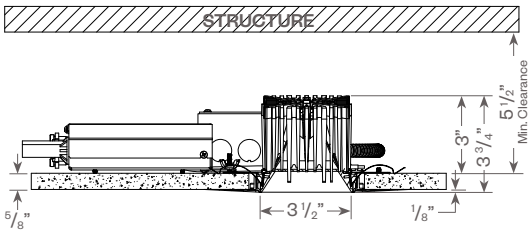


Trimless Ceiling cut out: 4 1/2" sq.

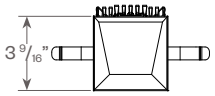


Hornet HP Square Lensed Wall Wash Remodeler:

Trimless

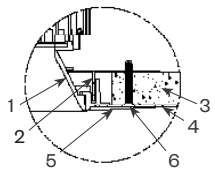


Trimless Ceiling cut out: 4 1/2" sq.



Plaster Frame Installation Detail (for trimless fixture only)

1. Reflector Trim
2. Aperture plate
3. Ceiling ⅝"
4. Cast Aluminum Plaster Frame
5. Plaster Skim Coat (by others)
6. 6-32 Type F Thread Cutting Screw



Remodeler

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

Kugler Ning Lighting

Hornet® HP

Square Lensed Downlight/Wall Wash

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PROJECT: **TYPE:**

Hornet HP Square Lensed Downlight:

FIXTURE DATA: (Complete photometric data (.ies format) available upon request)

MULTIPLYING FACTORS: (Multiplying Factor is based on 3000K-83 120V IES file on website)

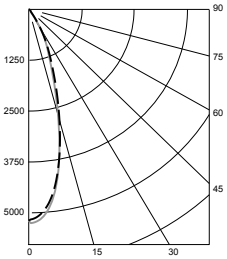
Wattage:	9W	12W	16W	23W	27W	30W
Factor:	0.39	0.52	0.69	1.0	1.2	1.3

CCT:	2700K-83	3000K-83	3500K-83	4000K-83
Factor:	0.96	1.0	1.02	1.04

CCT:	2200K-90+	2700K-90+	3000K-90+	3500K-90+	4000K-90+	CRISP	3CLA
Factor:	0.66	0.83	0.86	0.90	0.93	0.65	0.70

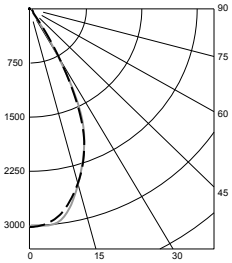
23W LED, 3000K-83

30° Solite Lens
LTL # 13408034.06
Lumens: 2080 lm; 92.1 lm/W



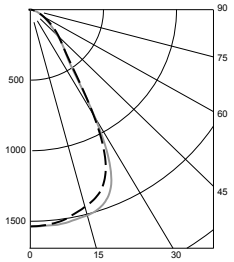
Candelas at Nadir	
Deg	Candela
0	5191
5	4959
15	2524
25	955
35	141
45	58

50° Solite Lens
LTL # 13408034.07
Lumens: 2133 lm; 94.5 lm/W



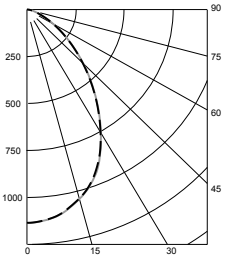
Candelas at Nadir	
Deg	Candela
0	3023
5	3010
15	2495
25	1604
35	180
45	66

65° Solite Lens
LTL # 13408034.08
Lumens: 2073 lm; 91.9 lm/W



Candelas at Nadir	
Deg	Candela
0	1537
5	1535
15	1509
25	1305
35	479
45	267

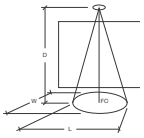
75° Satin Ice Lens
LTL # 13408034.09
Lumens: 1925 lm; 85.9 lm/W



Candelas at Nadir	
Deg	Candela
0	1135
5	1125
15	1043
25	880
35	636
45	410

Application Data:

Notes and Definitions:
Beam spread is to 50% center beam candlepower (CBCP).
D=Distance to floor or wall.
FC=Footcandles on floor or wall at center beam aiming location.
L=Effective Visual Beam length in feet (50% of maximum footcandle level).
W=Effective Visual Beam width in feet (50% of maximum footcandle level).
CB=Distance across or down to center beam location.



30° Solite Lens
0° Aiming Angle Horizontal Footcandles

D	FC	L	W
5.0'	208	2.6	2.6
7.5'	93	3.7	3.8
10.0'	52	5.0	5.2
12.5'	34	6.3	6.4

50° Solite Lens
0° Aiming Angle Horizontal Footcandles

D	FC	L	W
5.0'	122	4.1	4.1
7.5'	54	6.1	6.1
10.0'	31	8.2	8.2
12.5'	20	10.3	10.2

65° Solite Lens
0° Aiming Angle Horizontal Footcandles

D	FC	L	W
5.0'	62	5.2	5.1
7.5'	28	7.9	7.7
10.0'	16	10.6	10.4
12.5'	10	13.4	13.2

75° Satin Ice Lens
0° Aiming Angle Horizontal Footcandles

D	FC	L	W
5.0'	44	5.5	5.5
7.5'	20	8.1	8.1
10.0'	12	10.9	10.9
12.5'	8	14.1	14.0

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

Square Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Hornet HP Square Lensed Wall Wash:

FIXTURE DATA: (Complete photometric data (.ies format) available upon request)

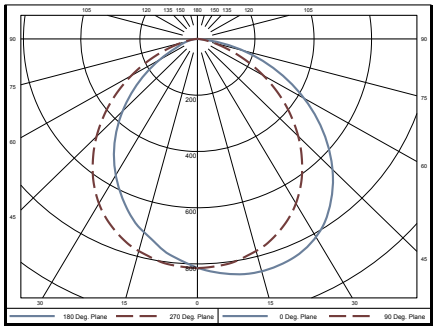
MULTIPLYING FACTORS: (Multiplying Factor is based on 3000K-83 120V IES file on website)

Wattage:	9W	12W	16W	23W	27W	30W
Factor:	0.39	0.52	0.69	1.0	1.2	1.3

CCT:	2700K-83	3000K-83	3500K-83	4000K-83
Factor:	0.96	1.0	1.02	1.04

CCT:	2200K-90+	2700K-90+	3000K-90+	3500K-90+	4000K-90+	CRISP	3CLA
Factor:	0.66	0.83	0.86	0.90	0.93	0.65	0.70

23W 3000K-83 **Wall Wash**
LTL # 13408034.10
Lumens: 2045 lm



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1029	50.3
0-60	1739	85.0
0-90	2045	100.0
90-180	0	0.0

Luminaire Efficacy: 90.6 Lm/W

Application Data: **Footcandles on Wall**

Footcandles are average and rounded off. Data for multiple units are based on a minimum of five units.

1.5 Feet from Wall

Distance from ceiling	1.5′			1.5′		
0.5′	105	109	110	109	105	
1.5′	170	180	183	180	170	
2.5′	116	127	130	127	117	
3.5′	69	76	78	76	70	
4.5′	42	45	48	47	43	
5.5′	29	31	32	31	29	
6.5′	21	22	23	22	21	
7.5′	16	17	17	17	16	

1.5 Feet from Wall

Distance from ceiling	2′			2′			
0.5′	78	87	79	88	77	87	77
1.5′	131	141	137	143	136	142	130
2.5′	92	99	101	103	101	99	93
3.5′	55	61	63	64	63	61	57
4.5′	35	38	40	41	41	39	36
5.5′	24	27	28	28	28	27	25
6.5′	18	20	20	21	21	20	19
7.5′	14	15	16	16	16	16	15

2 Feet from Wall

Distance from ceiling	2′			2′			
0.5′	44	50	48	51	49	50	46
1.5′	96	104	104	107	105	105	97
2.5′	88	95	98	99	98	96	88
3.5′	61	66	69	70	69	67	61
4.5′	41	45	47	48	47	45	41
5.5′	29	32	33	34	33	32	29
6.5′	22	23	25	25	25	23	22
7.5′	17	18	19	19	19	18	17

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

Square Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

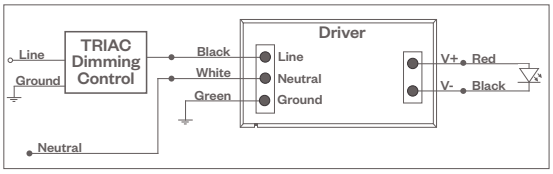
DIMMING COMPATIBILITY:
Amerlux® Hornet fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

TRIAC (Forward Phase) DIMMING (Standard)
Utilizes standard TRIAC dimmers that are in wide use in installations across the US. Best for retrofit applications where TRIAC dimmers are installed.

Notes:
- 120VAC or 277VAC*
- Dims down to 5% light output (most cases)
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!
- Must meet dimmer Minimum Load Requirements per dimming manufacturer

TRIAC Wiring Diagram



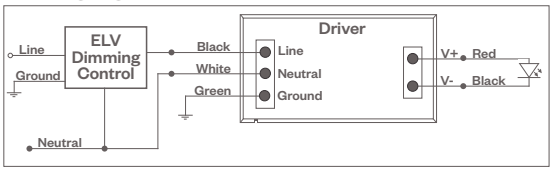
Compatible Dimmers†:

Wall Box (TRIAC 120VAC)	**Central System**
Lutron "Diva"	Lutron "GP" Panel
Lutron "Nova-T"	Lutron Grafik Eye QS
Lutron "Maestro"	
Lutron "Vareo"	
Lutron "Skylark"	

ELV - Electronic Low Voltage (Reverse Phase) DIMMING (Standard)
Utilizes specialized "ELV" dimmers.

Notes:
- 120VAC or 277VAC*
- Dims down to 5% light output (most cases)
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!
- Must meet dimmer Minimum Load Requirements

ELV Wiring Diagram



Compatible Dimmers†:

Wall Box (ELV 120VAC)	**Wall Box** (ELV 277VAC)	**Central System**
Lutron "Diva"	Leviton Revoir II AWSMT-E	Lutron "GP" Panel with PHPM-PA 120/277VAC
Lutron "Nova-T"		Lutron Grafik Eye QS with PHPM-PA 120/277VAC
Lutron "Maestro"		
Lutron "Vareo"		
Lutron "Skylark"		
Leviton "Surslide"		
Leviton "Vizio"		

Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer manufacturer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

Square Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

DIMMING COMPATIBILITY:
Amerlux® Hornet fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

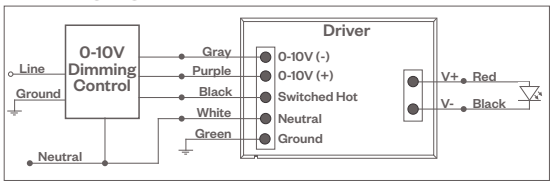
--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

0-10V DIMMING

Integrates into a variety of building management and daylighting controls

Notes:
- 120VAC or 277VAC*
- Dims down to 1% light output
- Requires interface to turn off power to driver
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

0-10V Wiring Diagram



Compatible Dimmers†:

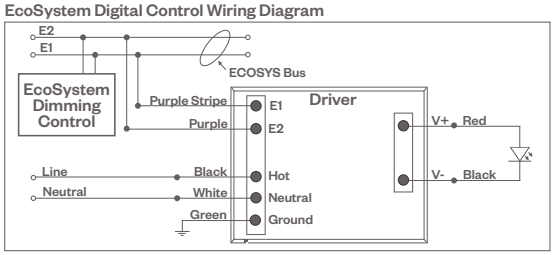
Wall Box		Central System
Lutron "Diva" - DVTV with PP-120H Interface	Leviton Renoir II 0-10V	Lutron Grafik Eye with GRX-TVI Interface

LUTRON H-SERIES / ECOSYSTEM DIMMING

Integrates into Lutron EcoSystem building management

Notes:
- 120VAC or 277VAC*
- Dims down to 1% light output
- EcoSystem Control
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

HILUME-H-ECO, HILUME-5-ECO
EcoSystem Digital Control Wiring Diagram



Compatible Dimmers†:

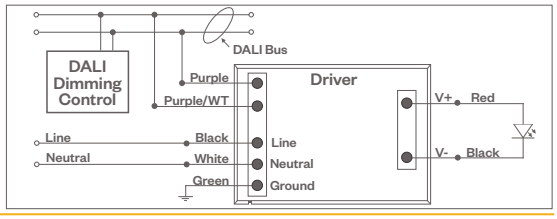
Lutron ECO System	Central System
Pow Pak Dimming Modules	Lutron EcoSystem compatible controls
Energi Savr Node	
Grafik Eye QS/Homeworks	
QS Control Unit	
Quantum Hub	
Homeworks QS/My Room	

DALI DIMMING

Digital control protocol allows individual fixture control

Notes:
- 120VAC - 277VAC*
- Dims down to 1% light output in most cases

DALI Wiring Diagram



Compatible Dimmers†:

Wall Box (3-Wire Fluorescent)	Central System
Leviton CD250 Controller	Dynalite
	Fifth Light

Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer manufacturer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Hornet® HP

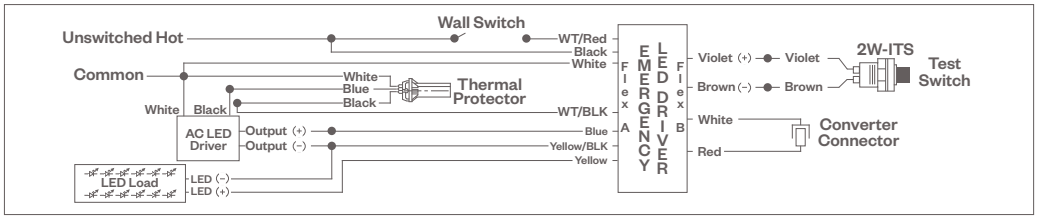
Square Lensed Downlight/Wall Wash

amerlux
A Delta Group Company

PROJECT: **TYPE:**

EMERGENCY DIMMING (-EM OPTION)

Wiring Diagram



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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KE

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

APOGEE LIGHTING

Project Name _____
Fixture Type _____

LightScape®

ARCHITECTURAL

Dim To Dark

Flicker Free

UGR>15

Patented Acoustic Dampening

Patented Ceiling Grid Mounting System

Human Centric Tunable Fixtures

High Efficiency

AVAILABLE SHAPES

CIRCLE OVAL SQUARE RECTANGLE TRIANGLE

Features

HOUSING
- Die- formed pure aluminum sheet
- Exotic clad metal housing available - consult factory

FINISH
- Powder coat white standard
- RAL color options available

REMOTE DRIVER SYSTEM

- **Standard 0-10V:** 120-277VAC, 0-10V Dims to Dark (1%), Class II/B, THD < 10%, PF > 0.95. Programmable in 1mA increments up to 96W.
- **Analog Tunable White:** 120-277VAC, Dual 0-10V channels for both intensity and color (CCT) tunning. Class II/B, THD < 10%, PF > 0.95. Programmable in 1mA increments up to 50W.
- **DALI:** 120-277VAC, Dims to Dark (1%), Class II/B, THD < 10%, PF > 0.95. Programmable in 1mA increments up to 96W.
- **DMX:** 120-277VAC, Dims over DMX, Class II/B, THD < 10%, PF > 0.95. Programmable in 25mA increments up to 96W. Up to 4 Channel DMX.

OPTICS
Aluminum frame with polyvinyl diffusing membrane with integrated optic modules.

REFLECTOR
97% reflective white finish, die-formed aluminum

OPTIONS
- 90-Minute Emergency battery pack with test switch
- Acoustic dampening tiles

SOURCE
- Custom binned 2 SDCM color binning for ultra consistent, uniform distribution
- Available in 2700k,3000k, 3500k, 4000k, 5000k, + Dynamic White 2700-6000k
- Dynamic white standard control over 0-10V wires.
- DMX options available - consult factory

CERTIFICATIONS
- IBEW (local 3) Union-Made in the USA
- UL Listed, Damp Location.
- Wet location options available - consult factory.

MOUNTING OPTIONS
- Surface
- Gypsum mud-in
- Gyp Flange
- Pendant
- 9/16" T grid
- 9/16" Tegular

OUTPUT
- Low Output - 2W/170LM/SF
- Standard - 4W/340LM/SF
- High Output - 6W/510LM/SF
- Ultra - 8.4W/700LM/SF
- Higher outputs available. Consult Factory.

US PATENT No: 10,077,877

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KF

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

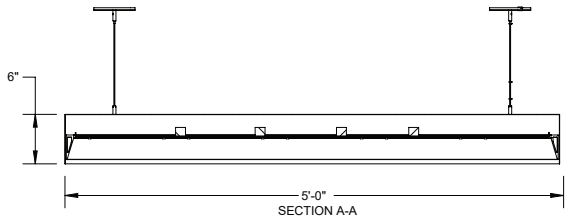
APOGEE LIGHTING

Project Name _____
Fixture Type _____

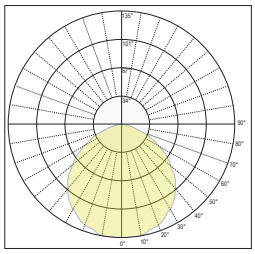
LightScape®

ARCHITECTURAL

Drawings



Photometrics



ORDERING INFORMATION FOR TRIANGLE

SERIES	SHAPE	CRI	COLOR	OUTPUT	SIZE	CONTROL	MOUNTING	FINISH	OPTIONS
LCS - Lightscape	T - Triangle	8 - 80	27 - 2700k	S - standard	20 - 2'x2'X2'	STD - Standard 0-10V	SRF - Surface	W - White standard	EM - 90-Minute Emergency battery pack with test switch
	S - Square	9 - 90	30 - 3000k	L - Low	T25 - 2.5'x2.5'x2.5'	LE - Lutron Ecosystem	G - Gypsum mud-in	CS - RAL paint match	ADT - Acoustic Dampening Tiles
	R - Rectangle		35 - 3500k	H - High	T30 - 3'x3'x3'	D - DALI dimming	FL - Gyp flange	(Consult Factory)	
	O - Oval		40 - 4000k	U - Ultra		DMX - DMX	P - Pendant		
	C - Circle		50 - 5000k			AT - Analog Tunable Dual 0-10V	GRD - 9/16" T grid		
			DW - Dynamic White				TEG - 9/16" Tegular		
			RGBW - RGB+W Note W = 4000k unless other specified						

Sample Number: LSC-T-9-35-S-T30-STD-SRF-W-EM

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KF

UHNJ - EMERGENCY DEPARTMENT EXPANSION

APOGEE LIGHTING

Project Name _____
Fixture Type _____

LightScape®

ARCHITECTURAL

ORDERING INFORMATION FOR SQUARE

SERIES	SHAPE	CRI	COLOR	OUTPUT	SIZE	CONTROL	MOUNTING	FINISH	OPTIONS
LCS - Lightscape	T - Triangle	8 - 80	27 - 2700k	S - standard	S22 - 2'x2'	STD - Standard 0-10V	SRF - Surface	W - White standard	EM - 90-Minute Emergency battery pack with test switch
	S - Square	9 - 90	30 - 3000k	L - Low	S33 - 3'x3'	LE - Lutron Ecosystem	G - Gypsum mud-in	CS - RAL paint match	ADT - Acoustic Dampening Tiles
	R - Rectangle		35 - 3500k	H - High	S44 - 4'x4'	D - DALI dimming	FL - Gyp flange	(Consult Factory)	
	O - Oval		40 - 4000k	U - Ultra	S55 - 5'x5'	DMX - DMX	P - Pendant		
	C - Circle		50 - 5000k			AT - Analog Tunable Dual 0-10V	GRD - 9/16" T grid		
			DW - Dynamic White				TEG - 9/16" Tegular		
			RGBW - RGB+W Note W = 4000k unless other specified						

Sample Number: LSC-S-9-27-H-S33-LU-TEG-W-ADT

ORDERING INFORMATION FOR RECTANGLE

SERIES	SHAPE	CRI	COLOR	OUTPUT	SIZE	CONTROL	MOUNTING	FINISH	OPTIONS
LCS - Lightscape	T - Triangle	8 - 80	27 - 2700k	S - standard	R1x -1'X1-9'	STD - Standard 0-10V	SRF - Surface	W - White standard	EM - 90-Minute Emergency battery pack with test switch
	S - Square	9 - 90	30 - 3000k	L - Low	R2x - 2'X1-9'	LE - Lutron Ecosystem	G - Gypsum mud-in	CS - RAL paint match	ADT - Acoustic Dampening Tiles
	R - Rectangle		35 - 3500k	H - High	R3x - 3'X1-9'	D - DALI dimming	FL - Gyp flange	(Consult Factory)	
	O - Oval		40 - 4000k	U - Ultra	R4x - 4'X1-9'	DMX - DMX	P - Pendant		
	C - Circle		50 - 5000k		* Length can vary 1'-9' with torsion spring service system.	AT - Analog Tunable Dual 0-10V	GRD - 9/16" T grid		
			DW - Dynamic White		Replace x with desirable length in FT		TEG - 9/16" Tegular		
			RGBW - RGB+W Note W = 4000k unless other specified						

Sample Number: LSC-R-9-50-H-R27-STD-P-W-EM

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KF

APOGEE LIGHTING

Project Name _____
Fixture Type _____

LightScape®

ARCHITECTURAL

ORDERING INFORMATION FOR OVAL

SERIES	SHAPE	CRI	COLOR	OUTPUT	SIZE	CONTROL	MOUNTING	FINISH	OPTIONS
LCS - Lightscape	T - Triangle	8 - 80	27 - 2700k	S - standard	O24 - 2'x4'	STD - Standard 0-10V	SRF - Surface	W - White standard	EM - 90-Minute Emergency battery pack with test switch
	S - Square	9 - 90	30 - 3000k	L - Low	O36 - 3'x6'	LE - Lutron Ecosystem	G - Gypsum mud-in	CS - RAL paint match	ADT - Acoustic Dampening Tiles
	R - Rectangle		35 - 3500k	H - High		D - DALI dimming	FL - Gyp flange	(Consult Factory)	
	O - Oval		40 - 4000k	U - Ultra		DMX - DMX	P - Pendant		
	C - Circle		50 - 5000k			AT - Analog Tunable Dual 0-10V	GRD - 9/16" T grid		
			DW - Dynamic White				TEG - 9/16" Tegular		
			RGBW - RGB+W Note W = 4000k unless other specified						

Sample Number: LSC-O-8-35-U-O36-LU-G-W-EM

ORDERING INFORMATION FOR CIRCLE

SERIES	SHAPE	CRI	COLOR	OUTPUT	SIZE	CONTROL	MOUNTING	FINISH	OPTIONS
LCS - Lightscape	T - Triangle	8 - 80	27 - 2700k	S - standard	C2 - 2' diameter	STD - Standard 0-10V	SRF - Surface	W - White standard	EM - 90-Minute Emergency battery pack with test switch
	S - Square	9 - 90	30 - 3000k	L - Low	C3 - 3' diameter	LE - Lutron Ecosystem	G - Gypsum mud-in	CS - RAL paint match	ADT - Acoustic Dampening Tiles
	R - Rectangle		35 - 3500k	H - High	C4 - 4' diameter	D - DALI dimming	FL - Gyp flange	(Consult Factory)	
	O - Oval		40 - 4000k	U - Ultra	C5 - 5' diameter	DMX - DMX	P - Pendant		
	C - Circle		50 - 5000k			AT - Analog Tunable Dual 0-10V	GRD - 9/16" T grid		
			DW - Dynamic White				TEG - 9/16" Tegular		
			RGBW - RGB+W Note W = 4000k unless other specified						

Sample Number: LSC-C-8-DW-H-C4-LE-FL-W-EM

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KF

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

Features

Prized for classic good looks, performance and flexibility, Grüv has taken a turn for the edgy. This Bauhaus-influenced family of linear LEDs has just expanded–by getting smaller. The Grüv 1.5" LED can climb walls, cross ceilings, literally go everywhere your design wants it to be. Get into Grüv. Perfect linear design, every time.

Product Overview

Type:	Recessed Direct Lens, Asymmetric, Grazer & Straight Blade Louver	
Wattage:	5W/ft, 10W/ft (other wattages availavle see p2)	
Color Temp:	2700K, 3000K, 3500K, 4000K; Tunable White (2700K-5700K)	
CRI:	83 or 90+ typ. (2700K, 3000K, 3500K, 4000K) 90+ (Tunable White)	
Dimming (wired):	Static White 0-10V, 1% dimming (standard) Lutron Hi-lume® EcoSystem, 1% dim, fade to off DALI dimming, 1% dim	Tunable White 0-10V TW, 1% dimming DALI DT8, 1% digital dimming Lutron T Series 1% dimming
Dimming (wireless):	Enlighted Sensor Lutron Athena (integral wireless RF node)	Enlighted Sensor TW Lutron Athena TW (integral wireless RF node)

**International version available, see website for spec sheet.*

PROJECT: **TYPE:**

Fixture Summary *(see following pages for more information)*

Ceiling Types

4" Tech Zone	6" Tech Zone	9/16"	15/16"	Gyp Board
Yes (FR only)	No	Yes	Yes (FLG-GRID only)	Yes

Millwork	Perimeter J-Mold
Yes	Yes

Performance Chart (4' Fixture)

Nominal Wattage/Foot	Delivered Lumens	LPW	Color Temp-CRI
5	1920	105.2	3500K-83
10	3691	101.1	3500K-83

Data is based on 3500K-83 IES files available on website
Data is baded on 4' fixture with Performance lens

Electrical Data

		4'		8'	
Wattage Per Foot		System Watts	Amps	System Watts	Amps
5	120V	18.2	0.15	36.5	0.30
	277V	18.2	0.07	36.5	0.13
10	120V	36.5	0.30	73.0	0.61
	277V	36.5	0.13	73.0	0.26

Electronic multi-volt (120-277VAC), constant current LED driver

Standard Patterns

"L"	"⌐"	"U"	"□"	"⌐¬"	Wall to Ceiling	Custom*
Yes	Yes	Yes	Yes	Yes	Yes	Yes

** Submit drawing, consult factory*

5 year limited warranty

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 1.5"

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Ordering Information

1	2	3	4	5	6	7	8	9	10
				HW	120/277				

1 Model
GRUV1.5-FLG-A16† - exposed flange
GRUV1.5-FLG-GRID-A16† - exposed flange, grid mount
GRUV1.5-FR-GRID-A16† - regressed lens grid
GRUV1.5-GB-A16† - gyp board trimless mud-in
GRUV1.5-GRID-A16† - grid mount
GRUV1.5-IS-A16† - independently suspended, millwork
GRUV1.5-J/GB-A16† - j-mold/gyp board trimless
GRUV1.5-J/GRID-A16† - j-mold/grid
GRUV1.5-J/IS-A16† - j-mold/independently suspended

2 Optics
PL - performance lens (standard)
SLDW - straight blade louver (wh) solid blades w/overlay
SLDB - straight blade louver (blk) solid blades w/overlay
SLDS - straight blade louver (slv) solid blades w/overlay
ASY - asymmetric lens (not for FR version)
GRZ - grazer lens (suggest cove installation, see page 7)
DRP1 - 1" drop lens

3 Wattage (per foot)
Standard:
5 - 5W/ft
10 - 10W/ft
Optional:
3 - 3W/ft (4' minimum length required)
4 - 4W/ft (4' minimum length required), DLC listed *(see additional notes below)*
6 - 6W/ft
7 - 7W/ft
8 - 8W/ft
9 - 9W/ft

4 Color Temp-CRI

Static White:

27 - 2700K-83	**279** - 2700K-90+	
30 - 3000K-83	**309** - 3000K-90+	
35 - 3500K-83	**359** - 3500K-90+	
40 - 4000K-83	**409** - 4000K-90+	

Tunable White:
TW9-2757 - tunable white, 90 CRI (2700K-5700K)

5 Finish
HW - high reflectance matte white

6 Voltage
120/277

7 Length

(Length A)	(Length B)	Length C)
Length A (used for) - all patterns - IND/IND-S+ - CON/CON-S+ - CUS	Length B (used for) - all patterns - PR - 2 lengths of 2	Length C (used for) - PU - PZ

8 Configuration
IND[1] - individual fixture, 2' to 8' in 1' increments
IND-S+ - individual with standard plus (see pg8, for GRID or J/GRID only)
CON - continuous run > than 8', specify to nearest foot
CON-S+ - continuous run with standard plus (see pg8, for GRID or J/GRID only)
CUS - custom made to measure, +/- 1/8" of customer supplied field dimensions
Standard Patterns *(see page 8 for details)*:
PLL - L left, (2) straights + (1) 90° corner, leg right
PLR - L right, (2) straights + (1) 90° corner, leg left
PU - U shape, (3) straight lengths + (2) 90° corners
PR - Rectangle, (4) straight lengths + (4) 90° corners
PZ - Z shape, (3) straight lengths + (2) 90° corners
PWC - wall to ceiling (1) 90° Corner joining 2 segments
Custom Patterns:
PC - please provide drawings and consult factory

9 Drivers/Controls
Wired - Static White:
0-10V - 1% analogue dimming, 120-277VAC, Dim to off when selected with wireless dimming control
HILUME-H-ECO - Lutron "H" Series, 1% dim, fade to off, EcoSystem
DALI - DALI Dimming 120-277VAC, 1% dim
Wired - Tunable White:
0-10V TW - 1% dimming , multi-volt (120V-277V) constant current
DALI DT8 - 1% digital dimming, CCT control per DALI DT8, (120V-277V) constant current
Lutron T - Lutron T Series, digital link 1% dimming, (120V-277V)
Wireless - Static White:
ENLS-SR - Enlighted sensor, energy metering (not available w/Gruv 1.5 FR)
ENLS-010 - Enlighted sensor with controller unit (not available w/Gruv 1.5 FR)
AWNR-WH-SR - Lutron Athena wireless node, RF only, white
AWNR-BL-SR - Lutron Athena wireless node, RF only, black
AWNR-WH-010 - Lutron Athena wireless node, RF only, white
AWNR-BL-010 - Lutron Athena wireless node, RF only, black
Wireless - Tunable White:
ENLS-SR-TW - Enlighted sensor, energy metering (not available w/Gruv 1.5 FR)
AWNR-WH-SR-TW - Lutron Athena wireless node, RF only, white
AWNR-BL-SR-TW - Lutron Athena wireless node, RF only, black

10 Options/Accessories
CP - Chicago Plenum (CCEA)
WHIP - 6' whip, 18/5 conductor
EMC-PF[2] - emergency circuit requires power feed located in last fixture section (for other locations consult factory)
PF[2] - Extra power feed for additional circuiting
EMB - emergency battery pack (not available for lengths under 4')

DLC listed (4W fixture in 4', 5', 6', 7', 8' and runs to the neares whole foot)
1 - Lengths less than 4' may have restrictions based upon wattage, lengths, drivers or other options.
2 - Not available with IND (individual) configuration.
† The "A" refers to the sequential revision in a year and "XX" refers to the year of update. Updates coincide with improved performance while not changing the overall fixture aesthetic and are reflected in the published performance data. Please contact your Amerlux representative for explanations of changes.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

Specifications

Application
Commercial and retail recessed ambient lighting can be customized with made to measure lengths, patterns, ceilings or wall mounted fixtures.

Construction
One piece extruded aluminum housing and trim. Die-formed, cold-rolled steel internal components and external mounting brackets. Numerous configurations accommodate most architectural ceiling conditions.

Optical
All lenses are snap-in, extruded acrylic, with a maximum length of 8'. Fixtures shipped with lenses installed. Amerlux's proprietary acrylic lens provides excellent transmission while effectively concealing source image. All louvers are retained with spring clips attached to louver side rails, for good fit and retention.
PL - Performance Lens provides high efficiency with greater lens surface brightness.
SLD - Straight blade Louver Direct has ½" high blades ½" on center with overlay.
ASY - Asymmetric 20° throw lens is backed high diffusion film that eliminates striations.
GRZ - Grazer lens for highlighting wall surfaces. Suggest cove installation. No overlay is used to enhance grazing performance. (see page 7)
DRP1 - 1" Drop lens with illuminated end caps

LED
Amerlux's boards and patented connector design with brand name LEDs enables Amerlux fixtures to have excellent thermal management and offer a 5 year warranty. Our LED binning is within 3 MacAdam ellipse. Boards are configured for maximum flexibility resulting in even illumination no matter the fixture layout. LED boards are easily replaced in the field with just a Phillips screw driver.

	Static White	Tunable White
CCT:	2700K, 3000K, 3500K, 4000K	2700K-5700K
CRI:	83 or 90+ typical	90+ (92 typ)
R9:	16 @ CRI 83; >50 @ CRI 90+	>50

Life: 50,000+ hr., > 70% of initial lumens (L70)

Electrical
Wiring: Supply wires are easily accessible through access plate on top of fixture.
WHIP: Optional factory installed 6' Greenfield whip (18/5 conductor) simplifies installation.
Standard Wattage: 5W/ft, 10W/ft.
Optional Wattages: 3W/ft, 4W/ft, 6W/ft, 7W/ft, 8W/ft, 9W/ft. (3W & 4W have a minimum length of 4'). For other wattages consult factory.
Emergency circuit via remote inverter or auxiliary emergency power supply (by others).
This product complies with IEEE C62.41 for surge endurance up to 2.5KV. Amerlux® recommends using additional surge protection with this unit (supplied by others), surge damage is not covered under warranty.
EMC-PF - Emergency circuit requires power feed wire harness to be located in last fixture section for continuous runs. For other locations consult factory. Not available for individual (IND) configuration.
PF - Extra power feed wire harness for additional circuiting. Not available for individual (IND) configuration.

Finish
HW - High reflectance, matte white powder coat paint. Baked on finish for maximum durability and color stability.

Configurations/Lengths
IND - Individual fixtures are made of single standard lengths of 2 ft to 8 ft (in 1' increments). These are stand alone fixtures with matching End Caps, supplied with the mounting hardware. Lengths less than 4' may have restrictions based upon wattage, lengths, drivers or other options.
CON - Continuous runs, > 8', specified to nearest whole foot length in 1' increments. Runs made from standard lengths have End Caps at the beginning and end of run. Runs > 60' may require second power feed. Each housing has factory installed alignment pins. Mating fixtures are easily aligned and joined with "catch and latch" mechanisms out of sight, on top of the Housing. Wiring is made fast and positive with molded quick connectors.
S+ - Standard Plus is a field cuttable filler bracket that can be used when an Individual fixture or a Continuous run isn't to the nearest foot (+3/4" to 6" max per end). *See page 8 for details.*
CUS - Custom made to measure runs are made to nearest 1/8"of customer supplied field measurements or drawings. Custom lengths use the same hardware for hairline joining.
PXX - Standard Patterns consist of 90° corners with standard lengths (4' to 8' in 1' increments), continuous runs or made to measure lengths. Depending upon complexity of the pattern drawings may be required from the customer. If ordering please give overall lengths.
A'-B'-PLL - L Left - (1) 90° Corner 2 segments. Specify overall segments: A' & B'
A'-B'-PLR - L Right - (1) 90° Corner 2 segments. Specify overall segments: A' & B'
A'-B'-PR - Rectangle - (4) 90° Corners joining 4 segments. Specify overall segments: A' & B'
A'-B'-C'-PU - U shape - (2) 90° Corners joining 3 segments. Specify overall segments: A', B', & C'
A'-B'-C'-PZ - Z shape - (2) 90° Corners joining 3 segments. Specify overall segments: A', B', & C'
A'-B'-PWC - Wall to Ceiling - 90° joining bracket. Specify overall segments: A' & B'
See page 8 for layouts.
PC - Custom Patterns may use standard lengths, Made To Measure, 90° or other corners (some limitations). Please provide drawing and consult factory.
Please note: Corners have lit mitered Lens.

Mounting
Intended for use in gypsum board, 9/16" Tee grid and Screw Slot, and millwork ceilings. Wall mounting J-Molding details available. For individual, continuous row, or pattern applications.
***Please note* - fixtures to be installed before gypsum board ceiling.**
GRUV1.5-FLG-A16 - exposed flange, fixture into gyp board ceiling
GRUV1.5-FLG-GRID-A16 - exposed flange grid mount, fixture into 9/16" Tee ceiling
GRUV1.5-FR-GRID-A16 - regressed lens grid, in 9/16" Screw Slot or Flat Tee ceilings (compatible with 4" TechZone™ & other 4" wide architectural ceiling systems)
GRUV1.5-GB-A16 - gyp trimless mud, fixture plastered into gypsum board ceiling
GRUV1.5-GRID-A16 - grid mount, in 9/16" Screw Slot or Flat Tee ceilings
GRUV1.5-IS-A16 -independently suspended, fixture in wood ceiling
GRUV1.5-J/GB-A16 - J mold/gyp trimless, plastered in ceiling - J Channel wall side
GRUV1.5-J/GRID-A16 - J mold/grid, in 9/16" Screw Slot or Flat Tee ceilings - J Channel wall side
GRUV1.5-J-IS-A16 - J mold/independently suspended in ceiling - J Channel wall side

Options
EMB - Emergency battery pack - 10W output power, 90 min of illumination time, up to 1300 lm of initial light output. Illuminated test-switch/charging indicator light is provided. Wattage consumption by EM: 2.5W/ft (4ft fixture), 1.66W/ft (6ft fixture), 1.25W/ft (8ft fixture). Request can be made to light up 4ft section on 8ft unit.

Certifications
Approved to UL standards for damp locations as tested by CSA.
Intended for indoor use only
Chicago Plenum (CCEA) optional.
IC rated

Warranty
Amerlux's 5 year limited warranty. Please consult Amerlux website for details.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

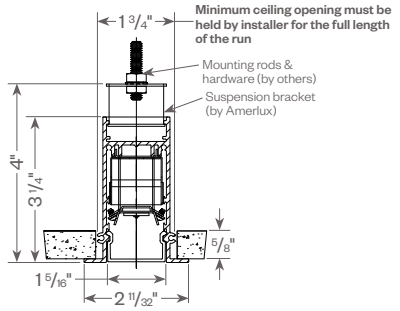
Grüv® 1.5”

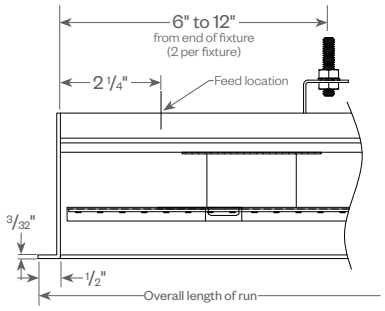
Recessed Linear LED

amerlux
A Delta Group Company

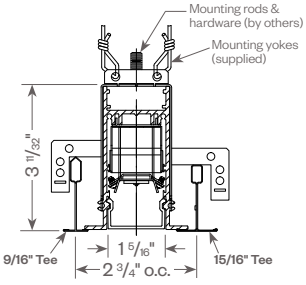
PROJECT: **TYPE:**

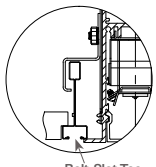
GRÜV1.5-FLG (exposed flange)

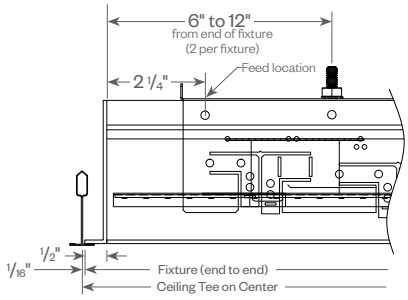




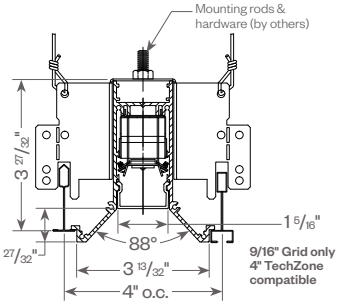
GRÜV1.5-FLG-GRID (flange, grid mount)

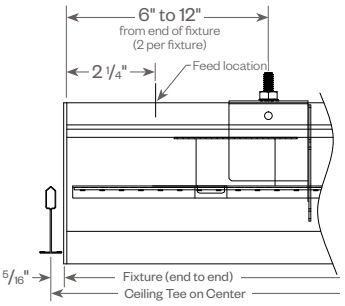






GRÜV1.5-FR-GRID (regressed lens, grid)





SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

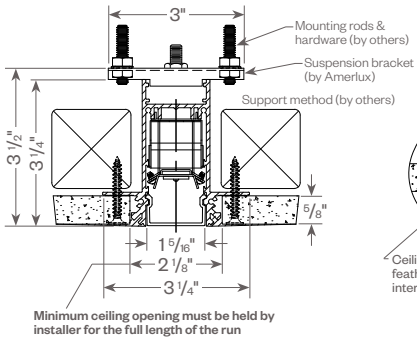
Grüv® 1.5”

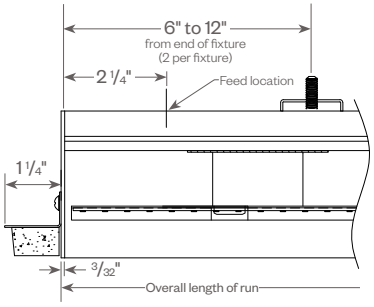
Recessed Linear LED

amerlux
A Delta Group Company

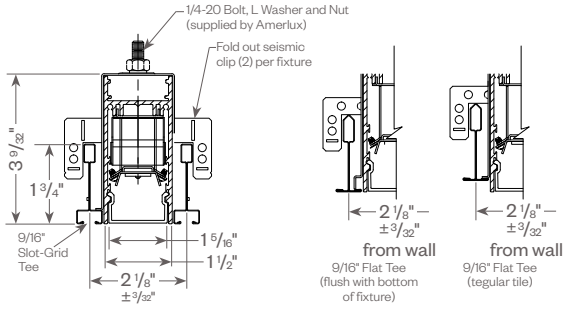
PROJECT: **TYPE:**

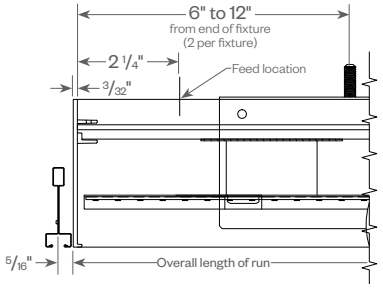
GRÜV1.5-GB (gyp board trimless mud-in)



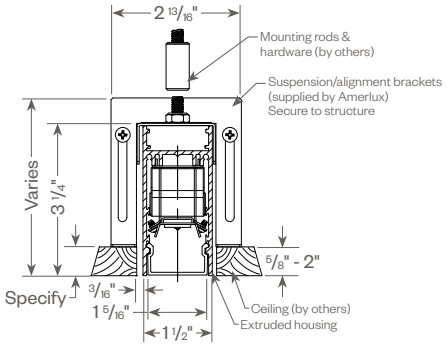


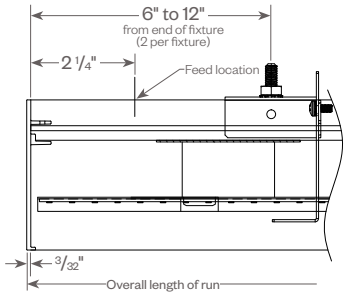
GRÜV1.5-GRID (grid mount) Compatible (see pg 8)





GRÜV1.5-IS (independently suspended)





STANDARD PLUS

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

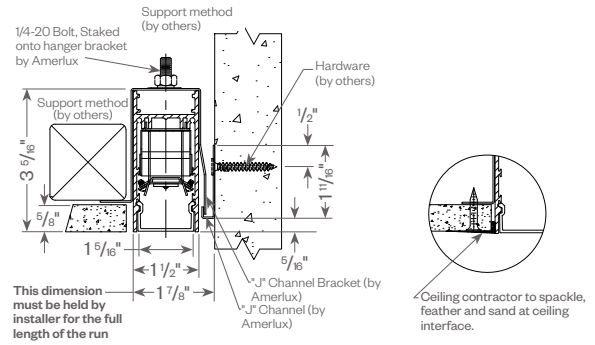
Grüv® 1.5”

Recessed Linear LED

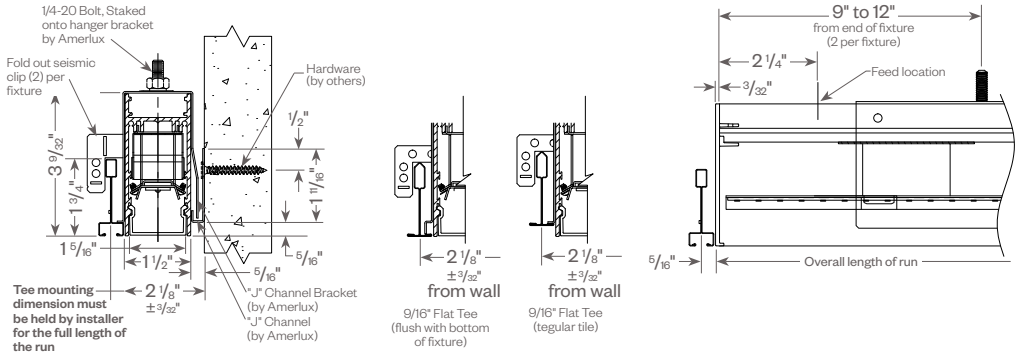
amerlux
A Delta Group Company

PROJECT: **TYPE:**

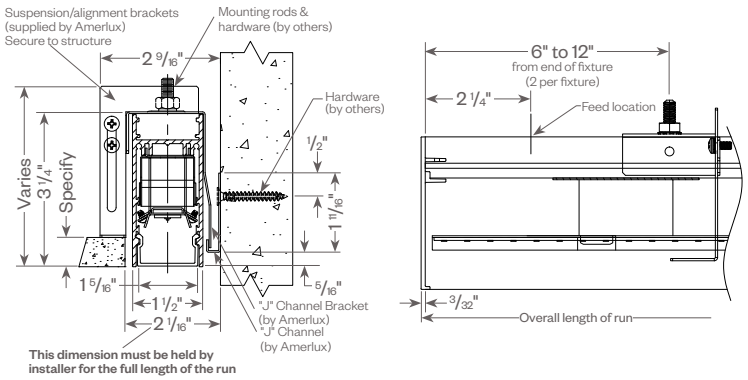
GRÜV1.5-J/GB (j-mold/gyp board trimless)



GRÜV1.5-J/GRID (j-mold/grid mount) Compatible (see pg 8)



GRÜV1.5-J/IS (j-mold/independently suspended)



STANDARD PLUS

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

Grüv® 1.5”

Recessed Linear LED

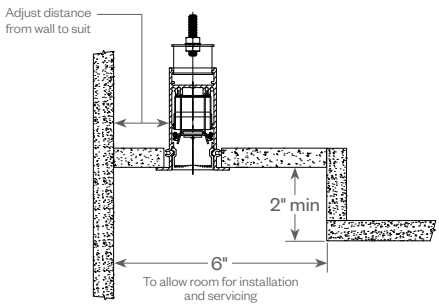
amerlux
A Delta Group Company

PROJECT: **TYPE:**

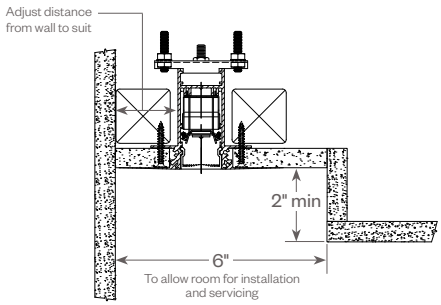
GRAZER LENS OPTIONS:

The Grazer Lens for the Gruv 1.5 was created to provide an effective and low cost wall grazing lighting tool. A cove or valance is suggested to block direct glare at mid to high angles. Surface mounting requires the housing to be attached to the structure above. Some fixture disassembly and reassembly required.

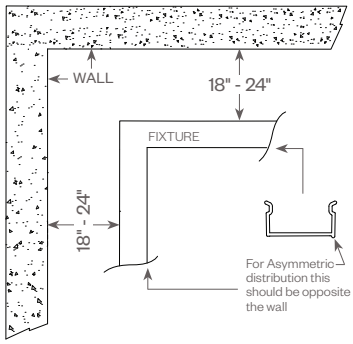
GRÜV1.5-FLG-GRZ (exposed flange)



GRÜV1.5-GB-GRZ (gyp board trimless mud-in)

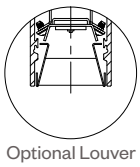


ASYMMETRIC LENS OPTION:

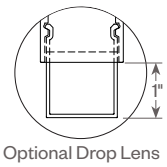


NOTE: Not available for GRUV1.5-FR-GRID

OPTIONAL LOUVER/DROP LENS



Optional Louver



Optional Drop Lens

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

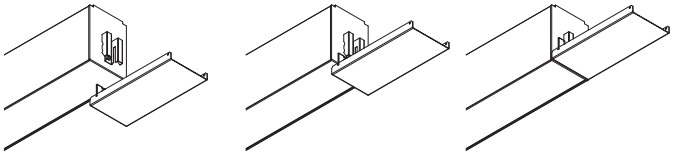
PROJECT: **TYPE:**

STANDARD PLUS

STANDARD PLUS (FILLER):

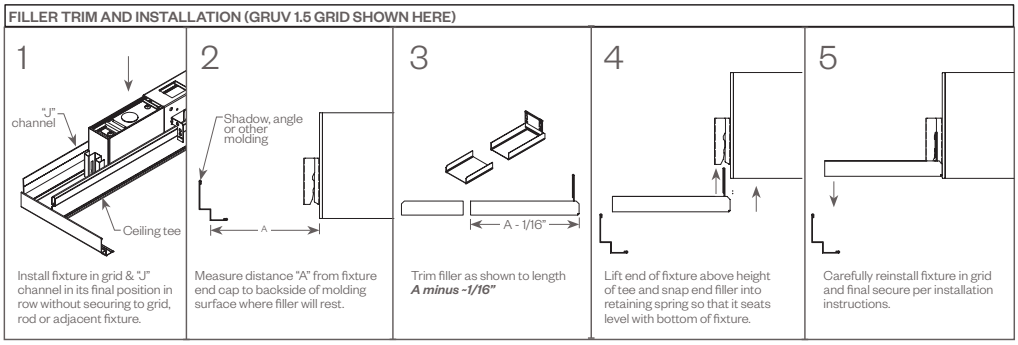
Whenever a continuous run is less than a foot to the next full foot length consider ordering Standard Plus field cuttable bracket for a perfect look. Fits 9/16" Slot Grid and 9/16" T grid. It snaps in place easily from below and gets you close to the wall with a standard fixture. Saves time and money compared to made-to-measure. (max length: 6")

GRID VERSION



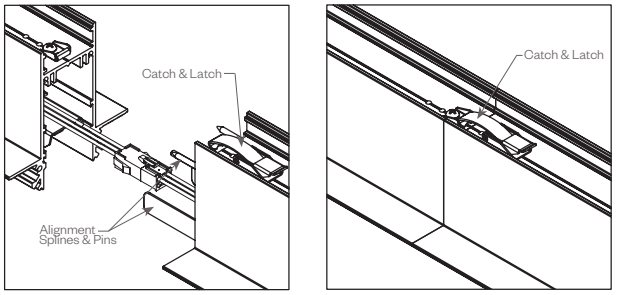
NOTE: Use with Gruv1.5-Grid and Gruv1.5-J/Grid

FILLER TRIM AND INSTALLATION (GRUV 1.5 GRID SHOWN HERE)



TOOLLESS JOINING:

Line up the two housings by using the alignment splines & pins. Secure them together by using the Catch & Latch System on the top of the extrusion.



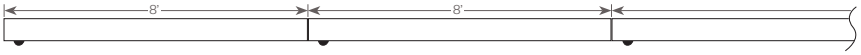
OPTIONAL SENSOR/RF NODE:

Amerlux® has partnered with control companies to create building environments that are safer, and smarter, than ever before. At the heart of our partnership is intelligent RF nodes and Smart Sensor, the most advanced digital wireless communication and sensors available today. Integrated into Amerlux products.

Minimum run length is 3' for wireless sensor and RF node.

INDIVIDUAL (MIN 3' LENGTH)

RUNS



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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 1.5”

Recessed Linear LED

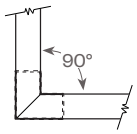
amerlux
A Delta Group Company

PROJECT: **TYPE:**

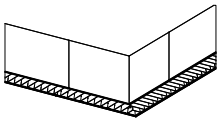
GRUV 1.5" PATTERNS:

Standard Patterns
All corners are standard 90°, standard length legs.
Use standard lengths: 4' min to 8' in 1 foot increments.
Continuous runs must be the same length in pairs for closed configuration.

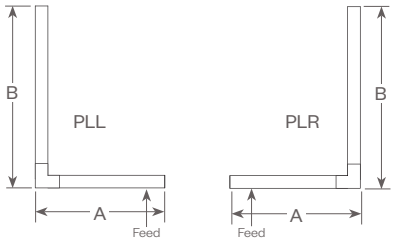
Custom Patterns
Please provide drawings of your configuration.
Made to Measure: +/- 1/8", consult factory.
PC - custom pattern, please provide drawings and consult factory



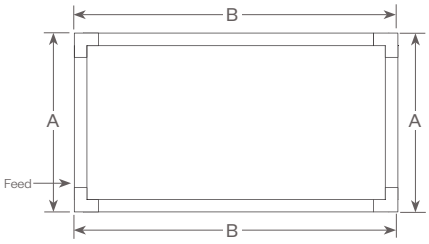
Gruv 1.5 Lens
Mitered Lens



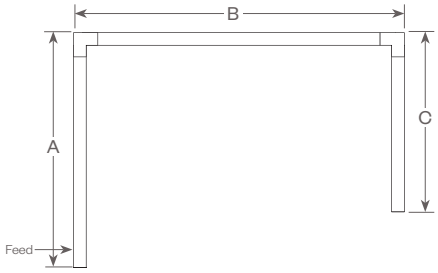
Optional Corner with Louver



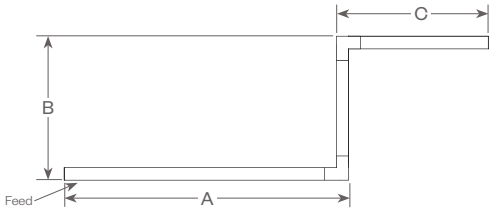
PLL - L Left, (2) straights + (1) 90° corner, leg right
PLR - L Right, (2) straights + (1) 90° corner, leg left
Provide overall lengths: A' & B'
Nomenclature: A-B-PLL A-B-PLR



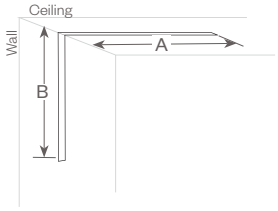
PR - Closed Rectangle, (4) straight lengths + (4) 90° corners
Provide overall lengths: A' & B'
Nomenclature: A-B-PR



PU - Open U, (3) straight lengths + (2) 90° corners
Provide overall lengths: A', B' & C'
Nomenclature: A-B-C-PU



PZ - Open Z, (3) straight lengths + (2) 90° corners
Provide overall lengths: A', B' & C'
Nomenclature: A-B-C-PZ



WC - Wall to Ceiling - 90° joining bracket, 12" leg length standard
Provide overall lengths: A' & B'
Nomenclature: A-B-PWC

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

FIXTURE DATA:

MULTIPLYING FACTORS: (Multiplying Factor is based on 3500K-83 120V IES file on website)

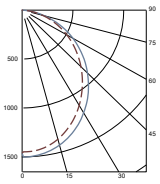
Wattage:	3W	4W	5W	6W	7W	8W	9W	10W
Factor:	0.31	0.42	0.53	0.63	0.72	0.81	0.90	1.0

CCT Factors:					TW9
CRI	2700K	3000K	3500K	4000K	(@3500K)
83	0.92	0.97	1.0	1.02	-
90	0.81	0.84	0.86	0.89	0.86

	Louver	
Finish:	SLV	BLK
Factor:	1.0	.65

GRUV 1.5" PERFORMANCE LENS 10W 3500K 4FT

Total Watts: 37 Total Lumens: 3691
Source: 96 White LED's



LTL# 14664757.01

ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1759	47.7
0-60	2984	80.8
0-90	3691	100.00
90-180	0	0.00

Efficacy = 101.1 Lumens/Watt

COEFFICIENTS OF UTILIZATION

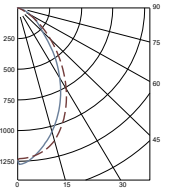
Effective Floor Cavity Reflectance 20%

RC	80			
RW	70	50	30	10
RCR				
0	119	119	119	119
1	109	105	100	97
2	100	92	85	79
3	91	81	73	66
4	83	72	63	57
5	77	64	55	49
6	71	58	49	43
7	66	53	44	38
8	62	48	40	34
9	58	44	36	31
10	54	41	33	28

Note: Values are expressed as percent of total lumen output delivered to the task surface.

GRUV 1.5" STRAIGHT BLADE LOUVER (SLV) 10W 3500K 4FT

Total Watts: 37 Total Lumens: 1584
Source: 96 White LED's



LTL# 14664757.05

ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1129	71.3
0-60	1502	94.8
0-90	1584	100.00
90-180	0	0.00

Efficacy = 43.5 lumens/Watt

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

RC	80			
RW	70	50	30	10
RCR				
0	119	119	119	119
1	112	109	106	103
2	105	99	94	89
3	98	90	84	79
4	91	82	75	70
5	86	75	68	63
6	80	70	62	57
7	75	64	57	52
8	71	60	53	48
9	67	56	49	44
10	63	52	45	41

Note: Values are expressed as percent of total lumen output delivered to the task surface.

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

FIXTURE DATA:

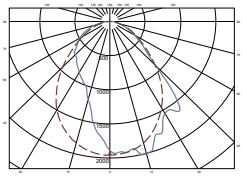
MULTIPLYING FACTORS: (Multiplying Factor is based on 3500K-83 120V IES file on website)

Wattage:	3W	4W	5W	6W	7W	8W	9W	10W
Factor:	0.31	0.42	0.53	0.63	0.72	0.81	0.90	1.0

CCT Factors:					TW9
CRI	2700K	3000K	3500K	4000K	(@3500K)
83	0.92	0.97	1.0	1.02	-
90	0.81	0.84	0.86	0.89	0.86

LINEA 1.5" ASYMMETRIC LENS 10W 3500K 4FT

Total Watts: 37 Total Lumens: 4046
Source: 96 White LED's



LTL# 14664757.02

ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	2048	50.6
0-60	3358	83.0
0-90	4046	100.00
90-180	0	0.00

Efficacy = 110.8 Lumens /Watt

COEFFICIENTS OF UTILIZATION

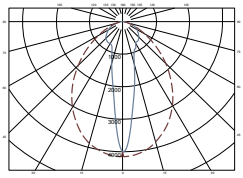
Effective Floor Cavity Reflectance 20%

RC	80			
RW	70	50	30	10
RCR				
0	119	119	119	119
1	110	105	101	97
2	100	92	86	81
3	92	82	74	68
4	85	73	65	58
5	78	66	57	51
6	72	60	51	45
7	67	54	46	40
8	63	50	41	36
9	59	46	38	32
10	55	42	35	30

Note: Values are expressed as percent of total lumen output delivered to the task surface.

LINEA 1.5" GRAZER LENS 10W 3500K 4FT

Total Watts: 37 Total Lumens: 4065
Source: 96 White LED's



LTL# 14664757.04

ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	2219	54.6
0-60	3418	84.1
0-90	4065	100.00
90-180	0	0.00

Efficacy = 111.3 Lumens /Watt

COEFFICIENTS OF UTILIZATION

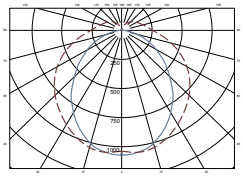
Effective Floor Cavity Reflectance 20%

RC	80			
RW	70	50	30	10
RCR				
0	119	119	119	119
1	110	106	102	98
2	101	94	88	82
3	93	84	76	70
4	86	75	67	61
5	80	68	60	54
6	75	62	54	48
7	70	57	49	44
8	65	53	45	40
9	62	49	42	36
10	58	46	39	34

Note: Values are expressed as percent of total lumen output delivered to the task surface.

LINEA 1.5" DROP LENS 10W 3500K 4FT

Total Watts: 37 Total Lumens: 4014
Source: 96 White LED's



LTL# 14664757.03

ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-40	1339	33.4
0-60	2397	59.7
0-90	3427	85.4
90-180	588	14.6

Efficacy = 109.9 Lumens /Watt

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

RC	80			
RW	70	50	30	10
RCR				
0	116	116	116	116
1	103	98	93	88
2	93	84	77	70
3	85	73	65	58
4	77	65	55	48
5	71	58	48	41
6	65	52	42	36
7	60	47	38	32
8	56	43	34	28
9	52	39	31	25
10	49	36	28	23

Note: Values are expressed as percent of total lumen output delivered to the task surface.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

FIXTURE DATA: (Complete photometric data (.ies format) available upon request)

MULTIPLYING FACTORS: (Multiplying Factor is based on 3500K-83 120V IES file on website)

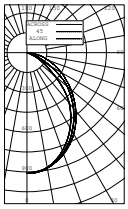
Wattage:	3W	4W	5W	6W	7W	8W	9W	10W
Factor:	0.63	0.82	1.0	1.17	1.34	1.50	1.64	1.83

CCT Factors:					TW9
CRI	2700K	3000K	3500K	4000K	(@3500K)
83	0.92	0.97	1.0	1.02	-
90	0.81	0.84	0.86	0.89	0.86

GRÜV 1.5” FLARED REGRESSED (FR-GRID) 5W 3500K 4FT

Total Watts: 21
Total Lumens: 1,866
Source: 96 White LED's

LTL# 695280



ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-30	669	35.82
0-40	1052	56.34
0-60	1665	89.19
0-90	1866	100.00
40-90	815	43.66
60-90	202	10.81
90-180	0	0.00
0-180	1866	100.00

Efficacy = 88.5 Lumens /Watt

COEFFICIENTS OF UTILIZATION

Effective Floor Cavity Reflectance 20%

RC	80			
RW	70	50	30	10
RCR				
0	1.19	1.19	1.19	1.19
1	1.11	1.08	1.05	1.02
2	1.04	0.98	0.92	0.88
3	0.96	0.88	0.81	0.76
4	0.90	0.80	0.73	0.67
5	0.83	0.73	0.65	0.59
6	0.77	0.66	0.58	0.53
7	0.72	0.60	0.52	0.47
8	0.67	0.54	0.47	0.42
9	0.62	0.50	0.42	0.37
10	0.58	0.46	0.38	0.33

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

STATIC WHITE - DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

0-10V - DIMMING (Standard)

Integrates into a variety of building management and daylighting controls

Notes:

- 120V or 277V*
- Dims down to 1% light output
- Requires interface to turn off power to driver
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

Compatible Dimmers†:

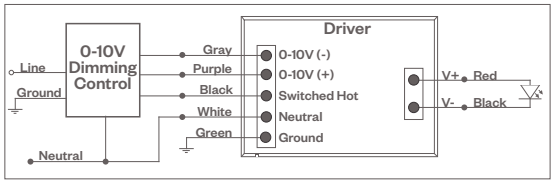
Wall Box

Lutron:	Wattstopper:	Leviton:
Diva - DVSTV	ADF-120277	Renoir II
Maestro - MS-Z101		
Nova-T - NTSTV-DV		

Center System

Lutron Grafixk Eye with GRX-TV1 Interface

0-10V Wiring Diagram



LUTRON HI-LUME ECOSYSTEM DIMMING

Integrates into Lutron EcoSystem building management

Notes:

- 120VAC or 277VAC*
- Dims down to 1% light output
- EcoSystem Control
- Consult Dimming manufacturer for installation instructions - DO NOT SHARE NEUTRALS!

Compatible Dimmers†:

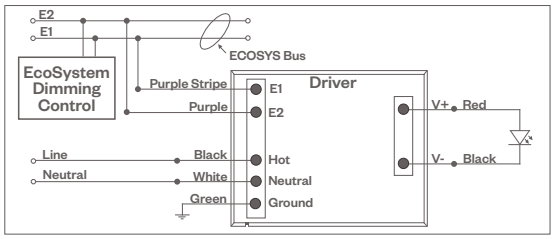
Lutron ECO System

Pow Pak Dimming Modules
Energi Savr Node
Grafik Eye QS/Homeworks
QS Control Unit
Quantum Hub
Homeworks QS/My Room

Central System

Lutron EcoSystem compatible controls

HILUME-H-ECO EcoSystem Digital Control Wiring Diagram



Notes:

* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.

† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

STATIC WHITE - DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

DALI - DALI DIMMING 120V-277V
Digital control protocol allows individual fixture control

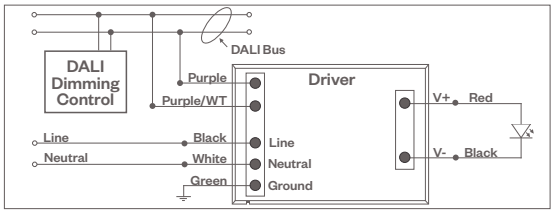
Notes:
- 120VAC - 277VAC*
- Dims down to 1% light output in most cases

Compatible Dimmers†:

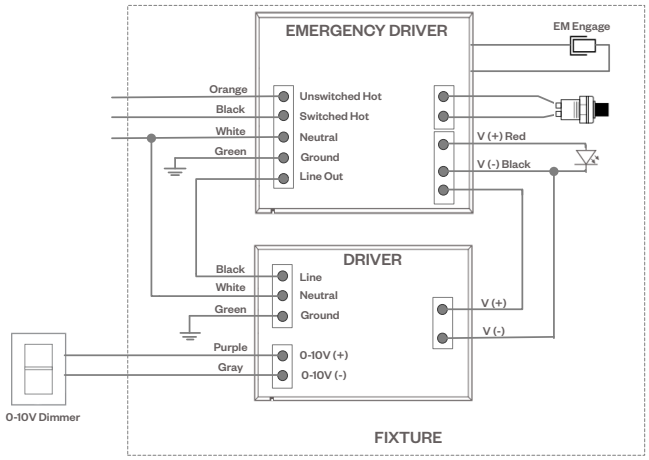
Wall Box
Leviton CD250 Controller

Center System
Dynalite
Fifth Light

DALI Wiring Diagram



EMERGENCY FIXTURE WITH BUILT-IN BATTERY PACK (EMB) WIRING:
Note: EMB not available on lengths under 4'.



Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

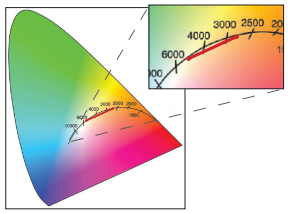
Grüv® 1.5”

Recessed Linear LED

amerlux
A Delta Group Company

PROJECT: **TYPE:**

TUNABLE WHITE

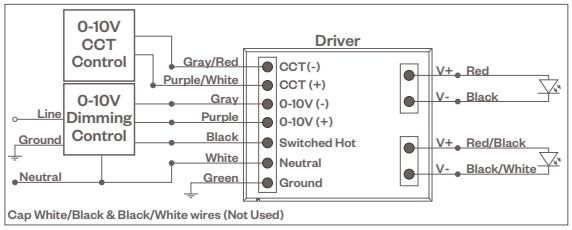


Tunable White range from 2700K-5700K, 90 CRI.
See wiring diagrams below.

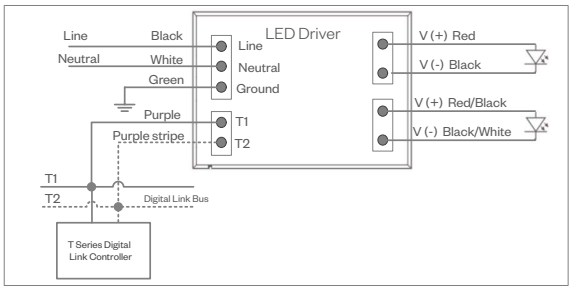
TUNABLE WHITE - DIMMING COMPATIBILITY:
Amerlux® Gruv fixtures are compatible with all major dimming protocols prevalent in the United States. Please see below for general compatibilities and wiring diagrams. Amerlux recommends testing your unique dimming configuration as the exact full configuration (Dimmer, Fixture Quantity, Voltage, etc) may affect dimming performance.

--- NOTE: INFORMATION BELOW IS FOR WIRED DIMMERS ONLY. FOR WIRELESS DIMMERS, CONSULT FACTORY ---

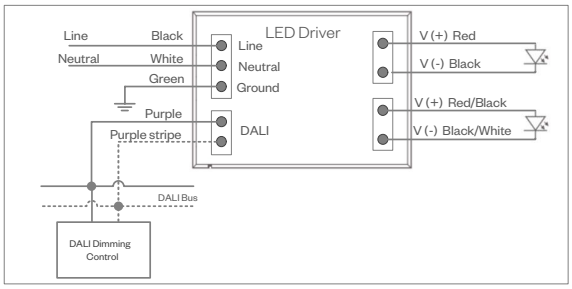
0-10V Wiring Diagram



Lutron T-Series Digital Link Wiring Diagram



DALI DT8 Wiring Diagram



Notes:
* Driver is 277VAC dimmable with appropriate dimmer (by others). All provided wiring diagrams show 120VAC wiring colors and method. Please refer to 277VAC dimmer installation instructions for 277VAC wiring diagrams.
† The absence of a dimmer from the lists above does not imply incompatibility. Please consult factory for compatibility inquiries.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KH

UHNJ - EMERGENCY DEPARTMENT EXPANSION

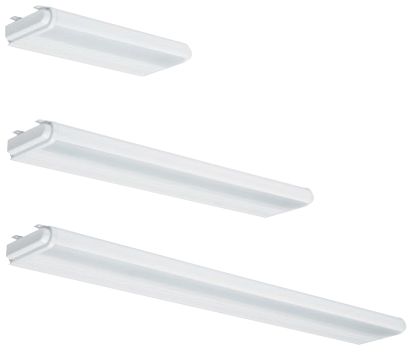
Kugler Ning Lighting

Day-Brite CFI by signify

Linear

LINCS LED undercabinet

10", 19", or 28" lengths



Project:
Location:
Cat.No:
Type:
Lamps: Qty:
Notes:

Day-Brite / CFI LINCS LED undercabinets enable flexibility to suit the needs of many applications including office, healthcare, educational, and residential. The state of the art LED system provides high resolution lighting with excellent color rendering for high visual acuity on the task plane. The modular design allows field application of control options and continuous connectivity for ease of configuration and installation. LINCS LED is an ideal choice where high performing undercabinet lighting is specified.

Ordering guide

Example: LINCS100EL28935UNVWHGDIM

Family	Length	Color	Voltage	Finish	Driver	Options
LINCS100E						
LINCS100E LINCS LED Energy Star	**L10** 10" **L19** 19" **L28** 28"	**930** 3000K, 90 CRI **935** 3500K, 90 CRI	**UNV** Universal Voltage 120-277V **120** 120V **277** 277V	**WHG** White Glossy **MB** Matte Black **SA** Satin Aluminum **SWH** Antimicrobial White	**DIM** Trailing edge phase dimming (ELV)	**CSJT3**[1,2] SJT cord set hard-wired into back of fixture. UL listed as a portable fixture for use in office workstations (120V only) **OSC**[3,4] Integral occupancy sensor control for UNV linking **OSHL**[3,4] Integral occupancy sensor control for UNV, hard wired **RSW**[4,5] Rocker switch (on/off) for linked input power, controls only this fixture **RSLL**[4,5] Rocker switch for hard linked input power, controls fixtures in the linked circuit **RSH**[4,5] Rocker switch for hard wired input power, controls only this fixture **RSHL**[4,5] Rocker swtich for hard wired input power, controls fixtures in linked circuit **SBF** Slow blow fuse

Accessories (order separately)

Specify Qty of Connectors Needed

QTY:	**LINCS1001**[6]	Wiring module
QTY:	**LINCS1001RSW**[6]	Wiring module with rocker switch
QTY:	**LINCS1002CO**[2,6]	Wiring module with duplex outlet
QTY:	**LINCS100PC3W**	3' Straight power cord, white
QTY:	**LINCS100PC6W**	6' Straight power cord, white
QTY:	**LINCS100ICSW**	6" Straight interconnect cord, white

Note: Power cords plug into left end of the luminaires.

Notes

1. LINCS fixtures with CSJT3 option can not be modularly connected.
2. 120V only.
3. OSC is not available with LINCS100EL10.
4. See controls table page 3.
5. Specify 120V or 277V only.
6. Specify voltage and finish for these accessories. Include voltage and finish codes from catalog matrix after "1" or "2", i.e. LINCS1001120WHGRSW.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KJ

Kugler Ning Lighting

LINCS100E LINCS LED undercabinet

10", 19", or 28" lengths

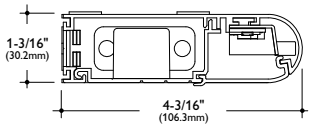
Features

- Miniature 1" deep profile
- Modular design with accommodating accessories for ease of installation and flexibility in the field.
- Optional wiring module with master on/off switch, duplex convenience outlet, or occupancy sensor
- Extruded aluminum design is durable, lightweight and corrosion resistant
- Available in a white, black, satin aluminum, or anitmicrobial white

Specifications

- **Construction:** .060" extruded aluminum housing with injection molded polycarbonate endcaps and covers.
- **Reflector and Lens:** Acrylic textured lens to minimize lamp image on task surface.
- **Finish:** LINCS is available in either a white or black polyester powder-coat paint finish. In addition, LINCS can be selected with an anodized satin aluminum finish. Standard white painted and antimicrobial finishes have matching white end caps. Black endcaps are provided with the black painted or satin aluminum finishes.
- **Lamps:** LINCS is supplied with high efficiency LEDs with a color temperature of 3000K or 3500K and 90 CRI. 70% of initial illumination at 50,000 hours at 25°C ambient. The LED board is field replaceable.
- **Listings:** cETLus Listed for direct-wire or portable installations. Damp rated. Energy Star® certified.
- **Electrical:** Luminaires are supplied with an integral, electronic Class "A" LED driver for 120V to 277V applications. Optional passive infrared occupancy sensor control (OSC) available.
- **Installation:** LINCS include male and female grounded connectors on each end to allow power conductivity with linking connector cord accessories. A UL recognized 3/8" flexible metal conduit/non-metallic sheathed wiring connector is supplied with the luminaire for direct-wiring into knockout in the back of the housing or through adapter plate at the left end. LINCS100-L19 and LINCS100-L28 models have a wiring access panel with a knockout to allow quick wiring of the first luminaire without opening the wireway cover. For portable installations, the LINCS100PC power cord plugs directly into the left end of the luminaire. It is not recommended that LINCS be plugged into a GFCI receptacle.
- **Warranty:** All luminaire components (except for the LED board and driver) are warranted against defects during the life of the original installation. The LED board and driver are warranted for 5 years from date of manufacture. Visit www.philips.com/warranties for complete warranty information.

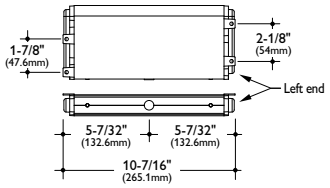
Dimensional Data



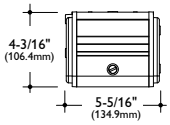
Installation Notes:

- (1) End-plate supplied to allow direct wiring into left end
- When row mounting, allow 1" at end of a run connection of last fixture
- When using power cord, allow 3" at start of run
- Subract 7/16" for each end-cover removed in row mount applications.

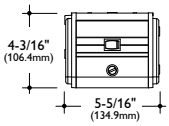
LINCS100L10



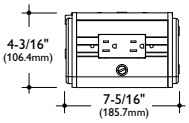
LINCS1001



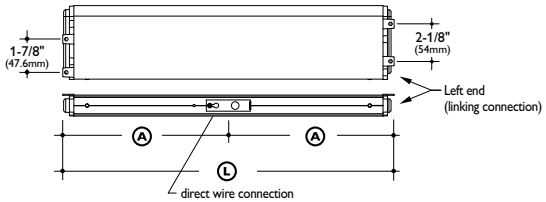
LINCS1001RSW



LINCS1002CO



LINCS100L19 and LINCS100L28



DIMENSION	L	A
LINCS100L19	19-1/4" (489.0mm)	9-5/8" (244.5mm)
LINCS100L28	28-1/16" (712.8mm)	14-1/32" (356.4mm)

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KJ

Kugler Ning Lighting

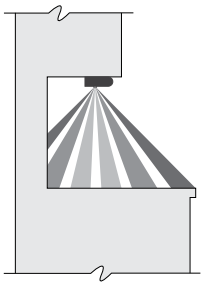
LINCS100E LINCS LED undercabinet

10", 19", or 28" lengths

Controls

				Control		
Option Code	**Description**	**Voltage**	**Wiring Type**	**Single Fixture**	**All In Circuit**	**Linked Thru Power**
OSC (standard)	Integral Occ Sensor - Linked Input Power, Linked Control	UNV	Linked		X	X
OSHL	Integral Occ Sensor - Hard Wired Power, Linked Control	UNV	Hard Wired		X	X
RSW (standard)	Rocker Switch - Linked Input Power	120V or 277V	Linked	X		X
RSLL	Rocker Switch - Linked Input Power, Linked Control	120V or 277V	Linked		X	X
RSH	Rocker Switch - Hard Wired Power	120V or 277V	Hard Wired	X		X
RSHL	Rocker Switch - Hard Wired Power, Linked Control	120V or 277V	Hard Wired		X	X

Wiring Type Describes whether power is linked to the left side of the fixture, or direct wired to the back of the fixture.
Control - Single Fixture The integrated device controls only this single fixture.
Control - All in Circuit The integrated device controls this fixture and all adjacent fixtures (i.e. the thru power is controlled from this fixture).
Linked Thru Power Power is linked to adjacent fixtures via the LINCS connectors.



Integral occupancy sensor control (OSC)

The OSC has a passive infrared occupancy (PIR) that has a field-adjustable time delay that that can be set for 30 sec., 10 min., 20 min., or 30 min. Connect building power to the LINCS luminaire with the OSC. All additional luminaires interconnected to that luminaire will be controlled by the single OSC.

Electrical Data			
Model	**LINCS L10**	**LINCS L19**	**LINCS L28**
Fix. Watts	2.5	4.9	7.3
Total Fix. Lumens	175	391	594
Max. Amps	.02	.04	.06

Maximum of 6 total amps when row mounting.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KJ

Kugler Ning Lighting

LINCS100E LINCS LED undercabinet

10", 19", or 28" lengths

Photometry

LINCS LED 10" 3000K

LER – 73

Catalog No. LINCS100E-L10-930-UNV-WHG-DIM
Test No. 35770
S/MH 1.2
Lamp Type LED
Lumens 184
Input Watts 3

Comparative yearly lighting energy cost per 1000 lumens – **$3.29** based on 3000 hrs. and **$.08** pwr KWH.

The photometric results were obtained in the Day-Brite laboratory which is NVLAP accredited by the National Institute of Standards and Technology.

Photometric values based on test performed in compliance with LM-79.

Candlepower

Angle	End	45	Cross
0	79	79	79
5	80	80	79
15	76	77	75
25	69	70	67
35	58	59	56
45	44	47	44
55	31	34	30
65	21	22	18
75	13	13	10
85	7	7	4

Light Distribution

Degrees	Lumens	% Luminaire
0-30	59	32.1
0-40	93	50.6
0-60	150	81.9
0-90	183	99.9
0-180	184	100.0

Average Luminance

Angle	End	45°	Cross
45	7476	7933	7358
55	6547	6985	6276
65	5886	6311	5207
75	5915	6192	4529
85	9331	9331	4803

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50	
pw	70	50	30	70	50	30	50	30
RCR								
0	118	118	118	115	115	115	111	111
1	109	104	100	106	102	97	97	94
2	100	92	84	96	90	83	85	81
3	92	81	73	89	80	72	77	70
4	83	72	64	81	70	64	68	61
5	78	65	56	76	64	56	61	55
6	71	58	51	69	57	50	56	48
7	67	54	46	65	53	45	52	44
8	63	50	40	60	48	40	46	40
9	58	46	38	56	45	36	44	36
10	55	41	34	54	41	34	40	34

LINCS LED 10" 3500K

LER – 79

Catalog No. LINCS100E-L10-935-UNV-WHG-DIM
Test No. 35771
S/MH 1.2
Lamp Type LED
Lumens 196
Input Watts 3

Comparative yearly lighting energy cost per 1000 lumens – **$3.04** based on 3000 hrs. and **$.08** pwr KWH.

The photometric results were obtained in the Day-Brite laboratory which is NVLAP accredited by the National Institute of Standards and Technology.

Photometric values based on test performed in compliance with LM-79.

Candlepower

Angle	End	45	Cross
0	84	84	84
5	85	84	84
15	81	82	80
25	73	74	72
35	61	63	60
45	47	50	46
55	34	36	32
65	23	24	20
75	14	15	10
85	7	7	4

Light Distribution

Degrees	Lumens	% Luminaire
0-30	63	31.9
0-40	99	50.3
0-60	161	81.7
0-90	196	99.9
0-180	196	100.0

Average Luminance

Angle	End	45°	Cross
45	8017	8457	7814
55	7069	7507	6735
65	6424	6792	5773
75	6423	6700	4806
85	10017	10017	5077

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50	
pw	70	50	30	70	50	30	50	30
RCR								
0	118	118	118	115	115	115	111	111
1	109	104	100	106	102	97	97	94
2	100	92	84	96	90	83	85	81
3	91	81	72	89	80	71	77	70
4	83	72	64	81	70	63	68	61
5	78	65	56	76	64	56	61	55
6	71	58	50	69	57	50	56	48
7	67	54	45	65	53	45	52	44
8	61	48	40	60	48	40	46	40
9	58	45	38	56	45	36	44	36
10	55	41	34	54	41	34	40	34

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KJ

Kugler Ning Lighting

LINCS100E LINCS LED undercabinet

10", 19", or 28" lengths

LINCS LED 19" 3000K

LER – 78

Catalog No. LINCS100E-L19-930-UNV-WHG-DIM
Test No. 35772
S/MH 1.2
Lamp Type LED
Lumens 392
Input Watts 5

Comparative yearly lighting energy cost per 1000 lumens – **$3.08** based on 3000 hrs. and **$.08** pwr KWH.

The photometric results were obtained in the Day-Brite laboratory which is NVLAP accredited by the National Institute of Standards and Technology.

Photometric values based on test performed in compliance with LM-79.

Candlepower

Angle	End	45	Cross
0	167	167	167
5	169	167	166
15	160	161	159
25	144	146	142
35	121	124	120
45	94	99	93
55	68	72	65
65	46	49	40
75	28	29	21
85	15	15	7

Light Distribution

Degrees	Lumens	% Luminaire
0-30	125	31.8
0-40	197	50.2
0-60	320	81.7
0-90	392	99.9
0-180	392	100.0

Average Luminance

Angle	End	45°	Cross
45	8091	8460	7937
55	7175	7619	6826
65	6539	6955	5779
75	6650	6885	4824
85	10709	10222	4520

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50	
pw	70	50	30	70	50	30	50	30
RCR								
0	118	118	118	115	115	115	111	111
1	109	104	100	106	102	97	97	94
2	100	92	84	96	90	83	85	81
3	91	81	72	89	80	71	77	70
4	83	72	64	81	70	63	68	61
5	78	65	56	76	64	56	61	55
6	71	58	50	69	57	50	56	48
7	67	54	45	65	53	45	51	44
8	61	48	40	60	48	40	46	40
9	57	45	36	56	45	36	44	36
10	55	41	34	54	41	34	40	34

LINCS LED 19" 3500K

LER – 87

Catalog No. LINCS100E-L19-935-UNV-WHG-DIM
Test No. 35773
S/MH 1.2
Lamp Type LED
Lumens 415
Input Watts 5

Comparative yearly lighting energy cost per 1000 lumens – **$2.76** based on 3000 hrs. and **$.08** pwr KWH.

The photometric results were obtained in the Day-Brite laboratory which is NVLAP accredited by the National Institute of Standards and Technology.

Photometric values based on test performed in compliance with LM-79.

Candlepower

Angle	End	45	Cross
0	176	176	176
5	177	176	174
15	169	170	167
25	153	154	150
35	130	132	126
45	103	106	98
55	75	78	68
65	51	53	43
75	32	32	22
85	17	16	7

Light Distribution

Degrees	Lumens	% Luminaire
0-30	131	31.5
0-40	207	49.9
0-60	338	81.4
0-90	415	99.9
0-180	415	100.0

Average Luminance

Angle	End	45°	Cross
45	8828	9051	8357
55	7957	8231	7196
65	7343	7586	6124
75	7517	7564	5128
85	12030	11335	4729

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50	
pw	70	50	30	70	50	30	50	30
RCR								
0	118	118	118	115	115	115	111	111
1	109	104	100	106	102	97	97	94
2	100	92	84	96	90	83	85	81
3	91	81	72	89	80	71	77	69
4	83	71	64	81	70	63	68	61
5	78	65	56	75	64	56	61	55
6	71	58	50	69	57	50	56	48
7	67	54	45	65	53	45	51	44
8	61	48	40	60	47	40	46	40
9	57	45	36	56	45	36	44	36
10	55	41	34	54	40	34	40	34

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KJ

Kugler Ning Lighting

LINCS100E LINCS LED undercabinet

10", 19", or 28" lengths

LINCS LED 28" 3000K

LER – 81

Catalog No. LINCS100E-L28-930-UNV-WHG-DIM
Test No. 35774
S/MH 1.2
Lamp Type LED
Lumens 588
Input Watts 7

Comparative yearly lighting energy cost per 1000 lumens – **$2.96** based on 3000 hrs. and **$.08** pwr KWH.

The photometric results were obtained in the Day-Brite laboratory which is NVLAP accredited by the National Institute of Standards and Technology.

Photometric values based on test performed in compliance with LM-79.

Candlepower

Angle	End	45	Cross
0	252	252	252
5	253	252	249
15	239	241	238
25	214	218	213
35	180	184	179
45	139	147	138
55	99	107	97
65	66	71	60
75	41	42	30
85	21	20	9

Light Distribution

Degrees	Lumens	% Luminaire
0-30	188	31.9
0-40	297	50.4
0-60	482	81.9
0-90	588	99.9
0-180	588	100.0

Average Luminance

Angle	End	45°	Cross
45	7948	8377	7908
55	6988	7516	6833
65	6320	6798	5765
75	6323	6604	4746
85	9596	9411	4080

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50	
pw	70	50	30	70	50	30	50	30
RCR								
0	118	118	118	115	115	115	111	111
1	109	104	100	106	102	97	97	94
2	100	92	84	96	90	83	85	81
3	91	81	73	89	80	72	77	70
4	83	72	64	81	70	63	68	61
5	78	65	56	76	64	56	61	55
6	71	58	51	69	57	50	56	48
7	67	54	45	65	53	45	52	44
8	63	48	40	60	48	40	46	40
9	58	46	38	56	45	36	44	36
10	55	41	34	54	41	34	40	34

LINCS LED 28" 3500K

LER – 88

Catalog No. LINCS100E-L28-935-UNV-WHG-DIM
Test No. 35775
S/MH 1.2
Lamp Type LED
Lumens 627
Input Watts 7

Comparative yearly lighting energy cost per 1000 lumens – **$2.73** based on 3000 hrs. and **$.08** pwr KWH.

The photometric results were obtained in the Day-Brite laboratory which is NVLAP accredited by the National Institute of Standards and Technology.

Photometric values based on test performed in compliance with LM-79.

Candlepower

Angle	End	45	Cross
0	269	269	269
5	270	269	266
15	257	258	254
25	231	234	228
35	194	199	191
45	150	158	148
55	107	116	103
65	71	77	64
75	45	47	32
85	24	23	9

Light Distribution

Degrees	Lumens	% Luminaire
0-30	200	31.9
0-40	316	50.4
0-60	514	81.9
0-90	626	99.9
0-180	627	100.0

Average Luminance

Angle	End	45°	Cross
45	8588	9045	8440
55	7516	8172	7284
65	6817	7400	6157
75	6947	7290	5058
85	11034	10663	4358

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE 20 PER (pfc=0.20)

pcc	80			70			50	
pw	70	50	30	70	50	30	50	30
RCR								
0	118	118	118	115	115	115	111	111
1	109	104	100	106	102	97	97	94
2	100	92	84	96	90	83	85	81
3	92	81	73	89	80	72	77	70
4	83	72	64	81	70	63	68	61
5	78	65	56	76	64	56	61	55
6	71	58	51	69	57	50	56	48
7	67	54	45	65	53	45	52	44
8	63	48	40	60	48	40	46	40
9	58	46	38	56	45	36	44	36
10	55	41	34	54	41	34	40	34

signify

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Somerset, NJ 08873
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281 Hillmount Road,
Markham, ON, Canada L6C 2S3
Telephone 800-668-9008

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KJ

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Day-Brite CFI by Signify

Recessed

FluxPanel LED gen 2 2x2

Up to 5400 lumens

Day-Brite/CFI FluxPanel LED gen 2 recessed is a highly versatile luminaire designed to provide smooth lighting gradient on the lens surface and ease of installation. Available for use in recessed, suspended, and surface mount orientation, FluxPanel is ideal for general lighting applications such as open office, schools, healthcare, clean rooms, and retail.

Project:
Location:
Cat.No:
Type:
Lamps: Qty:
Notes:

Ordering guide – Standard configurations available with all choices, unless otherwise noted.
Base configurations selections indicated by blue.

Example: 2FPZ38L840-2-DS-UNV-DIM-BSL6LST

Width	Family	Lumens	Color	Length	Diffuser	Voltage	Driver	Options [2]	
2	FPZ		–	2 –	DS –	–	–		
2 2'	FPZ FluxPanel gen 2	Base configuration[4] 38B 3800 nominal delivered lumens Standard configurations 20L[4,9] 2000 nominal delivered lumens 30L 3000 nominal delivered lumens 38L 3800 nominal delivered lumens 45L 4500 nominal delivered lumens 54L 5400 nominal delivered lumens Other lumen packages may be ordered in increments of 100lm from 2000 to 5400 lumens	835 80 CRI, 3500K 840 80 CRI, 4000K 850 80 CRI, 5000K	2 2'	DS Diffuse (smooth)	UNV Universal Voltage, 120-277 volt 120[3] 120V 277 277V 347 347V	DIM[1] 0-10V dimming SDIM[6] Step dimming to 40% input power XDIM[3,6] MarkX phase dimming	F1 3/8" flex, 3 wire 18 gauge 6' F2 3/8" flex, 4 wire 18 gauge 6' F1/D 3/8" twin flex, 3 wire 18 gauge 6' for dimmable luminaires F2/5W 3/8" single flex, 5 wire 18 gauge 6' for dimmable luminaires F2/6W 3/8" single flex, 6 wire 18 gauge 6' for dimmable and emergency luminaires GLR Fusing, fast blow ER100 [4,6,11,12] UL924 listed sensor bypass relay, factory installed between driver & sensor BSL10LST[5,9] Bodine 10W battery pack BSL6LST[5,9] Bodine 6W battery pack SWZCSRM[1,4,7,9,10] Remote Interact Pro scalable sensor with integral daylight & occupancy sensing, advanced grouping with dwell time SWZDTRM[1,4,7] Remote SpaceWise only sensor, daylighting and occupancy, advanced grouping with dwell time RADIO [1,4,6,7] Interact Pro RF sensor, enables wireless connected lighting control DSC Quick driver disconnect CHIC Chicago Plenum rated BAC[13] Meets the requirements of the Buy American Act of 1933 (BAA)	

Footnotes

1 Integral control options dimmable to 1% via wireless wall switch. Non-controls options are 0-10V dimmable to 1% for Standard configurations and 5% for Base configurations.
2 All options only available with Standard configurations.
3 XDIM is 120V only.
4 Specify DIM driver option only.
5 Not available with 347V option.
6 Available in 30L through 54L packages.
7 Not available with surface or suspended accessories.
8 Maximum of 4 luminaires per controller.
9 Emergency and Control options not clean room certified.
10 Must order IRT9015 Interact commissioning remote with each system order.
11 Must be installed in conjunction with a UL1008 device.
12 Must be ordered with an integral controls option.
13 Failure to properly select the "BAC" suffix could result in you receiving product that is not BAA compliant product with no recourse for an RMA or refund. This BAC designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies.
14 Consult Signify to confirm whether specific accessories are BAA-compliant.

Accessories[14] (order separately)

- **FMA22 –** 2'x2' "F" mounting frame for NEMA "F" mounting
- **FSK22 –** 2'x2' surface mount field installation kit (factory welded seams)
- **FSF22 –** 2'x2' surface mount field assembly kit (field assembled)
- **FPZCH48-1D-SC-UNV –** adjustable cable hanger kit with straight white 18/5 cord for dimming (two-1 powered, 1 non-powered)
- **FPZCH48-1D-SC-347 –** adjustable cable hanger kit with straight white 18/5 cord for dimming (two-1 powered, 1 non-powered)
- **SWZDT[1,7,8,9] –** SpaceWise wireless controller with daylighting and occupancy, advanced grouping with dwell time functionality (compatible with all 0-10V options, see SWZDT spec sheet)
- **SBAZ10-CS[1,7,8,9,10] –** Interact Ready System Bridge Accessory, refer to Philips System Bridge Accessory specification sheet for options and ordering details
- **IRT9015 –** handheld remote for grouping and configuration (at least one remote required for any SWZCS installation).

Not all product variations listed on this page are DLC qualified. To ensure that a specific model is qualified, visit www.designlights.org/search

interact ready.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KK, KK1, KK2

Kugler Ning Lighting

2FPZ FluxPanel LED recessed 2x2

Up to 5400 lumens

Application

- Base configurations are 1 9/16". Standard configurations are 3 " Dimensions stated for overall depth, including driver box.
- Even distribution of light on the lens provides exceptionally low glare gradient minimizing distractions at the ceiling plane.
- General light distribution creates uniform horizontal and vertical illuminance on the work plane and limits scalloping on the walls.
- Excellent consistency of correlated color temperature (CCT) per ANSI C78.377.
- CRI 80 minimum color rendering with balanced spectrum.
- Designed for use with standard Grid (NEMA "G") or Narrow Grid (NEMA "NFG") ceiling T-bars. Drywall or plaster application require use with the FMA22 "F" mounting frame accessory (sold and shipped separately).
- Accessory field install kits available for surface (FSF22) and suspended (FPZCH48) mounting.

Construction/Finish

- Die formed galvanized steel housing.
- Extruded aluminum frame post painted with gloss white enamel finish. Corners are precision welded for seamless aesthetic.
- Emergency options available with factory installed battery pack and remote field installed test switch/ light with cover plate.
- Die formed driver box with standard access plate for ease of wiring, provides tool-free access to driver(s) from above.
- Back lit LED arrays with optics provide highlyefficient and unpixilated transfer of light tothe diffuser.
- Integral clips accommodate definitive attachment to T-bar grid for recessed applications.
- Die formed surface box accessory kit post painted gloss white enamel.

Enclosure

- Diffuser provides visual comfort and high efficiency.
- Flat opal lens is easy to clean and provides a uniform aesthetic on the ceiling plane.
- Tight enclosure assembly impedes ingress of dust and insects.

Electrical

- Up to 130 lm/W efficacy.
- High efficiency Advance driver featuring high power factor (>0.90), 120-277V 60/50Hz, and less than 15% THD.
- Minimum start temperature -20°C (-4°F).
- Standard configurations are 0-10V dimming to 1%. Base configurations are to 5%.
- To predict lumen output in emergency mode,multiply emergency pack wattage by luminiare efficacy, then by 1.10. Typical lumen output is 1200lm for BSL10LST, and 850lm for BSL6LST.
- Electromagnetic interference (EMI) compliant to FCC Title 47 Part 15 class A.
- Flicker and stroboscopic effect compliant to NEMA 77-2017.
- TM-21 predicted L70 lumen maintenance up to 90,000 hours per LED manufacturer LM-80 report.
- cULus (Base) or cETLus (Standard) listed to UL and CSA standards, suitable for damp locations.
- Rated for clean room use - meets ISO14644-1 Class 5-9 (equivalent to Federal Standard No. 209E Class 100-100,000)
- Base and Standard configurations are IC rated.
- FluxPanel luminaires are Designlights Consortium® Standard and Premium qualified. Please see the DLC QPL list for exact catalog numbers (www.designlights.org/QPL).

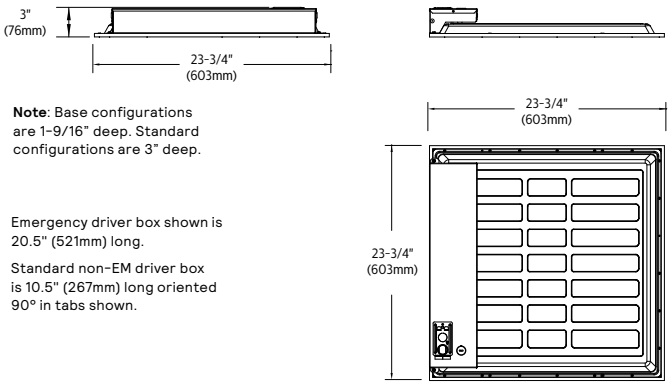
General Notes

- All options factory installed.
- All accessories are field installed.
- Many luminaire components, such as reflectors, refractors, lenses, sockets, lampholders, and LEDs are made from various types of plastics which can be adversely affected by airborne contaminants. If sulfur based chemicals, petroleum based products, cleaning solutions, or other contaminants are expected in the intended area of use, consult factory for compatibility.
- Five year limited luminaire warranty includes LED boards and driver. Visit www.signify.com/warranties for complete warranty information.

Energy data

Luminaire	Catalog Number	Input Power	Efficacy	DLC
2x2 Standard	2FPZ20L840	16	127	Premium
	2FPZ30L840	23	129	Premium
	2FPZ38L840	34	129	Premium
	2FPZ45L840	36	128	Premium
2x2 Base	2FPZ38B840	33	119	Standard

Dimensions



Note: Base configurations are 1-9/16" deep. Standard configurations are 3" deep.

Emergency driver box shown is 20.5" (521mm) long.

Standard non-EM driver box is 10.5" (267mm) long oriented 90° in tabs shown.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KK, KK1, KK2

Kugler Ning Lighting

2FPZ FluxPanel LED recessed 2x2

Up to 5400 lumens

Wireless Controls Options

SpaceWise DT (SWZDT)

- Standalone daylight and occupancy sensing with advanced grouping, wireless mesh networking and dwell time.
- Commissioning via compatible Android phone and Philips Field App
- Dimming via compatible Zigbee wireless wall switch only (see link below for details)
- Register for the commissioning app at http://registration.componentcloud.philips.com/appregistration/
- Integral sensing options may not be combined
- For more information including recommended switches, refer to the following: –

  SWZDT – www.usa.lighting.philips.com/systems/lighting-systems/spacewise

Emergency Options (ER100)

- Power Sensing (Factory default) – Recommended UL924 option requires unswitched power sense line, absence of voltage on the normal circuit triggers luminaire to 100% output
- Power Interruption Detection (Field option) – Detects AC power interruption >30ms triggers 90 minute emergency mode with luminaire at 100% output

Interact Pro scalable sensor for Foundation, Advanced & Enterprise tiers (SWZCS and an evolution of SpaceWise)

- SWZCS is a connected sensor with integral occupancy and daylight sensing and supports wireless mesh connectivity.
- The sensor works in the Foundation mode (similar to SpaceWise) when configured without a gateway or in an Interact Pro Advanced or Enterprise mode if a compatible gateway is used.
- Interact Pro includes an App, a portal and a broad portfolio of wireless luminaires, lamps and retrofit kits all working on the same system.
- Startup is implemented via Interact Pro App (Android or iPhone) & BlueTooth connectivity. The App provides flexibility to choose between a gateway or non gateway mode for setup.
- Setup with the gateway requires wired internet access to the gateway. It is possible to add a gateway at a later point.
- Prepare project configuration steps remotely and use IRT9015 remote onsite to identify and group devices together.
  - Compatible with:
    - SWS200 wireless scene switch
    - Battery powered IP42 presence sensor OCC sensor IA CM WH 10/1
    - Battery powered IP42 presence & daylight sensor OCC-DL sensor IA CM IP42 WH
    - LCN3110: Battery powered IP65 presence sensor, OCC sensor IA CM IP65WH
    - LCN3120: Battery powered IP65 presence & daylight sensor, OCC-DL sensor IA CM IP65 WH
  - For more information on Interact Pro visit: www.interact-lighting.com/interactproscalablesystem

Radio only sensor (RADIO)

- Integral RADIO only sensor simply enables wireless mesh connectivity to the luminaire without any occupancy or daylight sensing.
- Ideal for applications where sensing functionality is managed by other Interact devices and the luminaire only needs to have wireless connectivity.

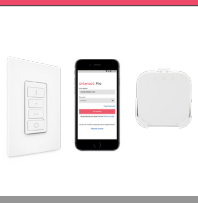
SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KK, KK1, KK2

Kugler Ning Lighting

2FPZ FluxPanel LED recessed 2x2

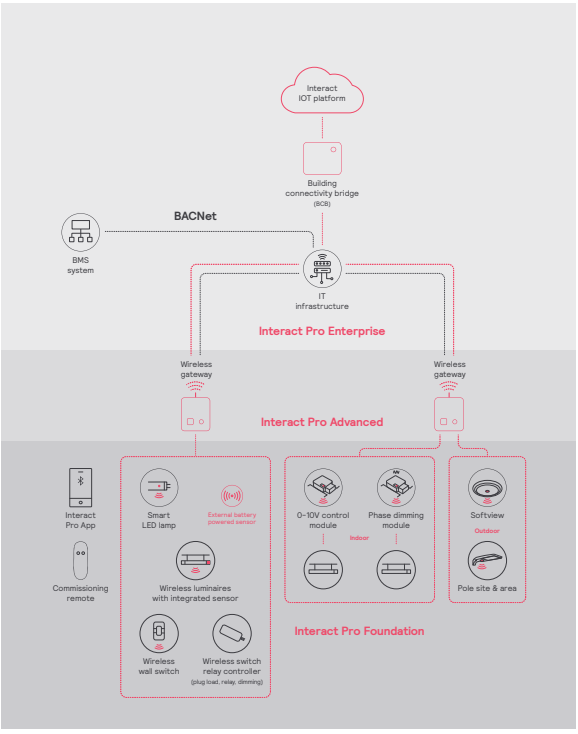
Up to 5400 lumens

	Interact Pro scalable system		
			
	Foundation	Advanced	Enterprise
Dimming, grouping, and zoning	✓	✓	✓
Bluetooth and ZigBee enabled	✓	✓	✓
Motion sensing and daylight harvesting	✓	✓	✓
Integration with 0–10V and phase dimming fixtures	✓	✓	✓
Code compliance	✓	✓	✓
Granular dimming and dwell time	✓	✓	✓
Energy reporting and monitoring		✓	✓
Scheduling		✓	✓
Demand response		✓	✓
BMS integration (BACnet)			✓
Floor plan visualization			✓
IoT sensors for wellness			✓
IoT Apps for productivity			✓

Currently supported maximum system size

To be able to design the lighting system correctly for the customer, it is important to know the prime characteristics of the system, its possibilities and limitations.

System level	
Total number of gateways	Unlimited
Total number of devices	200 per network
• luminaires with integrated sensors	150
• smart TLEDS	150
Total number of ZGP devices (sensors and switches)	50
• sensors	30
• switches	50
• zones and groups	64
Group level	
Recommended number of lights	40 (recommended 25)
Number of ZGP devices	5
Number of scenes	16



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KK, KK1, KK2

UHNJ - EMERGENCY DEPARTMENT EXPANSION

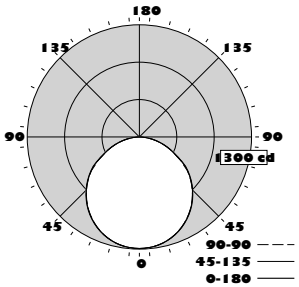
Kugler Ning Lighting

2FPZ FluxPanel LED recessed 2x2

Up to 5400 lumens

2FPZ38L835-2-DS-UNV-DIM

Luminaire Lumens	3710
Luminaire Efficacy Rating (LER)	125
Total Luminaire Watts	29.8
Spacing Criterion (0-180)	1.26



Candela Distribution						Flux
	0	22.5	45	67.5	90	Lumens
0	1293	1293	1293	1293	1293	
5	1288	1287	1288	1287	1288	122
15	1245	1244	1244	1244	1245	351
25	1159	1156	1155	1156	1159	533
35	1034	1030	1028	1030	1034	644
45	873	869	866	869	873	671
55	686	681	677	681	686	607
65	445	441	439	441	445	442
75	248	244	244	244	248	259
85	69	67	71	67	69	79
90	4	8	24	8	4	

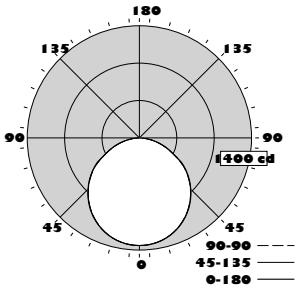
Zonal Lumen Summary			
Zone	Lumens	%Fixture	%Lamp
0-30	1007	27.1%	27.1%
0-40	1651	44.5%	44.5%
0-60	2928	78.9%	78.9%
0-90	3709	100.0%	100.0%
0-180	3710	100.0%	100.0%

Avg. Luminance (cd/m²)			
	0	90	180
0	4247	4247	4247
5	4247	4246	4247
15	4234	4230	4234
25	4199	4185	4199
35	4145	4120	4145
45	4056	4023	4056
55	3930	3879	3930
65	3461	3414	3461
75	3146	3096	3146
85	2604	2657	2604

Coefficients of Utilization %											
Pc---	80				70			50			0
Pw---	70	50	30	10	70	50	30	50	30	10	0
RCR											
0	119	119	119	119	116	116	116	111	111	111	100
1	109	104	99	96	106	101	98	97	94	91	83
2	99	90	83	78	96	88	82	85	80	75	69
3	90	79	71	65	87	78	70	75	68	63	58
4	82	70	61	55	80	69	61	66	59	53	50
5	76	63	54	47	74	62	53	59	52	46	43
6	70	56	47	41	68	55	47	54	46	40	38
7	65	51	42	36	63	50	42	49	41	36	33
8	60	47	38	32	59	46	38	45	37	32	30
9	56	43	35	29	55	42	34	41	34	29	27
10	53	39	32	26	51	39	31	38	31	26	24

2FPZ38L840-2-DS-UNV-DIM

Luminaire Lumens	3857
Luminaire Efficacy Rating (LER)	129
Total Luminaire Watts	29.8
Spacing Criterion (0-180)	1.27



Candela Distribution						Flux
	0	22.5	45	67.5	90	Lumens
0	1344	1344	1344	1344	1344	
5	1339	1337	1339	1337	1339	127
15	1294	1292	1293	1292	1294	365
25	1204	1202	1201	1202	1204	554
35	1074	1071	1068	1071	1074	670
45	908	904	901	904	908	697
55	713	708	705	708	713	632
65	463	459	456	459	463	461
75	257	253	252	253	257	269
85	71	69	71	69	71	81
90	4	8	22	8	4	

Zonal Lumen Summary			
Zone	Lumens	%Fixture	%Lamp
0-30	1046	27.1%	27.1%
0-40	1716	44.5%	44.5%
0-60	3045	78.9%	78.9%
0-90	3856	100.0%	100.0%
0-180	3857	100.0%	100.0%

Avg. Luminance (cd/m²)			
	0	90	180
0	4413	4413	4413
5	4415	4413	4415
15	4400	4397	4400
25	4363	4351	4363
35	4307	4283	4307
45	4216	4185	4216
55	4084	4035	4084
65	3594	3543	3594
75	3256	3203	3256
85	2676	2679	2676

Coefficients of Utilization %											
Pc---	80				70			50			0
Pw---	70	50	30	10	70	50	30	50	30	10	0
RCR											
0	119	119	119	119	116	116	116	111	111	111	100
1	109	104	99	96	106	102	98	97	94	91	83
2	99	90	83	78	96	88	82	85	80	75	69
3	90	79	71	65	87	78	70	75	68	63	58
4	82	70	61	55	80	69	61	66	59	53	50
5	76	63	54	47	74	62	53	59	52	46	43
6	70	56	47	41	68	55	47	54	46	40	38
7	65	51	42	36	63	50	42	49	41	36	33
8	60	47	38	32	59	46	38	45	37	32	30
9	56	43	35	29	55	42	34	41	34	29	27
10	53	39	32	26	51	39	31	38	31	26	24

Signify

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Signify Canada Ltd.
281 Hillmount Road,
Markham, ON, Canada L6C 2S3
Telephone 800-668-9008

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KK, KK1, KK2

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

MEDMASTER DOWNLIGHT

Luminaires for Surgical Applications

M4DL4 SERIES

PROJECT INFORMATION

Job Name _____

Fixture Type _____

Catalog Number _____

Approved by _____

PRODUCT FEATURES:

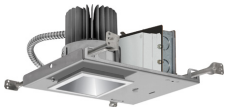
» 4" sealed, recessed downlight with round or square aperture

» Conducted emissions controlled as per MIL-STD-461G

» Delivered lumens: 983 - 2,640 lm

» 1% Dimming via 0-10V or DALI control

Round



Square

SPECIFICATIONS

HEAT SINK: Die-cast aluminum with external radial fins for natural convection.

ROUGH-IN FRAME: 18-gauge die-formed, corrosion-resistant steel. Vertically adjustable collar accommodates ceiling thicknesses up to 2", adjustable post-installation. Adjustable mounting bars for installation with wood and steel frame joists and T-grid ceiling systems spaced up to 24" on center. Quick-access junction box accessible post-installation from above and below ceiling. Includes (5) 1/2" knock-outs to allow straight conduit runs.

TRIM/HOUSING SECTION: IP-rated housing section incorporates the heat sink, LED module, optics and lower trim. Regressed lens trim is secured to the Rough-In frame with hidden torsion springs. Anti-microbial finish standard on all exposed painted surfaces.

OPTICAL: High-Efficiency mixing chamber design with regressed diffused acrylic lens producing uniform light output.Round or square aperture. Available with various reflector finishes. See Reflector Finish Ordering Information for available options.

ELECTRICAL: LED array available in multiple CCT and CRI combinations with a maximum 3-step MacAdam variation allowance. See Trim Ordering Information for available options. 120-277VAC or 347VAC, 50/60Hz electrical input with serviceable constant current driver (<20% THD, >0.90 PF). Minimum 85% driver efficiency. Standard 0-10V dimming with 1-100% range and dim-to-dark capabilities (non dim-to-dark with 347V); 165µA maximum source current. Optional eldoLED ECOdrive DALI driver with 1-100% range.

PHOTOMETRICS: Photometry tested to the IESNA LM-79-08 standard by an ILAC/ISO17025 accredited laboratory. For photometric information, go to www.kenall.com.

WARRANTY: Limited five (5) year LED warranty.

LISTINGS: Luminaire is certified to UL standards by Intertek Testing Laboratory for non-IC and Wet Location installations. IP64 rating per IEC60598. NSF2 Splash/Non-Food Zone. Conducted emissions controlled as per MIL-STD-461G. Optional CCEA compliant.

LED · ETL · MIL STD 461G · NSF · IP64 · CCEA OPTION

ORDERING INFORMATION (EX: M4DL4-DCFW-14L-35K8-FW-RIS4-277-DIM1)

TRIM

Model	Trim Finish	Lamp Power	Lamp Color	Reflector Finish
	DCFW			

Model
M4DL4 4" Surgical - Round
M4DL4S 4" Surgical - Square

Trim Finish
DCFW Die-Cast Aluminum in Flat White

Lamp Power
14L 14 Watt LED
28L* 28 Watt LED

Lamp Color
30K8 3000K / 80 CRI min.
30K9 3000K / 90 CRI min.
35K8 3500K / 80 CRI min.
35K9 3500K / 90 CRI min.
40K8 4000K / 80 CRI min.
40K9 4000K / 90 CRI min.
50K8 5000K / 80 CRI min.

Reflector Finish
FW Flat White
CD Clear Diffuse
CS Clear Specular (square only)
CSS Clear Semi-Specular (round only)

ROUGH-IN

Rough-In	Input Voltage	Driver Type	Options

Rough-In
RIS4 4" Surgical Rough-In - Round
RIS4S 4" Surgical Rough-In - Square

Input Voltage
120 120VAC, 50/60Hz
277 277VAC, 50/60Hz
347† 347VAC, 60Hz

Driver Type
DIM1 0-10V Dimming to 1%
DALI DALI Dimming to 1%

Options
FS Fuse & Holder
CCEA CCEA Approved (n/a 347V)

† N/A with DALI Driver Type
* Must be installed with a minimum 24" on-center spacing, 12" from wall, and have 1/2" clearance above the Trim/Housing

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KL

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

For additional photometry, go to www.kenall.com

MEDMASTER DOWNLIGHT

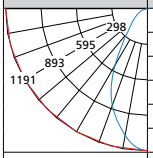
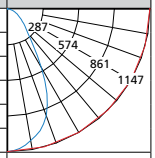
Luminaires for Surgical Applications

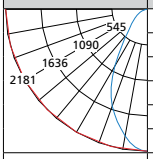
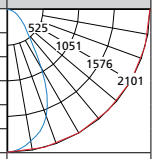
M4DL4 SERIES

PERFORMANCE

Optic		Lamp Power	Initial Delivered Lumens, By Lamp Color							Efficacy (lm/W)	Input Power (W)	Estd. L70 LED Life (hrs)
Reflector	Reflector Finish		30K8	30K9	35K8	35K9	40K8	40K9	50K8			
Round	CD	14L	1,175	983	1,175	995	1,222	995	1,249	61 - 78	16	80,000
		28L	2,152	1,800	2,152	1,822	2,239	1,822	2,287	58 - 74	31	85,000
	CSS	14L	1,248	1,044	1,248	1,056	1,298	1,056	1,326	65 - 83	16	80,000
		28L	2,286	1,911	2,286	1,934	2,377	1,934	2,428	62 - 78	31	85,000
	FW	14L	1,303	1,090	1,303	1,103	1,355	1,103	1,385	68 - 87	16	80,000
		28L	2,387	1,996	2,387	2,020	2,482	2,020	2,536	64 - 82	31	85,000
Square	CD	14L	1,251	1,046	1,251	1,059	1,301	1,059	1,329	65 - 83	16	80,000
		28L	2,291	1,916	2,291	1,939	2,383	1,939	2,435	62 - 79	31	85,000
	CS	14L	1,357	1,134	1,357	1,148	1,411	1,148	1,442	71 - 90	16	80,000
		28L	2,485	2,078	2,485	2,103	2,584	2,103	2,640	67 - 85	31	85,000
	FW	14L	1,350	1,129	1,350	1,142	1,404	1,142	1,434	71 - 90	16	80,000
		28L	2,472	2,067	2,472	2,092	2,571	2,092	2,627	67 - 85	31	85,000

Subject to change without notice. Visit www.kenall.com for ies files and additional information.

Round Aperture Candela Curve	M4DL4-DCFW-14L-40K8-FW		Distance to illuminated plane (ft)	M4DL4S-DCFW-14L-40K8-FW		Square Aperture Candela Curve
	Initial center beam foot-candles	Beam diameter (ft)		Initial center beam foot-candles	Beam diameter (ft)	
	23.8	4.2	5'	22.9	4.3	
	16.5	5.3	6'	15.9	5.6	
	12.2	6.2	7'	11.7	6.8	
	9.3	7.1	8'	9.0	7.7	
	7.4	8.0	9'	7.1	8.7	
	5.9	9.0	10'	5.7	9.7	
Spacing Criteria: 0.88	foot-candle multipliers for 30K8(.96), 30K9(.80), 35K8(.96), 35K9(.81), 40K9(.81), 50K8(1.0)					Spacing Criteria: 0.92
Beam Angle: 57.1	Beam diameter is where foot-candles drop to 50% of maximum					Beam Angle: 58.6

Round Aperture Candela Curve	M4DL4-DCFW-28L-40K8-FW		Distance to illuminated plane (ft)	M4DL4S-DCFW-28L-40K8-FW		Square Aperture Candela Curve
	Initial center beam foot-candles	Beam diameter (ft)		Initial center beam foot-candles	Beam diameter (ft)	
	43.6	4.2	5'	42.0	4.3	
	30.3	5.4	6'	29.2	5.6	
	22.3	6.3	7'	21.4	6.8	
	17.0	7.1	8'	16.4	7.7	
	13.5	8.0	9'	13.0	8.6	
	10.9	8.9	10'	10.5	9.6	
Spacing Criteria: 0.88	foot-candle multipliers for 30K8(.96), 30K9(.80), 35K8(.96), 35K9(.81), 40K9(.81), 50K8(1.0)					Spacing Criteria: 0.92
Beam Angle: 57.1	Beam diameter is where foot-candles drop to 50% of maximum					Beam Angle: 58.6

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M4DL4-061021

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KL

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

MEDMASTER DOWNLIGHT

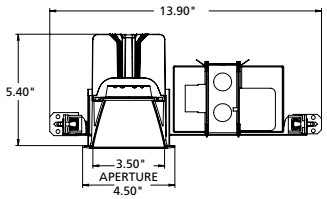
Luminaires for Surgical Applications

M4DL4 SERIES

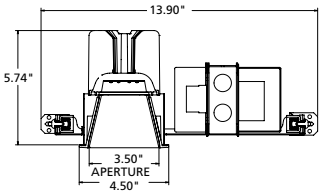
DIMENSIONAL DATA

CROSS SECTION

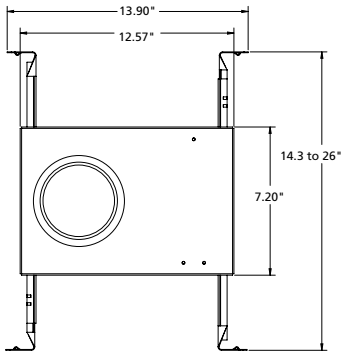
Round Aperture



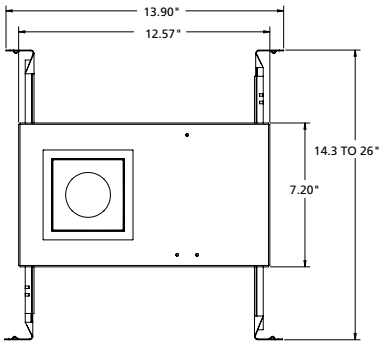
Square Aperture



BOTTOM VIEW



RECOMMENDED CEILING CUTOUT: 4.125" DIA.



RECOMMENDED CEILING CUTOUT: 4.125"× 4.125"

M4DL4-061021

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KL

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

MEDMASTER® SAFESLOT™

Luminaires for Behavioral Health Applications

BHRS4 SERIES

PROJECT INFORMATION

Job Name _____

Fixture Type _____

Catalog Number _____

Approved by _____

PRODUCT FEATURES:

» 4" recessed linear slot luminaire in multiple lengths

» Single-function luminaire provides ambient lighting within the patient room

» Symmetric and 10° asymmetric optical distribution options

» One-piece doorframe with continuous lens retention and tamper-resistant fasteners

» High-output, high-CRI LED lamp sources

SPECIFICATIONS

HOUSING: Extruded 6063-T5 aluminum construction with aluminum endcaps. Low-gloss anti-microbial white TGIC polyester powder-coat finish with five-stage pre-treatment applied to exterior, room-side components.

DOORFRAME: One-piece extruded 6063-T5 aluminum outer frame with low-gloss anti-microbial white TGIC polyester powder-coat finish with five-stage pre-treatment. Inner aluminum extrusion continuously bonds lens to door. Closed-cell gasketing. Tamper-resistant T20 TORX fasteners secure doorframe to housing.

OPTIC: Symmetric (Lambertian) or 10° asymmetric distribution option. Diffused polycarbonate lens with 0.188" overall thickness.

LED MODULE: Serviceable mid-power LED array. Minimum 82 CRI standard (R9>20). See Ordering Information for available color temperature options.

DRIVER: 120-277VAC or 347VAC, 50/60Hz electrical input with serviceable constant-current driver (<20% THD, >0.90 PF). Minimum 85% driver efficiency. Standard 0-10V dimming with 1-100% range and dim-to-dark capabilities (non dim-to-dark with 347V); maximum 330 µA maximum source current. Optional eldoLED ECOdrive DALI drivers with 1-100% range.

INSTALLATION: Suitable for Type-IC recessed ceiling installation into 9/16" and 15/16" lay-in and tegular grid ceilings, flanged drywall ceilings and trimless mud-in installations with 5/8" drywall. See Ordering Information for selection. Suitable for 0°C - 40°C ambient temperature environments.

PHOTOMETRICS: Photometry tested to the IESNA LM-79-08 standard by an ILAC/ISO17025 accredited laboratory. For detailed photometric information, please visit www.kenall.com.

WARRANTY: Limited five (5) year warranty.

LISTINGS: Luminaire is certified to UL standards by Intertek Testing Laboratories for Type-IC and Wet Location installations. IP65 rating per IEC60598. NSF2 Splash/Non-Food Zone rated. Standard CCEA compliance.

ORDERING INFORMATION (Ex: BHRS4-48-FL-ASYM-750LF-35K9-DIM1-DV-LVCD/M-FS)

Model	Length	Ceiling Configuration	Optical Distribution	Lumen Output	Lamp Color	Driver Type	Voltage	Low-Voltage Controller	LVC Master / Satellite	Options	Accessories
BHRS4									/		

Nominal Length
24 2'
36 3'
48 4'
72 6'
96 8'

Ceiling Configuration
G 9/16" and 15/16" Lay-In Grid
TG 9/16" and 15/16" Tegular Grid
FL Flange
TM Trimless Mud-In for 5/8" Drywall

Optical Distribution
SYM Symmetric
ASYM Asymmetric

Lumen Output
500LF 500 lumens/ft
750LF 750 lumens/ft
1000LF 1000 lumens/ft

Lamp Color
30K8 3000K / 80 CRI min.
30K9 3000K / 90 CRI min.
35K8 3500K / 80 CRI min.
35K9 3500K / 90 CRI min.
40K8 4000K / 80 CRI min.
40K9 4000K / 90 CRI min.

Driver Type
DIM1 0-10V Dimming to 1%
DALI* DALI Dimming to 1% (n/a with 6' length and 1000LF in 8' length)

Input Voltage
DV 120-277VAC, 50/60Hz
347 347VAC, 60Hz (n/a with 2' and 3' lengths)

Low-Voltage Controller (Optional)
LVC* Low Voltage Controller (click here for specifications)
LVCD* Low Voltage Controller with Dimming (click here for specifications)

LVC Master/Satellite for Paired Installations^
M Paired 'Master-Control' Luminaire
S Paired 'Satellite-Control' Luminaire

Options
LEL** Integral Emergency Battery Backup with Remote Test Button
FS Fuse & Holder

Accessories
T20 T20 Tamper-Resistant Torx Bit (D-0552)

* n/a with 347V
^ N/A for products not configured with an LVC option. Paired installations shall be ordered with equal quantities of Type 'M' and 'S' units. AC power feed required to both. Lamp control originates from LVC located in the Master unit. Control wiring method between luminaires supplied by others.
* LEL only available in Satellite unit when ordered in conjunction with an LVC or LVCD controller.

ACCESSORIES ORDERED SEPARATELY
MPWS Low Voltage Wall Switch (Click here for Specifications)

KENALL® | www.kenall.com | P: 800-4-Kenall | F: 262-891-9701 | 10200 55th Street Kenosha, Wisconsin 53144, USA
A brand of legrand®

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KM, KN

Kugler Ning Lighting

MEDMASTER® SAFESLOT™

Luminaires for Behavioral Health Applications

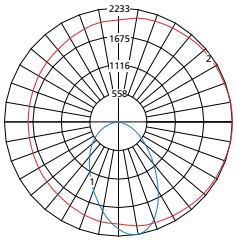
BHRS4 SERIES

PERFORMANCE

Distribution Type	Nominal Lumen Output	Initial Delivered Lumens per Foot, by Lamp Color (lm/ft)						Efficacy (lm/W)	Unit Input Power (W/ft)	Estd. L_{70} LED Life (Hrs)
		30K8	30K9	35K8	35K9	40K8	40K9			
ASYM	500LF	518	425	530	435	524	446	59 - 73	7	85,000
	750LF	765	628	783	643	774	659	55 - 69	11	85,000
	1000LF	992	814	1,015	834	1,004	854	52 - 65	16	85,000
SYM	500LF	477	412	492	422	508	433	68 - 84	6	85,000
	750LF	719	621	741	636	766	652	66 - 81	9	85,000
	1000LF	947	818	976	838	1,009	859	64 - 79	13	85,000

Nominal Lumen Output values based on 40K8 lamp color. Information subject to change without notice.
Visit www.kenall.com for IES files and additional information.

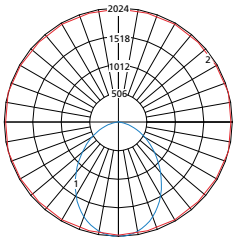
Model: BHRS4-48-yy-ASYM-1000LF-40K8-DIM1-zzz



Maximum Candela = 2233 Located At Horizontal Angle = 0, Vertical Angle = 10

1 - Vertical Plane Through Horizontal Angles (0-180) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (10) (Through Max. Cd.)

Model: BHRS4-48-yy-SYM-1000LF-40K8-DIM1-zzz



Maximum Candela = 2033 Located At Horizontal Angle = 15, Vertical Angle = 2.5

1 - Vertical Plane Through Horizontal Angles (15-195) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (2.5) (Through Max. Cd.)

BHRS4-012623

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KM, KN

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

For additional photometry, go to www.kenall.com

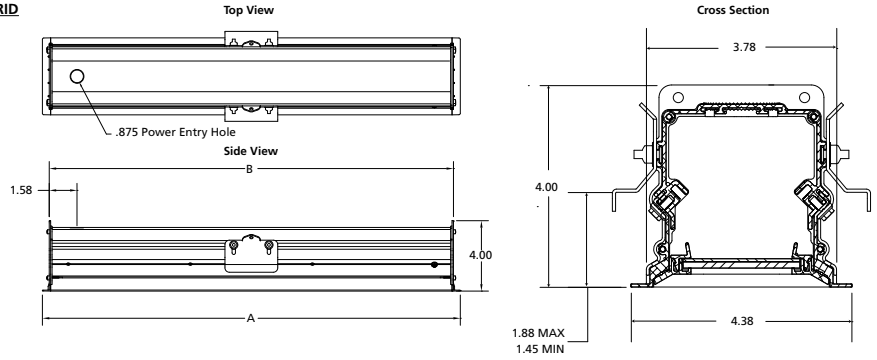
MEDMASTER® SAFESLOT™

Luminaires for Behavioral Health Applications

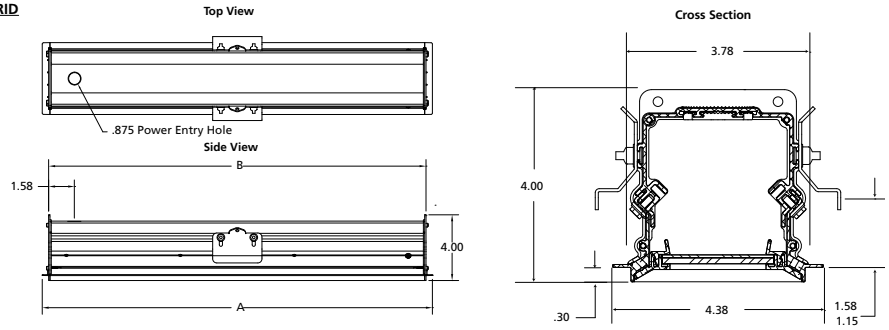
BHRS4 SERIES

DIMENSIONAL DATA

LAY-IN GRID



TEGULAR GRID



Nominal Length	Ceiling Configuration	A	B
24	LAY-IN GRID	23.75"	22.97"
	TEGULAR	23.75"	22.97"
36	LAY-IN GRID	35.75"	34.97"
	TEGULAR	35.75"	34.97"
48	LAY-IN GRID	47.75"	46.97"
	TEGULAR	47.75"	46.97"
72	LAY-IN GRID	71.75"	70.97"
	TEGULAR	71.75"	70.97"
96	LAY-IN GRID	95.75"	94.97"
	TEGULAR	95.75"	94.97"

NOTE: Standard (non-LVC) and LVC Satellite units supplied with one (1) 0.875" hole on back of housing. When ordered with the LVC or LVCD option, the Master unit is provided with two (2) 0.875" holes.

BHRS4-012623

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KM, KN

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

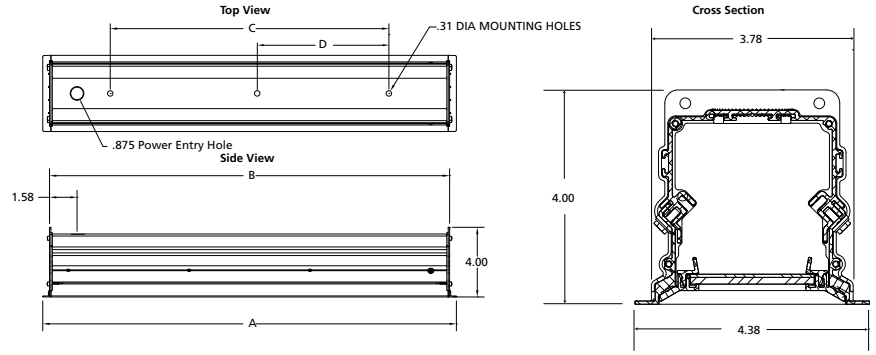
MEDMASTER® SAFESLOT™

Luminaires for Behavioral Health Applications

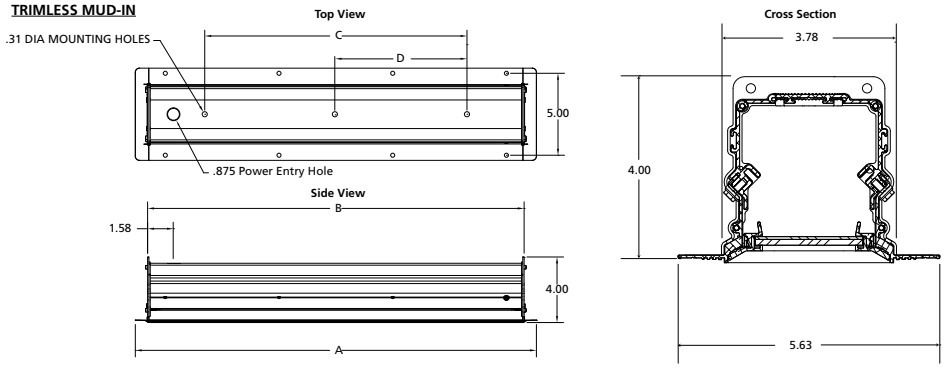
BHRS4 SERIES

DIMENSIONAL DATA

FLANGE



TRIMLESS MUD-IN



Nominal Length	Ceiling Configuration	A	B	C	D	Ceiling Cut-Out
24	FLANGE	23.75"	22.97"	16.00"	----	3.875" × 23.25"
	TRIMLESS	24.47"	22.97"	16.00"	----	
36	FLANGE	35.75"	34.97"	28.00"	----	3.875" × 35.25"
	TRIMLESS	36.47"	34.97"	28.00"	----	
48	FLANGE	47.75"	46.97"	40.00"	----	3.875" × 47.25"
	TRIMLESS	48.47"	46.97"	40.00"	----	
72	FLANGE	71.75"	70.97"	64.00"	32.00"	3.875" × 71.25"
	TRIMLESS	72.47"	70.97"	64.00"	32.00"	
96	FLANGE	95.75"	94.97"	88.00"	44.00"	3.875" × 95.25"
	TRIMLESS	96.47"	94.97"	88.00"	44.00"	

NOTE: Standard (non-LVC) and LVC Satellite units supplied with one (1) 0.875" hole on back of housing. When ordered with the LVC or LVCD option, the Master unit is provided with two (2) 0.875" holes.

BHRS4-012623

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KM, KN

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

KIRLIN HEALTHCARE LIGHTING

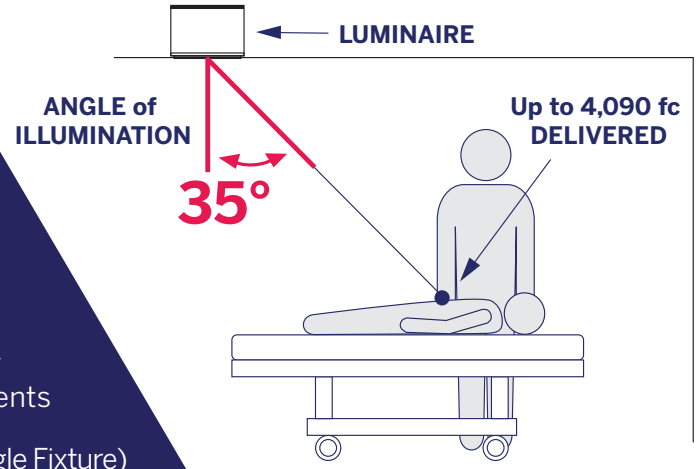
INFRALED® PRO 35

Catalog#: **PRO-12035**

Job Name: Type:

Recessed Aimable LED Exam Light for Emergency, Patient Room, & ICU

- 35° Tilt, 360° Rotation
- Fully Recessed System
- Ultimate Infection Control
- Cool LED Beams, 95+ CRI
- Wall and Remote Controlled
- Adjustable Direction & Intensity Suitable for Dynamic Environments
- 4,090 fc (44,024 lux) on Task (Single Fixture)



INFRALED® PRO
Configurable remote-aimable lighting system for healthcare applications

60	**PRO 60** High-angle exam light with 60° beam for Childbirth & Surgery	45	**PRO 45** 19" exam light with 45° beam for OR, Hybrid OR, & Cath Lab
35	**PRO 35/PRO 35V** 12" exam light with 35° beam for ICU, Patient Room, ED, & Behavioral	25	**PRO 25** 9" exam light with 25° beam for NICU, ICU, & Patient Room

Kirlin Lighting | 3401 E. Jefferson Ave., Detroit, MI 48207-4232, USA | P: 313.259.6400 | www.kirlinlighting.com

FCC Part 15 Certified

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KP

KNL
Kugler Ning Lighting

KIRLIN HEALTHCARE LIGHTING

INFRALED® PRO 35

PRO-12035

Recessed Aimable LED Exam Light for Emergency, Patient Room, & ICU

Luminaire Specifications (see page 4 for Controls Specifications)

Luminaires are sold individually, and include the following standard features:

- OPTeCOLOR™ LEDs: 95+ CRI, high R9 (72), R13 (96), R15 (96), cool beam, 60,000 hour life (L70). Cyanosis Observation Index of 2.7 meets AS/NZS 1680.2.5
- Blue LED indicator strip designates luminaire under active control
- BioGard™ anti-microbial white finish, regressed flare trim with tempered clear flat glass lens
- IP66 rated, sealed and gasketed trim
- Perforation-free, rust and corrosion proof aluminum housing (exceeds 1000hr ASTM salt spray test)
- Up to 35° tilt (from nadir)
- Up to 4,090 fc (44,024 lux) on task
- 0-10V CCR 100-1% dimming
- Input voltage: 110 - 277V
- Serviceable through aperture; convenient plug-in components for easy installation and service
- Lightweight 18.5 lbs; complies with OSHPD seismic requirements with addition of safety wires (by others)
- System wattage 54.1W (per luminaire)
- 5 year warranty

Options and Ordering Format

Must Specify		Optional		
Model	**CCT**	**Trim**	**Installation**	**Other Options**
PRO-12035				
	-35K: 3500K, 95+ CRI **-41K:** 4100K, 95+ CRI **-50K:** 5000K, 95+ CRI	**(Blank):** White BioGard™ trim, blue LED indicator **-94:** Custom color self-flanged trim; consult factory	**(Blank):** Suitable for installation in ceiling tile or sheetrock/drywall ceiling **-85:** Ceiling panel: lays into 2' x 2' grid	**(Blank):** None **-87:** Custom length (> 35') wall control cable; consult factory **-99:** Special modification; consult factory **-FS:** Single in line fuse **-SH:** Sealed housing and junction box

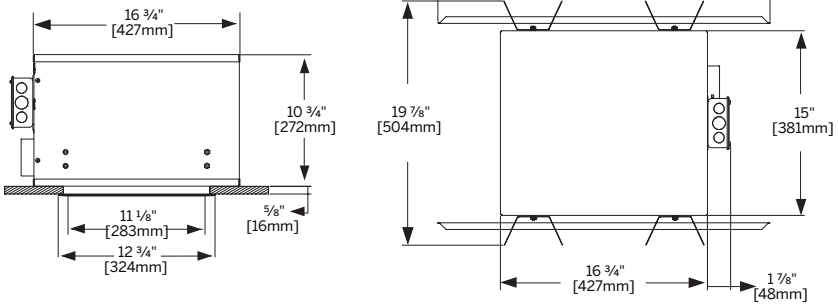
Full System Ordering Example

Part	Description	Quantity
PRO-12035-41K	INFRALED® PRO 35 Luminaires	2
PRO-WALLC	INFRALED® PRO Wall Control Panel	1
PRO-REMOT	INFRALED® PRO Remote Control	1
PRO-SENSR	Optional IR Remote Sensor	1

PRO-12 035-41K-XX-XX-XX-XX

- PRO-12: Series
- 035: Aperture Size
- 41K: Maximum Tilt (Degrees)
- XX: Color Temperature
- XX: Trim Options
- XX: Installation Options
- XX: Other Options

Dimensions



Drawing Not to Scale

FCC Part 15 Certified | Made in the USA | c UL us LISTED

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KP

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

KIRLIN HEALTHCARE LIGHTING

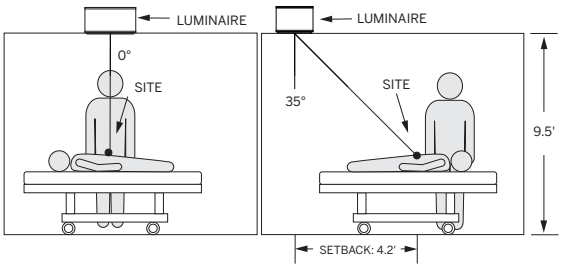
INFRALED® PRO 35

PRO-12035

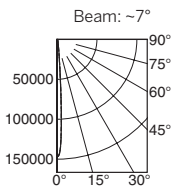
Recessed Aimable LED Exam Light for Emergency, Patient Room, & ICU

Single Luminaire Performance

All configuration and performance data assumes ceiling height of 9.5' and task elevation of 3.5'.



	Angle	Distance to Task	FC on Task	Lux on Task
Performance at Nadir	0°	6'	4,090	44,024
Performance at Max Angle	35°	7.3'	2,263	24,359



Cone of Light

Ft.	FC	Dia.
6.0	4090.0	0.7
8.0	2300.6	0.9
10.0	1472.4	1.2
12.0	1022.5	1.4
14.0	751.2	1.7
16.0	575.2	1.9

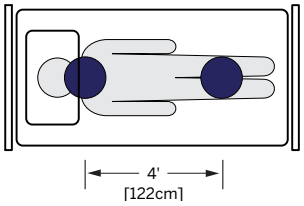
Cone of Light Key

Ft.: Distance from fixture
FC: Footcandles at nadir (0°)
Dia.: Circle of light at 50% of FC

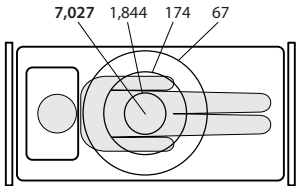
Photometric testing by I.T.L. (Boulder, CO); Test No. 93350

Two Light Configuration - 7,000+ fc Delivered

Top View

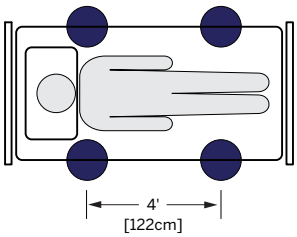


Footcandle Performance

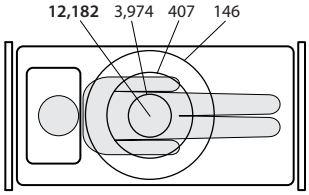


Four Light Configuration - 12,000+ fc Delivered

Top View



Footcandle Performance



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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KP

Kugler Ning Lighting

KIRLIN HEALTHCARE LIGHTING

INFRALED® PRO 35

PRO-12035

Recessed Aimable LED Exam Light for Emergency, Patient Room, & ICU

INFRALED® PRO 35 is controlled via wall control panel and optional remote control. Each controller supports up to 4 luminaires from the INFRALED® PRO family. Each wall control panel includes an infrared sensor. An optional ceiling-mounted infrared sensor is also available. All wall controls, remote controls, and remote sensors must be ordered separately.

Wall Control Panel (PRO-WALLC) Required

- Full function controls for power, fixture selection, intensity and direction
- Tactile-membranes and smooth surfaces for easy cleaning with isopropyl alcohol and disinfecting agents
- May be located outside of patient room or in a secure remote location. If remote control use is anticipated, add **PRO-SENSR** option, see below
- Includes infrared receiver for remote control operation
- Magnetic docking station for remote control
- Back box provided by Kirlin
- Add option **-ACH** (Alternative channel) on wall control when adding an additional wall control in the same room
- 5 year warranty

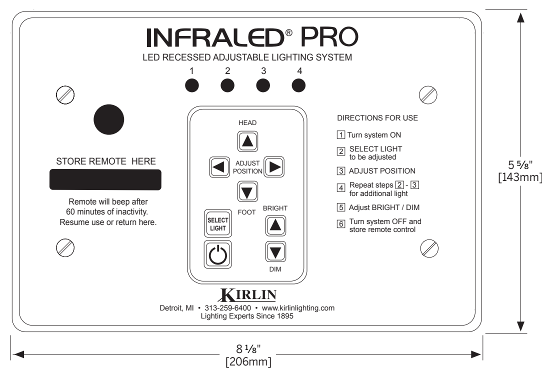
Remote Control (PRO-REMOT)

- Full function controls for power, fixture selection, intensity and direction
- Convenient one hand operation
- Tactile-membranes and smooth surfaces for easy cleaning with isopropyl alcohol and disinfecting agents
- Invisible infrared signal will not interfere with other equipment in the room
- Impact resistant construction
- Loss deterring beeper to remind user to return remote to docking station. Beeper is activated if remote control is not used for, nor returned to dock within 1 hour
- “Write-on” area for marking room number
- 2-AA batteries provided
- Low stand-by current assures long battery life
- Add option **-ACH** (alternative channel) on remote control when adding an additional remote/wall control in the same room
- Add option **-BI** (beeper inactive) when wishing to add a silence function to the remote
- Add **PRO-SENSR** (below) when wall control is located outside of patient room or obstructed from remote control’s IR signal
- 1 year warranty

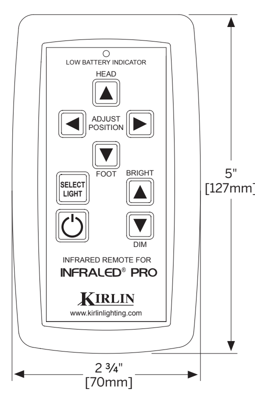
Remote Sensor (PRO-SENSR)

- Optional ceiling mounted infrared sensor enhances signal reception if wall control panel is obstructed
- Each PRO-WALLC supports one PRO-SENSR
- 5 year warranty

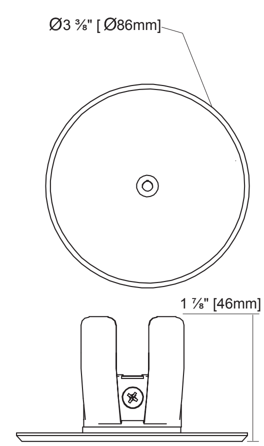
Wall Control Panel (PRO-WALLC)



Remote Control (PRO-REMOT)



Ceiling Mounted Infrared Sensor (PRO-SENSR)



INFRALED PRO JUNE 2023

FC FCC Part 15 Certified · Made in the USA · c UL us LISTED

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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KP

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

KIRLIN HEALTHCARE LIGHTING

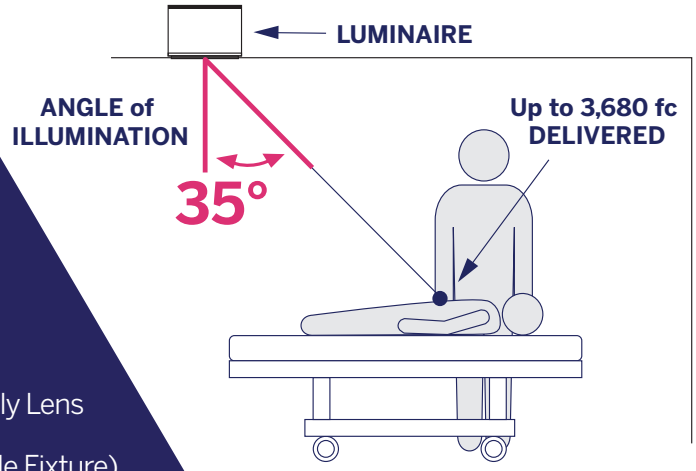
INFRALED® PRO 35V
BEHAVIORAL EXAM

Catalog#: **PRV-12035**

Job Name: Type:

Vandal/Ligature Resistant Recessed Aimable LED Exam Light for Behavioral Health

- 35° Tilt, 360° Rotation
- Fully Recessed System
- Ultimate Infection Control
- Cool LED Beams, 95+ CRI
- Wall and Remote Controlled
- Adjustable Direction & Intensity
- IK10 Impact Resistant Trim with Poly Lens
- 3680 fc (39,620 lux) on Task (Single Fixture)



INFRALED® PRO
Configurable remote-aimable lighting system for healthcare applications

60	**PRO 60** High-angle exam light with 60° beam for Childbirth & Surgery
45	**PRO 45** 19" exam light with 45° beam for OR, Hybrid OR, & Cath Lab
35	**PRO 35/PRO 35V** 12" exam light with 35° beam for ICU, Patient Room, ED, & Behavioral
25	**PRO 25** 9" exam light with 25° beam for NICU, ICU, & Patient Room

Kirlin Lighting | 3401 E. Jefferson Ave., Detroit, MI 48207-4232, USA | P: 313.259.6400 | www.kirlinlighting.com

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KP1

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

KIRLIN HEALTHCARE LIGHTING

INFRALED® PRO 35V BEHAVIORAL EXAM

PRV-12035

Vandal/Ligature Resistant Recessed Aimable LED Exam Light for Behavioral Health

Luminaire Specifications (see page 4 for Controls Specifications)

Luminaires are sold individually, and include the following standard features:

- OPTeCOLOR™ LEDs: 95+ CRI, high R9 (72), R13 (96), R15 (96), cool beam, 60,000 hour life (L70). Cyanosis Observation Index of 2.7 meets AS/NZS 1680.2.5
- BioGard™ anti-microbial white finish, regressed flare trim with clear flat poly lens
- IK10 impact resistant design with 0.22" polycarbonate lens and tamper-proof hardware
- Perforation-free, rust and corrosion proof aluminum housing (exceeds 1000hr ASTM salt spray test)
- Optional IP65-rated sealed and gasketed trim: stops migration of contaminants
- Up to 35° tilt (from nadir)
- Up to 3,680 fc (39,620 lux) on task
- 0-10V CCR 100-1% dimming
- Input voltage: 110 - 277V
- Serviceable through aperture; convenient plug-in components for easy installation and service
- Lightweight 19 lbs; complies with OSHPD seismic requirements with addition of safety wires (by others)
- System wattage 54.1W (per luminaire)
- 5 year warranty

Options and Ordering Format

Must Specify		Optional		
Model	**CCT**	**Trim**	**Installation**	**Other Options**
PRV-12035				
	-35K: 3500K, 95+ CRI **-41K:** 4100K, 95+ CRI **-50K:** 5000K, 95+ CRI	**(Blank):** White BioGard™ finish, 0.22" poly lens, tamper-proof hardware **-94:** Custom color self-flanged trim; consult factory **-I65:** IP65 rated trim and lens	**(Blank):** Suitable for installation in ceiling tile or sheetrock/drywall ceiling **-85:** Ceiling panel: lays into 2' x 2' grid	**(Blank):** None **-87:** Custom length (> 35') wall control cable; consult factory **-99:** Special modification; consult factory **-FS:** Single in line fuse **-SH:** Sealed housing and junction box

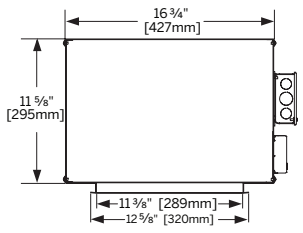
Full System Ordering Example

Part	Description	Quantity
PRV-12035-41K	INFRALED® PRO 35V Fixtures	2
PRO-WALLC	INFRALED® PRO Wall Control Panel	1
PRO-REMOT	INFRALED® PRO Remote Control	1
PRV-SENSR	Optional Vandal IR Remote Sensor	1

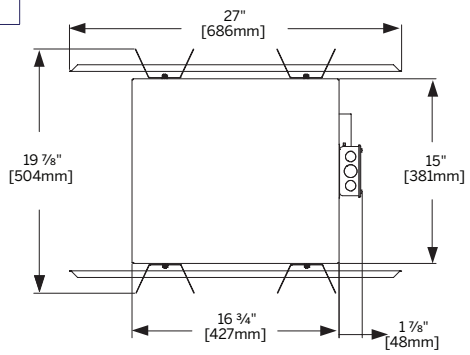
PRV-12 035-41K-XX-XX-XX-XX

- Series
- Aperture Size
- Maximum Tilt (Degrees)
- Color Temperature
- Trim Options
- Installation Options
- Other Options

Dimensions



Drawing Not to Scale



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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KP1

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

KIRLIN HEALTHCARE LIGHTING

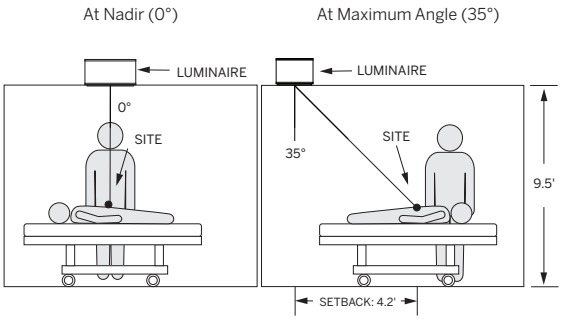
INFRALED® PRO 35V
BEHAVIORAL EXAM

PRV-12035

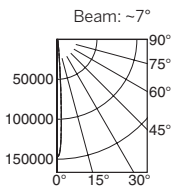
Vandal/Ligature Resistant Recessed Aimable LED Exam Light for Behavioral Health

Single Luminaire Performance

All configuration and performance data assumes ceiling height of 9.5' and task elevation of 3.5'.



	Angle	Distance to Task	FC on Task	Lux on Task
Performance at Nadir	0°	6'	3,680	39,620
Performance at Max Angle	35°	7.3'	2,035	21,923



Cone of Light

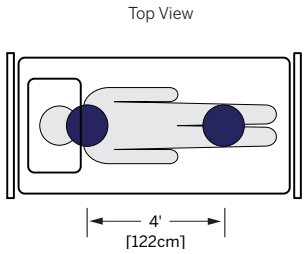
Ft.	FC	Dia.
6.0	4090.0	0.7
8.0	2300.6	0.9
10.0	1472.4	1.2
12.0	1022.5	1.4
14.0	751.2	1.7
16.0	575.2	1.9

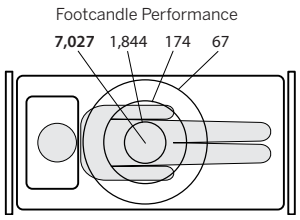
Cone of Light Key

Ft.: Distance from fixture
FC: Footcandles at nadir (0°)
Dia.: Circle of light at 50% of FC

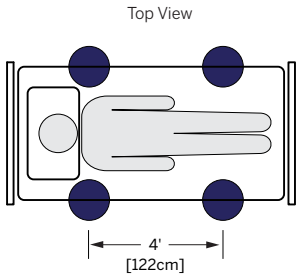
Photometric testing by I.T.L. (Boulder, CO); Test No. 93350

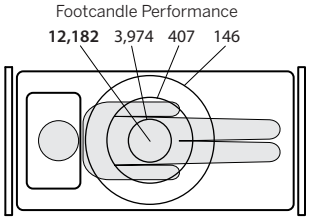
Two Light Performance - 7,000+ fc Delivered





Four Light Performance - 12,000+ fc Delivered





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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KP1

KIRLIN HEALTHCARE LIGHTING

INFRALED® PRO 35V
BEHAVIORAL EXAM
PRV-12035

Vandal/Ligature Resistant Recessed Aimable LED Exam Light for Behavioral Health

INFRALED® PRO 35V is controlled via wall control panel and optional remote control. Each controller supports up to 4 luminaires. Each wall control panel includes an infrared sensor. An optional vandal resistant ceiling-mounted infrared sensor is also available. All wall controls, remote controls, and remote sensors must be ordered separately.

Wall Control Panel (PRO-WALLC) Required

- Full function controls for power, fixture selection, intensity and direction
- Tactile-membranes and smooth surfaces for easy cleaning with isopropyl alcohol and disinfecting agents
- May be located outside of patient room or in a secure remote location.
- Includes infrared receiver for remote control operation
- Magnetic docking station for remote control
- Back box provided by Kirlin
- Add option **-ACH** (Alternative channel) on wall control when adding an additional wall control in the same room
- 5 year warranty

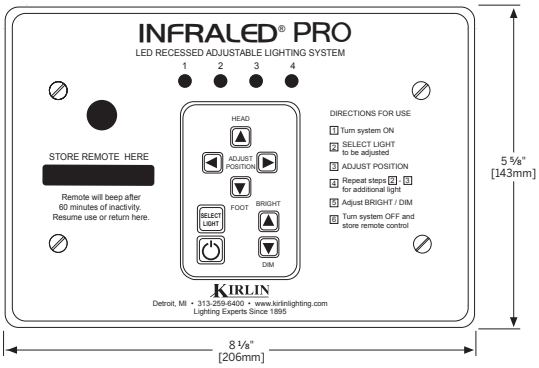
Remote Control (PRO-REMOT)

- Full function controls for power, fixture selection, intensity and direction
- Convenient one hand operation
- Tactile-membranes and smooth surfaces for easy cleaning with isopropyl alcohol and disinfecting agents
- Invisible infrared signal will not interfere with other equipment in the room
- Impact resistant construction
- Loss deterring beeper to remind user to return remote to docking station. Beeper is activated if remote control is not used for, nor returned to dock within 1 hour
- "Write-on" area for marking room number
- 2-AA batteries provided
- Low stand-by current assures long battery life
- Add option **-ACH** (alternative channel) on remote control when adding an additional remote/wall control in the same room
- Add option **-BI** (beeper inactive) when wishing to add a silence function to the remote
- Add **PRV-SENSR** (below) when wall control is located outside of patient room or obstructed from remote control's IR signal
- 1 year warranty

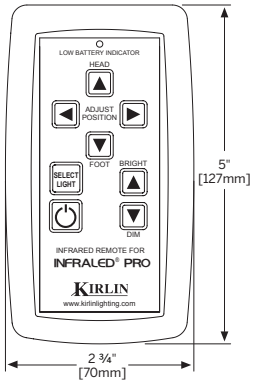
Remote Sensor (PRV-SENSR)

- Vandal-resistant ceiling mounted infrared sensor enhances remote control signal: Required if wall control panel is remotely located or is obstructed and remote control is being used. Optional under all other conditions.
- Beveled round flat plate with BioGard™ antimicrobial white finish and tamperproof hardware.
- Each PRO-WALLC supports one PRV-SENSR
- 5 year warranty

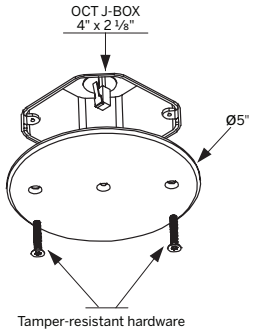
Wall Control Panel (PRO-WALLC)



Remote Control (PRO-REMOT)



Ceiling Mounted Infrared Sensor (PRV-SENSR)



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SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KP1

Kugler Ning Lighting

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Day-Brite CFI by signify

Linear

FluxStream strip

FSS 2', 3', 4', & 8'

Project:
Location:
Cat.No:
Type:
Lumens: Qty:
Notes:

Day-Brite / CFI FluxStream LED strip is a high performing luminaire delivering smooth diffuse light ideal for light industrial, commercial and residential applications with unparalleled energy efficiency.

Ordering guide – standard & wireless controls

example: FSS440L840-UNV-DIM

Series	Length (nominal)	Lumens[2] (nominal)	Color temp. (K)	Voltage	Driver	Options
FSS			–	–	–	
FSS FluxStream strip	**2** 2'	**20L** 2000 **30L** 3000	**830** 80 CRI, 3000K **835** 80 CRI, 3500K **840** 80 CRI, 4000K **850**[3] 80 CRI, 5000K	**UNV** Universal voltage 120-277V **120**[4] 120V **277**[4] 277V **347**[5] 347V	**DIM**[11] Dimming **SDIM**[6,7] Step dimming to 40% input power **XDIM**[4,6,7] MarkX phase dimming **DALI**[8] DALI	**EMLED**[5,6,9] Factory wired Bodine BSL310LP integral emergency pack. Nominal 1100lm **ER100**[12,13,17] UL924 listed bypass sensor relay, factory installed between driver & sensor PS/PI (Interact Pro compatible) **ER100/HVPS**[12,13,17] UL924 listed sensor bypass relay, factory installed between driver & sensor for 347/480 Power Sense (Interact Pro compatible) **ER100/HVPI**[12,13,17] UL924 listed sensor bypass relay, factory installed between driver & sensor 347/480 Power Interrupt (Interact Pro compatible) **GTD/E**[12] UL924 listed Bodine GTD factory installed on driver input **GTD/SNSR**[12,13] UL924 listed Bodine GTD factory installed between driver & sensor (alternate option to ER100) **SWZCS**[10,15] Interact Pro scalable sensor with integral daylight & occupancy sensing, advanced grouping with dwell time **SWZDT**[10] SpaceWise sensor, daylighting and occupancy, advanced grouping, with dwell time **RADIO**[10] Integral Interact Pro RF sensor, enables wireless connected lighting control **SWZCSH**[14] Interact Pro scalable high bay sensor with integral daylight & occupancy sensing, advanced grouping with dwell time for high mounting heights **IAOSB**[10,15] Interact Pro wireless sensor with occupancy, daylight, and environmental sensing capabilities **LSXR10** 120-347V motion sensor, factory installed on end cap **LSXR10ADC**[10] 120-347V motion sensor with photocell and hi/lo trim dimming, factory installed on end cap **PAF** Paint after fabrication for extra corrosion resistance (white) **BK** Matte black paint color **ST** Satin aluminum paint color **BAC**[18] Meets the requirements of the Buy American Act of 1933 (BAA)
	3 3'	**30L** 3000				
	4 4'	**30L** 3000 **40L** 4000 **55L** 5500 **70L** 7000				
	8[1] 8'	**60L** 6000 **80L** 8000 **110L** 11000 **140L** 14000				

Other lumen packages may be ordered in increments of 500lm from 3000 to 7000 lumens for 4' unit and increments of 1000lm from 6000 to 14000 lumens for 8' unit.

Ordering guide – PoE controls example: FSS440L840-LV-POE-IAO

Series	Length (nominal)	Lumens[2] (nominal)	Color temp. (K)	Voltage	Driver	Options
FSS			–	LV –	POE –	
FSS FluxStream Strip	**4** 4'	**30L** 3000 **40L** 4000 **60L** 6000	**830** 80 CRI, 3000K **835** 80 CRI, 3500K **840** 80 CRI, 4000K **850** 80 CRI, 5000K	**LV** Low voltage	**POE** Power over ethernet	**IAO** Interact PoE daylighting and occupancy sensor, enables wired connected lighting control **EMPOE**[16] 600lm integral emergency driver and battery pack. **PAF** Paint after fabrication for extra corrosion resistance (white) **BK** Matte black paint color **ST** Satin aluminum paint color **IAOSB** Interact Pro wireless sensor with occupancy, daylight, and environmental sensing capabilities
	8[16] 8'	**60L** 6000				

1 8' is tandem (2) 4' lenses with single piece 8' body.
2 Nominal delivered lumens at 25°C ambient.
3 Not available in 3' model.
4 XDIM option only available with 120V.
5 347V with EMLED only available in 8' models.
6 Not available in 2' or 3' model.
7 Not available in 4' 70L model or 8' 140L model.
8 DALI available up to 80L models only, consult factory for other options.
9 EMLED on 8' models illuminates 4' section in emergency mode.
10 Available with DIM driver option only.
11 Integral controls options dimmable to 5% via wireless wall switch. Non-integral controls configurations are 0-10V dimmable to 1%.
12 Must be installed in conjunction with a UL1008 device.
13 Only ordered with an Interact integral sensing option.
14 High bay motion detector. Motion sensing zone is extremely limited if used below 15' mounting height.
15 Must order IRT9015 Interact commissioning remote with each system order.
16 EMLED on 8' models illuminates 4' section in emergency mode.
17 ER100 options not available in 2', 3' only has availability when selecting UNV.
18 Failure to properly select the "BAC" suffix could result in you receiving product that is not BAA compliant product with no recourse for an RMA or refund. This BAC designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America" domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies.
19 Consult Signify to confirm whether specific accessories are BAA-compliant.

Accessories[19] (order separately)

- **FSSD2L** – 2' Diffuse replacement lens
- **FSSD3L** – 3' Diffuse replacement lens
- **FSSD4L** – 4' Diffuse replacement lens (order two for 8' models)
- **FSSWG4** – 4' wire guard (order two for 8' models)
- **FSTH** – Sliding hanger bracket (set of two)
- **LSXR10** – Low bay PIR motion sensor, 120-277V (not available with PoE)
- **LSXR10ADC** – Low bay PIR motion sensor with photocell and hi/lo trim dimming, 120-277V (not available with PoE)
- **FSSDEK** – Decorative plastic end cap (set of two)

(See last page for details and more options)

SWZCS accessories[19] (order separately)

- **IRT9015** – handheld remote for grouping and configuration(at least one remote required for any SWZCS installation).

General notes

Many luminaire components, such as reflectors, refractors, lenses, sockets, lampholders, and LEDs are made from various types of plastics which can be adversely affected by airborne contaminants. If sulfur based chemicals, petroleum based products, cleaning solutions, or other contaminants are expected in the intended area of use, consult factory for compatibility.

PAF (Paint after fabrication) option is required for all products that will be used in a damp or humid location, such as under a canopy or covered parking area.

Not all product variations listed on this page are DLC qualified. To ensure that a specific model is qualified, visit www.designlights.org/search

interact ready.

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KQ

Kugler Ning Lighting

FSS FluxStream LED strip

2', 3', 4' and 8'

Features

- Compact design for installation in tight spaces.
- Frosted acrylic diffuser provides wide light distribution and superior glare control.
- Diffuser and LED plate snap into place allowing tool-free access to LED boards and driver.
- 2', 3', 4' and 8' tandem lengths available to accommodate many field applications.
- Up to 100,000 hour predicted L70 LED lumen maintenance provides long service life to reduce maintenance costs.
- Can be surface mounted on ceilings or walls, or suspended via chain, pendants or cables.
- Wall mountable - ADA compliant.
- Ideal for cold applications (-20°C).
- Continuous row mounting using standard end caps. No extra parts needed.
- 7/8" knock out provided at each end and on base of luminaire. Note: Center knockout is covered and not useable in 4' version with EMLED option.
- Multiple driver options available with 0-10V as standard.
- Enclosed lens minimizes penetration of dust, insects, and other debris into the LED compartment.
- 8' tandem unit is two 4' optical assemblies with a center mullion on a single full length chassis.
- Integral controls options include sensor mounted in control module extension mounted on fixture end (see dimension drawing).
- Fluxstream luminaires are Designlights Consortium® qualifed. Please see the DLC QPL list for exact catalog numbers www.designlights.org/QPL.
- 5 year manufacturer's limited warranty. Visit signify.com/warranties for complete warranty information.

Finish

- Baked white acrylic matte high reflectance paint finish.
- PAF (Paint after fabrication) option, which is required for all products that will be used in damp or humid locations, such as a canopy or covered parking area, provides extra corrosion resistance.

Shielding

- Contoured frosted acrylic lens.

Electrical

- LED boards and drivers are RoHS (Restriction of Hazardous Substances) compliant. Total system life rated at 50,000 hours. Predicted L70 lifetime based on LED manufacturer's supplied LM-80 data and in-situ laboratory testing.
- Integral emergency driver with EMLED option. To estimate lumen output in emergency mode, multiply emergency pack wattage by efficacy, then by 1.10.
- The GTD/E option is used to bypass wall switches and allow luminaire operation on auxiliary power. Generator transfer requires installation in conjunction with a UL1008 listed device.
- The GTD/SNSR option is used to bypass integrated sensor control in the event of utility power loss. Generator transfer requires installation in conjunction with a UL1008 listed device.

Materials

- Heavy gauge cold rolled steel housing, LED plate, and end caps.

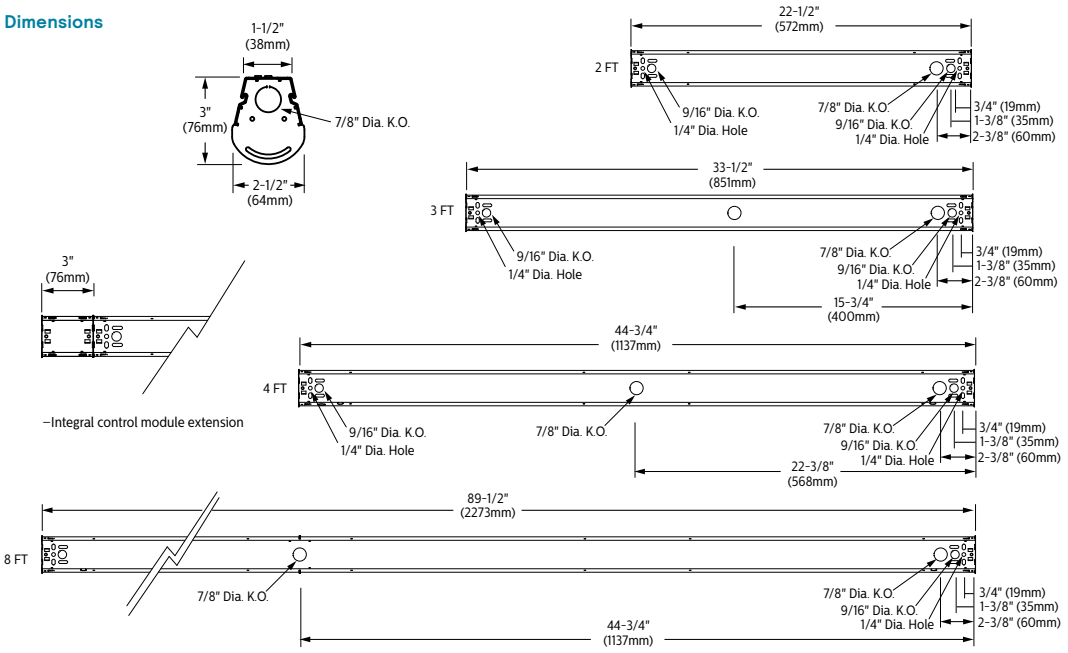
Labels

- cETLus listed.
- Suitable for damp locations.

Ambient temperature data

Configuration	Ambient
FSS470L	-20°C to 30°C
FSS8110L	-20°C to 35°C
FSS8140L	-20°C to 25°C
EMLED option	Minimum 0°C
All others	-20°C to 40°C

Dimensions



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KQ

Kugler Ning Lighting

FSS FluxStream LED strip

2', 3', 4' and 8'

Wireless Controls Options

SpaceWise DT (SWZDT)

- Standalone daylight and occupancy sensing with advanced grouping, wireless mesh networking and dwell time.
- Commissioning via compatible Android phone and Philips Field App
- Dimming via compatible Zigbee wireless wall switch only (see link below for details)
- Register for the commissioning app at http://registration.componentcloud.philips.com/appregistration/
- Integral sensing options may not be combined
- For more information including recommended switches, refer to the following: –

SWZDT – www.usa.lighting.philips.com/systems/lighting-systems/spacewise

Emergency Options (ER100)

- Power Sensing (Factory default) – Recommended UL924 option requires unswitched power sense line, absence of voltage on the normal circuit triggers luminaire to 100% output
- Power Interruption Detection (Field option) – Detects AC power interruption >30ms triggers 90 minute emergency mode with luminaire at 100% output
- 347V requires step-down transformer and must be ordered indicating Power Sensing or Power Interruption Detection.

FluxStream strip shown with integral sensor

Interact Pro scalable sensor for Foundation, Advanced & Enterprise tiers (SWZCS/SWZCSH and an evolution of SpaceWise)

- SWZCS/SWZCSH is a connected sensor with integral occupancy and daylight sensing and supports wireless mesh connectivity.
- The sensor works in the Foundation mode (similar to SpaceWise) when configured without a gateway or in an Interact Pro Advanced or Enterprise mode if a compatible gateway is used.
- Interact Pro includes an App, a portal and a broad portfolio of wireless luminaires, lamps and retrofit kits all working on the same system.
- Startup is implemented via Interact Pro App (Android or iPhone) & BlueTooth connectivity. The App provides flexibility to choose between a gateway or non gateway mode for setup.
- Setup with the gateway requires wired internet access to the gateway. It is possible to add a gateway at a later point.
- Prepare project configuration steps remotely and use IRT9015 remote onsite to identify and group devices together.
  - Compatible with:
    - SWS200 wireless scene switch
    - Battery powered IP42 presence sensor OCC sensor IA CM WH 10/1
    - Battery powered IP42 presence & daylight sensor OCC-DL sensor IA CM IP42 WH
    - LCN3110: Battery powered IP65 presence sensor, OCC sensor IA CM IP65WH
    - LCN3120: Battery powered IP65 presence & daylight sensor, OCC-DL sensor IA CM IP65 WH
- For more information on Interact Pro visit: www.interact-lighting.com/interactproscalablesystem

Radio only sensor (RADIO)

- Integral RADIO only sensor simply enables wireless mesh connectivity to the luminaire without any occupancy or daylight sensing.
- Ideal for applications where sensing functionality is managed by other Interact devices and the luminaire only needs to have wireless connectivity.

Interact Pro scalable sensor bundles for Enterprise tier

- IAOSB option in addition to occupancy and daylight sensing supports advanced IoT capabilities such as people estimation analysis, desk level temperature & humidity sensing, noise classification, and BLE beacon.
- Compatible with SWS200 wireless scene switch and Interact Ready wireless battery powered sensors.
- Use Interact software and insights to increase building efficiency, achieve building wide integration and optimize space through occupancy analytics.
- Requires compatible Gateway and internet connectivity for commissioning.
- For more information, visit: www.interact-lighting.com/office or www.usa.lighting.philips.com/systems/system-areas/offices

Wired Controls Options

Interact PoE

- PoE based IoT connected lighting solution for large enterprises that span across multiple floors, buildings and require multiple gateways.
- Use Interact software and insights to increase building efficiency, achieve building wide integration and optimize space through occupancy analytics.
- IAOSB option in addition to occupancy and daylight sensing supports advanced IoT capabilities such as people estimation analysis, desk level temperature & humidity sensing, noise classification, and BLE beacon.
- PoE lighting controller is accessible from below.
- Integral sensor option for occupancy sensing (PIR) and/or daylight harvesting available for additional energy savings.
- Optional integral emergency controller and battery pack provides 600lm nominal output. Test switch and indicator light mounted on side of chassis on one end.
- Emergency battery has a 3 month pre-installed shelf life, and must be stored and installed in environments of 20C to 30C (-4F to 86F) ambient, and 45-85% relative humidity.
- For more information, visit: www.interact-lighting.com/office or www.usa.lighting.philips.com/systems/system-areas/offices

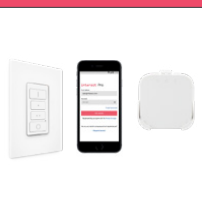
SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KQ

Kugler Ning Lighting

FSS FluxStream LED strip

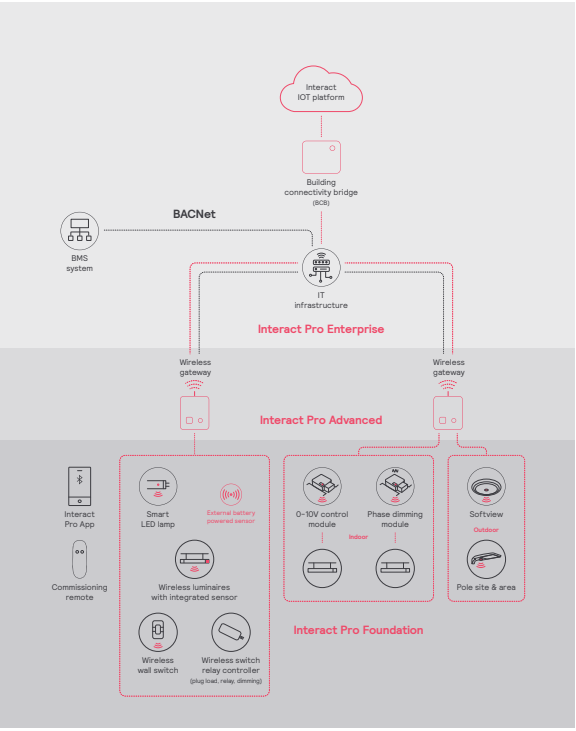
2', 3', 4' and 8'

	Interact Pro scalable system		
			
	Foundation	Advanced	Enterprise
Dimming, grouping, and zoning	✓	✓	✓
Bluetooth and ZigBee enabled	✓	✓	✓
Motion sensing and daylight harvesting	✓	✓	✓
Integration with 0–10V and phase dimming fixtures	✓	✓	✓
Code compliance	✓	✓	✓
Granular dimming and dwell time	✓	✓	✓
Energy reporting and monitoring		✓	✓
Scheduling		✓	✓
Demand response		✓	✓
BMS integration (BACnet)			✓
Floor plan visualization			✓
IoT sensors for wellness			✓
IoT Apps for productivity			✓

Currently supported maximum system size

To be able to design the lighting system correctly for the customer, it is important to know the prime characteristics of the system, its possibilities and limitations.

System level	
Total number of gateways	Unlimited
Total number of devices	200 per network
• luminaires with integrated sensors	150
• smart TLEDS	150
Total number of ZGP devices (sensors and switches)	50
• sensors	30
• switches	50
• zones and groups	64
Group level	
Recommended number of lights	40 (recommended 25)
Number of ZGP devices	5
Number of scenes	16



SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KQ

FSS FluxStream LED strip

2', 3', 4' and 8'

Photometry Test List

Catalog No.	Delivered Lumens	Input Watts	Efficacy
FSS220L830-UNV-DIM	1916	17.1	112
FSS230L830-UNV-DIM	2789	24.6	113
FSS330L830-UNV-DIM	2911	24.4	119
FSS430L830-UNV-DIM	2803	21.8	129
FSS440L830-UNV-DIM	3812	29.9	127
FSS455L830-UNV-DIM	5158	41.2	125
FSS470L830-UNV-DIM	6567	54.1	121
FSS860L830-UNV-DIM	5598	43.7	128
FSS880L830-UNV-DIM	7612	60.0	127
FSS8110L830-UNV-DIM	10301	82.6	125
FSS8140L830-UNV-DIM	13114	108.5	121

Catalog No.	Delivered Lumens	Input Watts	Efficacy
FSS220L835-UNV-DIM	1994	17.1	117
FSS230L835-UNV-DIM	2903	24.6	118
FSS330L835-UNV-DIM	2850	23.9	119
FSS430L835-UNV-DIM	2917	21.8	134
FSS440L835-UNV-DIM	3967	29.9	133
FSS455L835-UNV-DIM	5368	41.2	130
FSS470L835-UNV-DIM	6834	54.1	126
FSS860L835-UNV-DIM	5826	43.7	133
FSS880L835-UNV-DIM	7922	60.0	132
FSS8110L835-UNV-DIM	10720	82.6	130
FSS8140L835-UNV-DIM	13647	108.5	126

Catalog No.	Delivered Lumens	Input Watts	Efficacy
FSS220L840-UNV-DIM	2049	17.1	120
FSS230L840-UNV-DIM	2983	24.6	121
FSS330L840-UNV-DIM	2991	24.5	122
FSS430L840-UNV-DIM	2998	21.8	138
FSS440L840-UNV-DIM	4077	29.9	136
FSS455L840-UNV-DIM	5517	41.2	134
FSS470L840-UNV-DIM	7023	54.1	130
FSS860L840-UNV-DIM	5987	43.7	137
FSS880L840-UNV-DIM	8141	60.0	136
FSS8110L840-UNV-DIM	11017	82.6	133
FSS8140L840-UNV-DIM	14025	108.5	129

Catalog No.	Delivered Lumens	Input Watts	Efficacy
FSS220L850-UNV-DIM	2059	17.1	120
FSS230L850-UNV-DIM	2998	24.6	122
FSS430L850-UNV-DIM	3013	21.8	138
FSS440L850-UNV-DIM	4097	29.9	137
FSS455L850-UNV-DIM	5544	41.2	135
FSS470L850-UNV-DIM	7057	54.1	130
FSS860L850-UNV-DIM	6017	43.7	138
FSS880L850-UNV-DIM	8181	60.0	136
FSS8110L850-UNV-DIM	11071	82.6	134
FSS8140L850-UNV-DIM	14094	108.5	130

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KQ

UHNJ - EMERGENCY DEPARTMENT EXPANSION

Kugler Ning Lighting

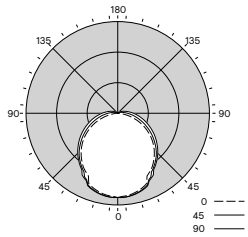
FSS FluxStream LED strip

2', 3', 4' and 8'

Photometry

FSS220L840-UNV-DIM

Luminaire Lumens	2049
Luminaire Efficacy Rating (LER)	120
Total Luminaire Watts	17.1
Spacing Criterion (0-180)	1.24
Spacing Criterion (90-270)	1.36



Candela Distribution

	0	22.5	45	67.5	90	Lumens
0	643	643	643	643	643	
5	634	639	642	645	644	61
15	611	616	622	625	626	175
25	529	541	561	567	569	259
35	470	478	486	494	497	304
45	394	401	417	427	432	320
55	306	314	332	351	359	297
65	208	219	247	274	283	244
75	104	126	166	200	211	172
85	18	53	101	136	148	103
90	0	30	75	109	120	
95	0	16	54	85	96	56
105	0	5	27	50	58	30
115	0	2	14	28	33	15
125	0	1	8	15	18	7
135	0	1	3	8	10	3
145	0	0	1	3	3	1
155	0	0	1	1	2	0
165	0	0	0	0	0	0
175	0	0	0	0	0	0
180	0	0	0	0	0	

Zonal Lumen Summary

Zone	Lumens	%Fixture	%Lamp
0-30	495	24.2%	24.2%
0-40	799	39.0%	39.0%
0-60	1416	69.1%	69.1%
0-90	1935	94.5%	94.5%
90-130	109	5.3%	5.3%
90-150	113	5.5%	5.5%
90-180	114	5.5%	5.5%
0-180	2049	100.0%	100.0%

Avg. Luminance (cd/m²)

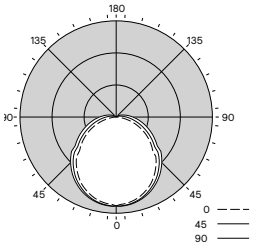
	0	45	90
45	16078	13361	12955
55	15126	11869	11761
65	13546	10324	10590
75	10480	8705	9540
85	4160	7313	8765

Coefficients of Utilization %

Pc---	80				70			50			0
Pw---	70	50	30	10	70	50	30	50	30	10	0
RCR											
0	118	118	118	118	114	114	114	108	108	108	94
1	106	100	96	91	103	98	93	92	89	85	76
2	96	87	79	73	93	84	78	80	74	69	62
3	87	76	67	60	84	74	66	70	63	58	52
4	80	67	58	51	77	65	57	62	55	49	44
5	73	60	51	44	71	58	50	56	48	42	38
6	67	54	45	38	65	53	44	50	43	37	33
7	63	49	40	34	60	48	39	46	38	33	29
8	58	44	36	30	56	44	35	42	34	29	26
9	54	41	32	27	53	40	32	38	31	26	23
10	51	38	30	24	49	37	29	36	29	24	21

FSS330L840-UNV-DIM

Luminaire Lumens	2991
Luminaire Efficacy Rating (LER)	122
Total Luminaire Watts	24.5
Spacing Criterion (0-180)	1.22
Spacing Criterion (90-270)	1.32



Candela Distribution

	0	22.5	45	67.5	90	Lumens
0	925	925	925	925	925	
5	907	915	923	930	927	88
15	871	880	893	904	902	251
25	802	812	831	847	850	382
35	702	717	743	765	771	463
45	583	599	633	661	670	483
55	421	437	473	508	521	428
65	284	304	350	395	412	346
75	143	174	237	290	307	245
85	26	73	143	197	215	147
90	0	41	106	157	175	
95	0	21	76	123	139	80
105	0	6	37	71	83	42
115	0	2	17	37	45	20
125	0	1	7	18	23	9
135	0	0	4	9	11	4
145	0	0	2	5	7	2
155	0	0	1	2	4	1
165	0	0	0	0	1	0
175	0	0	0	0	0	0
180	0	0	0	0	0	

Zonal Lumen Summary

Zone	Lumens	%Fixture	%Lamp
0-30	721	24.1%	24.1%
0-40	1185	39.6%	39.6%
0-60	2095	70.0%	70.0%
0-90	2834	94.8%	94.8%
90-130	151	5.0%	5.0%
90-150	156	5.2%	5.2%
90-180	157	5.2%	5.2%
0-180	2991	100.0%	100.0%

Avg. Luminance (cd/m²)

	0	45	90
45	16262	13770	13535
55	14287	11502	11498
65	12834	9994	10388
75	10118	8488	9361
85	4505	7192	8613

Coefficients of Utilization %

Pc---	80				70			50			0
Pw---	70	50	30	10	70	50	30	50	30	10	0
RCR											
0	118	118	118	118	114	114	114	108	108	108	95
1	106	101	96	92	103	98	93	93	89	86	76
2	96	87	80	74	93	85	78	80	75	70	63
3	87	76	68	61	84	74	66	70	64	58	52
4	80	67	58	51	77	66	57	62	55	49	44
5	73	60	51	44	71	59	50	56	48	43	38
6	68	54	45	38	65	53	44	50	43	37	33
7	63	49	40	34	61	48	39	46	38	33	30
8	58	45	36	30	56	44	35	42	35	29	26
9	55	41	33	27	53	40	32	39	31	26	24
10	51	38	30	24	50	37	29	36	29	24	21

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KQ

Kugler Ning Lighting

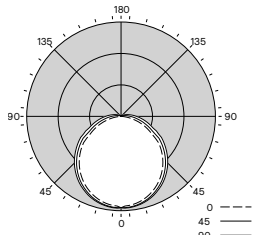
FSS FluxStream LED strip

2', 3', 4' and 8'

Photometry

FSS440L840-UNV-DIM

Luminaire Lumens	4077
Luminaire Efficacy Rating (LER)	136
Total Luminaire Watts	29.9
Spacing Criterion (0-180)	1.24
Spacing Criterion (90-270)	1.32



Candela Distribution						
	0	22.5	45	67.5	90	Lumens
0	1259	1259	1259	1259	1259	
5	1233	1248	1256	1265	1264	119
15	1186	1202	1215	1228	1228	342
25	1096	1114	1132	1151	1154	521
35	969	988	1015	1040	1047	634
45	811	832	867	898	910	667
55	629	650	694	734	750	617
65	399	423	477	547	568	481
75	203	240	315	377	399	327
85	38	95	182	247	269	187
90	0	50	130	192	214	
95	0	24	90	146	167	96
105	0	6	40	80	94	47
115	0	2	18	40	49	22
125	0	1	10	20	25	10
135	0	1	5	11	14	5
145	0	1	3	5	8	2
155	0	1	2	3	5	1
165	0	1	1	1	1	0
175	0	0	0	0	0	0
180	0	0	0	0	0	

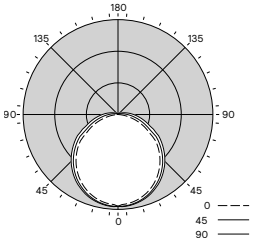
Zonal Lumen Summary			
Zone	Lumens	%Fixture	%Lamp
0-30	983	24.1%	24.1%
0-40	1617	39.7%	39.7%
0-60	2900	71.1%	71.1%
0-90	3895	95.5%	95.5%
90-130	174	4.3%	4.3%
90-150	181	4.4%	4.4%
90-180	182	4.5%	4.5%
0-180	4077	100.0%	100.0%

Avg. Luminance (cd/m²)			
	0	45	90
45	17180	14281	13846
55	16265	12783	12498
65	13799	10335	10800
75	11102	8598	9173
85	5376	6959	8126

Coefficients of Utilization %											
Pc---	80				70			50			0
Pw---	70	50	30	10	70	50	30	50	30	10	0
RCR											
0	118	118	118	118	115	115	115	109	109	109	96
1	106	101	96	92	103	98	94	93	90	86	77
2	96	87	80	74	93	85	78	81	75	70	63
3	88	76	68	61	85	74	67	71	64	59	53
4	80	68	58	51	77	66	57	63	55	50	45
5	73	60	51	44	71	59	50	56	49	43	39
6	68	54	45	38	66	53	44	51	43	37	34
7	63	49	40	34	61	48	39	46	38	33	30
8	58	45	36	30	57	44	36	42	35	29	26
9	55	41	33	27	53	40	32	39	31	26	24
10	51	38	30	24	50	37	29	36	29	24	21

FSS880L840-UNV-DIM

Luminaire Lumens	8141
Luminaire Efficacy Rating (LER)	136
Total Luminaire Watts	60
Spacing Criterion (0-180)	1.24
Spacing Criterion (90-270)	1.32



Candela Distribution						
	0	22.5	45	67.5	90	Lumens
0	2515	2515	2515	2515	2515	
5	2462	2493	2508	2526	2524	238
15	2368	2400	2427	2452	2453	684
25	2188	2224	2261	2298	2305	1041
35	1935	1973	2027	2076	2091	1265
45	1620	1661	1731	1792	1816	1331
55	1256	1298	1385	1466	1499	1231
65	797	845	953	1093	1134	960
75	405	480	630	754	797	653
85	76	189	363	493	537	374
90	0	99	259	383	427	
95	0	48	181	292	333	191
105	0	12	81	159	188	94
115	0	4	36	79	98	43
125	0	2	19	41	50	20
135	0	2	9	23	28	9
145	0	1	6	11	15	4
155	0	1	4	5	9	2
165	0	2	2	2	3	1
175	0	1	1	0	0	0
180	0	0	0	0	0	

Zonal Lumen Summary			
Zone	Lumens	%Fixture	%Lamp
0-30	1963	24.1%	24.1%
0-40	3228	39.7%	39.7%
0-60	5791	71.1%	71.1%
0-90	7778	95.5%	95.5%
90-130	348	4.3%	4.3%
90-150	361	4.4%	4.4%
90-180	364	4.5%	4.5%
0-180	8141	100.0%	100.0%

Avg. Luminance (cd/m²)			
	0	45	90
45	17337	14344	13825
55	16487	12861	12479
65	14090	10422	10784
75	11515	8699	9160
85	5958	7083	8113

Coefficients of Utilization %											
Pc---	80				70			50			0
Pw---	70	50	30	10	70	50	30	50	30	10	0
RCR											
0	118	118	118	118	115	115	115	109	109	109	96
1	106	101	96	92	103	98	94	93	90	86	77
2	96	87	80	74	93	85	78	81	75	70	63
3	88	76	68	61	85	74	67	71	64	59	53
4	80	68	58	51	77	66	57	63	55	50	45
5	73	60	51	44	71	59	50	56	49	43	39
6	68	54	45	38	66	53	44	51	43	37	34
7	63	49	40	34	61	48	39	46	38	33	30
8	58	45	36	30	57	44	36	42	35	29	26
9	55	41	33	27	53	40	32	39	31	26	24
10	51	38	30	24	50	37	29	36	29	24	21

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KQ

Kugler Ning Lighting

FSS FluxStream LED strip

2', 3', 4' and 8'

Accessories[19]

Accessory Catalog Code	Description	
FSTH	Sliding hanger bracket (pair)	
SV5F12	12" Stem and canopy kit	White stem and canopy kit, 1/4" trade size (1/2" O.D.) locknuts included. Works with 9/16" k.O. on base of housing.
SV5F18	18" Stem and canopy kit	
SV5F24	24" Stem and canopy kit	
SV5F36	36" Stem and canopy kit	
SV5F48	48" Stem and canopy kit	
FKR-126	Chain hanger set (pair)	Includes two 5' heavy duty link chains with "V" hooks. Attaches to base of housing.
DACHxx	Adjustable cable hanger kit (single)	Works with 1/4" hole on base of housing or FSTH hanger bracket. **xx**=cable length in inches, enter 48" to 180" lengths in 12" increments
DACHxx-1-SC	Adjustable cable hanger kit with white straight 18/3 cord (single)	
DACHxx-1-CC	Adjustable cable hanger kit with white coiled 18/3 cord (single)	
DACHxx-2-SC	Adjustable cable hanger kit with white straight 18/4 cord (single)	
DACHxx-2-CC	Adjustable cable hanger kit with white coiled 18/4 cord (single)	
DACHxx-1D-SC	Adjustable cable hanger kit with white straight 18/5 cord with dimming leads (single)	
LSXR10	Low bay pir motion sensor (120-277v)	
LSXR10ADC	Low bay pir motion sensor with photocell and hi/lo trim dimming (120-277v)	
FSSWG4	4' Wire guard (order two for 8' models)	
FSSD2L	2' Diffuse replacement lens	
FSSD3L	3' Diffuse replacement lens	
FSSD4L	4' Diffuse replacement lens (order two for 8' models)	
FSSDEK	Decorative plastic end cap (set of two)	

19 Consult Signify to confirm whether specific accessories are BAA-compliant.

Signify

Signify North America Corporation
400 Crossing Blvd, Suite 600
Bridgewater, NJ 08807
Telephone 855-486-2216

Signify Canada Ltd.
281 Hillmount Road,
Markham, ON, Canada L6C 2S3
Telephone 800-668-9008

SEE FIXTURE SCHEDULE FOR CATALOG NUMBER AND DESCRIPTION

TYPE: KQ

SECTION 265100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Exit signs.

C. Drivers.

D. Light Source (Lamps/Modules).

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 260529 - Hangers and Supports for Electrical Systems.

B. Section 260533.16 - Boxes for Electrical Systems.

C. Section 260547/260548 - Vibration and Seismic Controls for Electrical Systems.

D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 260923 - Lighting Control Devices.

1.03 REFERENCE STANDARDS

A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information 2019.

C. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.

D. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

F. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems 2006.

G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 924 - Emergency Lighting and Power Equipment Current Edition, Including All Revisions.

J. UL 1598 - Luminaires Current Edition, Including All Revisions.

K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

1.04 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. Chromaticity: The property of color of light defined by the dominant or complementary wavelength and purity aspects of the color taken together.

D. Emergency Lighting Batteries: Integral battery mounted within normal use luminaire or dedicated emergency on only luminaire with light source.

E. Junction Box: Outlet Box

F. L80: The extrapolated life in hours of the luminaire when the luminous output depreciates 20 percent from initial values.

G. LED: Light Emitting Diode
H. LED Light Source: Integral LED luminous component in the form of boards or modules.
I. LER: Luminaire efficacy rating.
J. Lumen: Measured output of lamp and luminaire, or both.
K. Luminaire (Fixture): Complete lighting fixture, including driver.
L. MacAdam: Shape on the CIE chromaticity diagram that illustrates how much one can “stray” from the target before perceiving a difference from the target color
M. NEMA: National Electrical Manufacturers Association
N. SSL: Solid State Lighting
O. THD: Total Harmonic Distortion - The amount of higher frequency power on the power line.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Luminaires, drivers, lamps and other components meet or exceed the requirements of all applicable federal, state, and/or municipal energy codes.
2. Coordinate LEDs, light sources, drivers, lamps, dimming ballasts with lighting control systems. Before ordering any equipment, verify with manufacturers that proposed drivers are compatible with proposed lighting controls, and that proposed LEDs, light sources, or lamps are compatible with proposed drivers.
3. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
4. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
5. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
6. Notify Architect and lighting designer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.
B. Submittals shall be provided a minimum of 12 weeks prior to commencement of luminaire installation unless otherwise approved. Failure to submit within the deadline constitutes a guarantee that only the base specified products will be supplied and that no other products, whether listed as alternates or not, will be installed.
C. Submittals or shop drawings lacking sufficient detail to indicate clear and complete compliance with specifications shall be rejected.
D. "Approved Equal" specification status does not and shall not exempt the identified manufacturers from full and complete compliance with all criteria identified either in the specifications or as attributed to "prime specification" equipment with regards to photometric performance, brightness control, size, finishes, credentials or experience, etc. Consideration, acceptance or rejection of any proposed submittal at any time shall rest solely upon the evaluation of the Lighting Designer for those areas within the project scope.
E. Shop Drawings:
1. Provide plans, elevations, sections, details, and attachment to other work.
2. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
3. Submit project-specific, factory-produced shop drawings for linear luminaires mounted in continuous rows. Drawings shall show housing lengths, light source layout, joiners, lens seams, supports, endcaps, corners, and unlighted end sections as applicable for all

unique row lengths, suspension installation hardware or components.

4. All continuous-run luminaire lengths, whether straight or curvilinear, shall be fabricated based upon field verified dimensions only.

F. Substitutions:
   1. Subject to compliance with project requirements, luminaires that may be incorporated into the Work include, but are not limited to, the products specified in the Luminaire Schedule included on the drawings.
      a. Where three or more manufacturers are indicated for each luminaire type, no other manufacturers will be considered.
      b. Where one manufacturer is indicated for each luminaire type, other manufacturers will be considered only if the engineer, architect, or lighting consultant can determine that the proposed equipment is equal to the specified equipment. A maximum of one (1) submission of substitutions for lighting fixtures will be accepted, after which time luminaires must be submitted as specified.
      c. Where a design series number is listed in the Light Fixture Schedule (as opposed to a complete cataloge number), the listed manufacturer shall comply with all of the requirements contained in the construction documents, even if they do not offer a standard project which meets all of these requirements. It is the responsibility of the contractor for work of this section to insure that their price includes only products which comply with all project requirements.
   2. Where owners provided standard products are specified, no substitutions will be considered.
   3. Provide photometric calculations where luminaires are proposed for substitution upon request.

G. Product Data:
   1. For all luminaires and lamps, provide manufacturer's standard catalog pages and data sheets, arranged in order of luminaire designation with model number nomenclature clearly marked with all proposed features. Catalog pages shall include the following information:
      a. Detailed information on luminaire construction.
      b. Dimensions.
      c. Power supplies.
      d. Lamping.
      e. Ratings.
      f. Finishes.
      g. Mounting requirements.
      h. Listings.
      i. Service conditions.
      j. Photometric performance.
      k. Installed accessories.
      l. Ceiling compatibility.
   2. For LED luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.
      b. Include IES LM-79 test report upon request.
      c. Include correlated color temperature (CCT), color rendering index (CRI), and delivered lumens.
   3. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
   4. For drivers: Include wiring diagrams, list of compatible controls, and driver data including dimming percentage.
   5. Submit driver and dimming ballast compatibility certificates signed by the lighting control system manufacturer certifying that proposed driver and dimming ballasts are compatible with proposed dimming systems.

H. Samples:
   1. Provide one sample(s) of each luminaire proposed for substitution upon request.
   2. Samples shall include the following:
      a. Lamps and drivers, installed.
      b. Cords and plugs.
      c. Support system.
      d. Custom factory-applied finishes, if required.
      e. Accessories.

I. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

J. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
   1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.
   2. Provide a list of all luminaires used on Project, including model number and manufacturer cutsheets.
   3. Provide installation and maintenance instructions for all luminaires used on Project.
   4. Provide warranty information for all luminaires used on Project.

K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Lenses and Louvers: Two% of total quantity installed for each type, but not less than one of each type.
   3. Extra Lamps: Ten% of total quantity installed for each type, but not less than two of each type.
   4. Extra Drivers and Ballasts: Three% of total quantity installed for each type, but not less than one of each type.
   5. Luminaire-mounted emergency battery pack: One for every 50 emergency lighting units.
   6. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.
   7. LED's: One for every 40 of each type and rating installed. The spare component shall be the smallest discrete element that the manufacturer recommends servicing in the field without voiding the warranty. In some cases, this will be a snap-in diode. In other cases, it will be a replacement fixture. Furnish at least one of each type.

L. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

E. Qualification Data: For testing laboratory providing photometric data for luminaires.

F. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

G. Mockups:
   1. Refer to Architect’s list of required mockups.
   2. Provide with complete power and control connections.

3. Obtain Lighting Designer and Architect's approval of luminaires in mockups before starting installations.
4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Approved fixtures in in-place mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. Electrical Components of luminaires are listed and labeled by UL where applicable.

I. Provide luminaires and accessory components specified in this Section that are listed and labeled for their indicated use and installation conditions on Project.
1. Luminaires specified for installation in damp or wet locations are listed and labeled for use in such locations.
2. Luminaires specified for installation in insulated ceilings are IC-rated if insulation comes within 3" (76.2 mm) of sides of luminaire housings, or within 6" (152.4 mm) of top of luminaire housings.
3. Luminaires specified for installation in hazardous locations conform to UL 844.
4. Luminaires specified for installation underwater comply with UL 676.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.09 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

B. Final coordination of fixtures with ceiling types and finishes is the responsibility of the Architect.

C. For mechanical spaces, electrical rooms, EMR’s and similar spaces, final mounting locations of fixtures and coordination with equipment is the responsibility of the installing contractor.

1.10 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for LED luminaires, including drivers.

C. All above warranty periods shall start from date of substantial completion.

1.11 TECHNICAL AND ADMINISTRATIVE REQUIREMENTS

A. All information identified in the following Schedules, Details, Layouts and Specifications shall be considered to form a complete and integrated Specification for Lighting Fixtures and Control Systems in the agreed upon Scope Areas. The Lighting Designer shall be contacted for any queries regarding the proper interpretation of all information indicated on the Lighting Fixture Schedules, Fixture Cuts, Details and Specifications.

B. The submission of a contractor bid will be construed as evidence that a careful, complete and thorough examination of the premises, existing job conditions and Specifications has been made and later claims for labor, materials or equipment required or for difficulties encountered, which could have been foreseen had such an examination been made, will not be recognized. It shall also constitute a representation that the site has checked and verified all quantities, work and materials involved and shall take complete responsibility for any deficiencies encountered thereafter.

C. Specifications and drawings are intended to convey the salient features, function and character of the fixtures only, and do not undertake to illustrate or set forth every item or detail necessary for the work. Minor details not usually indicated on the drawings nor specified, but that are

necessary or normally required for the proper execution, completion, installation and operation of the fixtures, shall be included, the same as if they were herein specified or indicated on the drawings.

PART 2 PRODUCTS

2.01 LUMINAIRE REQUIREMENTS

A. Provide products listed and classified by UL, CSA, or ETL only.

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Provide products complying with Federal Energy Management Program (FEMP) requirements.

F. Unless otherwise indicated, provide complete luminaires including chip-on-board LEDs, lamp(s) and all sockets, drivers/ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

G. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete and fully functional operating system.

H. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

I. Recessed Luminaires:
   1. Ceiling Compatibility: Comply with NEMA LE 4.
   2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
   3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.

J. Lamp base shall comply with applicable ANSI standards.

K. Luminaire shall comply with applicable NEMA standards.

L. Nominal Operating Voltage: As indicated on the drawings. Luminaires and components shall be suitable for operation at the voltage of the building circuits to which they are connected.

M. Lampholders shall be suitable for operation of the specified lamps and are set such that lamps are positioned in optically correct relation to all luminaire components. All lampholders comply with applicable requirements of ANSI C81.

N. Luminaires for use in damp or wet locations shall be suitably gasketed to prevent the entrance of moisture and shall be listed for such use.

O. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Luminaire Estimated Useful Life: Minimum of 50,000 hours at 70% lumen maintenance, calculated based on IES LM-80 test data.
   4. Compliant with Restriction of Hazardous Substances Directive (RoHS).
   5. LED luminaire shall be operated at constant and carefully regulated current levels. LEDs shall not be overdriven beyond their specified nominal voltage and current.
   6. For wet and damp use, LED-based fixture itself shall be sealed, rated, and tested for appropriate environmental conditions, not accomplished by using an additional housing or enclosure.
   7. LED luminaire housing shall be designed to transfer heat from the LED board to the outside environment.
   8. Luminaires shall have internal thermal protection.
   9. All hardwired connections to LED fixtures shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.

10. The lighting system shall consist of the type and manufacturer as shown on the drawings or approved equal. If other than fixture shown is submitted, complete illumination calculations are required to show equality.
11. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers. User serviceable LED lamps and drivers shall be replaceable from the room side. LED Boards shall be suitable for field maintenance and have plug-in connectors. LED boards shall be upgradable.
12. As in the case of other new technologies, it is possible that replacement products may not be available in the long term since technological advances may render older designs obsolete. Therefore, it is essential that the manufacturer guarantees availability of same or relatively similar products over at least a ten-year period.

P. LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.

Q. LED products which are connected to dimming systems shall be provided with dimmable power supplies and drivers which are compatible with the specified dimmer or dimming system.

R. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, current limiters, dead ends, hangers and canopies as necessary to provide a and functional complete installation. All components shall be provided by one manufacturer.

S. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning, with no sway or visible angle changes.

T. General Construction:
1. Luminaires are constructed with joints made only by means of welded, brazed, screwed, or bolted construction methods. Soldered joints will not be permitted. No self-tapping screws, bled metal tapping methods, or rivets are employed for fastening any parts to or in any wireway or wiring chamber, for fastening any parts which must be removed to gain access to electrical components requiring service or replacing, or for fastening any electrical component or support for same.
2. All ferrous parts and supports, other than parts manufactured of stainless steel, are completely rustproofed after fabrication, and before finish coatings are applied. Rustproofing is by means of galvanizing, bonderizing, zinc plating, or by treatment with other industry standard rust-preventing processes providing rustproofing qualities equal to the processes mentioned above.
3. All screws, bolts, nuts, and other fascinating and latching hardware are cadmium or equivalent plated.
4. All metallic cast or extruded parts are close grained, sound, and free from imperfections or discolorations. Cast or extruded parts are rigid, true to pattern, and of ample weight and thickness. Cast or extruded parts are properly fitted, filed, ground buffed, and chased to provide furnished surfaces and joints free of imperfection with all details or ornamentation brought out. Finished thickness of all cast parts is not less than 1/8" (3.175 mm).
5. Housings are constructed such that all electrical components are easily accessible and replaceable without removing housings from their mountings.
6. Sheet metal components are fabricated of steel, except as indicated, Form and support sheet metal to prevent warping and sagging.
7. Doors, frames, and other means of internal access operate smoothly, free from light leakage under operating conditions, and are arranged to permit maintenance without use of tools, unless indicated otherwise on drawings. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during maintenance and when secured in operating position.
8. Specular, semi-specular, and laminated silver metallized film reflectors have a non-iridescent coating. Reflectors have total hemispheric reflectances equal to or greater than the following values, unless otherwise noted:
   a. White surfaces: 90%.
   b. Specular surfaces: 87%.

c. Semi-specular surfaces: 84%.
d. Laminated silver metallized films: 95%.

9. Reflector Cones
   a. Cones shall provide a minimum of 50-degree cutoff to source and source image.
   b. Plastic material shall not be used for reflector cones.
   c. Cones shall not be permanently fastened to the housing and shall be removable without tools. Retention devices shall not deform the cone or be visible from normal viewing angles.
   d. Trim shall be flush to ceiling without gaps or light leaks. Where the flange trim is separate from the cone, it shall have the same finish as the reflector cone.
   e. Reflector cones shall be uniform gauge, not less than 0.032” (0.8128 mm) thick, high purity aluminum Alcoa 3002 alloy. Cones shall be free from spin marks or other defects.
   f. Manufacture cones using the Alzak® process. Refer to Luminaire Schedule for cone color and finish, i.e., specular or diffuse requirements.

U. Diffusers and Globes
1. Acrylic Lighting Diffusers: 100% virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
   a. Lens Thickness: At least 1/8" (3.175 mm) minimum unless otherwise indicated.
   b. UV stabilized.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Factory-Applied Labels: Comply with UL 1598. Include recommended LED/Driver combinations. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
   a. Wattage restriction labels, where required.

2.02 EXIT SIGNS

A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, ASHRAE Std 90.1 I-P or local energy code having jurisdiction and listed and labeled as complying with UL 924.
1. Color, letter height, and letter stroke comply with all requirements of authorities having jurisdiction, unless otherwise noted.
2. Edge-lit exit signs which are visible from two directions shall have a mylar mirror film inserted in the center of the panel, such that letters are not visible from the opposite direction.
3. Internally illuminated with LEDs unless otherwise indicated. 50,000 hours minimum rated lamp life. 5W maximum power consumption.
4. Number of illuminated faces: Single-face or double-face as indicated or as required for installed location.
5. Directional Arrows: As indicated or as required for installed location.
6. Mounting: As indicated or as required for installed location.

B. Self-Powered Exit Signs:
1. Operation: Upon interruption of normal power source or brownout condition exceeding 20% voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
2. Battery: Maintenance-free nickel cadmium (NiCad) unless otherwise indicated.
3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
4. Provide low-voltage disconnect to prevent battery damage from deep discharge.
5. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
6. Charger: Solid State, fully automatic with a sealed transfer relay. When the input voltage drops to 80% of normal or below, the relay energizes the lamps from the battery pack,

instead of the normal building power. When normal power is restored, the relay energizes the lamps from the normal building power, automatically recharges the battery, and floats it on the charger.

7. AC Only:
   a. Exit signs without battery to be powered by emergency circuit.
8. Provide cold temperature compatible unit where required.

C. Accessories:
1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
3. Provide compatible accessory wire guards where indicated.
4. Provide weatherproof type where indicated.
5. Provide heavy duty protection guard where indicated.
6. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

2.03 BALLASTS AND DRIVERS

A. Manufacturers:
1. Substitutions: See Section 016000 - Product Requirements.
2. Manufacturer Limitations: Where possible, for each type of luminaire provide ballasts or drivers produced by a single manufacturer.
3. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.

B. Ballasts/Drivers - General Requirements:
1. Provide ballasts or drivers containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts or drivers complying with all current applicable federal and state ballast efficiency/efficacy standards.
3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.

C. Dimmable LED Drivers:
1. Minimum Starting Temperature: Minus 20 deg F (Minus 29 deg C).
2. Rated Ambient Operating Temperature: 130 deg F (54 deg C).
3. Sound Rating: Class A.
4. Total Harmonic Distortion Rating: Less than 20%.
5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
6. Power Factor: 0.90 or higher.
7. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
8. LED drivers shall conform to IEEE 1789 standards. Alternatively, manufacturers must demonstrate conformance with product literature and testing which demonstrates this performance. Systems that do not meet IEEE 1789 will not be considered.
9. Flicker Frequency: Greater than 100 Hz.
10. Dimming Protocol: Constant Current Reduction or Hybrid Pulse Width Modulation and Variable Frequency, unless otherwise indicated, required to reduce flicker. Protocol shall be as specified on Luminaire Schedule.
11. Dimming Range: Continuous dimming from 100% to ten% relative light output unless dimming capability to lower level is indicated, without strobing, flickering, or visible steps in transition.
12. Control Compatibility: Fully compatible with the dimming controls to be installed.
    a. Certified by manufacturer for use with individually specified luminaire, LED board/module, and individually specified control components.
13. Manufacturer(s):
    a. Unless otherwise noted, luminaire manufacturers bear responsibility for selecting compatible driver manufacturers.

2.04 LIGHT SOURCE (LAMPS, MODULES, BOARDS, ETC.)

A. Substitutions: See Section 016000 - Product Requirements.

B. Manufacturer Limitations: Where possible, provide lamps produced by a single manufacturer.
   1. Where a specific manufacturer or model is indicated in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.

C. General Requirements:
   1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
   2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
   3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
   4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

D. Light Emitting Diodes (LED).
   1. Static LED Technology
      a. Correlated Color Temperature (CCT): 3500K unless otherwise indicated.
      b. Color Rendering Index (CRI): Not less than 80.
      c. Integral LEDs
         1) Individual LEDs shall be connected such that a catastrophic loss or the failure of one LED will not result in the loss of all LEDs within the luminaire.
         2) Lumen output shall not decrease by more than 20% over the minimum operational life of 50,000 hours at the rated ambient operating temperature.
         3) LEDs binned within a maximum three-step MacAdam Ellipse to ensure color consistency among luminaires of same type.
         4) Manufacturers:
            (a) Nichia
            (b) Samsung
            (c) Bridgelux
            (d) Xicato
            (e) Cree
            (f) Lumileds (Philips)
            (g) _____
   2. LED Retrofit Lamps - Wattage and lamp type as indicated, with base type as required for lighting fixture
      a. Comply with NEMA SSL 4 “SSL Retrofit Lamps: Suggested Minimum Performance Requirements”.
      b. Minimum Rated Life: 215,000 hours, unless otherwise indicated.
      c. LED retrofit lamps shall be tested for compatibility with lighting control systems to be installed. If provided lamps are not certified for compatibility without flicker, lamps shall be provided to lighting control manufacturer for testing.
      d. Manufacturers: as specified on Luminaire Schedule:
   3. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.

2.05 FINISHES

A. Provide metal finishes and paint colors as selected by the Architect.

B. Where a "Custom Color Finish" is specified but not identified, match sample provided by Architect.

C. Apply paint finishes over corrosion-resistant treatment or primer, free of streaks, runs, stains, blisters, and similar defects.

D. When the Architect issues no instructions pertaining to finishes, provide standard finishes as follows:

1. Unpainted non-reflecting surfaces are satin finished and coated with a baked-on clear lacquer to preserve the surface. Where aluminum surfaces are treated with an anodic process, the clear lacquer coating may be omitted.
2. Enamel coatings are of the high temperature baked-on type. Enamel reflecting surfaces are white with 90% minimum initial reflectance.
3. Porcelain enameled finishes meet or exceed RLM standards in all respects.
4. Painted surfaces on fixtures for use in damp or wet locations exhibit moisture resisting qualities equal to surfaces having epoxy-based coatings and appropriate to location.
5. Unpainted aluminum surfaces are anodized.

2.06 ACCESSORIES

A. Comply with requirements in Section 26 0529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2" (13 mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Twin-Stem Hangers: Two, 1/2" (13 mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

D. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gauge (2.68 mm).

E. Rod Hangers: 3/16" (5 mm) minimum diameter, cadmium-plated, threaded steel rod.

F. Hook Hangers, Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

G. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that junction boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring junction boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from junction boxes.

3.03 TEMPORARY LIGHTING

A. If approved by the Architect and Lighting Designer, use permanent luminaires for temporary lighting. Install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires; disassemble, clean, and install new lamps; and reinstall luminaires.

3.04 INSTALLATION

A. Coordinate locations of junction boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

E. Provide required support and attachment in accordance with Section 260529.

F. Provide required seismic controls in accordance with Section 260548.

G. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

H. Comply with requirements in Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables" and Section 26 0533 "Surface Raceways for Electrical Systems" for wiring connections and wiring methods.

I. Provide low voltage circuitry as required between dimming equipment and driver/ballasts in accordance with manufacturer's instructions.

J. Light fixture locations shown on electrical drawings are approximate. For light fixtures in building equipment rooms (Mechanical, Electrical, Telecommunications, etc.), coordinate fixture locations with equipment, such that optimal light distribution is obtained, without obstructing access to equipment. All other light fixtures are installed as shown on architectural drawings, or as directed by Architect.

K. Fixtures with asymmetric light distributions are oriented as shown in manufacturer’s installation instructions. When manufacturer’s instructions are not clear, obtain clarification from Architect before proceeding with installation.

L. Fixture manufacturer shall coordinate conduit entry locations with installing site condition.

M. Suspended Ceiling Mounted Luminaires:
   1. Do not use ceiling tiles to bear weight of luminaires.
   2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
   3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
   4. Secure pendant-mounted luminaires to building structure.
   5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
   6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
   7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
   8. Supports:
      a. Sized and rated for luminaire weight.
      b. Able to maintain luminaire position after cleaning and relamping.
      c. Provide support for luminaire without causing deflection of ceiling or wall.
      d. Luminaire mounting devices shall be capable of supporting a horizontal force of 100% of luminaire weight and vertical force of 400% of luminaire weight.
   9. Ceiling-Grid-Mounted Luminaire Supports: Use grid as a support element.
      a. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each luminaire. Locate not more than 6" (152.4 mm) from luminaire corners.
      b. Support Clips: Fasten to luminaires and to ceiling grid members at or near each luminaire corner with clips that are UL listed for the application.
      c. Luminaires of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support luminaires independently with at least two 3/4" (20 mm) metal channels spanning and secured to ceiling tees.
      d. Install at least one independent support rod or wire from structure to a tab on luminaire. Wire or rod shall have breaking strength of the luminaire weight at a safety factor of 3.

N. Recessed Luminaires:
   1. Install trims tight to mounting surface with no visible light leakage.
      a. Secured to junction box.
      b. Attached to ceiling structural members.
      c. Trim ring flush with finished surface.

2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

O. Suspended Luminaires:
1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
3. Provide minimum of two supports for each luminaire equal to or exceeding 8 feet nominal length, with no more than 6 feet between supports.
4. Install canopies tight to mounting surface.
5. Unless otherwise indicated, support pendants from swivel hangers.
6. Suspended Lighting Luminaire Support:
   a. Pendants and Rods: Where longer than 48" (1219.2 mm), brace to limit swinging.
   b. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with an approved junction box and accessories that hold stem and provide damping of luminaire oscillations. Support junction box vertically to building structure using approved devices.
   c. Continuous Rows of Luminaires: Use power cable or stem for power feeding at one end and tubing, rod, or wire support for suspension for each unit length or luminaire chassis, including one at each end.
   d. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
   e. Feed location within room shall be submitted for Lighting Designer approval prior to installation.

P. Wall-Mounted Luminaires:
1. Unless otherwise indicated, specified mounting heights are to center of luminaire.
2. Wall-Mounted Lighting Luminaire Support:
   a. Attached to structural members in walls.
   b. Attached to a minimum 1/8" (3 mm) backing plate attached to wall structural members.
   c. Attached using through bolts and backing plates on either side of wall.
   d. Do not attach luminaires directly to gypsum board.

Q. Cove-Mounted Luminaires:
1. Luminaires shall be installed so as to produce a continuous and unbroken band of light free of visual imperfections, hot spots, socket shadows, light gaps, etc. The inability to provide this appearance shall be brought immediately to the Lighting Designer’s attention prior to installation.

R. Install accessories as indicated in luminaire schedule and furnished with each luminaire.

S. Bond products and metal accessories to branch circuit equipment grounding conductor.

T. Exit Signs:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
2. Install lock-on device on branch circuit breaker serving units.

U. Remote LED Drivers:
1. Distance between the driver and luminaire shall not exceed that recommended by driver manufacturer. Verify, with driver manufacturers, maximum distance between driver and luminaire.
2. Locate in a ventilated and accessible area in accordance with manufacturer requirements.

V. Identify luminaires connected to emergency power system in accordance with Section 260553.

W. Install lamps in each luminaire as required.

X. Coordinate layout and installation of luminaires and suspension system with other construction that penetrates ceilings or is supported by them.

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Perform the following tests and inspections:
   1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
   2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
   3. For emergency power units perform the following:
      a. Charge emergency power units and batteries a minimum of one hour and depress switch to conduct short-duration test.
      b. Charge emergency power units and batteries a minimum of 24 hours and conduct one-hour discharge test.

D. Operate each luminaire after installation and connection to verify proper operation.

E. All LED fixtures mounted in locations which are not readily accessible by a ladder, or by a lift which resides permanently on the premises, shall be operated at full output for a minimum of 500 hours, and all failed components promptly replaced, before the scaffolding or construction lift used to install them is removed.

F. Luminaire will be considered defective if it does not pass operation tests and inspections.

G. Prepare test and inspection reports.

H. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

I. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts/drivers as determined by Architect.

J. Repair and retest malfunctioning fixtures and components. Repeat procedure until all units operate properly.

3.06 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect and Lighting Designer . Secure locking fittings in place. Where possible, units shall be focused during the normal working day. However, where daylight interferes with seeing, aiming shall be accomplished at night.

B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.07 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

B. Clean lenses to remove dirt and debris.

C. Clean reflectors to remove fingerprints, dust, and debris.

3.08 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or adjust as directed.

D. Just prior to Substantial Completion, replace all lamps that have failed.

E. Confirm or re-adjust all recessed luminaires such that trims are flush to ceiling and light leakage is not visible.

3.09 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 265100

SECTION 270500 - COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section covers the basic materials and installation methods for telecommunications work. It applies in general to all sections under DIVISION 27.

B. Section includes:
1. Communications system design requirements.
2. Communications pathways.
3. Sleeves and sleeve seals.
4. Fire-Rated cable pathways.
5. Requirements for common communications installation.

1.02 DEFINITIONS

A. "Furnish" or "provide": to supply, install and make complete, safe, and operable, the particular work referred to unless specifically indicated otherwise.

B. "Install": to erect, mount and make complete with all related accessories.

C. "Supply": to purchase, procure, acquire, and deliver complete with related accessories.

D. "Work": includes labor, materials, equipment, services, and all related accessories necessary for the proper and complete installation of complete systems.

E. "Wiring": includes raceway, fittings, wire, boxes, and all related accessories.

F. "Concealed": not in view, installed in masonry or other construction, within furred spaces, double partitions, hung ceilings, trenches, crawl spaces, or enclosures.

G. "Exposed": in view, not installed underground or "concealed" as defined above.

H. "Indicated," "shown," or "noted": as indicated, shown or noted on drawings or specifications.

I. "Similar" or "equal": of base bid manufacturer, equal in quality, materials, weight, size, performance, design and efficiency of specified product, conforming with "Base Bid Manufacturers."

J. "Reviewed," "satisfactory," "accepted," or "directed": as reviewed, satisfactory, accepted, or directed by or to Architect and/or Engineer.

K. "Finished Spaces": Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

L. "Exposed, Interior Installations": Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

M. "Exposed, Exterior Installations": Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

N. "Concealed, Interior Installations": Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

O. "Concealed, Exterior Installations": Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

P. EPDM: Ethylene-propylene-diene terpolymer rubber.

Q. NBR: Acrylonitrile-butadience rubber.

1.03 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 260533.13 - Conduit for Electrical Systems.

C. Section 260533.16 - Boxes for Electrical Systems.

1.04 REFERENCE STANDARDS

A. Published specifications, standards tests, or recommended methods of trade, industry or governmental organizations apply to work in all Sections as noted below:
   1. NEMA - National Electrical Manufacturers' Association.
   2. NECA - National Electrical Contractors Association.
   3. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance.
   4. BICSI - Building Industry Consulting Service International Telecommunications Distribution Methods Manual, Latest Edition.
   5. ANSI - American National Standards Institute.
   6. IEEE - Institute of Electrical and Electronics Engineers.
   7. ASTM - American Society for Testing and Materials.
   8. NEC - National Electrical Code.
   9. NFPA - National Fire Protection Association.
   10. CFR - Code of Federal Regulations.
   11. UL - Underwriters' Laboratories, Inc.
   12. OSHA - Occupational Safety and Health Administration Regulations.

B. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association 2006.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set 2016.

E. TIA-569 - Telecommunications Pathways and Spaces 2015d, with Addendum (2016).

F. TIA-569-D - Telecommunications Pathways and Spaces Rev D, 2015.

G. TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards Rev C, 2009 (with Addenda; 2016).

H. TIA-568-C.3 - Optical Fiber Cabling Components Standard Rev C, 2008 (with Addenda; 2011).

I. TIA-569-D - Telecommunications Pathways and Spaces Rev D, 2015.

J. TIA-606 - Administration Standard for Telecommunications Infrastructure 2017c.

K. TIA-606-B - Administration Standard for Telecommunications Infrastructure Rev B, 2012 (with Addenda; 2015).

L. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises 2015c, with Addendum (2017).

M. TIA-607-C - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises Rev C, 2015.

N. The referenced standards establish a base level of quality with industry standards. The contract drawings and these specifications take precedence over any documentation referenced below.

O. Nothing in the contract drawings or these specifications is intended to conflict with the standards referenced above. Any conflicts determined by the contractor shall be communicated to the Architect and Engineer prior to the work in question being performed or material being purchased.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. See Section 016000 - Product Requirements, for submittal requirements of factory fabricated items.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

D. Sustainable Design Documentation: Submit manufacturer's product data on cable and cable insulation showing compliance with specified lead content requirements.

E. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).

F. Submit shop drawings for approval ten (10) days prior to start of work and prior to ordering of material to consist of one (1) set of reproducible and three (3) sets of prints of drawings, diagrams, and/or manufacturers' data in accordance with the contract documents.

G. Evidence of qualifications for installer.

H. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a 1 year period after Date of Acceptance by the Owner.

C. The Contractor shall furnish a written guarantee to replace or repair promptly and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within one year form the date of final certificate for payment and/or from date or actual use of equipment or occupancy of spaces by Owner included under the various parts of work, whichever date is earlier. This work shall be done as directed by the Owner. This guarantee shall also provide that where defects occur, the Contractor will assume responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by the Contractor.

D. A manufacturer and/or supplier's warranty shall be provided by the contractor for all associated hardware and labor for a period of twenty-five (25) years from the date of acceptance by the Owner. Contactor shall replace any defective components at no cost to the Owner for parts or labor. The warranty shall cover channel and link performance parameters that meets or exceeds the specifications for the designed solution.

1.07 QUALITY ASSURANCE

A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

F. All work shall combine with National Electrical Code and all applicable local codes.

G. All equipment and accessories shall be the product of manufacturers regularly engaged in their manufacture. All items of a given type shall be the products of the same manufacturer.

H. Furnish all materials, equipment and accessories new and free from defects.

I. All electrical equipment shall be listed by Underwriters' Laboratories, Inc. (UL) or bear UL labels.

J. Supply all equipment and accessories in complete compliance with and in accordance with the applicable standards listed in reference standards of this Section and with all applicable

national, state and local codes.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Ship materials and equipment in crated sections of sizes to permit passing through available space, where required

C. Deliver equipment with protective crating and shrink-wrapped covering.

D. Receive and accept materials and equipment at the site, properly handle, house, and protect them from damage and the weather until installation. Replace equipment damaged in the course of handling without additional charge.

E. Store to prevent damage and protect from weather, dirt, fumes, water, and construction debris in clean dry space

F. Arrange for and provide storage space or area at the job site for all materials and equipment to be received and/or installed in this project

G. All exposed openings of equipment and materials are to be covered

H. Handle according to manufacturer's written rigging and installation instructions for unloading, transporting, and setting in final location

I. Protect units from physical damage. Leave factory shipping covers in place until installation

1.09 INSPECTIONS

A. Independent testing and inspections shall be provided by this contractor who shall hire the inspector or testing agency.

B. Register with the approved agency for the AHJ prior to starting any work.

C. Furnish inspection certificates from said agency upon completion of the work for all equipment and systems installed or furnished as part of the work.

1.10 COORDINATION

A. Arrange for distribution spaces, space for equipment, chases, slots, and openings in building structure during progress of construction, to allow for telecommunications installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for telecommunication items requiring access that are concealed behind finished surfaces.

D. The Communications Drawings indicate the work for the communications systems. The Architectural, Structural, and Mechanical Drawings contain certain information and details pertinent to the communications work. The telecommunications contractor should become familiar with all drawings and requirements pertinent to the work.

E. Drawings are diagrammatic and should not be used to obtain dimensional requirements by scaling the drawings.

F. The commmunications equipment should be arranged, mounted, and supported to:
   1. Allow maximum headroom, unless indicated by the drawings to mount at a specific height at a reduced headroom.
   2. Provide for minimual interference to other equipement installations when disconnecting the equipment pertinent to this work.
   3. Allow for right of way of piping and conduit.
   4. Allow for clear working and access space of other equipment from installed pathways, cables, cable trays, and wireways.

G. Coordinate selection and application of sleeves with firestopping as specificed in Section 078400 - Firestopping.

1.11 EQUIPMENT LOCATIONS

A. Locations are subject to changes in order to avoid obstacles in building construction. All dimensions and conditions are to be verified on site. Check layout for sizes and clearances, so that the apparatus and material may be installed and operated satisfactorily in space provided. Install equipment and raceways to preserve headroom and to keep openings and passageways clear.

B. Install equipment, boxes and outlets in accessible locations. Obtain final locations of all outlets and equipment from details on drawings and from Architect. Examine drawings of other trades and avoid interferences with their work.

C. Refer to architectural details for mounting heights and locations of devices.

D. Install conduit to avoid mechanical and/or structural obstructions, minimizing crossovers.

E. Exposed conduit shall be installed parallel or perpendicular to building lines.

F. Provide minimum of 6 inches clearance between communications work and electrical work, flues, steam pipes and other heat sources.

G. Mounting heights of outlets and equipment shall be as indicated on "Mounting Height" Schedule, or as specified herein.

H. Verify all door swings before installing switch boxes. In case of conflict between drawings, Architectural details shall take precedence.

I. Architect reserves the right to change, without additional cost, location of any communications outlet, provided such changed location is not more than 10 feet, and is ordered changed before said work is completely "roughed in".

J. Locations of communications equipment and connections to all other equipment are approximately correct, and are subject to such modifications as are required at time of installation, in order to meet field conditions or the dimensions of equipment actually being supplied.

K. No changes are to be made in the original design without written approval by Architect.

PART 2 PRODUCTS

2.01 SLEEVES FOR PATHWAYS

A. Conduit: As specified in Section 260533.13; provide pull cords in all conduit.

B. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
   1. Products:
      a. Refer to parts list on T series drawings.

C. J-Hooks
   1. Description: Prefabricated sheet metal cable supports for telecommunications cable.
   2. Manufacturers: Subject to compliance with requirements, provide by the following. For requirements regarding Substitutions for Cause see Division 01.
      a. Erico
      b. Owner approved Equal.
   3. Listed and labelled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
   4. Comply with TIA-569-D.
   5. Stainless steel.
   6. J or U shape, based on usage.
   7. Provide J-hooks as specified in Drawings. J hooks shall be wide based and sized appropriately to allow correct fill ratio with 20% expansion.
   8. Utilize the appropriate attachment hardware as required (i.e., straps, clamps, brackets, etc.)

2.02 FIRE STOPPING

A. Seal all penetrations through fire rated walls, floors and walls created by or made on the behalf of the contractor so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electric Code.

B. Use sealant material that has passed fire exposure testing in accordance with standard time-temperature curve in the standard, UL, ASTM E 119, and NFPA 251 and the hose stream test in accordance with UL 1OB.

C. Provide removable fire-stopping pillows (IPC flamesafe sealbags or approved equivalent) in an approved fashion in openings greater than 4" diameter, or 4" x 4" square cross section. Provide wire mesh grate over bags as recommended by manufacturer subsequent to installation.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

B. Comply with Communication Service Provider requirements.

C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

D. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400 - Firestopping.

E. Follow manufacturers' instructions for installing all telecommunications cabling. Where instructions are unavailable, follow approved industry practice.

F. Compare communications drawings and specifications with the drawings and specifications of other trades, report any discrepancies to the Consultant; and obtain written instructions for changes necessary in the work. Include most stringent requirements in bid.

G. Repairs or changes caused by contractor's neglect shall be made at contractor's expense. Protect finished work of other trades from damage or defacement and remedy any damages as required.

H. Clean up all debris generated by installation activities and discard as directed by the Construction Manager.

I. Maintain a current copy of this Specification and related Drawings at the job site at all times.

3.02 INSTALLATION OF PATHWAYS

A. Install pathways with the following minimum clearances:
   1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches from power conduits and cables and panelboards.
   3. 5 inches from fluorescent and high frequency lighting fixtures.
   4. 6 inches from flues, hot water pipes, and steam pipes.

B. Conduit, in Addition to Requirements of Section 260533.13:
   1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
   2. Conduit Bends:
      a. For conduits trade size 2 or smaller: not less than 6 times conduit internal diameter.
      b. For conduits greater than trade size 2: not less than 10 times conduit internal diameter.
   3. Arrange conduit to provide no more than 100 feet between pull points.

C. Outlet Boxes:
   1. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of telecommunications outlets provided under this section.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches.

C. Copper Cabling:
   1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
   2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
   3. Use T568B wiring configuration.

D. Identification:
   1. Use wire and cable markers to identify cables at each end.

3.04 STAFFING

A. Designate a qualified foreman. The foreman shall be present in the field at all times during the performance of the work.

B. Provide a supervisory work force sufficient to maintain efficient performance of the contractor's responsibilities.

C. Use only skilled and reliable work force and discontinue the services of anyone employed on this project upon written request by the Owner, Architect, Construction Manager or Consultant.

D. Use personnel who are qualified (at minimum) to perform all of the installation and testing work activities required under the contract.

E. Provide and use the proper tools in good working order for the performance of the work. The Consultant reserves the right to review the tools and tool maintenance procedures of the contractor and require replacements to be obtained.

F. Telephone and data industry cable installation standards, TIA/EIA and BICSI standards, and manufacturers' instructions shall be used for in-process quality control and final acceptance of the work.

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.
   4. Inspect patch cords for complete labels.

3.06 CABLE TESTING

A. Test all cables installed under the contract.

B. Pre-installation Inspection
   1. Visually inspect all cables, cable reels and shipping cartons for shipping damage. Return visibly damaged items to the manufacturer.
   2. Prior to testing, submit for review and approval copies of test report forms proposed for use. Forms shall, at minimum, contain: Project name; Contractor's name; Date of test; Media type and description; Make, model and serial number of the test equipment used

and date of last calibration.

C. Post Installation Testing
   1. Test only completed systems. Partial or statistically sampled testing is not acceptable, except by prior, written approval from the Consultant.
   2. perform an end-to-end test for continuity, ground fault, shorts and crossed pairs for each cable pair/conductor.
      a. Test cable pairs from the work area outlet, through all conductors, patches and cross connects, to the equipment room.
      b. Test horizontal cable pairs not cross-connected to backbone from their furthest termination point to the work area outlet.
   3. 4-pair Category 6 UTP: in addition to end-to-end tests listed above,
      a. Conduct a permanent link test of each cable including: wire map, length, insertion loss, NEXT loss, PSNEXT loss, ELFEXT loss, PSELFEXT loss, propagation delay, and delay skew with injected standard signals, utilizing automated test equipment. Record all results. Test bi-directionally in accordance with ANSI/TIA/EIA-568 () and compare results with the performance requirements of ANSI/TIA/EIA-568-B.1 and/or B.2-1 respectively.
      b. Test cabling not cross connected or patched within the closet as a permanent link.
   4. For 4-pair, 25-pair, and 50-pair cables, replace the entire cable if a bad pair or conductor is found. For cables with a pair count of 100-pairs or higher, replace if more than 5 pairs are bad.
   5. Remove all defective cables from cable pathways. Do not abandon cables in place.
   6. The Consultant reserves the right to observe the conduct of any or all portions of the testing process and to conduct, and to require the Contractor, using the Contractor's equipment and labor, a random re-test of up to five (5) percent of the cable plant to confirm documented test results.
   7. Document all test results and corrective procedures and submit to the Consultant within ten (10) working days of test completion.
   8. In addition to the actions specified above, the contractor may be required to be present while the owner or owner's designated representatives conduct performance tests of the transport electronics connected to the cabling system.

3.07 ACCEPTANCE

A. Once the testing has been completed, as-built and testing documentation delivered to the Consultant, and the Consultant is satisfied that all work is in accordance with the contract documents, the Consultant shall notify the contractor in writing of the acceptance of the work performed. The date of this acceptance shall constitute the commencement of the warranty period.

3.08 CABLE IDENTIFICATION SYSTEM

A. Use color coding in accordance with the TIA-606-B standards.

B. Jacks, faceplates and wall outlets at the user locations, termination blocks and individual lateral cables shall be labeled with (at minimum) machine generated black uppercase lettering on a permanent adhesive label stock, covered with a permanent water resistant sealer. Labeling stock and/or lettering must be used that provides a high contrast with the color of the terminating equipment, faceplate or cable.

C. Place labels on both ends of the cable at least 4 inches from the point at which the cable is terminated on the connector or terminal block.

D. Provide permanent, machine generated cable tags. Temporary tags are acceptable only during construction. Label each tag with the appropriate cable number as shown on the drawings and as indicated on the cable schedules provided by the Consultant.

E. Cable identification numbers shown on the plans are presented in an abbreviated format. All cables ID's shall (at minimum) indicate the floor, originating closet ID, and the sequential cable number shown on drawings.

F. If at any time during the job the permanent cable tag becomes illegible or is defaced or removed, immediately replace it with a duplicate pre-printed cable tag.

3.09 PANEL IDENTIFICATION

A. Furnish a nameplate for each patch panel, cross-connect field, equipment rack, etc. Unless otherwise noted, use a permanent adhesive label stock, covered with a permanent water-resistant sealer.

3.10 TERMINATING BLOCKS, DISTRIBUTION RACKS AND PATCH PANELS

A. Locate and place all terminating and distribution hardware as shown on drawings.

B. Assemble and install all equipment per manufacturers' printed instructions.

C. Terminate all horizontal Category 6 UTP cables directly on the 110-type termination strips at the rear of rack-mounted 24-port patch panels, unless otherwise noted.

3.11 CABLE PULLING

A. Do not exceed a pulling tension of 110 N (25 lbf) on 4-pair UTP cables.

3.12 CABLE INSTALLATION

A. Special Conditions
   1. Furnish and install communications cables per the drawings and specifications provided by the Consultant and per manufacturer's recommendations.
   2. Install each station cable as an uninterrupted conductor section from the IDF closet to the user-end termination point, as indicated on the drawings, without splices or mechanical couplers between the points of origin and termination.
   3. The pathways shall be parallel to building lines and shall sweep/turn at 90 degree angles while maintaining minimum bend radius for cable, and shall comply with the guidelines and recommendations outlined in the TIA-568-C.2 and TIA-568-C.3 Series of standards and the TIA-569-D Standard.
   4. Contractor shall support all backbone cables and all primary horizontal cable bundles on open mesh cable tray to be furnished and installed under the Telecommunications Pathways work. No non-re-enterable tie wraps shall be used to secure cables to the trays.
   5. Where horizontal cables exit trays to run to workstation locations, contractor shall furnish and install J-hooks with the appropriate mounting hardware every 60 inch OC (maximum) for open cable runs. J-hooks shall not be fastened to suspended ceiling support structures, electrical or plumbing piping or any other trade work.
      a. J-Hooks shall be installed 48" to a maximum of 60 inch apart. Spacing shall maintain maximum sag of 12" between hooks. Closer spacing will be required anytime the condition exists.
      b. J-Hooks shall be installed at the point of elevation change as well as change of direction.
   6. Provide all other outlet configurations in accordance with the Drawings.

B. Terminate all four-pair UTP horizontal cables on 4-pair Category 6 jacks. The pinning configuration of the outlet jacks shall be T568B unless otherwise specified by the Owner prior to installation. The jacks shall then be inserted into appropriate faceplates for flush wall mounted receptacles, surface-mounted channels or boxes.

C. Unless otherwise noted, route all intra-building station cables above the finished ceilings, transitioning vertically to wall mounted back boxes and/or surface-mounted wiring channels via conduit stub-ups into the ceiling void or to floor boxes or poke-thru fittings to the floor above, as required.

D. Label each outlet and each cable with an appropriate ID number.

3.13 EQUIPMENT ROOM

A. All cables, after entry into the equipment rooms must be secured to backboards and dressed into supports. The contractor shall attach the cables where required to plywood backboards using Velcro-type re-enterable cable ties at spacing of approximately 12 inches. Velcro cable ties shall be secured to backboards using #10 machine screws and metallic washers, or rigid

tabs.

B. Support all cables mounted onto patch panels with strain management bars on rear of rack.

C. Route cables from work locations into equipment rooms via overhead distribution. Maintain overhead distribution wherever possible within equipment rooms.

END OF SECTION

SECTION 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground busbars.

1.02 DEFINITIONS

A. BCT: Bonding conductor for telecommunications.

B. EMT: Electrical metallic tubing.

C. TBB: Telecommunications bonding backbone.

D. TGB: Telecommunications grounding busbar.

E. TMGB: Telecommunications main grounding busbar.

1.03 SYSTEM DESCRIPTION

A. Provide a communications bonding and grounding system as described in this document, documents and drawings specific to that project, and in compliance with the above cited Codes, Standards and Agencies.

B. Comply with the requirement of Code of Practice for Info-Communications Facilities in Buildings.

C. Comply with the requirement for 260526 - Grounding and Bonding for Electrical Systems.

D. Bond the following items within the telecommunications grounding system.
   1. Metallic raceway systems, including metallic cable trays.
   2. Communications equipment enclosures (cabinets) or cross-connect frames.
   3. All metal cable conduit.
   4. Electrical service panels in entrance facilities, telecommunications and equipment rooms.
   5. Wall and rack mounted grounding busbars.
   6. Exposed building steel that is within 6 feet of equipment racking systems.
   7. Building steel extending to earth in outside-plant.
   8. All related bonding accessories.

1.04 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Grounding to conform to applicable building codes.

C. Cable and equipment to be installed in a neat and workmanlike manner.

D. Methods of construction that are not specifically described or indicated in the contract documents to be subject to the control and approval of the owner or their official representatives.

E. Equipment and materials specified shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed.

F. Where “approved equal” is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to written approval by from owner per the Substitutions Policy listed below.

G. Materials and Methods shall comply in every way with above cited Standards and Codes.

H. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

I. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

J. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff..

K. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Field quality control test reports.

E. Materials Substitution Policy:
1. Substitution of products for those specified within this document is not allowed without express written permission from owner.
2. Should Contractor feel product substitution unavoidable for reasons of logistics or availability, Contractor shall submit to the owner project representative a request for product substitution in writing no less than 5 business days in advance of bid explaining need for deviation from this specification.
3. Written requests for substitution shall be accompanied by all drawings, specification sheets and engineering documents, as well as third party laboratory performance test results proving equivalent or superior performance in mechanical or electrical function of the product to be substituted.
4. Equal substituted product acceptance must be received in writing from owner or their official representatives.
5. Contractor shall be responsible for, and assume all costs for removal and replacement of any substituted materials or products not approved in writing from owner or their official representatives. Such costs shall include, but not be limited to labor, materials as well as any penalties or fees for late completion.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
   a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
   b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
   c. Ground Bar Mounting Height: 8 feet above finished floor unless otherwise indicated.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.
3. Comply with TIA-607-C.

B. Telecommunications Main Grounding Busbar (TMGB)
1. Meet BICSI and TIA-607-C requirements for network systems grounding applications.
2. Telecommunications Main Grounding Busbar (TMGB) shall be constructed of 0.25 inch thick solid copper bar.
3. Minimum 95% copper content.
4. The busbar shall be 4 inch high and 20 inch long and shall have 30 attachment points (two rows of 15 each) for two-hole grounding lugs.
5. Employ BICSI hole spacing to fit HGBL series 2-hole lugs.
6. The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4 inch standoff from the wall.
7. The busbar shall be UL Listed as grounding and bonding equipment.

C. Telecommunications Grounding Busbar (TGB)
1. Meet BICSI and TIA-607-C requirements for network systems grounding applications.
2. Telecommunications Grounding Busbar (TGB) shall be constructed of 0.25 inch thick solid copper bar.
3. Minimum 95% copper content.
4. The busbar shall be 2 inch high and 12 inch long and shall have 9 attachment points (one row) for two-hole grounding lugs.
5. Employ BICSI hole spacing to fit HGBL series 2-hole lugs.
6. The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 2 inch standoff from the wall.
7. The busbar shall be UL Listed as grounding and bonding equipment.

D. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
1. Use insulated copper conductors unless otherwise indicated.
   a. Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
   b. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
   c. Cable Tray Grounding Jumper:
      1) Not smaller than No. 6 AWG and not longer than 12 inches (300 mm). If jumper is a wire, it shall have a crimped grounding lug with two holes and long barrel for two crimps. If jumper is a flexible braid, it shall have a one-hole ferrule. Attach with grounding screw or connector provided by cable tray manufacturer.

E. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

F. Product(s):
1. Refer to parts list on T series drawings.

2.03 LABELING

A. Comply with TIA-606-B .

B. Comply with UL 969.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Comply with TIA-607-C.

D. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

3.03 TELECOMMUNICATIONS MAIN GROUND BUSBAR (TMGB)

A. Where a panelboard (electrical power panel) is located in the same room or space as the TMGB that panelboard’s alternating current equipment ground (ACEG) bus (when equipped) or the panelboard enclosure shall be bonded to the TMGB.

B. The TMGB should:
   1. Be located in the telecommunications entrance facility.
   2. Have a mounting height adjusted to accommodate overhead or underfloor cable routing.
   3. Minimize the length of bonding conductor for telecommunications.
   4. Be located near backbone cabling and associated terminations.
   5. Serve telecommunications equipment that is located within the same room space.

C. Attachments to TMGB:
   1. Bonding Conductor – Electrical Distribution Panel.
   2. Building Steel.
   3. Outside plant cables.
   4. Backbone cables that incorporates a shield or metallic member.
   5. All metallic pathways for telecommunications cabling located within the same room or space as the TMGB.
   6. Cable tray.
   7. Ladder rack.
   8. Conduit – via grounding hubs.
   9. Telecommunications equipment located in the telecommunications equipment room.
   10. TBB.

3.04 TELECOMMUNICATION GROUND BUSBAR (TGB)

A. The TBG shall:
   1. Maintain 36” separation from active electronics
   2. The TGB is the grounding connection point for telecommunications systems and equipment in the area served by that telecommunications room or equipment room.

3. Where a panelboard is located in the same room or space as the TGB that panelboard's ACEG bus (ac electrical ground when equipped) or the panelboard enclosure shall be bonded to the TGB. When a panelboard for telecommunications equipment is not in the same room or space as the TGB, that TGB should be bonded to the panelboard that feeds the distributor.
4. The TBBs and other TGBs within the same space shall be bonded to the TGB with a conductor the same size as the TBB.
5. Where a grounding equalizer (GE) is required, it shall be bonded to the TGB.

3.05 TELECOMMUNICATIONS BONDING BACKBONE (TBB)

A. The intended function of a TBB is to reduce or equalize potential differences between telecommunications systems. While the TBB will carry some current under AC power ground fault conditions, it is not intended to provide the only ground fault return path.

B. The TBB shall:
1. Be connected to the TMGB.
2. Be a continuous copper 3/0 AWG conductor.
3. Be consistent with the design of the telecommunications backbone cabling system.
4. The TBB conductors shall be installed and protected from physical and mechanical damage.
5. The TBB conductors should be installed without splices.
a. Where splices are necessary, the number of splices should be a minimum and they shall be accessible and located in telecommunications spaces.
b. Joined segments of a TBB shall be connected using exothermic welding, irreversible compression-type connectors, or equivalent.

C. Permit multiple TBBs as dictated by the building size.

D. The metallic cable shield shall not be used as a TBB.

3.06 TELECOMMUNICATIONS EQUIPMENT BONDING CONDUCTOR

A. Connects the TMGB or TGB to equipment racks/cabinets

B. Shall be a continuous copper conductor that should be sized per the length of cable.

C. Shall be separated from ferrous materials by 2" or be bonded to the ferrous metal
1. May be routed within cable trays or suspended 2" under or off the side of the cable tray or ladder rack

D. Shall be supported every 3ft

E. 8" Bend radius – with no less than a 90 degree bend

F. May come in contact with other cable groups at a 90 degree angle only

G. Cable shields do not satisfy the requirements of a TEBC

H. There may be more than one TEBC within each telecommunication room.

3.07 RACK BONDING CONDUCTOR

A. A bonding conductor used to connect the rack/cabinet directly to the TMGB or TGB.

B. Metallic enclosures, including telecommunications cabinets and racks, shall be bonded to the TMGB or TGB using a minimum sized conductor of No. 6 AWG.

C. Cabinets, racks, and other enclosures in computer rooms shall not be bonded serially; each shall have their own dedicated bonding conductor to the TMGB or TGB.

3.08 ELECTRICAL DISTRIBUTION PANEL

A. When located in the same room as the TMGB or TGB, the EDP's equipment grounding bus or the panel board enclosure shall be bonded to the TMGB/TGB

B. Use a 3/0 AWG bonding conductor.

C. A qualified electrician shall make all connections within an AC electrical panel.

D. Outside of the scope of TIA-607-C.

3.09 CONDUCTIVE FIBER OPTIC CABLES

A. The metallic components of a conductive cable are capable of transmitting current.

B. Conductive fiber-optic cables should be bonded and grounded as specified in NEC Article 770.100

3.10 LADDER RACK AND/OR CABLE TRAY

A. To achieve the objective of potential equalization in the TR, all cable runway sections are bonded together and bonded back to the TMGB or TGB.

B. Maintain a 8” Bend Radius on the telecommunications equipment bonding conductor.

C. Keep a 2” separation from other cables, power and telecommunications.

D. Remove any paint, oxidation, ect. from the runway surfaces that are being bonded.

E. Drill two holes as required to accommodate the 2-hole compression lug.

F. Apply a thin coat of antioxidant around the holes and on the surface where the lug will be in contact.

G. Attach straps to the runway using stainless steel hardware sized for the lug holes.

H. Tighten the hardware.

I. Wipe off any excess antioxidant after installation of the lug.

3.11 LABELING

A. The format for the telecommunications main grounding busbar shall be FS-TMGB, while the format for the TGBs shall be FS-TGB.
   1. FS is the telecommunications space identifier for the space containing the busbar; floor & space.
   2. TMGB is the portion of an identifier designating a telecommunications main grounding busbar.
   3. TGB is the portion of the identifier designating a telecommunications grounding busbar.

3.12 FIELD QUALITY CONTROL

A. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Perform tests and inspections.

D. Tests and Inspections:
   1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
   2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.
      a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.
   3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.
      a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB and each TBG. Maximum acceptable ac current level is 1 Amp.

E. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Architect promptly and include recommendations to reduce ground resistance.

F. Grounding system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Inspecting Contractor shall verify that any conduit longer than 3 feet through which a grounding conductor passes is properly bonded to the grounding conductor as described in this document.

I. During inspections contractor shall verify compliance with all stipulations specified in this document and compliance with all regulatory references (Standards and Codes) cited.

J. All opens or gaps in the bonding system during final inspections will be recorded in the inspection report and remedied.

K. All bonded connections failing the test described above shall be remedied and retested by the installation contractor at contractor's expense.

END OF SECTION

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SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Telecom Outlets (TO)
B. Horizontal Distribution Systems
C. Station Conduits
D. Junction Box Requirements for Stations Conduits
E. Service Entrance Conduits
F. Pathway Requirements for Entrance Conduits
G. Riser Conduits
H. Firestopping

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 270526 - Grounding and Bonding for Communications Systems.
C. Section 270536 - Cable Trays for Communications Systems
D. Section 260529 - Hangers and Supports for Electrical Systems.
E. Section 270500 - Common Work Results for Communications.
F. Section 271100 - Communications Equipment Room Fittings.
G. Section 271300 - Communications Backbone Cabling
H. Section 271500 - Communications Horizontal Cabling

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a.
B. BICSI TDMM - Telecommunications Distribution Methods Manual, 13th Edition 2014.
C. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association 2006.
D. NEMA FG 1 - Fiberglass Cable Tray Systems 1993 (with Rev 1; 1994).
E. NEMA VE 1 - Metal Cable Tray Systems 2009.
F. NEMA VE 2 - Cable Tray Installation Guidelines 2013, with Errata 2016.
G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
H. NFPA 70B - Recommended Practice for Electrical Equipment Maintenance Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
I. NFPA 70E - Standard for Electrical Safety in the Workplace 2015.
J. TIA-569-D - Telecommunications Pathways and Spaces 2015d, with Addendum (2016).
K. TIA-606-B - Administration Standard for Telecommunications Infrastructure Rev B, 2012 (with Addenda; 2015).
L. UL 1479 - Standard for Fire Tests of Penetration Firestops Current Edition, Including All Revisions.

1.04 DEFINITIONS

A. ARC: Aluminum rigid conduit.
B. GRC: Galvanized rigid conduit.
C. IMC: Intermediate metal conduit.

D. RTRC: Reinforced thermosetting resin conduit.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer’s standard catalog data for specified products demonstrating compliance with referenced standards and listing numbers of systems in which each product is to be used.

C. Shop Drawings: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings.

D. Manufacturer's Instructions: Submit manufacturer’s printed installation instructions.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three (3) years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

D. Products/Systems: Provide firestopping systems that comply with the following requirements:
   1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop system acceptable to authorities having jurisdiction.
   2. Firestopping products bear the classification marking of qualified testing and inspection agency.

E. Installer Qualifications: Experience in performing work of this section who is qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products in accordance with specified requirements.

F. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where “approved equal” is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

G. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions and NEMA VE 2.

B. Handle products carefully to avoid damage to finish.

C. Delivery:
   1. Manufacturer’s original, unopened, undamaged containers, identification labels intact identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspection agency’s classification marking; and mixing instruction for multicomponent products.
   2. Handle and store products according to manufacturer’s recommendations published in technical materials. Leave products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.

D. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.08 PROJECT CONDITIONS

A. Do not install firestopping products when ambient or substrate temperatures are outside limitations recommended by manufacturer.

B. Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.

C. Maintain minimum temperature before, during, and for a minimum 3 days after installation of materials.

D. Do not use materials that contain flammable solvents.

E. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

F. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

G. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

PART 2 PRODUCTS

2.01 TELECOM OUTLETS (TO)

A. New construction TO consists of one (1) 4 inches square by 2-1/8" deep (100 mm square by 60 mm deep) flush mounted box. Each outlet box shall have a EMT conduit stubbed above the drop ceiling or extended into the hallway cabletray. Conduits size is as follows:
   1. For Outlets with 3 or less cables, use a 1” EMT conduit
   2. For Outlets with 3-6 cables, use a 1.25” EMT conduit
   3. For all other sizes, calculate fill ratio at 40% for proper sized conduit

B. Existing surface-mounted construction TO typically consists of surface-mounted raceway including base, cover, end fitting, entrance end fitting, and (2) 1" EMT conduits stubbed out top of entrance end fitting to above ceiling or out to nearest hallway distribution system. Size of the raceway is site dependent based on number of conductors to be installed.

C. The intent of the installation of the TOs which consist of the raceway is as follows:
   1. Where ceilings are accessible, the raceway and entrance end fitting shall extend above the ceiling and the conduits installed above the ceiling in the room to the nearest hallway distribution system.
   2. Where ceilings are partially accessible, or if the Drawings and/or Specifications indicate installation of access panels, the raceway shall extend above the ceiling and the conduits installed above the ceiling in the room to the nearest hallway distribution system.
   3. Where ceilings are inaccessible or no ceilings exist, the raceway shall extend up as close to the ceiling as practical to allow installation of conduits as high as possible to the nearest hallway distribution system.

2.02 HORIZONTAL DISTRIBUTION SYSTEMS

A. Conduit System (Renovations only, where conduit exists)
   1. Provide conduits secured to wall above corridor ceilings as shown on the Drawings or as specified herein for installation of telecommunications cables.
   2. Corridor conduits shall be 4" EMT, furnished in 10 foot lengths wherever possible, with no sharp edges, reamed as necessary, evenly supported at two locations per 10-foot section spacing. Conduits shall be sized and quantified to account for handling cables in all TO conduits at 40% fill back to the TR and/or ER rooms. Verify size prior to installation. Bushings and/or connectors on ends of EMT are required.
   3. All conduits shall be installed stacked and attached to walls unless conditions exist which prohibit this type of installation. When this condition exists, mount conduits side-by-side supported with 3/8” rod attached to building structure utilizing unistrut channel to form a trapeze. Double nut the top and bottom at the unistrut. Utilize conduit clamp to secure conduits to unistrut.

4. Provide measured pull line in each conduit rated at 1200 lbs. minimum. Increments must be in 12” steps.
5. Grounding of conduits is not required per NEC #250-33, Exception No. 2. shall be painted except conduit above suspended ceilings or in mechanical, electrical or telecommunication rooms. Color to match that of surface installed upon or as directed by Owner’s Representative. Coordinate with other trades prior to painting.
6. Provide restorable fire stops inside and around conduits as recommended by UL 1479 or ASTM E814 for all conduits penetrating fire-rated construction. Fire rated construction to be verified with AHJ.

B. Corridor Cable Tray System
1. Complete wall mounted or suspended aluminum cable tray system and necessary accessories shall be provided as shown on plans. Install entire cable tray system in accordance with manufacturer’s minimum installation practices and all local governing codes.
2. Coordinate installation of cable tray with other trades to allow a minimum of 12” above, 12” in front, and 12” below of clearance from piping, conduits, ductwork, etc. Allowance must be provided for access to the tray with reasonable room to work. Obstructions to the tray must be minimized and cannot block more than 6 feet of the tray at any point in the run.
3. Cable tray shall not be loaded beyond 60% of manufacturer’s recommended load capacity.
4. Where a new cable tray distribution system encounters a wall, install sufficient re-enterable firestopping assemblies through the wall so cabling does not exceed 40% fill.
5. Where cable tray is exposed below ceiling, install the appropriate solid bottom inserts to conceal cables.
6. Install cable tray dropouts where large quantities of cables exit the distribution system.
7. Cable tray must be sized to facilitate sufficient growth capacity for migration cable plant to coexist in same tray as existing cable plant, wherever possible.
8. Manufacturer of cable tray in corridors and telecom rooms shall be:
   a. Refer to parts list on T series drawings.

C. Telecommunication Room Cable Tray System
1. TR cable tray shall completely wrap all walls within the room. Cable tray shall extend over all equipment frames.
2. Cable tray shall be a minimum width of 2” high x 12” wide. Cable tray may be sized upwards if fill ratio requirements need to be met based on cable quantities.
3. Cable tray shall be 12 inch cable runway.
4. Manufacturer of cable tray in telecom rooms shall be:
   a. Refer to parts list on T series drawings.

D. Re-enterable Firestopping Assemblies
1. EZ-Path Series 44 and multi-gang wall mount bracket, w/ radius control fittings.
   a. Refer to parts list on T series drawings.

E. Cable Supports
1. J-hooks Description: Prefabricated sheet metal cable supports for telecommunications cable.
2. Manufacturers: Subject to compliance with requirements, provide by the following. For requirements regarding Substitutions for Cause see Division 01.
   a. Erico
   b. Owner approved Equal.
3. Listed and labelled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
4. Comply with TIA-569-D.
5. Stainless steel.
6. J or U shape, based on usage.
7. Provide J-hooks as specified in Drawings. J hooks shall be wide based and sized appropriately to allow correct fill ratio with 20% expansion.

8. Utilize the appropriate attachment hardware as required (i.e., straps, clamps, brackets, etc.)

F. All open pathway/trays shall be installed a minimum of six (6) inches away from any light fixture or other source of EMI (Electromagnetic Interference).

G. All pathways shall be grounded per NEC Article 250.

H. Provide external grounding strap at expansion joints, sleeves and crossover and at other locations where pathway/tray continuity is interrupted.

I. Support all pathways from building construction. Do not support pathways from ductwork, piping, or equipment hangers.

J. Install cable tray level and straight unless noted on the construction drawings

2.03 STATION CONDUITS

Station conduit is defined as conduit that originates at the TO and rises within the walls or is exposed from a raceway and extends up into the drop ceiling or over to the hallway distribution system.

A. Provide station conduits from TOs to above the drop ceiling or extend over to the hallway distribution systems consisting of 1” EMT minimum or appropriate size as shown on the Drawings or as specified herein for installation of telecommunications cables.

B. Provide an insulating press fit bushing on all telecommunications conduits including interconnecting nipples and stub to distribution system. To prevent conflicts with other cables or conduits to cable tray, the conduit shall be stubbed not less than 6" above or below conduit/cable tray center line. Where space permits, every effort shall be made to bend station conduits down such that the flow of installed cables promotes the minimum length back to the TR and the least amount of bends in the cables. Bushings must be rated to be used in an environmental air handling space (Plenum).

C. Manufacturer of insulating bushing on all telecommunication conduits shall be:

D. Provide measured pull line in 12” increments in each empty conduit to hallway distribution system.

E. Indelibly mark station conduit at hallway distribution end with Room # that conduit serves.

F. The use of 90-degree electrical pulling elbows is prohibited.

G. Do not include more than two 90-degree bends between pulling points when installing station conduit runs. If the path of the station conduits requires more than 180 degrees of total bends, installation of an appropriate sized junction box is required. See section 2.4 for junction box requirements.

H. Place an appropriate sized junction box in each individual station conduit run that exceeds 100 feet in length.

I. The use of a third bend in a conduit is only acceptable if:
1. The total conduit run is reduced by 15%.
2. The conduit size is increased to the next trade size.
3. One of the bends is located within 12” of the cable feed end.

2.04 JUNCTION BOX REQUIREMENTS FOR STATION CONDUITS

A. If the station conduit route exceeds the 180 degree of total bends limitation, an appropriate sized junction box is required within a straight section of the conduit run.

B. Each station conduit run requires a separate junction box. The sharing of a junction box by multiple conduits is prohibited.

C. A junction box shall not be used in place of a bend. All junction boxes in station conduit paths shall be installed within a straight section of the conduit run.

2.05 SERVICE ENTRANCE CONDUITS

A. Minimum of two (2) 4" IMC conduits shall be installed from the nearest utility tunnel on outside of the building as shown on the Drawings.

B. Terminate entrance conduits entering Enterance Rooms (ER) from below grade to extend 4" above finished floor. Location of entrance conduits shall be within 12” of room corners.

C. Terminate entrance conduits entering ER rooms from above ceiling height to extend 4" below finished ceiling or 12” above cable tray.

D. Terminate entrance conduits entering an ER rooms from below ceiling height to extend 4" into the room.

E. Entrance conduits shall be continuous into the building and to the ER. Securely fasten all entrance conduits to the building to withstand any cable placing operation. Do not include more than two 90-degree bends between pulling points when installing entrance conduits.

F. On exterior wall penetrations, seal both sides of the wall around outside of conduit with hydraulic cement to prevent water from entering the building. Seal the inside of the conduit on both sides with conduit plugs, water plugs, or duct sealer to prevent water, vapors, or gases from entering the building.

2.06 PATHWAY REQUIREMENTS FOR ENTRANCE CONDUITS

A. If the entrance conduits exceed the 180 degree of total bends limitation, an appropriate sized junction box, manhole, or handhole is required.

B. As-built drawings of entrance conduit path required to be submitted to Owner’s Representative before covered with soil.

2.07 RISER CONDUITS

Riser conduits shall only be used when noted on the Construction Documents for special applications only. As a rule, riser conduits are not required for the riser system. However, when required:

A. Minimum of two (2) 4" conduits shall be installed between the ER room and each TR room as shown on the Drawings.

B. Conduits entering ER and TR rooms shall be reamed or bushed and terminated not more than 4" from entrance wall and within 12” of room corners.

C. Conduits entering ER and TR rooms from below floor shall be terminated not more than 4" above finished floor.

D. Conduits for riser cables shall be continuous and separate from all other conduit or enclosed raceway systems. Do not include more than two 90-degree bends between pulling points when installing riser conduits. Where junction boxes are required, locate in accessible areas, such as above suspended ceilings in hallways.

E. Conduits shall not be less than 4" trade size and be equipped with a measured pull line at 12” increments rated at a minimum 1200-pound test.

F. Provide restorable fire stops inside and around conduits as recommended by UL 1479 or ASTM E814 for all conduits penetrating fire-rated construction. Fire-rated construction to be verified with AHJ.

G. Provide an insulating press fit bushing on all telecommunications riser conduits. Bushings must be rated to be used in an environmental air handling space (Plenum).

H. Riser conduits shall not be used for the distribution of horizontal cables.

2.08 FIRESTOPPING

A. General: Use only firestopping products that have been tested for specific fire resistance rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

B. In all buildings, floor/ceiling assemblies, stairs, and elevator penetrations must be sealed with a 2-hour fire stop assembly at a minimum, unless otherwise noted.

C. Contact Owner’s Representative to identify walls which are fire-rated construction. Walls must be sealed with a 2-hour fire stop assembly at a minimum.

D. Communication pathways requiring fire stopping shall utilize removable/re-usable fire stopping putties for ease of Moves, Adds, and Changes.

E. All fire stopping penetrations shall conform to the recommended practices listed in UL 1479 or ASTM E814.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. The intention of the telecommunications conduits is to provide a route between ER and TR rooms, routes from the TRs throughout building floors to hallways, and routes from hallway distribution systems into rooms to individual TOs for telecommunications cabling.

B. Installation of new pathways shall not interfere with existing pathways in such a way that installation of new cables within the existing pathway is made more difficult.

3.02 EXAMINATION

A. Before beginning installation, verify that substrate conditions previously installed under other sections are acceptable for installation of firestopping in accordance with manufacturer’s installation instructions and technical information.

B. Surfaces shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellants, and any other substances that may inhibit optimum adhesion.

C. Provide masking and temporary covering to protect adjacent surfaces.

D. Examine areas to receive cable management system. Notify the Owner’s Representative of conditions that would adversely affect the installation or subsequent utilization of the system.

E. Do not proceed with installation until unsatisfactory conditions are corrected.

3.03 INSTALLATION

A. General: Install through-penetration firestop systems in accordance with Performance Criteria and in accordance with the conditions of testing and classification as specified in the published design.

B. Manufacturer’s Instructions: Comply with manufacturer’s instructions for installation of firestopping products.

C. Install in accordance with recognized industry practices, to ensure that the equipment complies with requirements of the NEC, and applicable portions of NFPA 70B and NECA "Standards of Installation" pertaining to general electrical installation practice.

D. Coordinate installation with other trades.

E. Field verification is required before installation.

F. Install cable management system at locations indicated on the drawings and in accordance with manufacturer's instructions.

3.04 FIELD QUALITY CONTROL

A. Inspections: Owner shall engage qualified independent inspection agency to inspect through-penetration firestop systems.

B. Keep areas of work accessible until inspection by authorities having jurisdiction.

C. Where deficiencies are found, repair firestopping products so they comply with requirements.

3.05 ADJUSTING AND CLEANING

A. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

END OF SECTION

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SECTION 271100 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 GENERAL

1.01 SUMMARY

A. This section covers the basic materials and installation methods for telecommunications work in equipment rooms.

B. Section includes:
   1. Telecommunications mounting elements.
   2. Telecommunications equipment racks and cabinets.
   3. Backboards.
   4. Grounding.

1.02 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. LAN: Local area network.

C. RCDD: Registered Communications Distribution Designer

1.03 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 260526 - Grounding and Bonding for Electrical Systems.
   1. Includes intersystem bonding termination.
   2. Includes bonding jumpers for bonding of communications systems and electrical system grounding.

C. Section 260536 - Cable Trays for Electrical Systems.

D. Section 270500 - Common Work Results for Communications.

E. Section 271300 - COMMUNICATIONS BACKBONE CABLING.

F. Section 271500 - Communications Horizontal Cabling.

G. Section 28 0513 - Conductors and Cables for Electronic Safety and Security.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. See Section 016000 - Product Requirements, for submittal requirements of factory fabricated items.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

D. Sustainable Design Documentation: Submit manufacturer's product data on cable and cable insulation showing compliance with specified lead content requirements.

E. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).

F. Submit shop drawings for approval ten (10) days prior to start of work and prior to ordering of material to consist of one (1) set of reproducible and three (3) sets of prints of drawings, diagrams, and/or manufacturers' data in accordance with the contract documents.

G. Evidence of qualifications for installer.

1.05 QUALITY ASSURANCE

A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.
   3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

F. All work shall combine with National Electrical Code and all applicable local codes.

G. All equipment and accessories shall be the product of manufacturers regularly engaged in their manufacture. All items of a given type shall be the products of the same manufacturer.

H. Furnish all materials, equipment and accessories new and free from defects.

I. All electrical equipment shall be listed by Underwriters' Laboratories, Inc. (UL) or bear UL labels.

J. Supply all equipment and accessories in complete compliance with and in accordance with the applicable standards listed in reference standards of this Section and with all applicable national, state and local codes.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
   1. Locate main distribution frame as indicated on the drawings.

B. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.
   1. Locate intermediate distribution frames as indicated on the drawings.

C. Entrance Facilities: Contains the cables, network demarcation point(s), connecting hardware, protection devices and other equipment that connect to the access provider (AP) or private network cabling. It includes connections between outside plant and inside building cabling.

D. Backbone Cabling: Cabling, pathways, and terminal hardware connecting intermediate distribution frames (IDF's) with main distribution frame (MDF), wired in star topology with main distribution frame at center hub of star.

E. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 BACKBOARDS

A. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
   1. Size: 48 by 96 inches.
   2. Do not paint over UL label.

2.03 EQUIPMENT FRAMES, RACKS AND CABINETS:

A. Component Racks: EIA/ECA-310 standard 19 inch wide.

B. Floor Mounted Racks: Aluminum or steel construction with corrosion resistant finish; vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.

C. Freestanding Cabinets: Front and rear doors with locks; removable side panels with locks; vented top and rear door; adjustable leveling feet; cable access in roof and base; grounding bar.

D. Cabinets: Steel construction with corrosion resistant finish.

E. Locks: Keyed alike.

F. Cable Management:
   1. Metal with cable retaining fingers or cover.
   2. Vertical cable management shall be dual sided with front and rear channels, with covers.
   3. Provide a horizontal cable manager at the top of each floor mounted rack with a minimum size of 2 RMU.

G. Product(s):
   1. Refer to parts list on T series drawings.

2.04 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

B. Comply with Section 27 0526.

C. Wall-mount Busbars (TGB and TMGB)
   1. Meet BICSI and TIA-607-C requirements for network systems grounding applications.
   2. Employ BICSI hole spacing to fit LCC-W series 2-hole lugs.
   3. Be made of high conductivity copper and tin-plated to inhibit corrosion.
   4. Come pre-assembled with brackets and insulators attached for quick installation.

2.05 LABELING

A. Comply with TIA-606.

B. Comply with UL 969.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

B. Comply with Communication Service Provider requirements.

C. Comply with BICSI TDMM for layout and installation of communications equipment rooms.

D. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

E. Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers.

F. Coordinate service entrance arrangement with local exchange carrier.

G. Power raceways and receptacles shall be coordinated with locations of communications equipment requiring electrical power to operate.

H. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

I. Follow manufacturers' instructions for installing all telecommunications cabling. Where instructions are unavailable, follow approved industry practice.

J. Compare communications drawings and specifications with the drawings and specifications of other trades, report any discrepancies to the Consultant; and obtain written instructions for changes necessary in the work. Include most stringent requirements in bid.

K. Repairs or changes caused by contractor's neglect shall be made at contractor's expense. Protect finished work of other trades from damage or defacement and remedy any damages as required.

L. Clean up all debris generated by installation activities and discard as directed by the Construction Manager.

M. Maintain a current copy of this Specification and related Drawings at the job site at all times.

3.02 INSTALLATION OF EQUIPMENT AND CABLING

A. Wall-Mounted Racks and Enclosures:
   1. Install to plywood backboards only, unless otherwise indicated.
   2. Mount so height of topmost panel does not exceed 78 inches above floor.

B. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.

C. Floor-Mounted Enclosures: Connect adjacent cabinets together and remove interior side panels.

D. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. Furnish and install communications cables per the drawings and specifications provided by the Consultant and per manufacturer's recommendations.

E. For power raceways and receptacles, coordinate location with locations of communications equipment requiring electrical power to operate.

3.03 FIRE STOPPING

A. Comply with Section 27 0300.

B. Comply with requirements in Section 078413 "Penetration Firestopping."

C. Comply with TIA-569-B, Annex A, "Firestopping."

D. Comply with BICSI TDMM, "Firestopping Systems" Article.

E. Seal all penetrations through fire rated walls, floors and walls created by or made on the behalf of the contractor so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electric Code.

F. Use sealant material that has passed fire exposure testing in accordance with standard time-temperature curve in the standard, UL, ASTM E 119, and NFPA 251 and the hose stream test in accordance with UL 1OB.

3.04 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

B. Comply with Section 27 0526.

C. Grounding shall be installed according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

D. Locate grounding bus bar to minimize length of bonding conductors.

E. Grounding bus bar shall be connected to a suitable electrical building ground with a minimum of a No. 4 AWG grounding electrode conductor.

F. Metallic equipment shall be grounded to the grounding bus bar with a minimum of No. 6 AWG equipment grounding conductor.

3.05 IDENTIFICATION

A. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.
   1. Unless otherwise noted, use a permanent adhesive label stock, covered with a permanent water-resistant sealer.

B. Comply with TIA/EIA-606-A for identification of system components, wiring, and cabling.

C. Comply with requirements in Section 26 0553 "Identification for Electrical Systems."

D. Comply with requirements in Section 09 9123 "Interior Painting" for painting backboards.
   1. For fire-resistant plywood, do not paint over manufacturer's label.

E. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration including optional identification requirements of this standard.

F. Labels shall be preprinted or computer-printed type. Hand written labels are unacceptable.

END OF SECTION

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SECTION 271300 - COMMUNICATIONS BACKBONE CABLING

PART 1 GENERAL

1.01 SUMMARY

A. This section covers the basic materials and installation methods for backbone cabling.

B. Section includes:
   1. Pathways.
   2. UTP cable and cable connection hardware.
   3. 8.3/125 and 50/125-micrometer, optical fiber cabling, and cable connecting hardware.
   4. Coaxial cable and cable connecting hardware.
   5. Cabling identification products.

C. Examine the contract documents in their entirety (including drawings and specification sections in the other divisions) for requirements or work which may affect work under this section, regardless of whether such requirements or work are specifically indicated in this section.

D. Related Sections
   1. Section 260526 - Grounding and Bonding for Electrical Systems.
   2. Section 270500 - Common Work Results for Communications.
   3. Section 270526 - Grounding and Bonding for Communications Systems.
   4. Section 271100 - Communications Equipment Room Fittings.
   5. Section 271500 - Communications Horizontal Cabling.

1.02 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Cross–Connect: equipment used to terminate and tie together communications circuits.

C. EMI: Electromagnetic interference.

D. FDE: Fiber Distribution Enclosure.

E. IDC: Insulation displacement connector.

F. LAN: Local area network.

G. RCDD: Registered Communications Distribution Designer.

H. UTP: Unshielded twisted pair.

1.03 REFERENCES

A. Most recent editions and addenda of the following documents:

B. TIA/EIA-568 series, most recent revisions, addenda and systems bulletins. All applicable.

C. TIA-569-D Telecommunications Pathways and Spaces, most recent revision including all relevant addenda and systems bulletins

D. TIA-606-B Administration Standard for Telecommunications Infrastructure, most recent revision including all addenda and systems bulletins

E. TIA-607-C Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, most recent revision including all addenda and systems bulletins

F. ANSI/TIA–862 Structured Cabling Infrastructure Standard for Intelligent Building Systems, most recent revision including all addenda and systems bulletins

G. ANSI/TIA–942 Telecommunications Infrastructure Standard for Data Centers, most recent revision including all addenda and systems bulletins

H. BICSI Telecommunications Distribution Methods Manual (TDMM), most recent edition

I. National Electric Codes (NEC) – all applicable

J. Local Codes and Standards – all applicable

K. UL444 – Standard for Safety of Communications Cable

L. UL 1666 – Standard for Safety of Flame Propagation Height

M. Local Authority Having Jurisdiction (AHJ)

N. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.

O. Manufacturers' Recommendations - Install all cabling and termination devices per the manufacturers' recommended installation practices for the applications warranties.

P. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense.

1.04 BACKBONE CABLING

A. Backbone Cabling shall consist of cabling, pathways, and terminal hardware interconnecting entrance facilities, telecommunications equipment rooms, intermediate distribution frames (IDF's) with main distribution frame (MDF).
   1. Backbone cabling shall be wired in star topology with main distribution frame (MDF) at center hub of star.
   2. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.

B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities.

C. Bridged taps and splitters shall not be used as part of backbone cabling.

1.05 PERFORMANCE REQUIREMENTS

A. Backbone cabling system shall comply with transmission standards in TIA/EIA-568, when tested according to test procedures of this standard.
   1. TIA-568.2 for twisted-pair telecommunications cabling and components.
   2. TIA-568.3 for optical fiber cabling and components.
   3. TIA-568.4 for broadband coaxial cablig and components.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. See Section 016000 - Product Requirements, for submittal requirements of factory fabricated items.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

E. Informational Submittals
   1. Qualification Data for layout technician, installation supervisor, and field inspector.
   2. Source quality-control reports.
   3. Field quality-control reports.
   4. Maintenance Data: For splices and connectors to include in maintenance manuals.

F. Closeout Submittals
   1. Device address list.

G. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. Record actual locations of distribution frames.
   2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
   3. Identify distribution frames and equipment rooms by room number on drawings.

H. Field Test Reports.

1.07 QUALITY ASSURANCE

A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.
   3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.

D. Testing Agency Qualifications: An NRTL.
   1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

E. Products: Listed, classified, and labeled as suitable for the purpose intended.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

G. All work shall combine with National Electrical Code and all applicable local codes.

H. All equipment and accessories shall be the product of manufacturers regularly engaged in their manufacture. All items of a given type shall be the products of the same manufacturer.

I. Furnish all materials, equipment and accessories new and free from defects.

J. All electrical equipment shall be listed by Underwriters' Laboratories, Inc. (UL) or bear UL labels.

K. Telecommunications pathways and spaces shall comply with TIA-569-D.

L. Grounding shall comply with TIA-607-C.

M. Supply all equipment and accessories in complete compliance with and in accordance with the applicable standards listed in reference standards of this Section and with all applicable national, state and local codes.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep stored products clean and dry.

C. Test cables upon receipt at Project site.
   1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical fiber flashlight.
   2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.
   3. Test each pair of UTP cable for open and short circuits.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until:
   1. Spaces are dry and wet work is complete.
   2. HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 COORDINATION

A. Arrange for distribution spaces, space for equipment, chases, slots, and openings in building structure during progress of construction, to allow for telecommunications installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for telecommunication items requiring access that are concealed behind finished surfaces.

D. Coordinate layout and installation of telecommunications pathways and cabling with owner's telecommunications and LAN equipment and service suppliers.

E. The Communications Drawings indicate the work for the communications systems. The Architectural, Structural, and Mechanical Drawings contain certain information and details pertinent to the communications work. The telecommunications contractor should become familiar with all drawings and requirements pertinent to the work.

F. Drawings are diagrammatic and should not be used to obtain dimensional requirements by scaling the drawings.

G. Coordinate selection and application of sleeves with firestopping as specificed in Section 078400 - Firestopping.

PART 2 PRODUCTS

2.01 GENERAL

A. Refer to Section 270500 - Common Work Results for Communications for General Requirements.

B. All materials and products shall be:
1. Appropriate for the intended use.
2. Recognized as such by a Nationally Recognized Testing Laboratory (NRTL) such as Underwriters Laboratories (UL), ETL SEMCO (ETL), the Canadian Standards Association (CSA) or the American National Standards Institute (ANSI).
3. Permitted by the Authority Having Jurisdiction (AHJ).

C. All products shall be new, of the latest version at time of bid, and brought to the job site in original manufacturer's packaging. Used equipment and damaged material will be rejected.

D. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.

E. Cable lubricants specifically designed for installing communications cable may be used as needed to reduce pulling tension when pulling cable into conduit.

F. Take care during installation to prevent scratches, dents, chips, etc. Equipment with significant or disfiguring cosmetic flaws will be rejected.

G. All components will be approved by the Engineer and shall have the most aesthetic value possible while maintaining specified functionality. Hardware shall:
1. Be in compliance with the Construction Documents.
2. Have fit and finish compatible with the existing surrounding structure.
3. Be unobtrusive.
4. Provide the required functionality.

H. Provide products that are suitable for the intended use, including, but not limited to environmental, regulatory, and electrical factors.

2.02 PATHWAYS

A. Pathways for communications cabling shall comply with TIA-569-D.

B. Conduit: As specified in Section 260533.13; provide pull cords in all conduit.

C. Boxes: As specified in Section 260533.16.
1. Outlet boxes shall be no smaller than 2 inch wide, 3 inch high, and 2-1/2 inch deep.

D. Cable Trays: As specified in Section 270536.

E. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

1. Product(s):
    a. Refer to parts list on T series drawings.

2.03 BACKBOARDS

A. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
    1. Size: 48 by 96 inches.
    2. Do not paint over UL label.

2.04 UTP COPPER CABLE AND TERMINATIONS

A. Manufacturers:
    1. Refer to parts list on T series drawings.

B. UTP Copper Backbone Cable:
    1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2, ICEA S-90-661, and listed and labeled as complying with UL 444; arranged in 25-pair binder groups.
    2. Cable Type: TIA-568.2 Category 3 UTP (unshielded twisted pair); 24 AWG.
    3. Cable Capacity: Quantity of pairs as indicated on drawings.
    4. Cable Applications:
        a. Plenum Applications: Use listed NFPA 70 Type CMP plenum cable.
        b. Riser Applications: Use listed NFPA 70 Type CMR riser cable or Type CMP plenum cable.
    5. Cables shall be terminated with connecting hardware of same category or higher.
    6. Product(s):
        a. Refer to parts list on T series drawings.

C. Connecting Blocks:
    1. Type: 110-style IDC for Category 5e.
    2. Provide blocks for the number of cables terminated on the block, plus 25 percent spare.
    3. Integral with connector bodies, including plugs and jacks where indicated.
    4. Product(s):
        a. Refer to parts list on T series drawings.

D. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

E. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between copper cables.

F. Patch Panel: Panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

G. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
    1. Performance: 500 mating cycles.
    2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.
    3. Product(s):
        a. Refer to parts list on T series drawings.

H. Copper Patch Cords:
    1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.
    2. Length: 3 feet.
    3. Product(s):
        a. Refer to parts list on T series drawings.

2.05 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES

A. Manufacturers:

1. Refer to parts list on T series drawings.

B. Fiber Optic Backbone Cable:
1. Description: Tight buffered, non-conductive fiber optic cable complying with TIA-568.3, TIA-598, ICEA S-83-596 and listed as complying with UL 444 and UL 1651.
2. Cable Type: Multimode, laser-optimized 50/125 um (OM4) complying with TIA-492AAAD.
3. Cable Capacity: Quantity of fibers as indicated on drawings.
4. Cable Applications:
a. Plenum Applications: Use listed NFPA 70 Type OFNP plenum cable.
b. Riser Applications: Use listed NFPA 70 Type OFNR riser cable or Type OFNP plenum cable.
5. Maximum Attenuation: 3.50 dB/km at 850 nm and 1.5 dB/km at 1300 nm
6. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm
7. Cable Jacket Color:
a. Laser-Optimized Multimode Fiber (OM3/OM4): Aqua.
b. Multimode Fiber (OM1/OM2): Orange.
c. Single-Mode Fiber (OS1/OS2): Yellow.
8. Product(s):
a. Refer to parts list on T series drawings.

C. Fiber Optic Interconnecting Devices:
1. Connector Type: Type LC.
2. Connector Performance: 500 mating cycles, when tested in accordance with TIA-455-21.
3. Maximum Attenuation/Insertion Loss: 0.3 db.
4. Product(s):
a. Refer to parts list on T series drawings.

D. Fiber Optic Cable Termination
1. Where cables are installed, the 900 µm buffer or 250 µm coated fibers contained in these cables may be terminated either by:
a. Cam-style mechanical splice connectors using a tool that provides calculated insertion loss at the point of termination.
2. Product(s):
a. Refer to parts list on T series drawings.
3.

2.06 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

B. Comply with Section 260526.

2.07 LABELING

A. Comply with TIA-606.

B. Comply with UL 969.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

B. Comply with Communication Service Provider requirements.

C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

D. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

E. Follow manufacturers' instructions for installing all telecommunications cabling. Where instructions are unavailable, follow approved industry practice.

F. Compare communications drawings and specifications with the drawings and specifications of other trades, report any discrepancies to the Consultant; and obtain written instructions for changes necessary in the work. Include most stringent requirements in bid.

G. Repairs or changes caused by contractor's neglect shall be made at contractor's expense. Protect finished work of other trades from damage or defacement and remedy any damages as required.

H. Provide any screws, anchors, clamps, tie wraps, distribution rings, miscellaneous grounding and support hardware, etc. needed to facilitate the installation of the cable plant system.

I. Furnish any special installation equipment or tools required to properly complete the installation.

J. All wiring, materials, and equipment must be listed and labeled by an NRTL. To certify that performance characteristics, meet ANSI/TIA 568 Standards, provide all Original Equipment Manufacturer (OEM) documentation to the Owner.

K. All techniques and fixtures used in the installation must minimize complexity must allow for easy maintenance of, and ready access to, all components for test measurements.

L. No self-tapping screws shall be used.

M. All parts shall be made of corrosion-resistant material, such as plastic, anodized aluminum, or brass.

N. All empty innerduct or conduit shall include a non-corrosive pull-rope.

O. All of the pathways shown on the drawings are suggested routes for the Contractor to use as guidelines. Prior to construction, the Contractor shall coordinate in the field with other trades to determine the exact feeder, tie, and riser backbone cabling pathways. In any case where the communication pathway must be removed and re-routed, due to conflicts with other trades with which the Contractor did not previously coordinate, the Contractor is responsible for all costs associated with the removal and relocation.

P. Clean up all debris generated by installation activities and discard as directed by the Construction Manager.

Q. Maintain a current copy of this Specification and related Drawings at the job site at all times.

3.02 WIRING METHODS

A. Wiring method: conceal conductors and cables in accessible ceilings, walls, and floors where possible.

B. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.03 OPTICAL FIBER CABLE

A. Install the optical fiber backbone in a continuous length from the FDE in the MDF to an FDE within each IDF.

B. Throughout its length, run the backbone cable in appropriate, listed raceway.

C. Throughout the length of the cable, maintain the minimum bend radius and pulling force recommended by the manufacturer and required by industry standards, both during installation and after termination and testing.

D. Route individual strands in the rear of the FDE in a neat and orderly fashion and place them so as not to create undue stress or micro bending of the strands.

3.04 CABLE BUNDLING MATERIALS

A. Secure all cable bundles with proper bundling or securing materials so as to ensure that the cable runs are securely held in place both vertically and horizontally.

B. Do not tighten bundling materials or securing devices so tightly that they deform the inherent cable geometry or construction.

C. Do not use cable ties or hook-and-loop tape to secure cable runs to other building systems such as electrical conduit, Electric Metallic Tube (EMT), sprinkler pipes, ceiling suspension members.

D. In environmental air-handling spaces, only use appropriately-listed materials.

3.05 BACKBONE CABLE TESTING

A. UTP Backbone Cable
1. Complete end-to-end test results for all copper UTP cables installed are required.
2. All multi-pair copper cable pairs installed shall be tested to TIA/EIA-568, Category 3, Category 5e, or Category 6 equivalent performance specifications. In addition, provide loop resistance measurements in ohms and dB loss at 1KHz, 8KHz, and 256KHz.
3. The owner is to be notified at least 24 hours prior to testing to allow observation at the Owner's discretion. If the Owner confirms his intention to observe, a reasonable starting time shall be agreed upon. Should the Owner not be present at the scheduled commencement time, the Contractor may begin testing as scheduled.
4. 100% of all pairs in bacbone copper cables shall be tested for continuity and wire-map.
5. Testing Format: Test Results must be submitted in two (2) formats. First, must be original file(s) down loaded from tester. Second, the file must be cohesively placed in Excel format with the following fields: ER/TR RM # / RM # of drop / Port # / all relevant test information in as many fields as necessary.
6. All test results are to be recorded and submitted to the Owner.

B. Optical Fiber Backbone Cable
1. Complete end-to-end test results for all Fiber Optic cables installed are required.
2. All fiber optic cable must be visually inspected and optically tested on the reel upon delivery to the installation site. Using an Optical Time Domain Reflectometer (OTDR), an access jumper with like fiber, a pigtail, and a mechanical splice, all fibers shall be tested for continuity and attenuation.
3. Testing for continuity and attenuation on the reel must confirm factory specifications to ensure that the fiber optic cable was not damaged during shipment. The test results must match the results of the factory-attached tag on the reel, or the fiber shall not be used. Reel data sheet must be provided showing test results.
4. End to end (bi-directional) test measurements shall be provided for single-mode and multimode fibers (2 wavelengths per test are required). Test results must be submitted for review as part of the installation inspection requirements. Test results shall be in paper form and electronic form, and must contain the names and signatures of the technicians performing the tests.
5. Testing shall be performed on 100% of the fibers in the completed end-to-end system. TIA/EIA-568, provides the technical criteria and formulae to be used in fiber optic testing.
6. Additionally, all fiber optic cable links must pass all installation and performance tests both recommended and mandated by the cable manufacturer.
7. The Owner is to be notified at least 24 hours prior to testing to allow observation at the Owner's discretion. If the Owner confirms his intention to observe, a reasonable starting time shall be agreed upon. Should the Owner not be present at the scheduled commencement time, the Contractor may begin testing as scheduled.
8. Testing Format: Test Results must be submitted in two (2) formats. First, must be original file(s) down loaded from tester. Second, the file must be cohesively placed in Excel format with the following fields: ER/TR RM # / RM # of drop / Port # / all relevant test information in as many fields as necessary.
9. All test results are to be recorded and submitted to the Owner.

3.06 FIRE STOPPING

A. Comply with Section 27 0300.

B. Comply with requirements in Section 078413 "Penetration Firestopping."

C. Comply with TIA-569-B, Annex A, "Firestopping."

D. Comply with BICSI TDMM, "Firestopping Systems" Article.

E. Seal all penetrations through fire rated walls, floors and walls created by or made on the behalf of the contractor so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electric Code.

F. Use sealant material that has passed fire exposure testing in accordance with standard time-temperature curve in the standard, UL, ASTM E 119, and NFPA 251 and the hose stream test in accordance with UL 1OB.

3.07 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

B. Comply with Section 27 0526.

C. Grounding shall be installed according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

D. Locate grounding bus bar to minimize length of bonding conductors.

E. Grounding bus bar shall be connected to a suitable electrical building ground with a minimum of a No. 4 AWG grounding electrode conductor.

F. Metallic equipment shall be grounded to the grounding bus bar with a minimum of No. 6 AWG equipment grounding conductor.

3.08 IDENTIFICATION

A. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.
   1. Unless otherwise noted, use a permanent adhesive label stock, covered with a permanent water-resistant sealer.

B. Comply with TIA/EIA-606-A for identification of system components, wiring, and cabling.

C. Comply with requirements in Section 26 0553 "Identification for Electrical Systems."

D. Comply with requirements in Section 09 9123 "Interior Painting" for painting backboards.
   1. For fire-resistant plywood, do not paint over manufacturer's label.

E. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration including optional identification requirements of this standard.

F. Labels shall be preprinted or computer-printed type. Hand written labels are unacceptable.

END OF SECTION

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SECTION 271500 - COMMUNICATIONS HORIZONTAL CABLING

PART 1 GENERAL

1.01 SUMMARY

A. This section covers the basic materials and installation methods for horizontal cabling.

B. Section includes:
   1. UTP cable and cable connection hardware.
   2. Cabling identification products.

C. Examine the contract documents in their entirety (including drawings and specification sections in the other divisions) for requirements or work which may affect work under this section, regardless of whether such requirements or work are specifically indicated in this section.

D. Related Sections
   1. Section 260526 - Grounding and Bonding for Electrical Systems.
   2. Section 270500 - Common Work Results for Communications.
   3. Section 270526 - Grounding and Bonding for Communications Systems.
   4. Section 271100 - Communications Equipment Room Fittings.
   5. Section 271300 - COMMUNICATIONS BACKBONE CABLING.

1.02 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Cross–Connect: equipment used to terminate and tie together communications circuits.

C. EMI: Electromagnetic interference.

D. FDE: Fiber Distribution Enclosure.

E. IDC: Insulation displacement connector.

F. LAN: Local area network.

G. RCDD: Registered Communications Distribution Designer.

H. UTP: Unshielded twisted pair.

1.03 REFERENCES

A. Most recent editions and addenda of the following documents:

B. TIA/EIA-568 series, most recent revisions, addenda and systems bulletins. All applicable.

C. TIA-569-D Telecommunications Pathways and Spaces, most recent revision including all relevant addenda and systems bulletins

D. TIA-606-B Administration Standard for Telecommunications Infrastructure, most recent revision including all addenda and systems bulletins

E. TIA-607-C Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, most recent revision including all addenda and systems bulletins

F. ANSI/TIA–862 Structured Cabling Infrastructure Standard for Intelligent Building Systems, most recent revision including all addenda and systems bulletins

G. ANSI/TIA–942 Telecommunications Infrastructure Standard for Data Centers, most recent revision including all addenda and systems bulletins

H. BICSI Telecommunications Distribution Methods Manual (TDMM), most recent edition

I. National Electric Codes (NEC) – all applicable

J. Local Codes and Standards – all applicable

K. UL 444 – Standard for Safety of Communications Cable

L. UL 1666 – Standard for Safety of Flame Propagation Height

M. Local Authority Having Jurisdiction (AHJ)

N. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.

O. Manufacturers' Recommendations - Install all cabling and termination devices per the manufacturers' recommended installation practices for the applications warranties.

P. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense.

1.04 HORIZONTAL CABLING

A. Horizontal Cabling shall consist of cabling, pathways, and terminal hardware interconnecting telecommunications equipment rooms, intermediate distribution frames (IDF's) with workstation outlets.
   1. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".
   2. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.
      a. Locate intermediate distribution frames as indicated on the drawings.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. See Section 016000 - Product Requirements, for submittal requirements of factory fabricated items.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

E. Informational Submittals
   1. Qualification Data for layout technician, installation supervisor, and field inspector.
   2. Source quality-control reports.
   3. Field quality-control reports.
   4. Maintenance Data: For splices and connectors to include in maintenance manuals.

F. Maintenance Material Submittals
   1. Furnish extra materials that match products installed. Products are to be packaged with protective covering for storage and identified with labels describing contents.
      a. Device Plates: One (1) of each type.

G. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. Record actual locations of distribution frames.
   2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
   3. Identify distribution frames and equipment rooms by room number on drawings.

H. Field Test Reports.

1.06 QUALITY ASSURANCE

A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.

3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.

D. Testing Agency Qualifications: An NRTL.
   1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

E. Products: Listed, classified, and labeled as suitable for the purpose intended.

F. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

G. All work shall combine with National Electrical Code and all applicable local codes.

H. All equipment and accessories shall be the product of manufacturers regularly engaged in their manufacture. All items of a given type shall be the products of the same manufacturer.

I. Furnish all materials, equipment and accessories new and free from defects.

J. All electrical equipment shall be listed by Underwriters' Laboratories, Inc. (UL) or bear UL labels.

K. Telecommunications pathways and spaces shall comply with TIA-569-D.

L. Grounding shall comply with TIA-607-C.

M. Supply all equipment and accessories in complete compliance with and in accordance with the applicable standards listed in reference standards of this Section and with all applicable national, state and local codes.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:
   1. Store and handle materials in accordance with manufacturer’s instructions.
   2. Keep materials in manufacturer’s original, unopened containers and packaging until installation.
   3. Store materials in clean, dry area indoors.
   4. Protect materials during storage, handling, and installation to prevent damage.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until:
   1. Spaces are dry and wet work is complete.
   2. HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.09 COORDINATION

A. Arrange for distribution spaces, space for equipment, chases, slots, and openings in building structure during progress of construction, to allow for telecommunications installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for telecommunication items requiring access that are concealed behind finished surfaces.

D. Coordinate layout and installation of telecommunications pathways and cabling with owner's telecommunications and LAN equipment and service suppliers.

E. The Communications Drawings indicate the work for the communications systems. The Architectural, Structural, and Mechanical Drawings contain certain information and details pertinent to the communications work. The telecommunications contractor should become familiar with all drawings and requirements pertinent to the work.

F. Drawings are diagrammatic and should not be used to obtain dimensional requirements by scaling the drawings.

G. Coordinate selection and application of sleeves with firestopping as specificed in Section 078400 - Firestopping.

1.10 WARRANTY

A. The horizontal communications cabling system installed shall be eligible for coverage by a 25 Year Warranty to the end user.
   1. Horizontal channels shall be completed with the specified connectivity products, including factory manufactured patch cords, for each System listed in Part 2 Products below in order to qualify for the 25 Year Warranty.

B. Certified Installer/Certified Integrator shall provide labor, materials, and documentation in accordance with the specified cable manufacturer's requirements to ensure that the Owner will be furnished with a 25 Year Warranty.

C. The installed structured cabling system shall provide a warranty guaranteeing installed channel performance above the TIA/EIA-568 requirements for Category 6 cabling systems.
   1. Standards-compliant channel or permanent link performance tests shall be performed in the field with an approved certification tester in the permanent link test configuration.

D. Necessary documentation for warranty registration shall be provided to the manufacturer by the installer (within 10 days) following 100 percent testing of cables.
   1. Submit test results to the manufacturer, in the certification tester’s original software files.
      a. Installer shall ensure that the warranty registration is properly submitted, with all required documentation within 10 days of project completion.
      b. Certified Contractor/Certified Integrator must adhere to the terms and conditions of the respective manufacturer’s warranty programs.

E. Installer shall ensure that the Owner receives the manufacturer issued project warranty certificate within 60 calendar days of warranty registration.

PART 2 PRODUCTS

2.01 UTP COPPER SYSTEMS DESCRIPTION

A. Horizontal twisted-pair category rated cabling systems are TIA/EIA-568 standards compliant intra-building twisted-pair communications cabling channels connecting Telecommunication Rooms (TRs) to Telecommunication Outlets (TOs) located at individual work areas.

B. Each system consists of a matched set of components installed according to industry guidelines that yield a defined and guaranteed systems performance level.

C. Each Horizontal twisted pair category rated cabling system includes the following components matched to the desired system performance.
   1. Category rated horizontal cable
   2. Category rated connector modules
   3. Category rated patch panels
   4. Category rated patch cords
   5. Necessary support systems, such as cable managers and faceplates

2.02 PATHWAYS

A. Pathways for communications cabling shall comply with TIA-569-D.

B. Conduit: As specified in Section 260533.13; provide pull cords in all conduit.

C. Boxes: As specified in Section 260533.16.
   1. Outlet boxes shall be no smaller than 2 inch wide, 3 inch high, and 2-1/2 inch deep.

D. Cable Trays: As specified in Section 270536.

E. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
   1. Product(s):

a. Refer to parts list on T series drawings.

2.03 UTP COPPER CABLE AND TERMINATIONS

A. Manufacturers:
   1. Refer to parts list on T series drawings.

B. Copper Horizontal Cable:
   1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
   2. Cable Type - Voice and Data: TIA-568.2 Category 6A UTP (unshielded twisted pair); 23 AWG.
   3. Cable Capacity: 4-pair.
   4. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.
   5. Cable Jacket Color - Voice and Data Cable: Blue.
   6. Product(s):
      a. Refer to parts list on T series drawings.

C. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

D. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch wide equipment racks; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
   1. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
   2. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
   3. Provide incoming cable strain relief and routing guides on back of panel.

E. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
   1. Performance: 500 mating cycles.
   2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.
   3. Product(s):
      a. Refer to parts list on T series drawings.

F. Copper Patch Cords:
   1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.
   2. Length: As indicated on drawings.
   3. Product(s):
      a. Refer to parts list on T series drawings.

2.04 COMMUNICATIONS OUTLETS

A. Manufacturers:
   1. Refer to parts list on T series drawings.

B. Outlet Boxes: Comply with Section 260533.16.
   1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.

C. Wall Plates - Voice/Data Outlets
   1. Comply with system design standards and UL 514C.
   2. Accepts modular jacks/inserts.
   3. The wallplate housing shall be a one-piece, Single-gang flush mount style that fits standard NEMA openings.

4. Wallplate shall be made of high-impact, fire-retardant plastic rated UL 94V-0, and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet TIA/EIA-568 specifications.
5. Colors and configurations to be specified per schedule on plan.
6. Wallplate screws must match wallplate color.
7. The flush-mounted wallplate shall have the option of being mounted on adapter boxes for surface mount installation.
8. Capacity:
   a. Data or Combination Voice/Data Outlets: 1, 2, 3, 4, or 6 ports.
9. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified on the drawings.
10. Product(s):
    a. Refer to parts list on T series drawings.

D. Wall Plates - Wall Phone Outlets
1. Comply with system design standards and UL 514C.
2. Accepts modular jacks/inserts.
3. The wallplate housing shall be a one-piece, Single-gang flush mount style that fits standard NEMA openings.
4. Wallplate must be manufactured from 304 stainless steel in a brushed finish to provide corrosion resistance in a non-magnetic material and be cULus Listed (UL 1863 & CAN/CSA-C22.2 No. 182.4) and meet TIA/EIA-568 specifications.
5. Colors and configurations to be specified per schedule on plan.
6. Wallplate screws must match wallplate color.
7. Capacity:
   a. Data or Combination Voice/Data Outlets: 1, 2, 3, 4, or 6 ports.
8. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified on the drawings.
9. Product(s):
   a. Refer to parts list on T series drawings.

2.05 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

B. Comply with Section 260526.

2.06 LABELING

A. Comply with TIA-606.

B. Comply with UL 969.

PART 3 EXECUTION

3.01 GENERAL

A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

B. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

C. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

D. Follow manufacturers' instructions for installing all telecommunications cabling. Where instructions are unavailable, follow approved industry practice.

E. Compare communications drawings and specifications with the drawings and specifications of other trades, report any discrepancies to the Consultant; and obtain written instructions for changes necessary in the work. Include most stringent requirements in bid.

F. Repairs or changes caused by contractor's neglect shall be made at contractor's expense. Protect finished work of other trades from damage or defacement and remedy any damages as

required.

G. Provide any screws, anchors, clamps, tie wraps, distribution rings, miscellaneous grounding and support hardware, etc. needed to facilitate the installation of the cable plant system. No self-tapping screws shall be used.

H. Furnish any special installation equipment or tools required to properly complete the installation.

I. All wiring, materials, and equipment must be listed and labeled by an NRTL. To certify that performance characteristics, meet ANSI/TIA 568 Standards, provide all Original Equipment Manufacturer (OEM) documentation to the Owner.

J. All techniques and fixtures used in the installation must minimize complexity must allow for easy maintenance of, and ready access to, all components for test measurements.

K. Provide protection for exposed cables where subject to damage.

L. Provide bushings on all conduit ends.

M. Abrasion Protection:
   1. Provide abrasion protection for cable or wire bundles which pass through holes or across edges of sheet metal.
   2. Use protective bushings to protect cables.

N. Where possible, route cables in overhead cable trays and inside wire management systems attached to equipment cabinets and racks.
   1. Use hook and loop cable wraps or ducts to restrain cabling installed outside of wire management systems on racks or in cabinets.
   2. Cable Raceways: Do not fill greater than ANSI/TIA-569-E maximum fill for particular raceway type.

O. Support horizontal cables at a maximum of 48-inch irregular intervals, if J-hook or trapeze system is used to support cable bundles.

P. Do not allow cables to rest on acoustic ceiling grids, plumbing pipes, or electrical conduits.

Q. Fire-Sprinkler System:
   1. Install cables above fire-sprinkler system.
   2. Do not attach cables to fire-sprinkler system or ancillary equipment or hardware.
   3. Install cable system and support hardware so that it does not obscure valves, fire alarm conduit, boxes, or other control devices.

R. Do not attach cables to ceiling grid or lighting fixture wires.

S. Replace before final acceptance, cables damaged or exceeding recommended installation parameters during installation.

T. All of the pathways shown on the drawings are suggested routes for the Contractor to use as guidelines. Prior to construction, the Contractor shall coordinate in the field with other trades to determine the exact feeder, tie, and riser backbone cabling pathways. In any case where the communication pathway must be removed and re-routed, due to conflicts with other trades with which the Contractor did not previously coordinate, the Contractor is responsible for all costs associated with the removal and relocation.

U. Wiring method: conceal conductors and cables in accessible ceilings, walls, and floors where possible.

V. Clean up all debris generated by installation activities and discard as directed by the Construction Manager.

W. Maintain a current copy of this Specification and related Drawings at the job site at all times.

3.02 INSTALLATION - TWISTED-PAIR COPPER CABLES

A. Install twisted-pair copper cables in accordance with manufacturer’s instructions.

B. Install cables in continuous lengths from origin to destination, without splices, except for transition points or consolidation points.

C. Cable Minimum Bend Radius and Maximum Pulling Tension:
   1. Do not exceed bend radius for UTP and Shielded cable: 4 X Cable OD
   2. Install cables so that there are no bends smaller than 4X cable OD at any point in the run and at the termination field.
   3. Pulling Tension: Do not exceed 25 ft.lb.

D. Separation from Power Lines: Provide following minimum separation distances between pathways for copper communications cables and power wiring of 480 volts or less:
   1. Open or Nonmetal Communications Pathways:
      a. Electric motors, fluorescent light fixtures, and unshielded power lines carrying up to 3 kVA: 12 inches.
      b. Electrical equipment and unshielded power lines carrying more than 5 kVA: 36 inches.
      c. Large electrical motors or transformers: 48 inches.
   2. Grounded Metal Conduit Communications Pathways:
      a. Electrical equipment and unshielded power lines carrying up to 2 kVA: 2-1/2 inches.
      b. Electrical equipment and unshielded power lines carrying from 2 kVA to 5 kVA: 6 inches.
      c. Electrical equipment and unshielded power lines carrying more than 5 kVA: 12 inches.
      d. Power lines enclosed in grounded metal conduit (or equivalent shielding) carrying from 2 kVA to 5 kVA: 3 inches.
      e. Power lines enclosed in grounded metal conduit (or equivalent shielding) carrying more than 5 kVA: 6 inches.

E. Coil cables to house cable coil without exceeding manufacturer’s bend radius.
   1. In hollow wall installations where box eliminators are used, store excess wire in wall.
   2. Store no more than 12 inches of cable slack.
   3. Loosely coil excess slack and store in ceiling above each drop location, when there is not enough space present in outlet box to store slack cables.

F. Dress and terminate cables in accordance with TIA/EIA-568, BICSI TDMM, and manufacturer's instructions.

G. Terminate 4-pair cables on jack and patch panels using T568-B wiring scheme.

H. Pair Untwist at Termination: Do not exceed 12 mm (1/2 inch).

I. Neatly bundle cables and dress to their respective panels or blocks.

J. Feed each panel or block by individual bundle separated and dressed back to point of cable entrance into rack or frame.

3.03 CABLE BUNDLING MATERIALS

A. Secure all cable bundles with proper bundling or securing materials so as to ensure that the cable runs are securely held in place both vertically and horizontally.

B. Bundle horizontal distribution cables in groups of no more than amount of cables designed for by cable support manufacturer, based on cable OD and weight.

C. Cable Ties and Other Cable Management Clamps:
   1. No more than hand tightened.
   2. Fit snugly, but not compress, crimp, or otherwise change physical characteristics of cable jacket or distort placement of twisted-pair components.
   3. Replace cables exhibiting stresses due to over tightening of cable management devices.
   4. Use hook and loop cable wraps for all cable bundles.

D. Do not use cable ties or hook-and-loop tape to secure cable runs to other building systems such as electrical conduit, Electric Metallic Tube (EMT), sprinkler pipes, ceiling suspension members.

E. In environmental air-handling spaces, only use appropriately-listed materials.

3.04 FIELD QUALITY CONTROL

A. Cables and Termination Hardware: Test 100 percent for defects in installation and verify cabling system performance under installed conditions in accordance with TIA/EIA-568.
   1. Verify all pairs of each installed cable before system acceptance.
   2. Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.

B. Test all cables in accordance with this specification section, TIA-568.2 and TIA-568.3 standards, and manufacturer instructions.
   1. If any of these are in conflict, bring discrepancies to the attention of the Architect for clarification and resolution.

C. Cables, Jacks, Connecting Blocks, and Patch Panels:
   1. Verify all pairs of each installed cable before system acceptance.
   2. Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.

D. Testing Twisted-Pair Copper Cables: Perform Permanent Link Testing (Unless patch cords that will remain installed at the work area and cross-connect are also being tested, in which case Channel Test results would be expected and accepted).
   1. Test twisted-pair copper cable links for continuity, pair reversals, shorts, opens, and performance as specified.
      a. Additional testing is required to verify Category performance.
      b. Test horizontal cabling using approved certification tester for Category 6A, Category 6, and Category 5e performance compliance in accordance with TIA-568.2.
   2. Basic Tests Required:
      a. Wire map.
      b. Length (feet).
      c. Insertion loss (dB), formerly attenuation.
      d. NEXT (Near end crosstalk) (dB).
      e. Return loss (dB).
      f. ELFEXT (dB).
      g. Propagation delay (ns).
      h. Delay skew (ns).
      i. PSNEXT (Power sum near-end crosstalk loss) (dB).
      j. PSELFEXT (Power sum equal level far-end crosstalk loss) (dB).
   3. Test Category 6 to 250 MHz.
   4. Provide test results in approved certification testers original software format, with the following minimum information per cable:
      a. Circuit ID.
      b. Information from specified basic tests required.
      c. Test Result: “PASS” or “FAIL”.
      d. Date and time of test.
      e. Project name.
      f. NVP.
      g. Software version.
   5. Report in writing to the Owner immediately, along with copy of test results, failed test results that cannot be remedied through re-termination (as in the case of reversed or split pairs).

3.05 FIRE STOPPING

A. Comply with Section 27 0300.

B. Comply with requirements in Section 078413 "Penetration Firestopping."

C. Comply with TIA-569-B, Annex A, "Firestopping."

D. Comply with BICSI TDMM, "Firestopping Systems" Article.

E. Seal all penetrations through fire rated walls, floors and walls created by or made on the behalf of the contractor so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electric Code.

F. Use sealant material that has passed fire exposure testing in accordance with standard time-temperature curve in the standard, UL, ASTM E 119, and NFPA 251 and the hose stream test in accordance with UL 1OB.

3.06 IDENTIFICATION

A. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.
   1. Unless otherwise noted, use a permanent adhesive label stock, covered with a permanent water-resistant sealer.

B. Comply with TIA-606-B for identification of system components, wiring, and cabling.

C. Comply with requirements in Section 26 0553 "Identification for Electrical Systems."

D. Comply with requirements in Section 09 9123 "Interior Painting" for painting backboards.
   1. For fire-resistant plywood, do not paint over manufacturer's label.

E. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 2 level of administration including optional identification requirements of this standard.

F. Labels shall be preprinted or computer-printed type. Hand written labels are unacceptable.

END OF SECTION

SECTION 284600
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm system design and installation, including all components, wiring, and conduit.

B. Transmitters for communication with supervising station.

C. Circuits from protected premises to supervising station, including conduit.

D. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.

E. Maintenance of fire alarm system under contract for specified warranty period.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping: Materials and methods for work to be performed by this installer.

B. Section 078700 - Smoke Containment Barriers: Smoke and fire curtains to be released by fire alarm system or smoke detectors.

C. Section 083323 - Overhead Coiling Doors: Coiling fire doors to be released by fire alarm system.

D. Section 087100 - Door Hardware: Electrically operated locks and door holder devices to be monitored and released by fire alarm system.

E. Section _____: Communications receivers and other supervising station components.

F. Section 211300 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.

G. Section 212200 - Clean-Agent Fire-Extinguishing System: Supervisory, alarm, and releasing devices installed in extinguishing system.

H. Section 233300 - Air Duct Accessories: Smoke dampers and combination fire/smoke dampers monitored and controlled by fire alarm system.

I. Section 260548 - Vibration and Seismic Controls for Electrical Systems: Requirements for the seismic qualification of equipment specified in this section.

J. Section 275129.13 - Rescue Assistance Signal Systems: Two-way emergency communication systems for areas of refuge/rescue assistance.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.

C. NFPA 13 - Standard for the Installation of Sprinkler Systems.

D. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

E. NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection.

F. NFPA 22 - Standard for Water Tanks for Private Fire Protection.

G. NFPA 70 - National Electrical Code.

H. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition.

I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

J. NFPA 92 - Standard for Smoke Control Systems.

K. NFPA 110 - Standard for Emergency and Standby Power Systems.

L. NFPA 2001 - Standard on Clean Agent Fire Extinguishing Systems.

M. UL 228 - Standard for Door Closers-Holders, With or Without Integral Smoke Detectors.

N. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems; Current Edition, Including All Revisions.

O. UL 268A - Standard for Smoke Detectors for Duct Application.

P. UL 346 - Standard for Waterflow Indicators for Fire Protective Signaling Systems.

Q. UL 864 - Standard for Control Units and Accessories for Fire Alarm Systems.

R. UL 1971 - Standard for Signaling Devices for the Hearing Impaired.

S. UL 1480 - Speakers for Fire Alarm and Signaling Systems, Including Accessories.

T. UL 1481 - Standard for Power Supplies for Fire-Protective Signaling Systems.

U. UL 2075 - Standard for Gas and Vapor Detectors.

V. UL 2196 - Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control, and Data Cables.

W. UL Product Category UUKL - Smoke Control System Equipment.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. General
1. Engineer shall review and recommend approval/disapproval or take other appropriate action on the Contractor's submittals including shop drawings, samples, documentation and record drawings. This review is to verify conformance to project specifications and design concepts expressed in the contract documents. This action shall be taken with all reasonable promptness as to cause to delay in the work, while allowing adequate time to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details (i.e. dimensions) or for substantiating installation or performance of equipment or systems designed by the Contractor, all of which remain in the Contractor's responsibility to the extent required by the contract documents. The Engineer's review shall not constitute approval of safety precautions of construction, means, methods, techniques, sequences of procedures, or approval of a specific assembly of which the item is a part.
2. If submittals, upon review by the Owner, are found not to conform to the requirements of these specifications, the Contractor shall be required to resubmit with modifications. The Contractor shall be responsible for the Owner's extra expenses for subsequent review(s) of rejected submittals necessitated by the Contractor's failure to make the requested modifications. Such extra fees shall be deducted from payments by the Owner to the Contractor. Approval of the submittals by the Owner shall, in no case, relieve the Contractor of his responsibility to meet the requirements of this specification.

C. Subcontractors
1. Contractor shall submit with his bid, a list of all proposed subcontractors. All proposed subcontractors are subject to the approval of the Owner. The installing subcontractor(s) shall:
a. Hold all licenses and permits necessary to perform this work.
b. Have at least five years of experience in the installation of systems of this type and be familiar with all applicable local, state and federal laws and regulations.
c. Regularly engaged in the servicing, installation, and testing of fire detection and alarm systems.

D. Equipment Lists
1. The Contractor shall submit with his bid a detailed equipment list, identifying types, models, and quantities of all materials, devices and equipment proposed. This submittal shall include manufacturers' data sheets showing the types and models of all equipment, devices, material and wire proposed. Evidence of ULI listings shall be submitted with the data sheets. The submittal shall include, but not be limited to the following:
a. Conduit, raceway, junction boxes, terminal cabinets, device backboxes, fittings, hangers, and mounting hardware.

b. Wire, cable, connectors, terminal strips, and electrical tape.
c. Fire alarm control equipment and annunciators, including all components, modules, and enclosures.
d. All components of voice evacuation and firefighters' communication equipment.
e. Graphic firefighter's smoke control panels, including all components.
f. Manual fire alarm stations, detectors, auxiliary function relays and solenoids, and notification appliances.
g. Uninterruptable power supplies and standby batteries.
h. Any other materials, devices, or equipment to be provided.
i. Fire alarm schematic riser diagram supplemented with narrative descriptions as necessary for clarity and completeness.

2. When a data sheet shows more than one product, the proposed product shall be clearly indicated by arrows or other suitable means.

E. Work Schedule
1. The Contractor shall submit with his bid a proposed work schedule and representative chart. This schedule shall indicate the time necessary for:
a. Project start-up.
b. Property survey (where applicable).
c. Shop drawing submittals.
d. Installation.
e. Contractor pre-testing.
f. Functional testing with Engineer.
g. Final acceptance tests with Authority Having Jurisdiction.
2. The proposed work schedule will be reviewed and finalized during the preconstruction meeting and will be updated during the project.

F. Samples
1. Within 30 days of authorization to proceed, the Contractor shall submit samples of all proposed alarm initiating devices and audio/visible notification devices, and equipment with back boxes to be installed at the fire alarm control panel to the Owner for approval.

G. Permits, Licenses, and Certificates
1. Prior to start of installation, the Contractor shall obtain and submit copies of all permits, licenses, certificated and approvals necessary to conduct this work.

H. Shop Drawings
1. Prior to installation, but within 30 days after awarding of the contract, the Contactor shall submit one full set of printed shop drawings, one set of electronic shop drawings (in PDF format), one electronic set of required data sheets, and installation manuals/instructions detailing the manufacturer's installation recommendations for all equipment to be installed, to the Owner for approval. Installation prior to receipt of approved shop drawings shall be at the risk of the Contractor.
2. The shop drawings shall consist of the following:
a. A drawing legend sheet identifying:
1) All symbols used on the drawings, by type of device or equipment, manufacturer, and manufacturer's part number. This information shall correspond to the manufacturer, and manufacturer's part number. This information shall correspond to the manufacturer's catalog data sheets required elsewhere in this section.
2) All conventions, abbreviations and specialized terminology used on the drawings, as necessary to understand and interpret the information contained therein.
3) All color codes and conduit, conductor/circuit and device numbering systems.
4) A complete drawing list/index identifying all drawings in the shop drawing package by title, drawing number and Specification cross-reference.
b. Clean architectural floor plans drawn to scale and a system riser diagram with a title block on each drawing. Floor plan drawings required for this submittal shall be

generated using backgrounds provided by the Owner in AutoCAD format.

1) The floor plan drawings shall indicate:
   (a) Location of all devices, equipment, risers and electrical power connections. Addressable systems shall indicate device addresses for all addressable components shown on each drawing.
   (b) Number, size, and type of conductors and conduit.
   (c) Point-to-point wiring connections showing individual circuits and circuit/conduit routing. This information shall be depicted in sufficient detail to readily locate specific conduits, raceways and circuits in the field and to identify the specific conductors/circuits contained therein.
   (d) Typical wiring diagrams for all alarm initiating devices and notification appliances, showing the size and type of conductors, wiring terminations and terminal identifications.
   (e) Conduit fill calculations, in chart form, indicating the cross-section area percent fill for each type of wire/cable in each size of conduit used in the system. Conduit fill shall be in accordance with NFPA 70.
2) The riser diagram shall indicate:
   (a) Number, size, and type of riser conduits/raceways.
   (b) Number, size, and type of conductors in each riser.
   (c) Number of each type of device on each circuit on each floor. Distinguish existing devices to remain, existing devices to be replace, and new devices.

c. Detailed wiring diagrams for all fire alarm control panels, voice evacuation panels, public address panels, firefighters' telephone panels control panel modules, power supplies, electrical power connections, auxiliary function relays and solenoids, remote signaling equipment, graphic firefighter's smoke control panels, and remote annunciators. Detailed wiring diagrams shall identify all required terminations, including terminal identifications. All unsupervised connections and terminations shall be noted "unsupervised."
   1) These diagrams shall depict and identify all circuit boards, modules, power supplies, standby batteries, wiring harnesses, terminal strips and connections thereto, including spare zones and circuits. Where multiple components of a similar type are provided, each shall be identified by a unique component number.
   2) These diagrams shall include front-view details of all control panels and annunciators, depicting and identifying all indicators, controls and zone labels, including proposed nomenclature.
   3) These diagrams shall depict the required information to relative scale, actual size or larger, showing proper spatial relationships between components, and shall reflect the corresponding system components as they are to be installed.
d. Standby battery capacity calculations. Battery calculations shall list the type of devices (UPS, detection, monitoring, and control), and modules; quantities, unit and extended amperage draw for quiescent and alarm conditions, total amperage draw and battery amp/hour rating. For design criteria, the calculated load shall be the design load, including spare capacity. In addition, the battery capacity used to meet the calculated load shall be a maximum of 80 percent of the amp-hour rating listed by the manufacturer.
   1) Amplifier capacity calculations showing sizing capable of powering all speakers (core areas and tenant spaces), simultaneously, while operating at no more than 67-percent of their rated capacity. Power supply capacity calculations showing that the power supplies are capable of powering all modules and devices shall be provided.
e. Voltage drop calculations shall list the actual percentage of drop for compliance with the manufacturer's requirements and provide sufficient capacity to increase loading of the circuit by 25%.
f. A complete zone/address list identifying each signal initiating zone, annunciator zone, notification signaling zone, paging zone, remote signaling and auxiliary function zone

and the specific devices associated with each zone.

g. An Input/Output Matrix defining the system operation. This matrix shall cross-reference each signal initiating zone to its corresponding annunciator zones, notification signaling zones, remote signaling zones, and auxiliary function zones, and indicate system operation in the event of each type of trouble condition recognized by the system.

3. Each drawing shall be cross-referenced to all related drawings and specific drawing details as necessary for the submittal as a whole to clearly depict the proposed installation. Each drawing shall show revision number and date indicated in the title block. Revisions shall be clouded or otherwise highlighted between submissions. Revisions made without clouding or other highlights will not be reviewed and any approval of the revised drawings will not apply to those unnoted revisions.
4. The Contractor will not be authorized to start installation until all of the shop drawings and data sheets are received, reviewed and approved in writing by the Engineer.

I. Evidence of Installer Qualifications
1. The Contractor shall be a manufacturer of fire alarm systems and devices, or be an authorized, factory trained, and certified representative of a manufacturer of fire alarm systems and devices.
2. The Contractor shall provide a job site supervisor who is a minimum NICET Level II Fire Alarm Systems technology subfield and factory trained and certified on the equipment being provided/installed and current software revisions. The job site supervisor shall be present on-site each day that work is actively in progress. This individual shall be the same person throughout the course of the project.
3. Prior to start of installation, the Contractor shall obtain and submit copies of all permits, licenses, certificated and approvals necessary to conduct this work.

J. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
2. Submit documentation of satisfactory inspections and tests.
3. Submit NFPA 72 Record of Completion filled out.

K. Operating and Maintenance Data: See Section 017800 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
2. One printed set of project record documents and closeout documents, bound or filed in same manuals.
3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
4. List of recommended spare parts, tools, and instruments for testing.
5. Replacement parts list with current prices, and source of supply.
6. Detailed troubleshooting guide and large scale input/output matrix.
7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

L. Project Record Documents: See Section 017800 for additional requirements; have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
2. "As installed" wiring and schematic diagrams, with final terminal identifications.
3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

M. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating

condition.
2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
3. Maintenance contract.

1.05 QUALITY ASSURANCE

A. Copies of Design Criteria Documents: Maintain at the project site for the duration of the project, bound together, an original copy of NFPA 72, the relevant portions of applicable codes, and instructions and guidelines of authorities having jurisdiction; deliver to Owner upon completion.

B. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer , with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.

C. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
3. Supervisor: NICET level II or(2) certified fire alarm technician; furnish name and business address.
4. Contract maintenance office located within 50 miles of project site.
5. Certified in the State in which the Project is located as fire alarm installer.

D. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.

C. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Alarm Control Units and Accessories - Acceptable Manufacturers:
1. EST;
2. Mircom;
3. Firecom;
4. Honeywell Security & Fire Solutions/Notifier ;
5. Siemens Building Technologies, Inc
6. SimplexGrinnell, a Johnson Controls Business

2.02 FIRE ALARM SYSTEM

A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
2. Protected Premises: Entire building shown on drawings.
3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
   a. ADA Standards.
   b. The requirements of the local authority having jurisdiction, which is _____.
   c. Applicable local codes.
   d. Contract Documents (drawings and specifications).

e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.

4. Evacuation Alarm: Allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
5. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital. A minimum of three separate channels shall be provided.
6. General Evacuation Zones: Each floor is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.
7. Staff Response Zones: For each smoke zone where occupants are not ambulatory, program notification zone as directed to notify staff in areas outside the normal notification zone and in other buildings, for response to assist in evacuation.
8. Program notification zones and voice messages as directed by Owner.
9. Hearing Impaired Occupants: Provide visible notification devices in all public areas.
10. Fire Command Center: Location indicated on drawings.
11. Fire Alarm Control Unit: New, located at fire command center.
12. Two-Way Telephone: Provide two-way telephone service for the use of the fire service and others; provide jacks and two portable handsets.
13. Combined Systems: Do not combine fire alarm system with other non-fire systems.

B. Supervising Stations and Fire Department Connections:
1. Remote Supervising Station: UL-listed central station under contract to facility.
2. Means of Transmission to Remote Supervising Station: Digital alarm communicator transmitter (DACT), 2 telephone lines.

C. Circuits:
1. Initiating Device Circuits (IDC): Class B.
2. Signaling Line Circuits (SLC) Within Single Building: Class B.
3. Notification Appliance Circuits (NAC): Class B.

D. Spare Capacity:
1. Initiating Device Circuits: Minimum 25 percent spare capacity.
2. Notification Appliance Circuits: Minimum 25 percent spare capacity.
3. Speaker Amplifiers: Minimum 50 percent spare capacity.
4. Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.

E. Power Sources:
1. Primary: Dedicated branch circuits of the facility power distribution system.
2. Secondary: Storage batteries.
3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
4. Each Computer System: Provide uninterruptible power supply (UPS).

F. Seismic Qualification: Provide fire alarm system and associated components suitable for application under the seismic design criteria specified in Section 260548 where required. Include certification of compliance with submittals.

2.03 EXISTING COMPONENTS

A. Existing Fire Alarm System: Remove existing system completely after new system is fully operational and tested.

B. Existing Fire Alarm System: Remove existing components indicated and incorporate remaining components into new system, under warranty as if they were new; do not take existing portions of system out of service until new portions are fully operational, tested, and connected to existing system.

C. On-Premises Supervising Station: Include as part of this work all modifications necessary to existing supervising station to accommodate new fire alarm work.

D. Clearly label components that are "Not In Service."

E. Remove unused existing components and materials from site and dispose of properly.

2.04 FIRE SAFETY SYSTEMS INTERFACES

A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
1. Sprinkler water control valves.
2. Dry-pipe sprinkler system pressure.
3. Dry-pipe sprinkler valve room low temperature.
4. Sprinkler water storage tank low level.
5. Sprinkler water storage tank low temperature.
6. Fire pump(s).
7. Elevator shut-down control circuits.

B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
1. Sprinkler water flow.
2. Total flooding suppression system activation.
3. Kitchen hood suppression activation; also disconnect fuel source from cooking equipment.
4. Elevator lobby, elevator hoistway, and elevator machine room smoke detectors.
5. Generator room heat detector.
6. Duct smoke detectors.

C. Elevators:
1. Elevator lobby, hoistway, and machine room smoke detectors: Elevator recall for fire fighters' service.
2. Elevator Machine Room Heat Detector: Shut down elevator power prior to hoistway sprinkler activation.
3. Sprinkler pressure or waterflow: Shut down elevator power prior to hoistway sprinkler activation.

D. HVAC:
1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

E. Doors:
1. Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 087100.
2. Electromagnetic Door Locks on Egress Doors: Unlock upon activation of any alarm initiating device or suppression system in smoke zone that doors serve as egress from. Refer to Section 087100.
3. Overhead Coiling Fire Doors: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 083323.

2.05 COMPONENTS

A. General:
1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.

B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.

B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

C. Obtain Owner's approval of locations of devices, before installation.

D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Owner will provide the services of an independent fire alarm engineer or technician to observe all tests.

C. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

D. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

E. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

F. Provide all tools, software, and supplies required to accomplish inspection and testing.

G. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.

H. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

I. Diagnostic Period: After successful completion of inspections and tests, Operate system in normal mode for at least 14 days without any system or equipment malfunctions.
   1. Record all system operations and malfunctions.
   2. If a malfunction occurs, start diagnostic period over after correction of malfunction.
   3. Owner will provide attendant operator personnel during diagnostic period; schedule training to allow Owner personnel to perform normal duties.
   4. At end of successful diagnostic period, fill out and submit NFPA 72 "Inspection and Testing Form."

3.03 OWNER PERSONNEL INSTRUCTION

A. Provide the following instruction to designated Owner personnel:
   1. Hands-On Instruction: On-site, using operational system.
   2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.
   3. Factory Instruction: At control unit manufacturer's training facility.

B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
   1. Initial Training: 1 session pre-closeout.
   2. Refresher Training: 1 session post-occupancy.

C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
   1. Initial Training: 1 session pre-closeout.
   2. Refresher Training: 1 session post-occupancy.

D. Detailed Operation: Two-hour sessions for engineering staff; assume NICET level I qualifications or equivalent; combination of classroom and hands-on:
   1. Initial Training: 1 session pre-closeout.
   2. Refresher Training: 1 session post-occupancy.

E. Maintenance Technicians: Detailed training for electrical technicians, on programming, maintaining, repairing, and modifying; factory training:
   1. Initial Training: One 3-day session, pre-closeout.
   2. Refresher Training: One 1-day session post-occupancy.

F. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

G. Provide means of evaluation of trainees suitable to type of training given; report results to Owner.

3.04 CLOSEOUT

A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
   1. Be prepared to conduct any of the required tests.
   2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   3. Have authorized technical representative of control unit manufacturer present during demonstration.
   4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
   5. Repeat demonstration until successful.

B. Occupancy of the project will not occur prior to Substantial Completion.

C. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
   1. Specified diagnostic period without malfunction has been completed.
   2. Approved operating and maintenance data has been delivered.
   3. Spare parts, extra materials, and tools have been delivered.
   4. All aspects of operation have been demonstrated to Owner.
   5. Final acceptance of the fire alarm system has been given by authorities having jurisdiction.
   6. Occupancy permit has been granted.
   7. Specified pre-closeout instruction is complete.

D. Perform post-occupancy instruction within 3 months after Substantial Completion.

3.05 MAINTENANCE

A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.

C. Provide to Owner, a proposal as an alternate to the base bid, for a maintenance contract for entire warranty period, to include the work described below; include the total cost of contract, proposal to be valid at least until 30 days after date of Substantial Completion.

D. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
   1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
   2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
   3. Record keeping required by NFPA 72 and authorities having jurisdiction.

E. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 2 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

F. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.

G. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.

H. Comply with Owner's requirements for access to facility and security.

END OF SECTION 284600

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Legend:
O - Owner Furnish/Install
C - Contractor Furnish/Install
V - Vendor Furnish/Install

Room: Treatment Rm - Private Room#: C001 - C047 Room Sign: Area/Phase: ED/1st Flr Room Qty: 17

Comments: C001; C002; C003; C004; C005; C009; C010; C011; C012; C029; C030; C031; C032; C044; C045; C046; C047

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	Project	Draft (New)	No	No	No	W	18.20	N/A	N/A	
BKT-CWS		C/C	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Yes	1-Fixed	No	No	No	42	42.00	N/A	N/A	No
			Dimensions reflect unit extended at max. Dimensions when folded: 25.75 in. W x 6 in. D x 34 in. H.		No	Unassigned	No	No	No	47	34.00	N/A	No	No
		1	Bracket, Monitor, Wall	GCX Corporation (WC-0002-05/AG-0018-21)	Project	Draft (New)	No	No	No	W	4.00	N/A	N/A	
BKT-VTS		C/C	19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21)	Yes	1-Fixed	No	No	No	6	16.10	N/A	N/A	No
			Weight and size varies depending on selected mfg/mdl monitoring equipment.		No	Unassigned	No	No	No	10	19.00	N/A	No	No
		1	Clock, Analog, Synchronized, Wireless	La Crosse Technology (WT-3122A)	Project	Draft (New)	No	No	No	W	12.50	N/A	N/A	
CLK-AWL		C/C	WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A)	Yes	1-Fixed	No	No	No	3	1.50	N/A	N/A	No
			Requires 1 AA battery. Depth from Manufacturer website. Weight from vendor.		No	Unassigned	No	No	No	3	12.50	N/A	No	No
		1	Computer, Desktop, All-in-One	Dell Inc. ( )	Project	Draft (New)	No	No	No	C	21.26	120	Type B (NEMA 5-15)	
CMP-AL1		O/O	OptiPlex 7400 All-In-One	Dell Inc. ( )	Yes	6-IT/Computers	No	No	No	15	2.07	3.60	N/A	Yes
					No	Unassigned	No	No	No	15	13.54	60	No	No
		1	Cart, Procedure, General	InterMetro Industries Corp (FLBED)	Project	Draft (New)	No	No	No	M	28.88	N/A	N/A	
CRT-GPN		O/O	Flexline Bedside FLBED	InterMetro Industries Corp ( )	No	3-Movable, Non-Elect	No	No	No	157	22.38	N/A	N/A	No
					No	Unassigned	No	No	No	157	35.13	N/A	No	No
		1	Curtain, Cubicle, Disposable	Medline Industries Inc. (Curtain/Disposable)	Project	Draft (New)	No	No	No			N/A	N/A	
CUR-CUB		O/C	Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable)	No	5-Furniture	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Dispenser, Disinfectant Wipes, Wall Mount	Medline Industries Inc. (MSC351128)	Project	Draft (New)	No	No	No	W	5.60	N/A	N/A	
DSP-DWP		O/C	MSC351128	Medline Industries Inc. (MSC351128)	Yes	1-Fixed	No	No	No	1	8.60	N/A	N/A	No
			Dimensions provided by the Supplier. Contact the Supplier for more information. Ships 12/case.		No	Unassigned	No	No	No	1	5.50	N/A	No	No
		1	Dispenser, Emesis Bag, Wall Mount	Medline Industries Inc. (NONEMBGDISP)	Project	Draft (New)	No	No	No	W	6.00	N/A	N/A	
DSP-EMS		O/C	NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP)	Yes	1-Fixed	No	No	No	9	6.00	N/A	N/A	No
			Ships 6/case.		No	Unassigned	No	No	No	9	6.50	N/A	No	No

Room: Treatment Rm - Private Room#: C001 - C047 Room Sign: Area/Phase: ED/1st Flr Room Qty: 17

Comments: C001; C002; C003; C004; C005; C009; C010; C011; C012; C029; C030; C031; C032; C044; C045; C046; C047

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	Project	Draft (New)	No	No	No	W	11.25	N/A	N/A	
DSP-GV3		O/C	305362 Clear PETG	Omnimed, Inc (305362)	Yes	1-Fixed	No	No	No	1	3.75	N/A	N/A	No
					No	Unassigned	No	No	No	1	15.50	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Dispenser, Paper Towel, Surface	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C	Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.		No	Unassigned	No	No	No	5	9.00	N/A	No	No
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.		No	Unassigned	No	No	No	1	10.56	N/A	No	No
		1	Diagnostic System, Integrated	Hillrom - Welch Allyn, Inc. (77791-2MPX)	Project	Draft (New)	No	No	No	W	30.00	120	Type B (NEMA 5-15)	
DSY-OTO		O/C	Green Series 777 [77791-2MPX]		Yes	1-Fixed	No	No	No	25	9.50	0.2	N/A	No
				Hillrom - Welch Allyn, Inc. (77791-2MPX)	No	Unassigned	No	No	No	24	11.75	60	No	No
			Dimension reflects wall board											
		1	Flowmeter, Air	Precision Medical (1MFA2005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-AIR		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO)	No	3-Movable, Non-Elect	No	No	No	1	2.50	N/A	N/A	No
					No	Unassigned	No	Yes	No	1	6.50	N/A	No	No
		2	Flowmeter, Oxygen	Precision Medical (1MFA1005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-OXF		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO)	No	3-Movable, Non-Elect	No	No	No	1	2.50	N/A	N/A	No
					No	Unassigned	No	Yes	No	1	6.50	N/A	No	No
		2	Regulator, Suction, Intermittent/Continuous	Precision Medical (PM3303)	Project	Draft (New)	No	No	No	W	2.80	N/A	N/A	
MDG-SCI		O/O	PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303)	No	3-Movable, Non-Elect	No	No	Yes	1	4.40	N/A	N/A	No
					No	Unassigned	No	No	No	1	5.30	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm - Private Room#: C001 - C047 Room Sign: Area/Phase: ED/1st Flr Room Qty: 17

Comments: C001; C002; C003; C004; C005; C009; C010; C011; C012; C029; C030; C031; C032; C044; C045; C046; C047

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
MON-PHS		1 O/O	Monitor, Physiologic, Bedside IntelliVue MP30 Electrical requirements are for battery charging.	Philips Healthcare - Monitoring Systems (M8002A) Philips Healthcare - Monitoring Systems (M8002A)	Project Yes No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	C 13 19	13.75 8.75 11.00	115 1.3 60	Type B (NEMA 5-15) 495 No	 Yes Yes
SCN-BCD		1 O/O	Scanner, Barcode DS8100 Series Corded and Cordless Handheld Imagers Power via host cable. Input Voltage Range. DS8178 Cradles 5V 4.7 to 5.5VDC, 12V 10.8 to 13.2VDC.	Zebra Technologies Corp (DS8178-SR7U2100SFW) Zebra Technologies Corp (DS8178-SR7U2100SFW)	Project No No	Draft (New) 6-IT/Computers Unassigned	No No No	No No No	No No No	C 1 1	2.60 4.20 6.60	N/A N/A N/A	N/A N/A No	 No No
SHP-WMT		1 O/C	Disposal, Sharps, Wall Mount Bio Systems C-04RES-04 w/Locking Bracket Max weight reflects container full.	Stericycle (C-04RES-04/WB-04) Stericycle (C-04RES-04/WB-04)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 13 6	13.75 7.75 21.25	N/A N/A N/A	N/A N/A No	 No No
STL-CSN		1 O/O	Stool, Exam, Cusion-Seat w/ Glides Ritter 274 Classic Series	Midmark Corporation - Medical (274-001) Midmark Corporation - Medical (274-001)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 15 20	21.50 21.50 24.50	N/A N/A N/A	N/A N/A No	 No No
STR-PRC		1 O/O	Stretcher, Procedure / Recovery w/ 30" Mattress w/ Scale Procedural Stretcher P8000 Height reflects floor to top of sleep deck Width reflects Overall width (siderails up)	Hillrom - Bed & Stretcher Group (P8000) Hillrom - Bed & Stretcher Group (P8000)	Project No Yes	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 295 350	35.50 83.00 34.25	N/A N/A N/A	N/A N/A No	 No No
TKC-IVP		1 C/C	Track, Ceiling, IV, Straight 4000B Telescoping Bottle Holder (Straight) Height reflects when fully extended. 29 in. when closed.	A.R. Nelson Co. (4000B) Medline Industries Inc. (IV4000108A)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	CE 5 5	11.00 11.00 45.00	N/A N/A N/A	N/A N/A No	 No No
TRY-OBS		1 O/O	Tray, Patient, Overbed, Stretcher Accessory P490B - Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( ) Hillrom - Bed & Stretcher Group ( )	Project No No	Draft (New) 0-Unassigned Unassigned	No No No	No No No	No No No			N/A N/A N/A	N/A N/A No	 No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm - Private Room#: C001 - C047 Room Sign: Area/Phase: ED/1st Flr Room Qty: 17

Comments: C001; C002; C003; C004; C005; C009; C010; C011; C012; C029; C030; C031; C032; C044; C045; C046; C047

Alt ID	Item ID	Qty F/I	Description Model Spec Remarks / Item Notes	Manufacturer Vendor	Funding Source Arch Sig. Spat. Sig.	Item Status Arch Code Custom Code	Water Cold Hot Treated	Drain Steam Gas	Vacuum Dental Medical Vent	(lbs) Mounting Max Weight Ship Weight	(in) Width Depth Height	Electrical/Mechanical Volts Amp Hz	Plug Type BTU/hr Ded. Circ.	Data Cnct. Emrg. Pwr.
Department: ED/1st Flr														
		1	Waste Can, Step-On	Rubbermaid Commercial Products	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige	(1883460) Rubbermaid Commercial Products (1883460)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	12 12	12.20 31.60	N/A N/A	N/A No	No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Toilet/Patient - Isolation **Room#: C007; C042** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 2**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
BAR-G18	TA-07A	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 18 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 18) Bobrick Washroom Equipment, Inc. (B-6806 x 18)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	18.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G18	TA-07B	1 C/C	Bar, Grab, Toilet/Shower w/ Peened Surface B-6806 x 18 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface) Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	18.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G36	TA-05	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 36 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 36) Bobrick Washroom Equipment, Inc. (B-6806 x 36)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 3	38.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G42	TA-06	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 42 Straight Grab Bar Dimensions reflect bar mounted horizontally. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 42) Bobrick Washroom Equipment, Inc. (B-6806 x 42)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 4 4	43.75 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-GTW	TA-08	1 C/C	Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface B-6861.99 Two-Wall Shower Grab Bar Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6861.99) Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 8 8	34.75 19.75 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-SWU	TA-13	1 C/C	Bar, Grab, Toilet/Shower, Swing Arm B-4998 Swing-Up Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-4998) Bobrick Washroom Equipment, Inc. (B-4998)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 10 12	6.13 29.00 8.75	N/A N/A N/A	N/A N/A No	N/A No No
DSP-PSS	TA-09	1 O/C	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216] Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 5	10.75 4.75 9.00	N/A N/A N/A	N/A N/A No	N/A No No

Room: Toilet/Patient - Isolation **Room#: C007; C042** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 2**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite) Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.	GOJO Industries (5134-01)	Yes No	1-Fixed Unassigned	No No	No No	No No	1 1	4.48 10.56	N/A N/A	N/A No	No No
		1	Dispenser, Toilet Paper, Surface Mount, Stainless Steel Coreless Double Roll [09606]	Kimberly-Clark Professional (09606)	Project	Draft (New)	No	No	No	W	10.13	N/A	N/A	
DSP-TLP	TA-02	O/C		Kimberly-Clark Professional (09606)	Yes No	1-Fixed Unassigned	No No	No No	No No	3 4	6.38 7.00	N/A N/A	N/A No	No No
		1	Hook, Coat/Robe, Wall Mount	Bobrick Washroom Equipment, Inc. (B-9542)	Project	Draft (New)	No	No	No	W	1.31	N/A	N/A	
HOK-COT	TA-11	C/C	B-9542 Surface-Mounted Coat Hook Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-9542)	Yes No	1-Fixed Unassigned	No No	No No	No No	1 1	2.97 1.31	N/A N/A	N/A No	No No
		1	Mirror, Vanity	Bobrick Washroom Equipment, Inc. ( )	Project	Draft (New)	No	No	No			N/A	N/A	
MIR-V24	TA-12	C/C	B-166 - 2448 Provide blocking as required.	Bobrick Washroom Equipment, Inc. ( )	Yes No	1-Fixed Unassigned	No No	No No	No No			N/A N/A	N/A No	No No
		1	Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	12 12	12.20 31.60	N/A N/A	N/A No	No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm/Isolation **Room#: C008; C043** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 2**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	Project	Draft (New)	No	No	No	W	18.20	N/A	N/A	
BKT-CWS		C/C	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Yes	1-Fixed	No	No	No	42	42.00	N/A	N/A	No
			Dimensions reflect unit extended at max. Dimensions when folded: 25.75 in. W x 6 in. D x 34 in. H.		No	Unassigned	No	No	No	47	34.00	N/A	No	No
		1	Bracket, Monitor, Wall	GCX Corporation (WC-0002-05/AG-0018-21)	Project	Draft (New)	No	No	No	W	4.00	N/A	N/A	
BKT-VTS		C/C	19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21)	Yes	1-Fixed	No	No	No	6	16.10	N/A	N/A	No
			Weight and size varies depending on selected mfg/mdl monitoring equipment.		No	Unassigned	No	No	No	10	19.00	N/A	No	No
		1	Clock, Analog, Synchronized, Wireless	La Crosse Technology (WT-3122A)	Project	Draft (New)	No	No	No	W	12.50	N/A	N/A	
CLK-AWL		C/C	WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A)	Yes	1-Fixed	No	No	No	3	1.50	N/A	N/A	No
			Requires 1 AA battery. Depth from Manufacturer website. Weight from vendor.		No	Unassigned	No	No	No	3	12.50	N/A	No	No
		1	Computer, Desktop, All-in-One	Dell Inc. ( )	Project	Draft (New)	No	No	No	C	21.26	120	Type B (NEMA 5-15)	
CMP-AL1		O/O	OptiPlex 7400 All-In-One	Dell Inc. ( )	Yes	6-IT/Computers	No	No	No	15	2.07	3.60	N/A	Yes
					No	Unassigned	No	No	No	15	13.54	60	No	No
		1	Cart, Procedure, General	InterMetro Industries Corp (FLBED)	Project	Draft (New)	No	No	No	M	28.88	N/A	N/A	
CRT-GPN		O/O	Flexline Bedside FLBED	InterMetro Industries Corp ( )	No	3-Movable, Non-Elect	No	No	No	157	22.38	N/A	N/A	No
					No	Unassigned	No	No	No	157	35.13	N/A	No	No
		1	Curtain, Cubicle, Disposable	Medline Industries Inc. (Curtain/Disposable)	Project	Draft (New)	No	No	No			N/A	N/A	
CUR-CUB		O/C	Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable)	No	5-Furniture	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Dispenser, Disinfectant Wipes, Wall Mount	Medline Industries Inc. (MSC351128)	Project	Draft (New)	No	No	No	W	5.60	N/A	N/A	
DSP-DWP		O/C	MSC351128	Medline Industries Inc. (MSC351128)	Yes	1-Fixed	No	No	No	1	8.60	N/A	N/A	No
			Dimensions provided by the Supplier. Contact the Supplier for more information. Ships 12/case.		No	Unassigned	No	No	No	1	5.50	N/A	No	No
		1	Dispenser, Emesis Bag, Wall Mount	Medline Industries Inc. (NONEMBGDISP)	Project	Draft (New)	No	No	No	W	6.00	N/A	N/A	
DSP-EMS		O/C	NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP)	Yes	1-Fixed	No	No	No	9	6.00	N/A	N/A	No
			Ships 6/case.		No	Unassigned	No	No	No	9	6.50	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm/Isolation **Room#: C008; C043** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 2**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Plug Type: Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	Project	Draft (New)	No	No	No	W	11.25	N/A	N/A	
DSP-GV3		O/C	305362 Clear PETG	Omnimed, Inc (305362)	Yes	1-Fixed	No	No	No	1	3.75	N/A	N/A	No
					No	Unassigned	No	No	No	1	15.50	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Dispenser, Paper Towel, Surface	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C	Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.		No	Unassigned	No	No	No	5	9.00	N/A	No	No
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.		No	Unassigned	No	No	No	1	10.56	N/A	No	No
		1	Diagnostic System, Integrated	Hillrom - Welch Allyn, Inc. (77791-2MPX)	Project	Draft (New)	No	No	No	W	30.00	120	Type B (NEMA 5-15)	
DSY-OTO		O/C	Green Series 777 [77791-2MPX]		Yes	1-Fixed	No	No	No	25	9.50	0.2	N/A	No
				Hillrom - Welch Allyn, Inc. (77791-2MPX)	No	Unassigned	No	No	No	24	11.75	60	No	No
			Dimension reflects wall board											
		1	Flowmeter, Air	Precision Medical (1MFA2005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-AIR		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO)	No	3-Movable, Non-Elect	No	No	No	1	2.50	N/A	N/A	No
					No	Unassigned	No	Yes	No	1	6.50	N/A	No	No
		2	Flowmeter, Oxygen	Precision Medical (1MFA1005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-OXF		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO)	No	3-Movable, Non-Elect	No	No	No	1	2.50	N/A	N/A	No
					No	Unassigned	No	Yes	No	1	6.50	N/A	No	No
		2	Regulator, Suction,	Precision Medical (PM3303)	Project	Draft (New)	No	No	No	W	2.80	N/A	N/A	
MDG-SCI		O/O	Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303)	No	3-Movable, Non-Elect	No	No	Yes	1	4.40	N/A	N/A	No
					No	Unassigned	No	No	No	1	5.30	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm/Isolation Room#: C008; C043 Room Sign: Area/Phase: ED/1st Flr Room Qty: 2

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Monitor, Physiologic, Bedside	Philips Healthcare - Monitoring	Project	Draft (New)	No	No	No	C	13.75	115	Type B (NEMA 5-15)	
MON-PHS		O/O	IntelliVue MP30	Systems (M8002A)	Yes	2-Movable, Elect	No	No	No	13	8.75	1.3	495	Yes
				Philips Healthcare - Monitoring Systems (M8002A)	No	Unassigned	No	No	No	19	11.00	60	No	Yes
			Electrical requirements are for battery charging.											
		1	Scanner, Barcode	Zebra Technologies Corp (DS8178-SR7U2100SFW)	Project	Draft (New)	No	No	No	C	2.60	N/A	N/A	
SCN-BCD		O/O	DS8100 Series Corded and Cordless Handheld Imagers		No	6-IT/Computers	No	No	No	1	4.20	N/A	N/A	No
				Zebra Technologies Corp (DS8178-SR7U2100SFW)	No	Unassigned	No	No	No	1	6.60	N/A	No	No
			Power via host cable. Input Voltage Range. DS8178 Cradles 5V 4.7 to 5.5VDC, 12V 10.8 to 13.2VDC.											
		1	Disposal, Sharps, Wall Mount	Stericycle (C-04RES-04/WB-04)	Project	Draft (New)	No	No	No	W	13.75	N/A	N/A	
SHP-WMT		O/C	Bio Systems C-04RES-04 w/Locking Bracket	Stericycle (C-04RES-04/WB-04)	Yes	1-Fixed	No	No	No	13	7.75	N/A	N/A	No
			Max weight reflects container full.		No	Unassigned	No	No	No	6	21.25	N/A	No	No
		1	Stool, Exam, Cusion-Seat w/ Glides	Midmark Corporation - Medical (274-001)	Project	Draft (New)	No	No	No	M	21.50	N/A	N/A	
STL-CSN		O/O	Ritter 274 Classic Series		No	3-Movable, Non-Elect	No	No	No	15	21.50	N/A	N/A	No
				Midmark Corporation - Medical (274-001)	No	Unassigned	No	No	No	20	24.50	N/A	No	No
		1	Stretcher, Procedure / Recovery w/ 30"	Hillrom - Bed & Stretcher Group (P8000)	Project	Draft (New)	No	No	No	M	35.50	N/A	N/A	
STR-PRC		O/O	Mattress w/ Scale		No	3-Movable, Non-Elect	No	No	No	295	83.00	N/A	N/A	No
			Procedural Stretcher P8000	Hillrom - Bed & Stretcher Group (P8000)	Yes	Unassigned	No	No	No	350	34.25	N/A	No	No
			Height reflects floor to top of sleep deck Width reflects Overall width (siderails up)											
		1	Track, Ceiling, IV, Straight	A.R. Nelson Co. (4000B)	Project	Draft (New)	No	No	No	CE	11.00	N/A	N/A	
TKC-IVP		C/C	4000B Telescoping Bottle Holder (Straight)	Medline Industries Inc. (IV4000108A)	Yes	1-Fixed	No	No	No	5	11.00	N/A	N/A	No
			Height reflects when fully extended. 29 in. when closed.		No	Unassigned	No	No	No	5	45.00	N/A	No	No
		1	Tray, Patient, Overbed, Stretcher	Hillrom - Bed & Stretcher Group ( )	Project	Draft (New)	No	No	No			N/A	N/A	
TRY-OBS		O/O	Accessory	Hillrom - Bed & Stretcher Group ( )	No	0-Unassigned	No	No	No			N/A	N/A	No
			P490B - Tray, Patient, Overbed, Stretcher Accessory		No	Unassigned	No	No	No			N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm/Isolation **Room#: C008; C043** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 2**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Waste Can, Step-On	Rubbermaid Commercial Products	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige	(1883460) Rubbermaid Commercial Products (1883460)	No / No	3-Movable, Non-Elect / Unassigned	No / No	No / No	No / No	12 / 12	12.20 / 31.60	N/A / N/A	N/A / No	No / No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Bay/Cubicle Room#: C013 - C040 Room Sign: Area/Phase: ED/1st Flr Room Qty: 9

Comments: C013; C014; C015; C016; C017; C037; C038; C039; C040

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	Project	Draft (New)	No	No	No	W	18.20	N/A	N/A	
BKT-CWS		C/C	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Yes	1-Fixed	No	No	No	42	42.00	N/A	N/A	No
			Dimensions reflect unit extended at max. Dimensions when folded: 25.75 in. W x 6 in. D x 34 in. H.		No	Unassigned	No	No	No	47	34.00	N/A	No	No
		1	Bracket, Monitor, Wall	GCX Corporation (WC-0002-05/AG-0018-21)	Project	Draft (New)	No	No	No	W	4.00	N/A	N/A	
BKT-VTS		C/C	19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21)	Yes	1-Fixed	No	No	No	6	16.10	N/A	N/A	No
			Weight and size varies depending on selected mfg/mdl monitoring equipment.		No	Unassigned	No	No	No	10	19.00	N/A	No	No
		1	Clock, Analog, Synchronized, Wireless	La Crosse Technology (WT-3122A)	Project	Draft (New)	No	No	No	W	12.50	N/A	N/A	
CLK-AWL		C/C	WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A)	Yes	1-Fixed	No	No	No	3	1.50	N/A	N/A	No
			Requires 1 AA battery. Depth from Manufacturer website. Weight from vendor.		No	Unassigned	No	No	No	3	12.50	N/A	No	No
		1	Computer, Desktop, All-in-One	Dell Inc. ( )	Project	Draft (New)	No	No	No	C	21.26	120	Type B (NEMA 5-15)	
CMP-AL1		O/O	OptiPlex 7400 All-In-One	Dell Inc. ( )	Yes	6-IT/Computers	No	No	No	15	2.07	3.60	N/A	Yes
					No	Unassigned	No	No	No	15	13.54	60	No	No
		1	Cart, Procedure, General	InterMetro Industries Corp (FLBED)	Project	Draft (New)	No	No	No	M	28.88	N/A	N/A	
CRT-GPN		O/O	Flexline Bedside FLBED	InterMetro Industries Corp ( )	No	3-Movable, Non-Elect	No	No	No	157	22.38	N/A	N/A	No
					No	Unassigned	No	No	No	157	35.13	N/A	No	No
		1	Curtain, Cubicle, Disposable	Medline Industries Inc. (Curtain/Disposable)	Project	Draft (New)	No	No	No			N/A	N/A	
CUR-CUB		O/C	Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable)	No	5-Furniture	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Dispenser, Disinfectant Wipes, Wall Mount	Medline Industries Inc. (MSC351128)	Project	Draft (New)	No	No	No	W	5.60	N/A	N/A	
DSP-DWP		O/C	MSC351128	Medline Industries Inc. (MSC351128)	Yes	1-Fixed	No	No	No	1	8.60	N/A	N/A	No
			Dimensions provided by the Supplier. Contact the Supplier for more information. Ships 12/case.		No	Unassigned	No	No	No	1	5.50	N/A	No	No
		1	Dispenser, Emesis Bag, Wall Mount	Medline Industries Inc. (NONEMBGDISP)	Project	Draft (New)	No	No	No	W	6.00	N/A	N/A	
DSP-EMS		O/C	NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP)	Yes	1-Fixed	No	No	No	9	6.00	N/A	N/A	No
			Ships 6/case.		No	Unassigned	No	No	No	9	6.50	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Bay/Cubicle Room#: C013 - C040 Room Sign: Area/Phase: ED/1st Flr Room Qty: 9

Comments: C013; C014; C015; C016; C017; C037; C038; C039; C040

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	Project	Draft (New)	No	No	No	W	11.25	N/A	N/A	
DSP-GV3		O/C	305362 Clear PETG	Omnimed, Inc (305362)	Yes	1-Fixed	No	No	No	1	3.75	N/A	N/A	No
					No	Unassigned	No	No	No	1	15.50	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Dispenser, Paper Towel, Surface	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C	Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.		No	Unassigned	No	No	No	5	9.00	N/A	No	No
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.		No	Unassigned	No	No	No	1	10.56	N/A	No	No
		1	Diagnostic System, Integrated	Hillrom - Welch Allyn, Inc. (77791-2MPX)	Project	Draft (New)	No	No	No	W	30.00	120	Type B (NEMA 5-15)	
DSY-OTO		O/C	Green Series 777 [77791-2MPX]		Yes	1-Fixed	No	No	No	25	9.50	0.2	N/A	No
				Hillrom - Welch Allyn, Inc. (77791-2MPX)	No	Unassigned	No	No	No	24	11.75	60	No	No
			Dimension reflects wall board											
		1	Flowmeter, Air	Precision Medical (1MFA2005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-AIR		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO)	No	3-Movable, Non-Elect	No	No	No	1	2.50	N/A	N/A	No
					No	Unassigned	No	Yes	No	1	6.50	N/A	No	No
		2	Flowmeter, Oxygen	Precision Medical (1MFA1005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-OXF		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO)	No	3-Movable, Non-Elect	No	No	No	1	2.50	N/A	N/A	No
					No	Unassigned	No	Yes	No	1	6.50	N/A	No	No
		2	Regulator, Suction,	Precision Medical (PM3303)	Project	Draft (New)	No	No	No	W	2.80	N/A	N/A	
MDG-SCI		O/O	Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303)	No	3-Movable, Non-Elect	No	No	Yes	1	4.40	N/A	N/A	No
					No	Unassigned	No	No	No	1	5.30	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Bay/Cubicle Room#: C013 - C040 Room Sign: Area/Phase: ED/1st Flr Room Qty: 9

Comments: C013; C014; C015; C016; C017; C037; C038; C039; C040

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Monitor, Physiologic, Bedside	Philips Healthcare - Monitoring	Project	Draft (New)	No	No	No	C	13.75	115	Type B (NEMA 5-15)	
MON-PHS		O/O	IntelliVue MP30	Systems (M8002A)	Yes	2-Movable, Elect	No	No	No	13	8.75	1.3	495	Yes
				Philips Healthcare - Monitoring Systems (M8002A)	No	Unassigned	No	No	No	19	11.00	60	No	Yes
			Electrical requirements are for battery charging.											
		1	Scanner, Barcode	Zebra Technologies Corp (DS8178-SR7U2100SFW)	Project	Draft (New)	No	No	No	C	2.60	N/A	N/A	
SCN-BCD		O/O	DS8100 Series Corded and Cordless Handheld Imagers		No	6-IT/Computers	No	No	No	1	4.20	N/A	N/A	No
				Zebra Technologies Corp (DS8178-SR7U2100SFW)	No	Unassigned	No	No	No	1	6.60	N/A	No	No
			Power via host cable. Input Voltage Range. DS8178 Cradles 5V 4.7 to 5.5VDC, 12V 10.8 to 13.2VDC.											
		1	Disposal, Sharps, Wall Mount	Stericycle (C-04RES-04/WB-04)	Project	Draft (New)	No	No	No	W	13.75	N/A	N/A	
SHP-WMT		O/C	Bio Systems C-04RES-04 w/Locking Bracket	Stericycle (C-04RES-04/WB-04)	Yes	1-Fixed	No	No	No	13	7.75	N/A	N/A	No
			Max weight reflects container full.		No	Unassigned	No	No	No	6	21.25	N/A	No	No
		1	Stool, Exam, Cusion-Seat w/ Glides	Midmark Corporation - Medical (274-001)	Project	Draft (New)	No	No	No	M	21.50	N/A	N/A	
STL-CSN		O/O	Ritter 274 Classic Series		No	3-Movable, Non-Elect	No	No	No	15	21.50	N/A	N/A	No
				Midmark Corporation - Medical (274-001)	No	Unassigned	No	No	No	20	24.50	N/A	No	No
		1	Stretcher, Procedure / Recovery w/ 30"	Hillrom - Bed & Stretcher Group (P8000)	Project	Draft (New)	No	No	No	M	35.50	N/A	N/A	
STR-PRC		O/O	Mattress w/ Scale		No	3-Movable, Non-Elect	No	No	No	295	83.00	N/A	N/A	No
			Procedural Stretcher P8000	Hillrom - Bed & Stretcher Group (P8000)	Yes	Unassigned	No	No	No	350	34.25	N/A	No	No
			Height reflects floor to top of sleep deck Width reflects Overall width (siderails up)											
		1	Track, Ceiling, IV, Straight	A.R. Nelson Co. (4000B)	Project	Draft (New)	No	No	No	CE	11.00	N/A	N/A	
TKC-IVP		C/C	4000B Telescoping Bottle Holder (Straight)	Medline Industries Inc. (IV4000108A)	Yes	1-Fixed	No	No	No	5	11.00	N/A	N/A	No
					No	Unassigned	No	No	No	5	45.00	N/A	No	No
			Height reflects when fully extended. 29 in. when closed.											
		1	Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	Project	Draft (New)	No	No	No			N/A	N/A	
TRY-OBS		O/O	P490B - Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	No	0-Unassigned	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Bay/Cubicle Room#: C013 - C040 Room Sign: Area/Phase: ED/1st Flr Room Qty: 9

Comments: C013; C014; C015; C016; C017; C037; C038; C039; C040

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Waste Can, Step-On	Rubbermaid Commercial Products	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige	(1883460) Rubbermaid Commercial Products (1883460)	No / No	3-Movable, Non-Elect / Unassigned	No / No	No / No	No / No	12 / 12	12.20 / 31.60	N/A	N/A / No	No / No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Alcove/Waste Can-Treatment Bay **Room#: C013A; C017A** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 2**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Waste Can, Step-On	Rubbermaid Commercial Products	Project	Draft (New)	No	No	No	F	22.40	N/A	N/A	
WST-24W		O/O	1883552 Slim Jim Resin Front Step 24 Gal Beige	(1883552) Rubbermaid Commercial Products (1883552)	No / No	3-Movable, Non-Elect / Unassigned	No / No	No / No	No / No	13 / 13	13.90 / 32.50	N/A	N/A / No	No / No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Toilet/Staff Room#: C018 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
BAR-G18	TA-07B	1 C/C	Bar, Grab, Toilet/Shower w/ Peened Surface B-6806 x 18 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface) Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	18.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G18	TA-07A	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 18 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 18) Bobrick Washroom Equipment, Inc. (B-6806 x 18)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	18.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G36	TA-05	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 36 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 36) Bobrick Washroom Equipment, Inc. (B-6806 x 36)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 3	38.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G42	TA-06	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 42 Straight Grab Bar Dimensions reflect bar mounted horizontally. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 42) Bobrick Washroom Equipment, Inc. (B-6806 x 42)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 4 4	43.75 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-GTW	TA-08	1 C/C	Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface B-6861.99 Two-Wall Shower Grab Bar Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6861.99) Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 8 8	34.75 19.75 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-SWU	TA-13	1 C/C	Bar, Grab, Toilet/Shower, Swing Arm B-4998 Swing-Up Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-4998) Bobrick Washroom Equipment, Inc. (B-4998)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 10 12	6.13 29.00 8.75	N/A N/A N/A	N/A N/A No	N/A No No
CSW-SWM	TA-01	1 C/C	Chair, Clinical, Shower, Wall Mount 4CS.447.UL01 - ADA Shower Seat White; Provide blocking as required.	PBA ( ) PBA ( )	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No			N/A N/A N/A	N/A N/A No	N/A No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Toilet/Staff Room#: C018 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Paper Towel, Surface	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C	Mount, Stainless Steel	Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
			SCOTTFOLD Compact [09216]		No	Unassigned	No	No	No	5	9.00	N/A	No	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.											
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.		No	Unassigned	No	No	No	1	10.56	N/A	No	No
		1	Dispenser, Toilet Paper, Surface	Kimberly-Clark Professional (09606)	Project	Draft (New)	No	No	No	W	10.13	N/A	N/A	
DSP-TLP	TA-02	O/C	Mount, Stainless Steel	Kimberly-Clark Professional (09606)	Yes	1-Fixed	No	No	No	3	6.38	N/A	N/A	No
			Coreless Double Roll [09606]		No	Unassigned	No	No	No	4	7.00	N/A	No	No
		1	Hook, Coat/Robe, Wall Mount	Bobrick Washroom Equipment, Inc. (B-9542)	Project	Draft (New)	No	No	No	W	1.31	N/A	N/A	
HOK-COT	TA-11	C/C	B-9542 Surface-Mounted Coat Hook		Yes	1-Fixed	No	No	No	1	2.97	N/A	N/A	No
				Bobrick Washroom Equipment, Inc. (B-9542)	No	Unassigned	No	No	No	1	1.31	N/A	No	No
			Provide blocking as required.											
		1	Mirror, Vanity	Bobrick Washroom Equipment, Inc. ( )	Project	Draft (New)	No	No	No			N/A	N/A	
MIR-V24	TA-12	C/C	B-166 - 2448	Bobrick Washroom Equipment, Inc. ( )	Yes	1-Fixed	No	No	No			N/A	N/A	No
			Provide blocking as required.		No	Unassigned	No	No	No			N/A	No	No
		1	Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige		No	3-Movable, Non-Elect	No	No	No	12	12.20	N/A	N/A	No
				Rubbermaid Commercial Products (1883460)	No	Unassigned	No	No	No	12	31.60	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Clean Supply **Room#: C019** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		100	Bin, Supply	Pegasus Medical Concepts, Inc. (2-205BK)	Project	Draft (New)	No	No	No	S	3.75	N/A	N/A	
BIN-SLY		O/O	Hanging Bin 2-205BK	Pegasus Medical Concepts, Inc. (2-205BK)	No	3-Movable, Non-Elect	No	No	No	4	3.63	N/A	N/A	No
					No	Unassigned	No	No	No	5	1.75	N/A	No	No
		2	Cabinet, Warming, Dual, Freestanding	Skytron (SS2207-MG)	Project	Draft (New)	No	No	No	F	30.00	120	Type B (NEMA 5-15)	
CAB-W2G		O/C	SS2207-MG (Glass Doors)	Skytron (SS2207-MG)	Yes	2-Movable, Elect	No	No	No	430	26.50	12	2557	No
					No	Unassigned	No	No	No	430	74.50	60	No	No
		1	Cart, Supply, Linen, 48 inch	InterMetro Industries Corp (A2448NC/74UP/2448FG/5MP/5MPB/EP37C/EP57C/VUCMB)	Project	Draft (New)	No	No	No	M	48.00	N/A	N/A	
CRT-L48		O/O	Super Erecta w/Cover (24"x48")	InterMetro Industries Corp (A2448NC/74UP/2448FG/5MP/5MPB/EP37C/EP57C/VUCMB)	No	3-Movable, Non-Elect	No	No	No	201	24.00	N/A	N/A	No
					Yes	Unassigned	No	No	No	201	79.00	N/A	No	No
			Height includes 5 inches casters.											
		2	Cart, Procedure, General	InterMetro Industries Corp (FLP22010)	Project	Draft (New)	No	No	No	M	32.25	N/A	N/A	
CRT-PG5		O/O	Flexline Standard 5-Drwr w/Passive Lock FLP22010	InterMetro Industries Corp (FLP22010)	No	3-Movable, Non-Elect	No	No	No	200	22.38	N/A	N/A	No
					No	Unassigned	No	No	No	200	45.25	N/A	No	No
		3	Cart, Supply, Bin/ Basket	Pegasus Medical Concepts, Inc. (SG-8-E)	Project	Draft (New)	No	No	No	M	26.25	N/A	N/A	
CRT-SBK		O/O	E-Style Single Rack Unit (SG-8-E)	Pegasus Medical Concepts, Inc. (SG-8-E)	No	3-Movable, Non-Elect	No	No	No	125	17.75	N/A	N/A	No
					No	Unassigned	No	No	No	157	78.25	N/A	No	No
			Cart frame weighs 100 lbs.											
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Stool, Step, w/Handrail	Blickman Industries (1011251000)	Project	Draft (New)	No	No	No	F	15.25	N/A	N/A	
STL-SHR		O/O	1251 Chrome	Blickman Industries (1011251000)	No	3-Movable, Non-Elect	No	No	No	11	11.38	N/A	N/A	No
					No	Unassigned	No	No	No	11	35.75	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Soiled Work Rm Room#: C020 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
ANZ-URN		1 O/O	Analyzer, Lab, Urinalysis, Semi-Automated Clinitek Status +	Siemens Healthcare Diagnostics (1780) Siemens Healthcare Diagnostics (1780)	Project No No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	C 4 6	6.70 10.70 6.20	110 N/A 60	Type B (NEMA 5-15) N/A No	 Yes No
			Electrical Requirements: Connect power cord to AC electrical wall outlet. Electrical Rating: 100V - 240V AC, 50-60 Hz (with in-line lead) Power 9V DC, 7.2 VA or Battery Powered: 6 AA batteries											
CRT-LTK		1 O/O	Cart / Truck, Linen, Bulk MetroTrux Secure TXPB-BLK48	InterMetro Industries Corp (TXPB-BLK48SEC) InterMetro Industries Corp (TXPB-BLK48SEC)	Project No Yes	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 143 148	29.50 48.00 73.30	N/A N/A N/A	N/A N/A No	 No No
DSP-GV3		1 O/C	Dispenser, Glove, Triple Box 305362 Clear PETG	Omnimed, Inc (305362) Omnimed, Inc (305362)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	11.25 3.75 15.50	N/A N/A N/A	N/A N/A No	 No No
DSP-HSZ		1 O/C	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01) Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.	GOJO Industries (7724-01) GOJO Industries (7724-01)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 2 2	5.51 3.88 9.06	N/A N/A N/A	N/A N/A No	 No No
DSP-PSS	TA-09	1 O/C	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216] Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 5	10.75 4.75 9.00	N/A N/A N/A	N/A N/A No	 No No
DSP-SPG	TA-10	1 O/C	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite) Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.	GOJO Industries (5134-01) GOJO Industries (5134-01)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	5.81 4.48 10.56	N/A N/A N/A	N/A N/A No	 No No
MON-GLC		1 O/O	Monitor, Blood Glucose, Point-of-Care ACCU-CHEK Inform II Meter & Base Unit	Roche Diagnostics Corporation (05060311001/05060290001) Roche Diagnostics Corporation (05060311001/05060290001)	Project No No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	C 2 4	4.75 4.00 7.75	120 1.7 60	Type B (NEMA 5-15) N/A No	 Yes No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Soiled Work Rm Room#: C020 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
REF-MDU		1 C/C	Refrigerator, Medical Grade, Undercounter Performance Plus REF4P-0R-00-00 Requires 15 amps dedicated circuit.	Follett LLC (REF4P-0R-00-00) Follett LLC (REF4P-0R-00-00)	Project Yes No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	F 170 205	23.75 27.00 31.38	115 4.10 60	Type B (NEMA 5-15) 2185 Yes	 No Yes
WST-23B		1 O/O	Waste Can, Bio-Hazardous 23RD Step-On	Continental Commercial Products (23RD) Continental Commercial Products (23RD)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	F 13 13	19.25 16.00 31.00	N/A N/A N/A	N/A N/A No	 No No
WST-32W		1 O/O	Waste Can, 32-40 Gallon 2632 BRUTE Gray w/2631 Lid & 2640 Dolly Height includes dolly.	Rubbermaid Commercial Products (FG263200GRAY/FG263100GRAY/FG264000BLA) Rubbermaid Commercial Products (FG263200GRAY/FG263100GRAY/FG264000BLA)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 16 16	25.00 25.00 36.25	N/A N/A N/A	N/A N/A No	 No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Nourishment Rm Room#: C021 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Coffee Maker, Single Cup, Plumbed	Keurig Green Mountain (K150P)	Project	Draft (New)	Yes	No	No	C	10.40	120	Type B (NEMA 5-15)	
COF-SGC		O/C	K150P Commercial Brewing System - Plumbed	Keurig Green Mountain (K150P)	Yes	1-Fixed	No	No	No	18	14.00	11.7	N/A	No
			Weight reflects empty brewing system. Manufacturer recommends 15 amp dedicated, grounded circuit. Requires the use of an external water filter such as Omnipure KQ8. Sold seperately. Does not require drain. Drain hose in back of unit - water drains into pitcher.		No	Unassigned	No	No	No	22	13.90	60	Yes	No
		1	Cart, Foodservice, Meal/Tray	Aladdin Temp-Rite, LLC (MD20SLP6B4-45)	Project	Draft (New)	No	No	No	M	38.00	N/A	N/A	
CRT-F20		O/O	MD20SLP -20 Tray	Aladdin Temp-Rite, LLC (MD20SLP6B4-45)	No	3-Movable, Non-Elect	No	No	No	208	29.00	N/A	N/A	No
					No	Unassigned	No	No	No	267	58.00	N/A	No	No
		1	Cart, Utility, Stainless	Lakeside Manufacturing, Inc. (939)	Project	Draft (New)	No	No	No	M	19.75	N/A	N/A	
CRT-U3S		O/O	939 Tough Transport	Lakeside Manufacturing, Inc. (939)	No	3-Movable, Non-Elect	No	No	No	80	33.00	N/A	N/A	No
					No	Unassigned	No	No	No	80	34.25	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Dispenser, Paper Towel, Surface Mount, Stainless Steel	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C	SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.		No	Unassigned	No	No	No	5	9.00	N/A	No	No
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.		No	Unassigned	No	No	No	1	10.56	N/A	No	No
		1	Ice Machine, Dispenser, Nugget, Countertop	Follett LLC (12CI425A-S)	Project	Draft (New)	Yes	Yes	No	C	16.12	115	Type B (NEMA 5-15)	
ICE-C12		C/C	Symphony Plus 12CI425A-S	Follett LLC (12CI425A-S)	Yes	1-Fixed	No	No	No	156	23.50	11	5000	No
			15 amp dedicated circuit. Max Weight reflects bin at max capacity.		Yes	Unassigned	No	No	No	199	32.50	60	Yes	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Nourishment Rm Room#: C021 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Water Treatment System, Ice Maker,	Follett LLC (00130229)	Project	Draft (New)	Yes	No	No	W	14.25	N/A	N/A	
ICE-FLT		C/C	Wall Mount	Follett LLC (00130229)	Yes	1-Fixed	No	No	No	15	6.00	N/A	N/A	No
			Standard Capacity Filter System 00130229		No	Unassigned	No	No	No	15	18.50	N/A	No	No
		1	Refrigerator, Domestic	Frigidaire - Div. Electrolux (FPRU19F8WF)	Project	Draft (New)	No	No	No	F	32.88	120	Type B (NEMA 5-15)	
REF-19S		C/C	FPRU19F8WF (19 cu.ft./Stainless Steel)	Frigidaire - Div. Electrolux (FPRU19F8WF)	Yes	2-Movable, Elect	No	No	No	233	27.00	15	N/A	No
					No	Unassigned	No	No	No	233	72.50	60	Yes	No
			Minimum Dedicated Circuit Required 15 amps Depth with Door Open 90 degrees is 58.25 in.											
		1	Waste Can, Recycle	Continental Commercial Products (8322-1)	Project	Draft (New)	No	No	No	F	20.00	N/A	N/A	
WST-23R		O/O	8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1)	No	3-Movable, Non-Elect	No	No	No	7	11.00	N/A	N/A	No
					No	Unassigned	No	No	No	7	30.00	N/A	No	No
		1	Waste Can, Step-On	Rubbermaid Commercial Products (1883552)	Project	Draft (New)	No	No	No	F	22.40	N/A	N/A	
WST-24W		O/O	1883552 Slim Jim Resin Front Step 24 Gal Beige	Rubbermaid Commercial Products (1883552)	No	3-Movable, Non-Elect	No	No	No	13	13.90	N/A	N/A	No
					No	Unassigned	No	No	No	13	32.50	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Med-Prep Rm Room#: C022 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Computer Workstation	GCX Corporation (ITK-0003-02)	Project	Draft (New)	No	No	No	W	21.00	N/A	N/A	
BKT-PCW		C/C	VHM Extended w/ Ergo & CPU Mount	GCX Corporation (ITK-0003-02)	Yes	1-Fixed	No	No	No	60	44.75	N/A	N/A	No
					No	Unassigned	No	No	No	60	37.00	N/A	No	No
		1	Camera, CCTV, Color	Hanwha Techwin America (QND-8080R)	Project	Draft (New)	No	No	No	CE	4.74	N/A	N/A	
CAM-CCT		O/V	Hanwha QND-8080R	Hanwha Techwin America (QND-8080R)	Yes	1-Fixed	No	No	No	1	4.74	N/A	N/A	Yes
			PoE : Maximum 8.9W, typical 6.6W		No	Unassigned	No	No	No	1	4.02	N/A	No	No
		1	Disposal, Sharps, Wall Mount	Stericycle (C-02RES-0203-OC)	Project	Draft (New)	No	No	No	W	14.50	N/A	N/A	
DSL-2GW		O/C	Bio Systems C-02RES-0203-OC	Stericycle (C-02RES-0203-OC)	Yes	1-Fixed	No	No	No	12	5.75	N/A	N/A	No
			Max weight reflects cabinet with container full.		No	Unassigned	No	No	No	6	15.50	N/A	No	No
		1	Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	Project	Draft (New)	No	No	No	W	11.25	N/A	N/A	
DSP-GV3		O/C	305362 Clear PETG	Omnimed, Inc (305362)	Yes	1-Fixed	No	No	No	1	3.75	N/A	N/A	No
					No	Unassigned	No	No	No	1	15.50	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Dispenser, Medication, Auxiliary	BD - Becton, Dickinson and Company (M4A7DRW7)	Project	Draft (New)	No	No	No	F	23.00	0	N/A	
DSP-MAU		O/V	Pyxis MedStation 4000 (7-Drwr, 7 Cubie)	BD - Becton, Dickinson and Company (M4A7DRW7)	Yes	2-Movable, Elect	No	No	No	133	27.00	N/A	N/A	No
			Final weight of unit varies per drawer configuration. Per Manufacturer, requires seismic anchoring kit 122596-01. Requires power and data connection to Medstation Main console (adds 21 BTU).		No	Unassigned	No	No	No	133	47.00	N/A	No	Yes
		1	Dispenser, Medication, Host (Main)	BD - Becton, Dickinson and Company (M4MB6DR7W3)	Project	Draft (New)	No	No	No	F	23.00	120	Type B (NEMA 5-15)	
DSP-MDM		O/V	MedStation 4000 (6-Drwr, 3 Cubie)	BD - Becton, Dickinson and Company (M4MB6DR7W3)	Yes	2-Movable, Elect	No	No	No	166	27.00	1	409	Yes
			Final weight of unit varies based on drawer configuration and addition of supplies. Electrical requirements are for main only. Each component requires independent outlet, see cutsheet for details. Dedicated circuit breaker recommended for all equipment. Per Manufacturer, requires seismic anchoring kit 122596-01.		No	Unassigned	No	No	No	200	55.00	60	Yes	Yes

Room: Med-Prep Rm Room#: C022 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
DSP-MLK		1 O/V	Dispenser, Medication, Lock Module SMART Remote Manager Mounts on refrigerator door (refrigerator not included). Ensure that overall width required includes space for unit to attach to the refrigerator. Connects to Pyxis Main dispenser for power. If undercounter refrigerator located in casework, provide grommet. Or, electrical can be installed in wall at each location and remote manager and medication dispenser can be tied together. Requires 4" clearance on non-hinge side of refrigerator.	BD - Becton, Dickinson and Company (MSRM) BD - Becton, Dickinson and Company (MSRM)	Project Yes No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	S 4 5	2.50 4.75 7.00	N/A N/A N/A	N/A N/A No	N/A No No
DSP-MTS		1 O/V	Dispenser, Medication, Auxiliary Pyxis MedStation ES Single Column Requires data connection to MedStation Main.	BD - Becton, Dickinson and Company ( ) BD - Becton, Dickinson and Company ( )	Project Yes No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	F 314 392	29.75 27.50 79.00	120 <1 60	Type B (NEMA 5-15) 21 No	 No Yes
DSP-PSS	TA-09	1 O/C	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216] Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 5	10.75 4.75 9.00	N/A N/A N/A	N/A N/A No	N/A No No
DSP-SPG	TA-10	1 O/C	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite) Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.	GOJO Industries (5134-01) GOJO Industries (5134-01)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	5.81 4.48 10.56	N/A N/A N/A	N/A N/A No	N/A No No
MTP-RFZ		2 O/O	Monitor, Temperature, Refrigerator/Freezer Traceable Hi-Accuracy Refrigerator Thermometer Powered by AA batteries. Can be wall mounted.	Fisher Scientific Company (15078215) Fisher Scientific Company (15078215)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	C 0 0	2.75 0.75 4.25	N/A N/A N/A	N/A N/A No	N/A No No
PCD-AL1		1 O/O	Computer, Desktop, All-in-One M810Z	Lenovo (M700z) Lenovo (M700z)	Project Yes No	Draft (New) 6-IT/Computers Unassigned	No No No	No No No	No No No			N/A N/A N/A	N/A N/A No	N/A No No
REF-MDU		2 C/C	Refrigerator, Medical Grade, Undercounter Performance Plus REF4P-0R-00-00 Requires 15 amps dedicated circuit.	Follett LLC (REF4P-0R-00-00) Follett LLC (REF4P-0R-00-00)	Project Yes No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	F 170 205	23.75 27.00 31.38	115 4.10 60	Type B (NEMA 5-15) 2185 Yes	 No Yes

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Med-Prep Rm Room#: C022 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Disposal, Sharps, Wall Mount	Stericycle (C-04RES-04/WB-04)	Project	Draft (New)	No	No	No	W	13.75	N/A	N/A	
SHP-WMT		O/C	Bio Systems C-04RES-04 w/Locking Bracket Max weight reflects container full.	Stericycle (C-04RES-04/WB-04)	Yes	1-Fixed	No	No	No	13	7.75	N/A	N/A	No
					No	Unassigned	No	No	No	6	21.25	N/A	No	No
		1	Telephone, Wall	TBD ( )	Project	Draft (New)	No	No	No	W	N/A	N/A	N/A	
TEL-WMT		O/C	TBD	TBD ( )	Yes	6-IT/Computers	No	No	No	N/A	N/A	N/A	N/A	Yes
					No	Unassigned	No	No	No	N/A	N/A	N/A	No	No
		4	Waste Disposal, Pharmaceutical, Container	Bemis Manufacturing Company (4008050)	Project	Draft (New)	No	No	No	F	16.50	N/A	N/A	
WSL-PH8		O/O	Sentinel 4008 050 (8 Gallon) Disposals: Black; Green; Purple; Blue	Bemis Manufacturing Company (4008050)	No	2-Movable, Elect	No	No	No	4	11.81	N/A	N/A	No
					No	Unassigned	No	No	No	4	15.88	N/A	No	No
		1	Waste Can, Dolly	Rubbermaid Commercial Products (1980602)	Project	Draft (New)	No	No	No	M	14.70	N/A	N/A	
WST-DLR		O/O	Slim Jim Resin Trainable Dolly	Rubbermaid Commercial Products (1980602)	No	3-Movable, Non-Elect	No	No	No	5	23.90	N/A	N/A	No
					No	Unassigned	No	No	No	5	8.40	N/A	No	No
		1	Waste Can, Swing Top	Rubbermaid Commercial Products (FG354060GRAY/FG267360GRAY)	Project	Draft (New)	No	No	No	F	11.70	N/A	N/A	
WST-SWG		O/O	Slim Jim Vented 23 Gal/Gray w/Swing Lid	Rubbermaid Commercial Products (FG354060GRAY/FG267360GRAY)	No	3-Movable, Non-Elect	No	No	No	6	22.00	N/A	N/A	No
					No	Unassigned	No	No	No	6	35.00	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Storage/Equipment **Room#: C023** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
CMP-EXC		3 O/O	Compression Unit, Extremity Pump, Rapid Inflation Flowtron Continuous/Sequential DVT Pump - ACS900	Arjo Inc (526000-01) Arjo Inc (526000-01)	Project No No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	C 9 9	9.10 7.50 9.00	120 0.3 60	Type B (NEMA 5-15) N/A No	 No No
COM-VID		4 O/O	Communication Device, Video Interpreter Stratus Stand w/iPad Air 2 Power is for iPad AC (USB) adapter.	Stratus Video (Stratus Stand) Stratus Video (Stratus Stand)	Project No No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	M 30 30	21.50 21.50 45.00	120 1 60	Type B (NEMA 5-15) N/A No	 No No
CRT-CST		1 O/O	Cart, Procedure, Cast Flexline Cast FLCAST	InterMetro Industries Corp (FLCAST) InterMetro Industries Corp (FLCAST)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 180 180	32.25 22.38 70.75	N/A N/A N/A	N/A N/A No	 No No
CRT-DFA		1 O/O	Cart, Procedure, Difficult Airway Starsys Difficult Airway SXRSDIFAIR Power strip optional and must be specified separately.	InterMetro Industries Corp (SXRSDIFAIR) InterMetro Industries Corp (SXRSDIFAIR)	Project No No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	M 235 235	24.30 31.00 57.80	N/A N/A N/A	N/A N/A No	 No No
CRT-ENT		1 O/O	Cart, Procedure, ENT StarSys ENT Cart (Single)	InterMetro Industries Corp (SXRSENT1) InterMetro Industries Corp (SXRSENT1)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 267 267	23.60 28.60 81.50	N/A N/A N/A	N/A N/A No	 No No
CRT-GPN		2 O/O	Cart, Procedure, General Flexline Bedside FLBED	InterMetro Industries Corp (FLBED) InterMetro Industries Corp ( )	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 157 157	28.88 22.38 35.13	N/A N/A N/A	N/A N/A No	 No No
CRT-MD6		1 O/O	Cart, Procedure, General TrippNT 51071 6 Drawer Blue WBB815770	Global Industrial Equipment Company (WBB815770) Global Industrial Equipment Company ( )	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 114 114	31.00 20.00 48.00	N/A N/A N/A	N/A N/A No	 No No
CRT-S48		6 O/O	Cart, Supply, Chrome, 48 inch Super Adjustable Super Erecta 48x18x69 (5-Tier) Height includes casters.	InterMetro Industries Corp ((5x)A1848NC/(4x)63UP/5MP/5MPB) InterMetro Industries Corp ((5x)A1848NC/(4x)63UP/5MP/5MPB)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 83 83	48.00 18.00 67.50	N/A N/A N/A	N/A N/A No	 No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Storage/Equipment Room#: C023 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
CRT-SUT		1	Cart, Supply, Suture	InterMetro Industries Corp (FL24K w/Options)	Project	Draft (New)	No	No	No	M	32.25	N/A	N/A	
		O/O	Flexline 5-Drwr w/Touchpad & Dividers (Green)	InterMetro Industries Corp (FL24K w/Options)	No	3-Movable, Non-Elect	No	No	No	160	22.50	N/A	N/A	No
			Drawer Pulls to be Sage Green. Weight shows estimate.		No	Unassigned	No	No	No	160	38.75	N/A	No	No
DIA-RNL	EXISTING	3	Dialysis Unit, Renal Replacement	Baxter Healthcare (113081)	Existing	Draft (Existing)	No	No	No	M	25.00	120	Type B (NEMA 5-15)	
		O/O	PrismaFlex	Baxter Healthcare (113081)	No	2-Movable, Elect	No	No	No	172	24.00	5	N/A	Yes
			Dimensions reflect floor space required. Actual unit dimensions: 19"W x 12"D.		No	Unassigned	No	No	No	195	64.00	60	No	No
DOP-VSC		1	Doppler, Vascular	Arjo - Huntleigh Healthcare, Inc (D900-P-USA/EZ8)	Project	Draft (New)	No	No	No	C	2.90	N/A	N/A	
		O/O	Dopplex D900 w/EZ8 Probe	Arjo Inc (D900-P-USA/EZ8)	No	2-Movable, Elect	No	No	No	1	1.10	N/A	N/A	No
			Requires 9 volt alkaline battery-6LR61, 6LF22 or equivalent.		No	Unassigned	No	No	No	1	5.50	N/A	No	No
DSP-HSZ		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
HYP-GEN		2	Hypo-Hyperthermia Unit, General	Medivance, Inc. - Subsidiary of Bard Medical (5000-00-00e)	Project	Draft (New)	No	No	No	M	14.00	115	Type B (NEMA 5-15)	
		O/O	Arctic Sun 5000e	Medivance, Inc. - Subsidiary of Bard Medical (5000-00-00e)	Yes	2-Movable, Elect	No	No	No	103	18.50	11	N/A	Yes
			Empty weight: 95 lbs. Do not use in the presence of flammable agents.		No	Unassigned	No	No	No	119	35.00	60	No	No
IMG-BLD		1	Ultrasound, Imaging, Urology	Verathon (0270-0870 / 0800-0532)	Project	Draft (New)	No	No	No	C	21.00	120	Type B (NEMA 5-15)	
		O/O	BladderScan Prime w/Mobile Cart	Verathon (0270-0870 / 0800-0532)	No	3-Movable, Non-Elect	No	No	No	15	21.00	2.7	N/A	No
			Dimensions are with ultrasound mounted to cart. Cart height adjusts from 40H to 52H inches overall. Weight shown is for ultrasound and cart together.. Electrical is for power adapter. Battery charger: 24V DC, 2.5A input current; output 18V DC max, 4A max.		No	Unassigned	No	No	No	20	52.00	60	No	No
INS-SRG		1	Instruments, Surgical	Aesculap, Inc. ( )	Project	Draft (New)	No	No	No	N/A	N/A	N/A	N/A	
		O/O	TBD	Aesculap, Inc. ( )	No	4-Instruments	No	No	No	N/A	N/A	N/A	N/A	No
					No	Unassigned	No	No	No	N/A	N/A	N/A	No	No
LOC-VEN		2	Locator, Vein	AccuVein (AV500)	Project	Draft (New)	No	No	No	C	2.00	120	Type B (NEMA 5-15)	
		O/O	AV500 Vein Viewing System	AccuVein (AV500)	No	2-Movable, Elect	No	No	No	1	2.50	0.4	N/A	No
			Electrical reflects charging cradle.		No	Unassigned	No	No	No	1	8.00	60	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Storage/Equipment **Room#: C023** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Laryngoscope Set, Video	Verathon (0270-0991)	Project	Draft (New)	No	No	No	M	20.98	120	Type B (NEMA 5-15)	
LRY-SMB		O/O	GlideScope Core Single-Use Premium WS + BFlex Height adjustable from 40 to 52.0078 inches.	Verathon (0270-0991)	No No	2-Movable, Elect Unassigned	No No	No No	No No	19 19	20.98 52.01	3.33 60	N/A No	No No
		3	Flowmeter, Air	Precision Medical (1MFA2005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-AIR		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO)	No No	3-Movable, Non-Elect Unassigned	No No	No Yes	No No	1 1	2.50 6.50	N/A N/A	N/A No	No No
		6	Flowmeter, Oxygen	Precision Medical (1MFA1005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-OXF		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO)	No No	3-Movable, Non-Elect Unassigned	No No	No Yes	No No	1 1	2.50 6.50	N/A N/A	N/A No	No No
		6	Regulator, Suction, Intermittent/Continuous	Precision Medical (PM3303)	Project	Draft (New)	No	No	No	W	2.80	N/A	N/A	
MDG-SCI		O/O	PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303)	No No	3-Movable, Non-Elect Unassigned	No No	No No	Yes No	1 1	4.40 5.30	N/A N/A	N/A No	No No
		2	Monitor, Physiologic, Bedside, With Mobile Stand	Philips Healthcare - Monitoring Systems (M8105A/A04/B41/989803002531)	Project	Draft (New)	No	No	No	M	21.00	120	Type B (NEMA 5-15)	
MON-BSM		O/O	Intellivue MP5 (4 wave w/stand)	Philips Healthcare - Monitoring Systems (M8105A/A04/B41/989803002531)	Yes No	2-Movable, Elect Unassigned	No No	No No	No No	29 35	21.00 56.00	1.3 60	N/A No	Yes No
		10	Pump, Infusion, Single	Fresenius Kabi USA (Ivenix Large Volume Infusion Pump (LVP))	Project	Draft (New)	No	No	No			N/A	N/A	
PMP-IF1		O/O	Ivenix Large Volume Infusion Pump (LVP)	Fresenius Kabi USA (Ivenix Large Volume Infusion Pump (LVP))	No No	2-Movable, Elect Unassigned	No No	No No	No No			N/A N/A	N/A No	No No
		1	Pump, Infusion, Rapid	Belmont Medical Technologies (903-00039)	Project	Draft (New)	No	No	No	C	7.50	115	Type B (NEMA 5-15)	
PMP-IFR		O/O	Rapid Infuser RI-2 (750ml) IV pole mountable or freestanding. IV pole diameter range of pole mount: 1" - 1-1/4". Fuse: 1.25A, 250V, Fast Acting, 5x20mm	Belmont Medical Technologies (903-00039)	Yes No	2-Movable, Elect Unassigned	No No	No No	No No	28 28	13.50 12.00	12.5 60	N/A No	No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Storage/Equipment **Room#: C023** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Rack, Crutch/Cane/Walker	Ideal Medical Products Inc. (RR32)	Project	Draft (New)	No	No	No	W	66.00	N/A	N/A	
RCK-CRU		C/C	RR32 Universal Wall Storage (Pair)	Ideal Medical Products Inc. (RR32)	Yes	1-Fixed	No	No	No	12	12.00	N/A	N/A	No
			2 Racks, side by side.		No	Unassigned	No	No	No	12	4.00	N/A	No	No
		10	Stand, IV, Chrome	Steelcraft, Inc. (1099)	Project	Draft (New)	No	No	No	M	22.00	N/A	N/A	
STD-IV4		O/O	1099 (5-leg, 4 hook)	Steelcraft, Inc. (1099)	No	3-Movable, Non-Elect	No	No	No	34	22.00	N/A	N/A	No
			Height reflects pole fully extended, minimum height 70".		No	Unassigned	No	No	No	34	110.00	N/A	No	No
		2	Stool, Step, w/Handrail	Blickman Industries (1011251000)	Project	Draft (New)	No	No	No	F	15.25	N/A	N/A	
STL-SHR		O/O	1251 Chrome	Blickman Industries (1011251000)	No	3-Movable, Non-Elect	No	No	No	11	11.38	N/A	N/A	No
					No	Unassigned	No	No	No	11	35.75	N/A	No	No
		1	Stretcher, Procedure, OB/GYN	Hillrom - Bed & Stretcher Group (P8050)	Project	Draft (New)	No	No	No	M	36.00	N/A	N/A	
STR-GYN		O/O	OB-GYN P8050		No	3-Movable, Non-Elect	No	No	No	350	83.00	N/A	N/A	No
				Hillrom - Bed & Stretcher Group (P8050)	Yes	Unassigned	No	No	No	400	37.00	N/A	No	No
			Height reflects floor to top of sleep deck											
		3	Stretcher, Procedure / Recovery w/ 30"	Hillrom - Bed & Stretcher Group (P8000)	Project	Draft (New)	No	No	No	M	35.50	N/A	N/A	
STR-PRC		O/O	Mattress w/ Scale		No	3-Movable, Non-Elect	No	No	No	295	83.00	N/A	N/A	No
			Procedural Stretcher P8000	Hillrom - Bed & Stretcher Group (P8000)	Yes	Unassigned	No	No	No	350	34.25	N/A	No	No
			Height reflects floor to top of sleep deck	Width reflects Overall width (siderails up)										
		3	Thermometer, Temporal Artery	Exergen Corp (124275)	Project	Draft (New)	No	No	No	C	2.00	N/A	N/A	
THM-TMP		O/O	TAT 5000	Exergen Corp (124275)	No	3-Movable, Non-Elect	No	No	No	0	8.00	N/A	N/A	No
					No	Unassigned	No	No	No	0	1.25	N/A	No	No
		1	Ventilator, Portable	Philips Healthcare - Respironics ( )	Project	Draft (New)	No	No	No			N/A	N/A	
VNT-PTB		O/O	Trilogy EV-300	Philips Healthcare - Respironics ( )	No	2-Movable, Elect	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Ventilator, Adult / Pediatric / Neonatal	Hamilton Medical, Inc. (161006)	Project	Draft (New)	No	No	No	C	12.20	120	Type B (NEMA 5-15)	
VNT-TRP		O/O	Hamilton T1	Hamilton Medical, Inc. ( )	Yes	2-Movable, Elect	No	No	No	14	10.60	1.25	N/A	Yes
			Height and depth reflects with handle.		No	Unassigned	No	No	No	14	11.70	60	No	No
		2	Warmer, Fluid/ Blood, Portable	3M Health Care (24500)	Project	Draft (New)	No	No	No	C	7.50	110	Type B (NEMA 5-15)	
WMR-FLU		O/O	Ranger Blood/Fluid Warming System	3M Health Care (24500)	Yes	2-Movable, Elect	No	No	No	8	10.00	7.5	880	No
			Model 245		No	Unassigned	No	No	No	10	4.50	60	No	No

Room: Toilet/Patient **Room#: C024; C025; C035; C036** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 4**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
BAR-G18	TA-07A	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 18 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 18) Bobrick Washroom Equipment, Inc. (B-6806 x 18)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	18.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G18	TA-07B	1 C/C	Bar, Grab, Toilet/Shower w/ Peened Surface B-6806 x 18 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface) Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	18.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G36	TA-05	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 36 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 36) Bobrick Washroom Equipment, Inc. (B-6806 x 36)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 3	38.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G42	TA-06	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 42 Straight Grab Bar Dimensions reflect bar mounted horizontally. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 42) Bobrick Washroom Equipment, Inc. (B-6806 x 42)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 4 4	43.75 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-GTW	TA-08	1 C/C	Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface B-6861.99 Two-Wall Shower Grab Bar Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6861.99) Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 8 8	34.75 19.75 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-SWU	TA-13	1 C/C	Bar, Grab, Toilet/Shower, Swing Arm B-4998 Swing-Up Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-4998) Bobrick Washroom Equipment, Inc. (B-4998)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 10 12	6.13 29.00 8.75	N/A N/A N/A	N/A N/A No	N/A No No
DSP-PSS	TA-09	1 O/C	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216] Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 5	10.75 4.75 9.00	N/A N/A N/A	N/A N/A No	N/A No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Toilet/Patient **Room#: C024; C025; C035; C036** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 4**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.		No	Unassigned	No	No	No	1	10.56	N/A	No	No
		1	Dispenser, Toilet Paper, Surface Mount, Stainless Steel Coreless Double Roll [09606]	Kimberly-Clark Professional (09606)	Project	Draft (New)	No	No	No	W	10.13	N/A	N/A	
DSP-TLP	TA-02	O/C		Kimberly-Clark Professional (09606)	Yes	1-Fixed	No	No	No	3	6.38	N/A	N/A	No
					No	Unassigned	No	No	No	4	7.00	N/A	No	No
		1	Hook, Coat/Robe, Wall Mount	Bobrick Washroom Equipment, Inc. (B-9542)	Project	Draft (New)	No	No	No	W	1.31	N/A	N/A	
HOK-COT	TA-11	C/C	B-9542 Surface-Mounted Coat Hook		Yes	1-Fixed	No	No	No	1	2.97	N/A	N/A	No
				Bobrick Washroom Equipment, Inc. (B-9542)	No	Unassigned	No	No	No	1	1.31	N/A	No	No
			Provide blocking as required.											
		1	Mirror, Vanity	Bobrick Washroom Equipment, Inc. ( )	Project	Draft (New)	No	No	No			N/A	N/A	
MIR-V24	TA-12	C/C	B-166 - 2448	Bobrick Washroom Equipment, Inc. ( )	Yes	1-Fixed	No	No	No			N/A	N/A	No
			Provide blocking as required.		No	Unassigned	No	No	No			N/A	No	No
		1	Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige		No	3-Movable, Non-Elect	No	No	No	12	12.20	N/A	N/A	No
				Rubbermaid Commercial Products (1883460)	No	Unassigned	No	No	No	12	31.60	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Alcove/XRay Portable Room#: C026 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	X-Ray Unit, Mobile, Digital	Carestream Health (1019397)	Project	Draft (New)	No	No	No	M	22.75	120	Type B (NEMA 5-15)	
XRY-MBL		O/V	DRX-Revolution	Carestream Health (1019397)	Yes	2-Movable, Elect	No	No	No	1268	48.00	20	N/A	Yes
			Height with column extended is 77 inches.		No	Unassigned	No	No	No	1268	77.00	60	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Alcove/PPE **Room#: C026A; C043A** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 2**

Comments:

Alt ID	Item ID	Qty F/I	Description Model Spec Remarks / Item Notes	Manufacturer Vendor	Funding Source Arch Sig. Spat. Sig.	Item Status Arch Code Custom Code	Water Cold Hot Treated	Vacuum Drain Steam Gas	Dental Medical Vent	(lbs) Mounting Max Weight Ship Weight	(in) Width Depth Height	Electrical/Mechanical Volts Amp Hz	Plug Type BTU/hr Ded. Circ.	Data Cnct. Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Personal Protection, Wall	Bowman Dispensers (RE101-0012)	Project	Draft (New)	No	No	No	W	24.36	N/A	N/A	
DSP-PPE		O/C	Mount, Recessed RE101-0012 Semi-Recessed Installation should be performed only by a licensed contractor. Screw holes in sides to mount to stud framing in wall.	Bowman Dispensers (RE101-0012)	Yes No	1-Fixed Unassigned	No No	No No	No No	22 26	4.77 27.65	N/A N/A	N/A No	No No
		1	Waste Can, Step-On	Rubbermaid Commercial Products	Project	Draft (New)	No	No	No	F	22.40	N/A	N/A	
WST-24W		O/O	1883552 Slim Jim Resin Front Step 24 Gal Beige	(1883552) Rubbermaid Commercial Products (1883552)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	13 13	13.90 32.50	N/A N/A	N/A No	No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Workstation/Care Team (13) **Room#: C027** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		2	Bin, Shredding, Secure	Shred-it, Inc. ( )	Operating	Draft (New)	No	No	No	F	20.25	N/A	N/A	
BIN-SJR		O/V	Mini Console	Shred-it, Inc. ( )	No	3-Movable, Non-Elect	No	No	No	30	19.50	N/A	N/A	No
			Fits under workstation.		No	Unassigned	No	No	No	40	26.00	N/A	No	No
		1	Clock, Analog, Synchronized, Wireless	La Crosse Technology (WT-3122A)	Project	Draft (New)	No	No	No	W	12.50	N/A	N/A	
CLK-AWL		C/C	WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A)	Yes	1-Fixed	No	No	No	3	1.50	N/A	N/A	No
			Requires 1 AA battery. Depth from Manufacturer website. Weight from vendor.		No	Unassigned	No	No	No	3	12.50	N/A	No	No
		13	Computer, Desktop, All-in-One	Lenovo (M700z)	Project	Draft (New)	No	No	No			N/A	N/A	
CMD-A2M		O/O	M810Z w/ Dual Monitors	Lenovo (M700z)	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		3	Cart, Procedure, General	Armstrong Medical Industries (AMC-1B-E)	Project	Draft (New)	No	No	No	M	21.35	N/A	N/A	
CRT-5DE		O/O	5-Drw Steel Mini Bge/Bge (Electronic)	Armstrong Medical Industries (AMC-1B-E)	No	3-Movable, Non-Elect	No	No	No	103	20.61	N/A	N/A	No
					No	Unassigned	No	No	No	103	35.07	N/A	No	No
		1	Cart, Procedure, Resuscitation	Armstrong Medical Industries (AR-6 / EB-1)	Project	Draft (New)	No	No	No	M	34.15	N/A	N/A	
CRT-CDE		O/O	AR-6 Standard Steel w/ EB-1 Deluxe Acc'y Pkg	Armstrong Medical Industries (AR-6 / EB-1)	No	3-Movable, Non-Elect	No	No	No	165	25.40	N/A	N/A	No
			Dimensions reflect approximate size with the AR-6 cart. Approximate dimensions with shelf and IV pole in up position: 86"H x 25.4"D x 51.5"W		No	Unassigned	No	No	No	165	70.00	N/A	No	No
		1	Cart, Cylinder, D&E, Multi	Anthony Welded Products, Inc. (6064)	Project	Draft (New)	No	No	No	M	18.00	N/A	N/A	
CRT-EC6		O/O	6064 (6 Cap.)	Anthony Welded Products, Inc. ( )	No	3-Movable, Non-Elect	No	No	No	33	15.00	N/A	N/A	No
					No	Unassigned	No	No	No	33	42.00	N/A	No	No
		1	Defibrillator, Monitor, w/Pacing	Zoll Medical Corporation (3 0520 0000 0111 0013)	Project	Draft (New)	No	No	No	C	10.50	120	Type B (NEMA 5-15)	
DFB-PCE		O/O	R Series Plus w/Exp Pkg and Pacing	Zoll Medical Corporation (3 0520 0000 0111 0013)	Yes	2-Movable, Elect	No	No	No	15	12.50	N/A	N/A	Yes
			Sits on stainless steel table		No	Unassigned	No	No	No	20	8.25	60	No	Yes
		2	Electrocardiograph (ECG), Interpretive	GE Healthcare - Cardiology (MAC VU360)	Project	Draft (New)	No	No	No	M	20.50	120	Type B (NEMA 5-15)	
ECG-CRT		O/O	MAC VU360 Resting ECG Workstation w/ Basic Trolley	GE Healthcare - Cardiology (MAC VU360)	Yes	2-Movable, Elect	No	No	No	76	23.50	1.5	N/A	Yes
			Dimensions reflects Basic Trolley only.		No	Unassigned	No	No	No	76	57.00	60	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Workstation/Care Team (13) **Room#: C027** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		2	Hamper, Linen	Filmop USA LLC (0000C0412xx)	Project	Draft (New)	No	No	No	M	19.75	N/A	N/A	
HMP-32G		O/O	Delta 32 Gallon Linen Hamper	Filmop USA LLC (0000C0412xx)	No	3-Movable, Non-Elect	No	No	No	15	25.25	N/A	N/A	No
					No	Unassigned	No	No	No	15	39.00	N/A	No	No
		1	Ultrasound, Imaging, Multipurpose	GE Healthcare - Imaging Systems (H4918U)	Project	Draft (New)	No	No	No	M	23.00	110	Type B (NEMA 5-15)	
IMG-UMP		O/O	LOGIQ E10	GE Healthcare - Imaging Systems (H4918U)	Yes	2-Movable, Elect	No	No	No	278	39.00	11	3070	Yes
					No	Unassigned	No	No	No	278	51.00	60	Yes	No
			Requires dedicated single branch circuit.											
		1	Monitor, Central Station, 9 - 15 Patient	Philips Healthcare - Monitoring Systems ( )	Project	Draft (New)	No	No	No	C	REM	110	Type B (NEMA 5-15)	
MON-CNS		O/O	IntelliVue	Philips Healthcare - Monitoring Systems ( )	Yes	2-Movable, Elect	No	No	No	REM	REM	15	N/A	Yes
					No	Unassigned	No	No	No	REM	REM	60	Yes	Yes
			15 amp dedicated circuit required. System consists of multiple components and will vary per project. Contact Philips for customized specification package.											
		1	Monitor, Physiologic, Vital Signs, w/Stand	Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3)	Project	Draft (New)	No	No	No	M	23.00	120	Type B (NEMA 5-15)	
MON-VSS		O/O	Connex Spot 7500 Wireless (BP, Covidien SpO2, SureTemp)	Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3)	No	2-Movable, Elect	No	No	No	50	23.00	1.5	N/A	No
					No	Unassigned	No	No	No	50	49.00	60	No	No
			Can be powered via AC power or battery. Dimensions include mobile stand. Weight includes battery and mobile stand.											
		1	Pump, Suction/Aspirator, General, Portable	SSCOR, Inc. (2310V)	Project	Draft (New)	No	No	No	C	17.00	120	Type B (NEMA 5-15)	
PMP-SAG		O/O	SSCOR VX-2	SSCOR, Inc. (2310V)	No	2-Movable, Elect	No	No	No	9	5.25	N/A	N/A	No
					No	Unassigned	No	No	No	15	9.00	60	No	No
			Electrical requirements are for land-based battery charging. DC power cord (included) charges battery within vehicle. Sits on Crash Cart;Sits on Crash Cart											
		1	Pneumatic Tube System, Station	Swisslog Healthcare Solutions (56488101 + 56575103)	Project	Draft (New)	No	No	No	W	32.25	120	Type B (NEMA 5-15)	
PNU-STR		C/C	6" Recessed Station w/ IQ Panel	Swisslog Healthcare Solutions (56488101 + 56575103)	Yes	1-Fixed	No	No	No	N/A	17.50	N/A	N/A	No
					No	Unassigned	No	No	No	N/A	44.50	60	No	No
		5	Printer, Label, Barcode	Zebra Technologies Corp (GK42-102510-000)	Project	Draft (New)	No	No	No	C	7.60	120	Type B (NEMA 5-15)	
PRT-LBL		O/O	GK420t (Thermal Transfer)	Zebra Technologies Corp (GK42-102510-000)	Yes	6-IT/Computers	No	No	No	5	10.00	.58	N/A	Yes
					No	Unassigned	No	No	No	5	7.50	60	No	No
			Requires data connection to either PC port or network cable/interface.											

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Workstation/Care Team (13) **Room#: C027** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		2	Printer, Laser, Multifunction	Hewlett-Packard (B5L47A#BGJ)	Project	Draft (New)	No	No	No	C	27.50	120	Type B (NEMA 5-15)	
PRT-MFC		O/O	Color LaserJet Enterprise MFP M577f	Hewlett-Packard (B5L47A#BGJ)	Yes	6-IT/Computers	No	No	No	85	19.84	4.9333	N/A	Yes
			Dimensions reflect maximum.		Yes	Unassigned	No	No	No	98	22.95	60	No	No
		1	Printer, Laser, Multifunction	Konica Business Machines ( )	Project	Draft (New)	No	No	No			N/A	N/A	
PRT-MFL		O/O	bizhub 558e	Konica Business Machines ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Printer, Wristband	Zebra Technologies Corp (DT ZD510-HC)	Project	Draft (New)	No	No	No	C	5.00	120	Type B (NEMA 5-15)	
PRT-WRT		O/O	ZD510-HC (Healthcare, Direct Thermal)	Zebra Technologies Corp (DT ZD510-HC)	No	6-IT/Computers	No	No	No	3	9.50	.5833	N/A	Yes
					No	Unassigned	No	No	No	3	7.00	60	No	No
		1	Scale, Clinical, Adult, Wheelchair	Hillrom - Scale-Tronix (6702W/60224/845010/845233)	Project	Draft (New)	No	No	No	M	28.25	120	Type B (NEMA 5-15)	
SCL-WHC		O/O	6702W Oversized Wheelchair w/Handrail,Ht Gauge,Pwr	Hillrom - Scale-Tronix (6702W/60224/845010/845233)	No	2-Movable, Elect	No	No	No	115	31.75	N/A	N/A	No
			Dimension reflects platform.		No	Unassigned	No	No	No	135	3.25	60	No	No
		2	Scanner, Document, Countertop	Fujitsu (PA03750-B005)	Project	Draft (New)	No	No	No	C	11.50	120	Type B (NEMA 5-15)	
SCN-CTP		O/O	fi-7030	Fujitsu (PA03750-B005)	No	2-Movable, Elect	No	No	No	7	5.75	0.1	N/A	No
					No	Unassigned	No	No	No	7	5.25	60	No	No
		2	Telephone, Desktop, Analog	TBD (TBD)	Project	Draft (New)	No	No	No	N/A	N/A	N/A	N/A	
TEL-DKE		O/C	(EMERGENCY-YELLOW)	TBD (TBD)	Yes	6-IT/Computers	No	No	No	N/A	N/A	N/A	N/A	No
			TBD		No	Unassigned	No	No	No	N/A	N/A	N/A	No	No
		13	Telephone, Desktop	TBD ( )	Project	Draft (New)	No	No	No			N/A	N/A	
TEL-DSK		O/C	TBD	TBD ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Thermometer, Digital	Hillrom - Welch Allyn, Inc. (01692-700/08273-000)	Project	Draft (New)	No	No	No	M	12.00	N/A	N/A	
THM-STD		O/O	SureTemp Plus 692 w/ M690 Mobile Stand	Hillrom - Welch Allyn, Inc. (01692-700/08273-000)	No	3-Movable, Non-Elect	No	No	No	24	12.00	N/A	N/A	No
			Thermometer requires 3 AA batteries.		No	Unassigned	No	No	No	24	31.46	N/A	No	No
		1	Wheelchair, Adult, Transport	STAXI Corporation Ltd. (RA010-C)	Project	Draft (New)	No	No	No	M	34.00	N/A	N/A	
WHC-ADB		O/O	Ranger Chair w/ Cushion [RA010-C]	STAXI Corporation Ltd. (RA010-C)	No	3-Movable, Non-Elect	No	No	No	79	39.00	N/A	N/A	No
			No weblink available from Supplier. Contact Supplier for more information.		No	Unassigned	No	No	No	99	41.00	N/A	No	No

Room: Workstation/Care Team (13) **Room#: C027** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Wheelchair, Adult, Transport	Stryker Medical (1460-000-000)	Project	Draft (New)	No	No	No	M	28.30	N/A	N/A	
WHL-ATR		O/O	Prime TC (Swing Away Flip-up Footrests)	Stryker Medical (1460-000-000)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	45 45	40.20 45.00	N/A N/A	N/A No	No No
		1	Warmer, Patient, Hypothermia	3M Infection Prevention Division (87500)	Project	Draft (New)	No	No	No	S	7.70	120	Type B (NEMA 5-15)	
WMR-HYP		O/O	Bair Paws System Model 875	3M Infection Prevention Division (87500)	No No	2-Movable, Elect Unassigned	No No	No No	No No	7 7	4.00 13.00	4.6 60	1000 No	No No
			Can be wall, pole or rail mounted. Detachable hose dimension: 78"L x 1.5"W. Temperature controller dimensions: 5.8"L x 2.5"W.											
		1	Waste Can, Recycle	Continental Commercial Products (8322-1)	Project	Draft (New)	No	No	No	F	20.00	N/A	N/A	
WST-23R		O/O	8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	7 7	11.00 30.00	N/A N/A	N/A No	No No
		1	Waste Can, Step-On	Rubbermaid Commercial Products (1883552)	Project	Draft (New)	No	No	No	F	22.40	N/A	N/A	
WST-24W		O/O	1883552 Slim Jim Resin Front Step 24 Gal Beige	Rubbermaid Commercial Products (1883552)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	13 13	13.90 32.50	N/A N/A	N/A No	No No
		6	Waste Can, Open Top	Continental Commercial Products (2818BK)	Project	Draft (New)	No	No	No	F	14.50	N/A	N/A	
WST-28Q		O/O	2818BK (28 qt.)	Continental Commercial Products (2818BK)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	2 2	10.50 15.00	N/A N/A	N/A No	No No
			Case ship weight is 27 lbs.											

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Alcove/Patient Tracking-Corridors Room#: C027; C050 Room Sign: Area/Phase: ED/1st Flr Room Qty: 2

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Television, Wall, Flat Panel	Peerless-AV (ST640)	Project	Draft (New)	No	No	No	W	22.14	N/A	N/A	
BKT-TVT		C/C	SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640)	Yes	1-Fixed	No	No	No	6	2.62	N/A	N/A	No
			Depth when tilted: 5.4 inches Load capacity: 150 lbs.		No	Unassigned	No	No	No	8	16.89	N/A	No	No
		1	Television, 36-43 in., Flat Panel	LG Commercial Products (43UT672M0UC)	Project	Draft (New)	No	No	No	S	38.31	120	Type B (NEMA 5-15)	
TV4-3CM		O/O	43 in. UT672M Series 4K UHD Pro:Centric Smart	LG Commercial Products (43UT672M0UC)	Yes	2-Movable, Elect	No	No	No	18	3.35	.9166	N/A	Yes
			Dimensions reflect without stand (Depth: Front to VESA). Depth with stand: 3.3 inch		No	Unassigned	No	No	No	22	22.52	60	No	No

Room: Treatment Rm/PersonOfSize (Bariatric) **Room#: C033** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	Project	Draft (New)	No	No	No	W	18.20	N/A	N/A	
BKT-CWS		C/C	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Yes	1-Fixed	No	No	No	42	42.00	N/A	N/A	No
			Dimensions reflect unit extended at max. Dimensions when folded: 25.75 in. W x 6 in. D x 34 in. H.		No	Unassigned	No	No	No	47	34.00	N/A	No	No
		1	Bracket, Monitor, Wall	GCX Corporation (WC-0002-05/AG-0018-21)	Project	Draft (New)	No	No	No	W	4.00	N/A	N/A	
BKT-VTS		C/C	19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21)	Yes	1-Fixed	No	No	No	6	16.10	N/A	N/A	No
			Weight and size varies depending on selected mfg/mdl monitoring equipment.		No	Unassigned	No	No	No	10	19.00	N/A	No	No
		1	Clock, Analog, Synchronized, Wireless	La Crosse Technology (WT-3122A)	Project	Draft (New)	No	No	No	W	12.50	N/A	N/A	
CLK-AWL		C/C	WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A)	Yes	1-Fixed	No	No	No	3	1.50	N/A	N/A	No
			Requires 1 AA battery. Depth from Manufacturer website. Weight from vendor.		No	Unassigned	No	No	No	3	12.50	N/A	No	No
		1	Computer, Desktop, All-in-One	Dell Inc. ( )	Project	Draft (New)	No	No	No	C	21.26	120	Type B (NEMA 5-15)	
CMP-AL1		O/O	OptiPlex 7400 All-In-One	Dell Inc. ( )	Yes	6-IT/Computers	No	No	No	15	2.07	3.60	N/A	Yes
					No	Unassigned	No	No	No	15	13.54	60	No	No
		1	Cart, Procedure, General	InterMetro Industries Corp (FLBED)	Project	Draft (New)	No	No	No	M	28.88	N/A	N/A	
CRT-GPN		O/O	Flexline Bedside FLBED	InterMetro Industries Corp ( )	No	3-Movable, Non-Elect	No	No	No	157	22.38	N/A	N/A	No
					No	Unassigned	No	No	No	157	35.13	N/A	No	No
		1	Curtain, Cubicle, Disposable	Medline Industries Inc. (Curtain/Disposable)	Project	Draft (New)	No	No	No			N/A	N/A	
CUR-CUB		O/C	Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable)	No	5-Furniture	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Dispenser, Disinfectant Wipes, Wall Mount	Medline Industries Inc. (MSC351128)	Project	Draft (New)	No	No	No	W	5.60	N/A	N/A	
DSP-DWP		O/C	MSC351128	Medline Industries Inc. (MSC351128)	Yes	1-Fixed	No	No	No	1	8.60	N/A	N/A	No
			Dimensions provided by the Supplier. Contact the Supplier for more information. Ships 12/case.		No	Unassigned	No	No	No	1	5.50	N/A	No	No
		1	Dispenser, Emesis Bag, Wall Mount	Medline Industries Inc. (NONEMBGDISP)	Project	Draft (New)	No	No	No	W	6.00	N/A	N/A	
DSP-EMS		O/C	NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP)	Yes	1-Fixed	No	No	No	9	6.00	N/A	N/A	No
			Ships 6/case.		No	Unassigned	No	No	No	9	6.50	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm/PersonOfSize (Bariatric) **Room#: C033** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Plug Type: Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	Project	Draft (New)	No	No	No	W	11.25	N/A	N/A	
DSP-GV3		O/C	305362 Clear PETG	Omnimed, Inc (305362)	Yes	1-Fixed	No	No	No	1	3.75	N/A	N/A	No
					No	Unassigned	No	No	No	1	15.50	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Dispenser, Paper Towel, Surface	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C	Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.		No	Unassigned	No	No	No	5	9.00	N/A	No	No
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.		No	Unassigned	No	No	No	1	10.56	N/A	No	No
		1	Diagnostic System, Integrated	Hillrom - Welch Allyn, Inc. (77791-2MPX)	Project	Draft (New)	No	No	No	W	30.00	120	Type B (NEMA 5-15)	
DSY-OTO		O/C	Green Series 777 [77791-2MPX]		Yes	1-Fixed	No	No	No	25	9.50	0.2	N/A	No
				Hillrom - Welch Allyn, Inc. (77791-2MPX)	No	Unassigned	No	No	No	24	11.75	60	No	No
			Dimension reflects wall board											
		1	Lift, Patient, Ceiling, 1-Bed	Arjo Inc (LF21409 w/ 700-5441 w/ 700-05401-BOX w/ 700.00525)	Existing	Draft (Existing)	No	No	No			N/A	N/A	
LFT-O1B	EXISTING	O/V	MS 1000 4F ECS w/ Scale		Yes	1-Fixed	No	No	No			N/A	N/A	No
				Arjo Inc (LF21409 w/ 700-5441 w/ 700-05401-BOX w/ 700.00525)	No	Unassigned	No	No	No			N/A	No	No
		1	Flowmeter, Air	Precision Medical (1MFA2005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-AIR		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO)	No	3-Movable, Non-Elect	No	No	No	1	2.50	N/A	N/A	No
					No	Unassigned	No	Yes	No	1	6.50	N/A	No	No
		2	Flowmeter, Oxygen	Precision Medical (1MFA1005PTO)	Project	Draft (New)	No	No	No	W	1.25	N/A	N/A	
MDG-OXF		O/O	Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO)	No	3-Movable, Non-Elect	No	No	No	1	2.50	N/A	N/A	No
					No	Unassigned	No	Yes	No	1	6.50	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm/PersonOfSize (Bariatric) **Room#: C033** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
MDG-SCI		2 O/O	Regulator, Suction, Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303) Precision Medical (PM3303)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No Yes No	W 1 1	2.80 4.40 5.30	N/A N/A N/A	N/A N/A No	 No No
MON-PHS		1 O/O	Monitor, Physiologic, Bedside IntelliVue MP30 Electrical requirements are for battery charging.	Philips Healthcare - Monitoring Systems (M8002A) Philips Healthcare - Monitoring Systems (M8002A)	Project Yes No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	C 13 19	13.75 8.75 11.00	115 1.3 60	Type B (NEMA 5-15) 495 No	 Yes Yes
SCN-BCD		1 O/O	Scanner, Barcode DS8100 Series Corded and Cordless Handheld Imagers Power via host cable. Input Voltage Range. DS8178 Cradles 5V 4.7 to 5.5VDC, 12V 10.8 to 13.2VDC.	Zebra Technologies Corp (DS8178-SR7U2100SFW) Zebra Technologies Corp (DS8178-SR7U2100SFW)	Project No No	Draft (New) 6-IT/Computers Unassigned	No No No	No No No	No No No	C 1 1	2.60 4.20 6.60	N/A N/A N/A	N/A N/A No	 No No
SHP-WMT		1 O/C	Disposal, Sharps, Wall Mount Bio Systems C-04RES-04 w/Locking Bracket Max weight reflects container full.	Stericycle (C-04RES-04/WB-04) Stericycle (C-04RES-04/WB-04)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 13 6	13.75 7.75 21.25	N/A N/A N/A	N/A N/A No	 No No
STL-CSN		1 O/O	Stool, Exam, Cusion-Seat w/ Glides Ritter 274 Classic Series	Midmark Corporation - Medical (274-001) Midmark Corporation - Medical (274-001)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 15 20	21.50 21.50 24.50	N/A N/A N/A	N/A N/A No	 No No
STR-BRI		1 O/O	Stretcher, Bariatric w/ Scale 7500 Wide Trauma / Transport Special Package Height includes side rails.	Pedigo Products, Inc (7500-W-SPEC) Pedigo Products, Inc (7500-W-SPEC)	Project No Yes	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 485 485	33.50 83.00 46.75	N/A N/A N/A	N/A N/A No	 No No
TKC-IVP		1 C/C	Track, Ceiling, IV, Straight 4000B Telescoping Bottle Holder (Straight) Height reflects when fully extended. 29 in. when closed.	A.R. Nelson Co. (4000B) Medline Industries Inc. (IV4000108A)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	CE 5 5	11.00 11.00 45.00	N/A N/A N/A	N/A N/A No	 No No
TRY-OBS		1 O/O	Tray, Patient, Overbed, Stretcher Accessory P490B - Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( ) Hillrom - Bed & Stretcher Group ( )	Project No No	Draft (New) 0-Unassigned Unassigned	No No No	No No No	No No No			N/A N/A N/A	N/A N/A No	 No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Treatment Rm/PersonOfSize (Bariatric) **Room#: C033** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Waste Can, Step-On	Rubbermaid Commercial Products	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige	(1883460) Rubbermaid Commercial Products (1883460)	No / No	3-Movable, Non-Elect / Unassigned	No / No	No / No	No / No	12 / 12	12.20 / 31.60	N/A	N/A / No	No / No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: EVS Room#: C041 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bucket, Mopping	Filmop USA LLC (0100SL2601C)	Project	Draft (New)	No	No	No	M	15.00	N/A	N/A	
BUK-MWR		O/O	Maxi Jolly Split Bucket System	Filmop USA LLC (0100SL2601C)	No	3-Movable, Non-Elect	No	No	No	16	19.00	N/A	N/A	No
					No	Unassigned	No	No	No	16	22.00	N/A	No	No
		1	Cart, Housekeeping, Polymer	Filmop USA LLC (AA1807706U002)	Project	Draft (New)	No	No	No	M	22.00	N/A	N/A	
CRT-HKP		O/O	Alpha ES EquoDose 50 Complete Workstation Weight shows estimate only.	Filmop USA LLC (AA1807706U002)	No	3-Movable, Non-Elect	No	No	No	85	50.00	N/A	N/A	No
					No	Unassigned	No	No	No	85	44.00	N/A	No	No
		1	Dispenser, Cleaning Solution	Diversey Care (D3764735)	Project	Draft (New)	Yes	No	No	W	18.50	N/A	N/A	
DSP-CLN		O/C	J-Fill QuattroSelect (Air Gap)	Diversey Care (D3764735)	Yes	1-Fixed	No	No	No	15	7.50	N/A	N/A	No
					No	Unassigned	No	No	No	19	24.25	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01) Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
					No	Unassigned	No	No	No	2	9.06	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Workstation/Care Team (11) **Room#: C049** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		2	Bin, Shredding, Secure	Shred-it, Inc. ( )	Operating	Draft (New)	No	No	No	F	20.25	N/A	N/A	
BIN-SJR		O/V	Mini Console	Shred-it, Inc. ( )	No	3-Movable, Non-Elect	No	No	No	30	19.50	N/A	N/A	No
			Fits under workstation.		No	Unassigned	No	No	No	40	26.00	N/A	No	No
		1	Clock, Analog, Synchronized, Wireless	La Crosse Technology (WT-3122A)	Project	Draft (New)	No	No	No	W	12.50	N/A	N/A	
CLK-AWL		C/C	WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A)	Yes	1-Fixed	No	No	No	3	1.50	N/A	N/A	No
			Requires 1 AA battery. Depth from Manufacturer website. Weight from vendor.		No	Unassigned	No	No	No	3	12.50	N/A	No	No
		11	Computer, Desktop, All-in-One	Lenovo (M700z)	Project	Draft (New)	No	No	No			N/A	N/A	
CMD-A2M		O/O	M810Z w/ Dual Monitors	Lenovo (M700z)	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		3	Cart, Procedure, General	Armstrong Medical Industries (AMC-1B-E)	Project	Draft (New)	No	No	No	M	21.35	N/A	N/A	
CRT-5DE		O/O	5-Drw Steel Mini Bge/Bge (Electronic)	Armstrong Medical Industries (AMC-1B-E)	No	3-Movable, Non-Elect	No	No	No	103	20.61	N/A	N/A	No
					No	Unassigned	No	No	No	103	35.07	N/A	No	No
		1	Cart, Procedure, Resuscitation	Armstrong Medical Industries (AR-6 / EB-1)	Project	Draft (New)	No	No	No	M	34.15	N/A	N/A	
CRT-CDE		O/O	AR-6 Standard Steel w/ EB-1 Deluxe Acc'y Pkg	Armstrong Medical Industries (AR-6 / EB-1)	No	3-Movable, Non-Elect	No	No	No	165	25.40	N/A	N/A	No
			Dimensions reflect approximate size with the AR-6 cart. Approximate dimensions with shelf and IV pole in up position: 86"H x 25.4"D x 51.5"W		No	Unassigned	No	No	No	165	70.00	N/A	No	No
		1	Cart, Cylinder, D&E, Multi	Anthony Welded Products, Inc. (6064)	Project	Draft (New)	No	No	No	M	18.00	N/A	N/A	
CRT-EC6		O/O	6064 (6 Cap.)	Anthony Welded Products, Inc. ( )	No	3-Movable, Non-Elect	No	No	No	33	15.00	N/A	N/A	No
					No	Unassigned	No	No	No	33	42.00	N/A	No	No
		1	Defibrillator, Monitor, w/Pacing	Zoll Medical Corporation (3 0520 0000 0111 0013)	Project	Draft (New)	No	No	No	C	10.50	120	Type B (NEMA 5-15)	
DFB-PCE		O/O	R Series Plus w/Exp Pkg and Pacing	Zoll Medical Corporation (3 0520 0000 0111 0013)	Yes	2-Movable, Elect	No	No	No	15	12.50	N/A	N/A	Yes
			Sits on stainless steel table		No	Unassigned	No	No	No	20	8.25	60	No	Yes
		2	Electrocardiograph (ECG), Interpretive	GE Healthcare - Cardiology (MAC VU360)	Project	Draft (New)	No	No	No	M	20.50	120	Type B (NEMA 5-15)	
ECG-CRT		O/O	MAC VU360 Resting ECG Workstation w/ Basic Trolley	GE Healthcare - Cardiology (MAC VU360)	Yes	2-Movable, Elect	No	No	No	76	23.50	1.5	N/A	Yes
			Dimensions reflects Basic Trolley only.		No	Unassigned	No	No	No	76	57.00	60	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Workstation/Care Team (11) **Room#: C049** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		2	Hamper, Linen	Filmop USA LLC (0000C0412xx)	Project	Draft (New)	No	No	No	M	19.75	N/A	N/A	
HMP-32G		O/O	Delta 32 Gallon Linen Hamper	Filmop USA LLC (0000C0412xx)	No	3-Movable, Non-Elect	No	No	No	15	25.25	N/A	N/A	No
					No	Unassigned	No	No	No	15	39.00	N/A	No	No
		1	Ultrasound, Imaging, Multipurpose	GE Healthcare - Imaging Systems (H4918U)	Project	Draft (New)	No	No	No	M	23.00	110	Type B (NEMA 5-15)	
IMG-UMP		O/O	LOGIQ E10	GE Healthcare - Imaging Systems (H4918U)	Yes	2-Movable, Elect	No	No	No	278	39.00	11	3070	Yes
					No	Unassigned	No	No	No	278	51.00	60	Yes	No
			Requires dedicated single branch circuit.											
		1	Monitor, Central Station, 9 - 15 Patient	Philips Healthcare - Monitoring Systems ( )	Project	Draft (New)	No	No	No	C	REM	110	Type B (NEMA 5-15)	
MON-CNS		O/O	IntelliVue	Philips Healthcare - Monitoring Systems ( )	Yes	2-Movable, Elect	No	No	No	REM	REM	15	N/A	Yes
					No	Unassigned	No	No	No	REM	REM	60	Yes	Yes
			15 amp dedicated circuit required. System consists of multiple components and will vary per project. Contact Philips for customized specification package.											
		1	Monitor, Physiologic, Vital Signs, w/Stand	Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3)	Project	Draft (New)	No	No	No	M	23.00	120	Type B (NEMA 5-15)	
MON-VSS		O/O	Connex Spot 7500 Wireless (BP, Covidien SpO2, SureTemp)	Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3)	No	2-Movable, Elect	No	No	No	50	23.00	1.5	N/A	No
					No	Unassigned	No	No	No	50	49.00	60	No	No
			Can be powered via AC power or battery. Dimensions include mobile stand. Weight includes battery and mobile stand.											
		1	Pump, Suction/Aspirator, General, Portable	SSCOR, Inc. (2310V)	Project	Draft (New)	No	No	No	C	17.00	120	Type B (NEMA 5-15)	
PMP-SAG		O/O	SSCOR VX-2	SSCOR, Inc. (2310V)	No	2-Movable, Elect	No	No	No	9	5.25	N/A	N/A	No
					No	Unassigned	No	No	No	15	9.00	60	No	No
			Electrical requirements are for land-based battery charging. DC power cord (included) charges battery within vehicle. Sits on Crash Cart;Sits on Crash Cart											
		1	Pneumatic Tube System, Station	Swisslog Healthcare Solutions (56488101 + 56575103)	Project	Draft (New)	No	No	No	W	32.25	120	Type B (NEMA 5-15)	
PNU-STR		C/C	6" Recessed Station w/ IQ Panel	Swisslog Healthcare Solutions (56488101 + 56575103)	Yes	1-Fixed	No	No	No	N/A	17.50	N/A	N/A	No
					No	Unassigned	No	No	No	N/A	44.50	60	No	No
		5	Printer, Label, Barcode	Zebra Technologies Corp (GK42-102510-000)	Project	Draft (New)	No	No	No	C	7.60	120	Type B (NEMA 5-15)	
PRT-LBL		O/O	GK420t (Thermal Transfer)	Zebra Technologies Corp (GK42-102510-000)	Yes	6-IT/Computers	No	No	No	5	10.00	.58	N/A	Yes
					No	Unassigned	No	No	No	5	7.50	60	No	No
			Requires data connection to either PC port or network cable/interface.											

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Workstation/Care Team (11) **Room#: C049** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		2	Printer, Laser, Multifunction	Hewlett-Packard (B5L47A#BGJ)	Project	Draft (New)	No	No	No	C	27.50	120	Type B (NEMA 5-15)	
PRT-MFC		O/O	Color LaserJet Enterprise MFP M577f	Hewlett-Packard (B5L47A#BGJ)	Yes	6-IT/Computers	No	No	No	85	19.84	4.9333	N/A	Yes
			Dimensions reflect maximum.		Yes	Unassigned	No	No	No	98	22.95	60	No	No
		1	Printer, Laser, Multifunction	Konica Business Machines ( )	Project	Draft (New)	No	No	No			N/A	N/A	
PRT-MFL		O/O	bizhub 558e	Konica Business Machines ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Printer, Wristband	Zebra Technologies Corp (DT ZD510-HC)	Project	Draft (New)	No	No	No	C	5.00	120	Type B (NEMA 5-15)	
PRT-WRT		O/O	ZD510-HC (Healthcare, Direct Thermal)	Zebra Technologies Corp (DT ZD510-HC)	No	6-IT/Computers	No	No	No	3	9.50	.5833	N/A	Yes
					No	Unassigned	No	No	No	3	7.00	60	No	No
		1	Scale, Clinical, Adult, Wheelchair	Hillrom - Scale-Tronix (6702W/60224/845010/845233)	Project	Draft (New)	No	No	No	M	28.25	120	Type B (NEMA 5-15)	
SCL-WHC		O/O	6702W Oversized Wheelchair w/Handrail,Ht Gauge,Pwr	Hillrom - Scale-Tronix (6702W/60224/845010/845233)	No	2-Movable, Elect	No	No	No	115	31.75	N/A	N/A	No
			Dimension reflects platform.		No	Unassigned	No	No	No	135	3.25	60	No	No
		2	Scanner, Document, Countertop	Fujitsu (PA03750-B005)	Project	Draft (New)	No	No	No	C	11.50	120	Type B (NEMA 5-15)	
SCN-CTP		O/O	fi-7030	Fujitsu (PA03750-B005)	No	2-Movable, Elect	No	No	No	7	5.75	0.1	N/A	No
					No	Unassigned	No	No	No	7	5.25	60	No	No
		2	Telephone, Desktop, Analog	TBD (TBD)	Project	Draft (New)	No	No	No	N/A	N/A	N/A	N/A	
TEL-DKE		O/C	(EMERGENCY-YELLOW) TBD	TBD (TBD)	Yes	6-IT/Computers	No	No	No	N/A	N/A	N/A	N/A	No
					No	Unassigned	No	No	No	N/A	N/A	N/A	No	No
		11	Telephone, Desktop	TBD ( )	Project	Draft (New)	No	No	No			N/A	N/A	
TEL-DSK		O/C	TBD	TBD ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Thermometer, Digital	Hillrom - Welch Allyn, Inc. (01692-700/08273-000)	Project	Draft (New)	No	No	No	M	12.00	N/A	N/A	
THM-STD		O/O	SureTemp Plus 692 w/ M690 Mobile Stand	Hillrom - Welch Allyn, Inc. (01692-700/08273-000)	No	3-Movable, Non-Elect	No	No	No	24	12.00	N/A	N/A	No
			Thermometer requires 3 AA batteries.		No	Unassigned	No	No	No	24	31.46	N/A	No	No
		1	Wheelchair, Adult, Transport	STAXI Corporation Ltd. (RA010-C)	Project	Draft (New)	No	No	No	M	34.00	N/A	N/A	
WHC-ADB		O/O	Ranger Chair w/ Cushion [RA010-C]	STAXI Corporation Ltd. (RA010-C)	No	3-Movable, Non-Elect	No	No	No	79	39.00	N/A	N/A	No
			No weblink available from Supplier. Contact Supplier for more information.		No	Unassigned	No	No	No	99	41.00	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Workstation/Care Team (11) **Room#: C049** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Wheelchair, Adult, Transport	Stryker Medical (1460-000-000)	Project	Draft (New)	No	No	No	M	28.30	N/A	N/A	
WHL-ATR		O/O	Prime TC (Swing Away Flip-up Footrests)	Stryker Medical (1460-000-000)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	45 45	40.20 45.00	N/A N/A	N/A No	No No
		1	Warmer, Patient, Hypothermia	3M Infection Prevention Division (87500)	Project	Draft (New)	No	No	No	S	7.70	120	Type B (NEMA 5-15)	
WMR-HYP		O/O	Bair Paws System Model 875	3M Infection Prevention Division (87500)	No No	2-Movable, Elect Unassigned	No No	No No	No No	7 7	4.00 13.00	4.6 60	1000 No	No No
			Can be wall, pole or rail mounted. Detachable hose dimension: 78"L x 1.5"W. Temperature controller dimensions: 5.8"L x 2.5"W.											
		1	Waste Can, Recycle	Continental Commercial Products (8322-1)	Project	Draft (New)	No	No	No	F	20.00	N/A	N/A	
WST-23R		O/O	8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	7 7	11.00 30.00	N/A N/A	N/A No	No No
		1	Waste Can, Step-On	Rubbermaid Commercial Products (1883552)	Project	Draft (New)	No	No	No	F	22.40	N/A	N/A	
WST-24W		O/O	1883552 Slim Jim Resin Front Step 24 Gal Beige	Rubbermaid Commercial Products (1883552)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	13 13	13.90 32.50	N/A N/A	N/A No	No No
		6	Waste Can, Open Top	Continental Commercial Products (2818BK)	Project	Draft (New)	No	No	No	F	14.50	N/A	N/A	
WST-28Q		O/O	2818BK (28 qt.)	Continental Commercial Products (2818BK)	No No	3-Movable, Non-Elect Unassigned	No No	No No	No No	2 2	10.50 15.00	N/A N/A	N/A No	No No
			Case ship weight is 27 lbs.											

Room: Alcove/Sink-Handwash Room#: C049A; C049B Room Sign: Area/Phase: ED/1st Flr Room Qty: 2

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Dispenser, Paper Towel, Surface	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C	Mount, Stainless Steel	Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
			SCOTTFOLD Compact [09216]		No	Unassigned	No	No	No	5	9.00	N/A	No	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.											
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
					No	Unassigned	No	No	No	1	10.56	N/A	No	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.											
		1	Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige		No	3-Movable, Non-Elect	No	No	No	12	12.20	N/A	N/A	No
				Rubbermaid Commercial Products (1883460)	No	Unassigned	No	No	No	12	31.60	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Break Rm/Radiology Room#: C305 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Television, Wall, Flat Panel	Peerless-AV (ST640)	Project	Draft (New)	No	No	No	W	22.14	N/A	N/A	
BKT-TVT		C/C	SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640)	Yes	1-Fixed	No	No	No	6	2.62	N/A	N/A	No
			Depth when tilted: 5.4 inches Load capacity: 150 lbs.		No	Unassigned	No	No	No	8	16.89	N/A	No	No
		1	Coffee Maker, Single Cup, Plumbed	Keurig Green Mountain (K150P)	Project	Draft (New)	Yes	No	No	C	10.40	120	Type B (NEMA 5-15)	
COF-SGC		O/C	K150P Commercial Brewing System - Plumbed	Keurig Green Mountain (K150P)	Yes	1-Fixed	No	No	No	18	14.00	11.7	N/A	No
			Weight reflects empty brewing system. Manufacturer recommends 15 amp dedicated, grounded circuit. Requires the use of an external water filter such as Omnipure KQ8. Sold seperately. Does not require drain. Drain hose in back of unit - water drains into pitcher.		No	Unassigned	No	No	No	22	13.90	60	Yes	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Dispenser, Paper Towel, Surface Mount, Stainless Steel	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C	SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.		No	Unassigned	No	No	No	5	9.00	N/A	No	No
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.		No	Unassigned	No	No	No	1	10.56	N/A	No	No
		1	Ice Machine, Dispenser, Nugget, Countertop	Follett LLC (12CI425A-S)	Project	Draft (New)	Yes	Yes	No	C	16.12	115	Type B (NEMA 5-15)	
ICE-C12		C/C	Symphony Plus 12CI425A-S	Follett LLC (12CI425A-S)	Yes	1-Fixed	No	No	No	156	23.50	11	5000	No
			15 amp dedicated circuit. Max Weight reflects bin at max capacity.		Yes	Unassigned	No	No	No	199	32.50	60	Yes	No
		1	Water Treatment System, Ice Maker, Wall Mount	Follett LLC (00130229)	Project	Draft (New)	Yes	No	No	W	14.25	N/A	N/A	
ICE-FLT		C/C	Standard Capacity Filter System 00130229	Follett LLC (00130229)	Yes	1-Fixed	No	No	No	15	6.00	N/A	N/A	No
					No	Unassigned	No	No	No	15	18.50	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Break Rm/Radiology Room#: C305 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
OVM-CTS		2 C/C	Oven, Domestic, Microwave, Countertop SCM853 Separate circuit recommended. 20 amp circuit required.	Summit Appliance (SCM853) Summit Appliance (SCM853)	Project Yes Yes	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	C 30 34	18.88 14.25 11.00	115 12 60	Type B (NEMA 5-15) N/A Yes	 No No
RFZ-10S		1 C/C	Refrigerator, Domestic with Freezer FF1159SS (10.3 cu.ft./Stainless Steel) Height includes hinge cap. Depth with door open 48.5" Separate circuit recommended. 15 amp circuit breaker required. This appliance is designed to be free-standing only, and should not be recessed or built in.	Summit Appliance (FF1159SS) Summit Appliance (FF1159SS)	Project Yes No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	F 130 135	23.63 26.00 58.88	115 1.6 60	Type B (NEMA 5-15) N/A Yes	 No No
TV4-3CM		1 O/V	Television, 36-43 in., Flat Panel 43 in. UT672M Series 4K UHD Pro:Centric Smart Dimensions reflect without stand (Depth: Front to VESA). Depth with stand: 3.3 inch	LG Commercial Products (43UT672M0UC) LG Commercial Products (43UT672M0UC)	Project Yes No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	S 18 22	38.31 3.35 22.52	120 .9166 60	Type B (NEMA 5-15) N/A No	 Yes No
WST-PLO		1 O/O	Waste Can, Roll Out/Pull Out w/ Trash And Recycle Can Waste Bin/Pull Out-KessebohmerTrack And Can-(1) Grey/Trash-(1) Blue/Recycle	Hafele America Co. ( ) Hafele America Co. ( )	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No			N/A N/A N/A	N/A N/A No	 No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Storage/Wheelchair Room#: C305 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		2	Wheelchair, Adult, Transport	STAXI Corporation Ltd. (RA010-C)	Project	Draft (New)	No	No	No	M	34.00	N/A	N/A	
WHC-ADB		O/O	Ranger Chair w/ Cushion [RA010-C]	STAXI Corporation Ltd. (RA010-C)	No	3-Movable, Non-Elect	No	No	No	79	39.00	N/A	N/A	No
			No weblink available from Supplier. Contact Supplier for more information.		No	Unassigned	No	No	No	99	41.00	N/A	No	No
		2	Wheelchair, Adult, Transport	Stryker Medical (1460-000-000)	Project	Draft (New)	No	No	No	M	28.30	N/A	N/A	
WHL-ATR		O/O	Prime TC (Swing Away Flip-up Footrests)	Stryker Medical (1460-000-000)	No	3-Movable, Non-Elect	No	No	No	45	40.20	N/A	N/A	No
					No	Unassigned	No	No	No	45	45.00	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Toilet/Public **Room#: C328** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
BAR-G18	TA-07A	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 18 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 18) Bobrick Washroom Equipment, Inc. (B-6806 x 18)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	18.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G18	TA-07B	1 C/C	Bar, Grab, Toilet/Shower w/ Peened Surface B-6806 x 18 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface) Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	18.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G36	TA-05	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 36 Straight Grab Bar Dimensions reflect bar mounted horizontally. Clearance between the grab bar and wall 1-1/2 inches. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 36) Bobrick Washroom Equipment, Inc. (B-6806 x 36)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 3	38.00 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-G42	TA-06	1 C/C	Bar, Grab, Toilet/Shower B-6806 x 42 Straight Grab Bar Dimensions reflect bar mounted horizontally. Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6806 x 42) Bobrick Washroom Equipment, Inc. (B-6806 x 42)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 4 4	43.75 3.00 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-GTW	TA-08	1 C/C	Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface B-6861.99 Two-Wall Shower Grab Bar Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-6861.99) Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 8 8	34.75 19.75 3.25	N/A N/A N/A	N/A N/A No	N/A No No
BAR-SWU	TA-13	1 C/C	Bar, Grab, Toilet/Shower, Swing Arm B-4998 Swing-Up Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-4998) Bobrick Washroom Equipment, Inc. (B-4998)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 10 12	6.13 29.00 8.75	N/A N/A N/A	N/A N/A No	N/A No No
DSP-PSS	TA-09	1 O/C	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216] Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 5	10.75 4.75 9.00	N/A N/A N/A	N/A N/A No	N/A No No

Room: Toilet/Public **Room#: C328** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Plug Type: Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
DSP-SPG	TA-10	1 O/C	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite) Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.	GOJO Industries (5134-01) GOJO Industries (5134-01)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	5.81 4.48 10.56	N/A N/A N/A	N/A N/A No	N/A No No
DSP-STN	TA-03	1 C/C	Dispenser, Sanitary Napkin, Stainless Steel B-35139 TrimLine Series Surface-Mounted	Bobrick Washroom Equipment, Inc. (B-35139) Bobrick Washroom Equipment, Inc. (B-35139)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 30 30	8.06 4.50 14.13	N/A N/A N/A	N/A N/A No	N/A No No
DSP-TLP	TA-02	1 O/C	Dispenser, Toilet Paper, Surface Mount, Stainless Steel Coreless Double Roll [09606]	Kimberly-Clark Professional (09606) Kimberly-Clark Professional (09606)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 3 4	10.13 6.38 7.00	N/A N/A N/A	N/A N/A No	N/A No No
DSP-TSC	TA-04	1 O/C	Dispenser, Toilet Seat Cover Scott Personal Seat Cover Dispenser Suggested Mounting Height from floor: 49 inch to 54 inch.	Kimberly-Clark Professional (09512) Kimberly-Clark Professional (09512)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 6 6	16.75 2.50 12.25	N/A N/A N/A	N/A N/A No	N/A No No
HOK-COT	TA-11	1 C/C	Hook, Coat/Robe, Wall Mount B-9542 Surface-Mounted Coat Hook Provide blocking as required.	Bobrick Washroom Equipment, Inc. (B-9542) Bobrick Washroom Equipment, Inc. (B-9542)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 1 1	1.31 2.97 1.31	N/A N/A N/A	N/A N/A No	N/A No No
MIR-V24	TA-12	1 C/C	Mirror, Vanity B-166 - 2448 Provide blocking as required.	Bobrick Washroom Equipment, Inc. ( ) Bobrick Washroom Equipment, Inc. ( )	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No			N/A N/A N/A	N/A N/A No	N/A No No
TBL-CGR	TA-14	1 C/C	Table, Changing, Infant, Wall Mount Horizontal Recessed Stainless Steel KB310-SSRE Wall opening: 37-1/16W x 21-5/8H inches Depth reflects extended (open) from wall. Depth recessed into wall: 3-31/32 inches. Depth closed: 2-23/32 inches (from finish face of wall)	Koala Kare Products (KB310-SSRE) Koala Kare Products (KB310-SSRE)	Project Yes No	Draft (New) 1-Fixed Unassigned	No No No	No No No	No No No	W 80 80	41.31 17.41 26.22	N/A N/A N/A	N/A N/A No	N/A No No
WST-18W		1 O/O	Waste Can, Step-On 1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460) Rubbermaid Commercial Products (1883460)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	F 12 12	19.70 12.20 31.60	N/A N/A N/A	N/A N/A No	N/A No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Toilet/Public **Room#: C328** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.

Department: ED/1st Flr

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Alcove/WOW-Registration Room#: C329 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
CRT-WOW		1 O/O	Cart, Computer, Workstation UltraLite 520 (LCD Mount, L500) Height adjusts 30" to 46". Weight includes 11 lbs. for 2 batteries. Dual cell battery, 500 watt-hr capacity.	JACO Inc. (520-L500 w/ 51-3648 Scanner Holder) JACO Inc. (520-L500 w/ 51-3648 Scanner Holder)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	M 76 95	20.00 16.00 46.00	120 1.1 60	Type B (NEMA 5-15) N/A No	No No No
PCD-AL1		1 O/O	Computer, Desktop, All-in-One M810Z	Lenovo (M700z) Lenovo (M700z)	Project Yes No	Draft (New) 6-IT/Computers Unassigned	No No No	No No No	No No No			N/A N/A N/A	N/A N/A No	No No No
PRT-MFC		1 O/O	Printer, Laser, Multifunction Color LaserJet Enterprise MFP M577f Dimensions reflect maximum.	Hewlett-Packard (B5L47A#BGJ) Hewlett-Packard (B5L47A#BGJ)	Project Yes Yes	Draft (New) 6-IT/Computers Unassigned	No No No	No No No	No No No	C 85 98	27.50 19.84 22.95	120 4.9333 60	Type B (NEMA 5-15) N/A No	No Yes No
PRT-WRT		1 O/O	Printer, Wristband ZD510-HC (Healthcare, Direct Thermal)	Zebra Technologies Corp (DT ZD510-HC) Zebra Technologies Corp (DT ZD510-HC)	Project No No	Draft (New) 2-Movable, Elect Unassigned	No No No	No No No	No No No	C 3 3	5.00 9.50 7.00	120 .5833 60	Type B (NEMA 5-15) N/A No	No Yes No
TEL-WMT		2 O/C	Telephone, Wall TBD	TBD ( ) TBD ( )	Project Yes No	Draft (New) 6-IT/Computers Unassigned	No No No	No No No	No No No	W N/A N/A	N/A N/A N/A	N/A N/A N/A	N/A N/A No	Yes No
WST-18W		1 O/O	Waste Can, Step-On 1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460) Rubbermaid Commercial Products (1883460)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	F 12 12	19.70 12.20 31.60	N/A N/A N/A	N/A N/A No	No No No
WST-23R		1 O/O	Waste Can, Recycle 8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1) Continental Commercial Products (8322-1)	Project No No	Draft (New) 3-Movable, Non-Elect Unassigned	No No No	No No No	No No No	F 7 7	20.00 11.00 30.00	N/A N/A N/A	N/A N/A No	No No No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Waiting Rm Room#: C329 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Television, Wall, Flat Panel	Peerless-AV (ST640)	Project	Draft (New)	No	No	No	W	22.14	N/A	N/A	
BKT-TVT		C/C	SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640)	Yes	1-Fixed	No	No	No	6	2.62	N/A	N/A	No
			Depth when tilted: 5.4 inches Load capacity: 150 lbs.		No	Unassigned	No	No	No	8	16.89	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		4	Speaker, Ceiling Mount - MUSIC	Black Diamond Video (BDV-CM-SPK)	Project	Draft (New)	No	No	No	CE	10.75	N/A	N/A	
SPK-CLG		C/C	BDV-CM-SPK (Electro-Voice EVID C8.2LP)	Black Diamond Video (BDV-CM-SPK)	Yes	1-Fixed	No	No	No	11	10.75	N/A	N/A	No
			Cut Out Size: 10.8"		No	Unassigned	No	No	No	24	7.00	N/A	No	No
		1	Television, 36-43 in., Flat Panel	LG Commercial Products (43UT672M0UC)	Project	Draft (New)	No	No	No	S	38.31	120	Type B (NEMA 5-15)	
TV4-3CM		O/O	43 in. UT672M Series 4K UHD Pro:Centric Smart	LG Commercial Products (43UT672M0UC)	Yes	2-Movable, Elect	No	No	No	18	3.35	.9166	N/A	Yes
			Dimensions reflect without stand (Depth: Front to VESA). Depth with stand: 3.3 inch		No	Unassigned	No	No	No	22	22.52	60	No	No
		2	Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	No	3-Movable, Non-Elect	No	No	No	12	12.20	N/A	N/A	No
					No	Unassigned	No	No	No	12	31.60	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Alcove/Beverage Room#: C329A Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Coffee Maker, Single Cup, Plumbed	Keurig Green Mountain (K150P)	Project	Draft (New)	Yes	No	No	C	10.40	120	Type B (NEMA 5-15)	
COF-SGC		O/C	K150P Commercial Brewing System - Plumbed	Keurig Green Mountain (K150P)	Yes	1-Fixed	No	No	No	18	14.00	11.7	N/A	No
					No	Unassigned	No	No	No	22	13.90	60	Yes	No
			Weight reflects empty brewing system. Manufacturer recommends 15 amp dedicated, grounded circuit. Requires the use of an external water filter such as Omnipure KQ8. Sold seperately. Does not require drain. Drain hose in back of unit - water drains into pitcher.											
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	Project	Draft (New)	No	No	No	W	10.75	N/A	N/A	
DSP-PSS	TA-09	O/C		Kimberly-Clark Professional (09216)	Yes	1-Fixed	No	No	No	3	4.75	N/A	N/A	No
					No	Unassigned	No	No	No	5	9.00	N/A	No	No
			Suggested mounting height = 44 inches. When installed properly, this dispenser meets the ADA Standards for Accessible Design.											
		1	Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	Project	Draft (New)	No	No	No	W	5.81	N/A	N/A	
DSP-SPG	TA-10	O/C	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Yes	1-Fixed	No	No	No	1	4.48	N/A	N/A	No
					No	Unassigned	No	No	No	1	10.56	N/A	No	No
			Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes. Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.											
		1	Dispenser, Water, Filtered	Waterlogic Commercial Products, LLC (Innowave Chiller 3)	Project	Draft (New)	Yes	No	No	C	13.50	120	Type B (NEMA 5-15)	
DSP-WCT		O/C	Innowave Chiller 3		Yes	1-Fixed	No	No	No	42	14.45	7.6	N/A	No
				Waterlogic Commercial Products, LLC (Innowave Chiller 3)	No	Unassigned	No	No	No	42	17.75	60	No	No
			Drain the water out of the storage tanks after long periods of non-usage.											
		1	Ice Machine, Dispenser, Nugget, Countertop 7 Series 7CI100A-IW-CF-ST-00	Follett LLC (7CI100A-IW-CF-ST-00)	Project	Draft (New)	Yes	No	No	C	14.62	115	Type B (NEMA 5-15)	
ICE-7CT		C/C		Follett LLC (7CI100A-IW-CF-ST-00)	Yes	1-Fixed	No	No	No	81	22.12	5	1700	No
					Yes	Unassigned	No	No	No	90	17.62	60	Yes	No
			Requires 15 amp dedicated circuit. Max Weight reflects bin at max capacity.											
		1	Water Treatment System, Ice Maker, Wall Mount Standard Capacity Filter System 00130229	Follett LLC (00130229)	Project	Draft (New)	Yes	No	No	W	14.25	N/A	N/A	
ICE-FLT		C/C		Follett LLC (00130229)	Yes	1-Fixed	No	No	No	15	6.00	N/A	N/A	No
					No	Unassigned	No	No	No	15	18.50	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Alcove/Beverage Room#: C329A Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Refrigerator, Domestic, Undercounter	Summit Appliance (AL752BKSSTB)	Project	Draft (New)	No	No	No	F	23.63	115	Type B (NEMA 5-15)	
REF-USS		C/C	AL752BKSSTB (ADA Compliant)	Summit Appliance (AL752BKSSTB)	Yes	2-Movable, Elect	No	No	No	100	26.00	0.9	N/A	No
			Separate circuit recommended. 15 amp circuit breaker required. Depth with handle shown. Depth with door at 90 degrees 45".		No	Unassigned	No	No	No	105	32.25	60	Yes	No
		2	Waste Can, Roll Out/Pull Out w/ Trash	Hafele America Co. ( )	Project	Draft (New)	No	No	No			N/A	N/A	
WST-PLO		O/O	And Recycle Can	Hafele America Co. ( )	No	3-Movable, Non-Elect	No	No	No			N/A	N/A	No
			Waste Bin/Pull Out-KessebohmerTrack And Can-(1) Grey/Trash-(1) Blue/Recycle		No	Unassigned	No	No	No			N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Waiting Rm/Public Room#: C466 Room Sign: Area/Phase: ED/1st Flr Room Qty: 1

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bracket, Television, Wall, Flat Panel	Peerless-AV (ST640)	Project	Draft (New)	No	No	No	W	22.14	N/A	N/A	
BKT-TVT		C/C	SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640)	Yes	1-Fixed	No	No	No	6	2.62	N/A	N/A	No
			Depth when tilted: 5.4 inches Load capacity: 150 lbs.		No	Unassigned	No	No	No	8	16.89	N/A	No	No
		1	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	Draft (New)	No	No	No	W	5.51	N/A	N/A	
DSP-HSZ		O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Yes	1-Fixed	No	No	No	2	3.88	N/A	N/A	No
			Mounts to wall with included adhesive tape or hardware. Install with at least 8" free space from bottom of dispenser to counter top. ADA compliant if mounted according to requirements. Powered via coin cell battery integrated into the refills.		No	Unassigned	No	No	No	2	9.06	N/A	No	No
		1	Ice Machine, Dispenser, Nugget, Countertop	Follett LLC (7CI100A-IW-CF-ST-00)	Project	Draft (New)	Yes	No	No	C	14.62	115	Type B (NEMA 5-15)	
ICE-7CT		C/C	7 Series 7CI100A-IW-CF-ST-00	Follett LLC (7CI100A-IW-CF-ST-00)	Yes	1-Fixed	No	No	No	81	22.12	5	1700	No
			Requires 15 amp dedicated circuit. Max Weight reflects bin at max capacity.		Yes	Unassigned	No	No	No	90	17.62	60	Yes	No
		1	Water Treatment System, Ice Maker, Wall Mount	Follett LLC (00130229)	Project	Draft (New)	Yes	No	No	W	14.25	N/A	N/A	
ICE-FLT		C/C	Standard Capacity Filter System 00130229	Follett LLC (00130229)	Yes	1-Fixed	No	No	No	15	6.00	N/A	N/A	No
					No	Unassigned	No	No	No	15	18.50	N/A	No	No
		6	Speaker, Ceiling Mount - MUSIC	Black Diamond Video (BDV-CM-SPK)	Project	Draft (New)	No	No	No	CE	10.75	N/A	N/A	
SPK-CLG		C/C	BDV-CM-SPK (Electro-Voice EVID C8.2LP)	Black Diamond Video (BDV-CM-SPK)	Yes	1-Fixed	No	No	No	11	10.75	N/A	N/A	No
			Cut Out Size: 10.8"		No	Unassigned	No	No	No	24	7.00	N/A	No	No
		1	Television, 36-43 in., Flat Panel	LG Commercial Products (43UT672M0UC)	Project	Draft (New)	No	No	No	S	38.31	120	Type B (NEMA 5-15)	
TV4-3CM		O/O	43 in. UT672M Series 4K UHD Pro:Centric Smart	LG Commercial Products (43UT672M0UC)	Yes	2-Movable, Elect	No	No	No	18	3.35	.9166	N/A	Yes
			Dimensions reflect without stand (Depth: Front to VESA). Depth with stand: 3.3 inch		No	Unassigned	No	No	No	22	22.52	60	No	No
		2	Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	Project	Draft (New)	No	No	No	F	19.70	N/A	N/A	
WST-18W		O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	No	3-Movable, Non-Elect	No	No	No	12	12.20	N/A	N/A	No
					No	Unassigned	No	No	No	12	31.60	N/A	No	No
		2	Waste Can, Roll Out/Pull Out w/ Trash And Recycle Can	Hafele America Co. ( )	Project	Draft (New)	No	No	No			N/A	N/A	
WST-PLO		O/O	Waste Bin/Pull Out-KessebohmerTrack And Can-(1) Grey/Trash-(1)	Hafele America Co. ( )	No	3-Movable, Non-Elect	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Waiting Rm/Public **Room#: C466** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.

Department: ED/1st Flr

Blue/Recycle

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Registration (5) **Room#: C467** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bin, Shredding, Secure	Shred-it, Inc. ( )	Operating	Draft (New)	No	No	No	F	20.25	N/A	N/A	
BIN-STD		O/V	Standard Front Load	Shred-it, Inc. ( )	No	3-Movable, Non-Elect	No	No	No	45	19.50	N/A	N/A	No
					No	Unassigned	No	No	No	55	36.00	N/A	No	No
		5	Computer, Desktop, All-in-One	Lenovo (M700z)	Project	Draft (New)	No	No	No			N/A	N/A	
CMD-A2M		O/O	M810Z w/ Dual Monitors	Lenovo (M700z)	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		2	Printer, Label, Barcode	Zebra Technologies Corp (GK42-102510-000)	Project	Draft (New)	No	No	No	C	7.60	120	Type B (NEMA 5-15)	
PRT-LBL		O/O	GK420t (Thermal Transfer)	Zebra Technologies Corp (GK42-102510-000)	Yes	6-IT/Computers	No	No	No	5	10.00	.58	N/A	Yes
			Requires data connection to either PC port or network cable/interface.		No	Unassigned	No	No	No	5	7.50	60	No	No
		1	Printer, Laser, Network	Hewlett-Packard (E6B70A#BGJ)	Project	Draft (New)	No	No	No	C	16.75	120	Type B (NEMA 5-15)	
PRT-LSN		O/O	LaserJet Enterprise M605dn	Hewlett-Packard (E6B70A#BGJ)	Yes	6-IT/Computers	No	No	No	57	21.25	7	N/A	Yes
					No	Unassigned	No	No	No	65	15.75	60	No	No
		1	Printer, Laser, Multifunction	Konica Business Machines ( )	Project	Draft (New)	No	No	No			N/A	N/A	
PRT-MFL		O/O	bizhub 558e	Konica Business Machines ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		2	Printer, Laser, Multifunction	Hewlett-Packard (W1A79A#BGJ)	Project	Draft (New)	No	No	No	C	16.80	110	Type B (NEMA 5-15)	
PRT-MFP		O/O	HP LaserJet Pro MFP M479fdn	Hewlett-Packard (W1A79A#BGJ)	Yes	6-IT/Computers	No	No	No	52	25.70	5	N/A	Yes
			Dimensions reflect maximum.		Yes	Unassigned	No	No	No	59	16.30	60	No	No
		1	Recorder, CD/DVD	Epson America, Inc. (C11CH40001)	Project	Draft (New)	No	No	No	C	14.84	120	Type B (NEMA 5-15)	
RDC-CDD		O/O	Discproducer PP-100III CD/DVD/Blu-ray	Epson America, Inc. (C11CH40001)	No	2-Movable, Elect	No	No	No	46	18.31	0.43	N/A	No
					Yes	Unassigned	No	No	No	46	19.40	60	No	No
		2	Scanner, Barcode	Zebra Technologies Corp (LS2208-SR20007R-NA)	Project	Draft (New)	No	No	No	C	2.50	N/A	N/A	
SCN-BCS		O/O	Symbol LS2208 (USB Kit with Stand)	Zebra Technologies Corp (LS2208-SR20007R-NA)	No	6-IT/Computers	No	No	No	0	3.34	N/A	N/A	No
			Powered via USB cable connection to host.		No	Unassigned	No	No	No	0	6.00	N/A	No	No
		1	Telephone, Desktop, Analog	TBD (TBD)	Project	Draft (New)	No	No	No	N/A	N/A	N/A	N/A	
TEL-DKE		O/C	(EMERGENCY-YELLOW) TBD	TBD (TBD)	Yes	6-IT/Computers	No	No	No	N/A	N/A	N/A	N/A	No
					No	Unassigned	No	No	No	N/A	N/A	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Registration (5) **Room#: C467** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		5	Telephone, Desktop	TBD ( )	Project	Draft (New)	No	No	No			N/A	N/A	
TEL-DSK		O/C	TBD	TBD ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Waste Can, Recycle	Continental Commercial Products (8322-1)	Project	Draft (New)	No	No	No	F	20.00	N/A	N/A	
WST-23R		O/O	8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1)	No	3-Movable, Non-Elect	No	No	No	7	11.00	N/A	N/A	No
					No	Unassigned	No	No	No	7	30.00	N/A	No	No
		5	Waste Can, Open Top	Continental Commercial Products (2818BK)	Project	Draft (New)	No	No	No	F	14.50	N/A	N/A	
WST-28Q		O/O	2818BK (28 qt.)	Continental Commercial Products (2818BK)	No	3-Movable, Non-Elect	No	No	No	2	10.50	N/A	N/A	No
			Case ship weight is 27 lbs.		No	Unassigned	No	No	No	2	15.00	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Office **Room#: C468** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Computer, Desktop, All-in-One	Lenovo (M700z)	Project	Draft (New)	No	No	No			N/A	N/A	
CMD-A2M		O/O	M810Z w/ Dual Monitors	Lenovo (M700z)	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Telephone, Desktop	TBD ( )	Project	Draft (New)	No	No	No			N/A	N/A	
TEL-DSK		O/C	TBD	TBD ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Waste Can, Open Top	Continental Commercial Products (2818BK)	Project	Draft (New)	No	No	No	F	14.50	N/A	N/A	
WST-28Q		O/O	2818BK (28 qt.)		No	3-Movable, Non-Elect	No	No	No	2	10.50	N/A	N/A	No
				Continental Commercial Products (2818BK)	No	Unassigned	No	No	No	2	15.00	N/A	No	No
			Case ship weight is 27 lbs.											

Room: Scheduling (3) **Room#: C469** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Bin, Shredding, Secure	Shred-it, Inc. ( )	Operating	Draft (New)	No	No	No	F	20.25	N/A	N/A	
BIN-SJR		O/V	Mini Console	Shred-it, Inc. ( )	No	3-Movable, Non-Elect	No	No	No	30	19.50	N/A	N/A	No
			Fits under workstation.		No	Unassigned	No	No	No	40	26.00	N/A	No	No
		3	Computer, Desktop, All-in-One	Lenovo (M700z)	Project	Draft (New)	No	No	No			N/A	N/A	
CMD-A2M		O/O	M810Z w/ Dual Monitors	Lenovo (M700z)	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Printer, Label, Barcode	Zebra Technologies Corp (GK42-102510-000)	Project	Draft (New)	No	No	No	C	7.60	120	Type B (NEMA 5-15)	
PRT-LBL		O/O	GK420t (Thermal Transfer)	Zebra Technologies Corp (GK42-102510-000)	Yes	6-IT/Computers	No	No	No	5	10.00	.58	N/A	Yes
			Requires data connection to either PC port or network cable/interface.		No	Unassigned	No	No	No	5	7.50	60	No	No
		1	Printer, Laser, Multifunction	Hewlett-Packard (B5L47A#BGJ)	Project	Draft (New)	No	No	No	C	27.50	120	Type B (NEMA 5-15)	
PRT-MFC		O/O	Color LaserJet Enterprise MFP M577f	Hewlett-Packard (B5L47A#BGJ)	Yes	6-IT/Computers	No	No	No	85	19.84	4.9333	N/A	Yes
			Dimensions reflect maximum.		Yes	Unassigned	No	No	No	98	22.95	60	No	No
		1	Printer, Laser, Multifunction	Konica Business Machines ( )	Project	Draft (New)	No	No	No			N/A	N/A	
PRT-MFL		O/O	bizhub 558e	Konica Business Machines ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Scanner, Document, Countertop	Fujitsu (PA03750-B005)	Project	Draft (New)	No	No	No	C	11.50	120	Type B (NEMA 5-15)	
SCN-CTP		O/O	fi-7030	Fujitsu (PA03750-B005)	No	2-Movable, Elect	No	No	No	7	5.75	0.1	N/A	No
					No	Unassigned	No	No	No	7	5.25	60	No	No
		1	Telephone, Desktop, Analog	TBD (TBD)	Project	Draft (New)	No	No	No	N/A	N/A	N/A	N/A	
TEL-DKE		O/C	(EMERGENCY-YELLOW) TBD	TBD (TBD)	Yes	6-IT/Computers	No	No	No	N/A	N/A	N/A	N/A	No
					No	Unassigned	No	No	No	N/A	N/A	N/A	No	No
		3	Telephone, Desktop	TBD ( )	Project	Draft (New)	No	No	No			N/A	N/A	
TEL-DSK		O/C	TBD	TBD ( )	Yes	6-IT/Computers	No	No	No			N/A	N/A	No
					No	Unassigned	No	No	No			N/A	No	No
		1	Waste Can, Recycle	Continental Commercial Products (8322-1)	Project	Draft (New)	No	No	No	F	20.00	N/A	N/A	
WST-23R		O/O	8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1)	No	3-Movable, Non-Elect	No	No	No	7	11.00	N/A	N/A	No
					No	Unassigned	No	No	No	7	30.00	N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Scheduling (3) **Room#: C469** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs): Mounting / Max Weight / Ship Weight	(in): Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type: BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		3	Waste Can, Open Top	Continental Commercial Products	Project	Draft (New)	No	No	No	F	14.50	N/A	N/A	
WST-28Q		O/O	2818BK (28 qt.)	(2818BK)	No	3-Movable, Non-Elect	No	No	No	2	10.50	N/A	N/A	No
				Continental Commercial Products (2818BK)	No	Unassigned	No	No	No	2	15.00	N/A	No	No
			Case ship weight is 27 lbs.											

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Miscellaneous Costs **Room#: ZZZ** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty / F/I	Description / Model / Spec Remarks / Item Notes	Manufacturer / Vendor	Funding Source / Arch Sig. / Spat. Sig.	Item Status / Arch Code / Custom Code	Water: Cold / Hot Treated	Vacuum: Drain / Steam / Gas	Vacuum: Dental Medical / Vent	(lbs) Mounting / Max Weight / Ship Weight	(in) Width / Depth / Height	Electrical/Mechanical: Volts / Amp / Hz	Plug Type / BTU/hr / Ded. Circ.	Data Cnct. / Emrg. Pwr.
Department: ED/1st Flr														
		1	Amplifier, Power, Stereo	Black Diamond Video (BDV-AMP)	Project	Draft (New)	No	No	No	S	19.00	120	Type B (NEMA 5-15)	
AMF-SRO		C/C	Samson SERVO 120A	Black Diamond Video (BDV-AMP)	No	2-Movable, Elect	No	No	No	15	11.50	N/A	N/A	No
			Rack mounted		No	Unassigned	No	No	No	19	1.75	60	No	No
		1	Server, Synchronized, Wireless Clock System	Primex, Inc ( )	Project	Draft (New)	No	No	No			N/A	N/A	
SVR-CWL		C/C		Primex, Inc ( )	Yes	1-Fixed	No	No	No			N/A	N/A	No
			OneVue Sync Transmitter		No	Unassigned	No	No	No			N/A	No	No

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Room by Room Detail

Room: Miscellaneous Costs **Room#: ZZZ** **Room Sign:** **Area/Phase: ED/1st Flr** **Room Qty: 1**

Comments:

Alt ID	Item ID	Qty F/I	Description Model Spec Remarks / Item Notes	Manufacturer Vendor	Funding Source Arch Sig. Spat. Sig.	Item Status Arch Code Custom Code	Water Cold Hot Treated	Drain Steam Gas	Vacuum Dental Medical Vent	(lbs) Mounting Max Weight Ship Weight	(in) Width Depth Height	Electrical/Mechanical Volts Amp Hz	Plug Type BTU/hr Ded. Circ.	Data Cnct. Emrg. Pwr.

Department: ED/1st Flr

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Item Summary

Alt ID / Item ID	Qty / F/I	Description / Model	Manufacturer (Mfr #) / Vendor (Vendor #)	Funding Source / Item Status	Cost Center / Budget Name	Arch Code / Custom Code
AMF-SRO	1	Amplifier, Power, Stereo	Black Diamond Video (BDV-AMP)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	C/C	Samson SERVO 120A	Black Diamond Video (BDV-AMP)	Draft (New)	ED Expansion Project	Unassigned
ANZ-URN	1	Analyzer, Lab, Urinalysis, Semi-Automated	Siemens Healthcare Diagnostics (1780)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Clinitek Status +	Siemens Healthcare Diagnostics (1780)	Draft (New)	ED Expansion Project	Unassigned
BAR-G18	8	Bar, Grab, Toilet/Shower	Bobrick Washroom Equipment, Inc. (B-6806 x 18)	Project	ED Expansion Project ED Expansion	1-Fixed
TA-07A	C/C	B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18)	Draft (New)	ED Expansion Project	Unassigned
BAR-G18	8	Bar, Grab, Toilet/Shower w/ Peened Surface	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	Project	ED Expansion Project ED Expansion	1-Fixed
TA-07B	C/C	B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	Draft (New)	ED Expansion Project	Unassigned
BAR-G36	8	Bar, Grab, Toilet/Shower	Bobrick Washroom Equipment, Inc. (B-6806 x 36)	Project	ED Expansion Project ED Expansion	1-Fixed
TA-05	C/C	B-6806 x 36 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 36)	Draft (New)	ED Expansion Project	Unassigned
BAR-G42	8	Bar, Grab, Toilet/Shower	Bobrick Washroom Equipment, Inc. (B-6806 x 42)	Project	ED Expansion Project ED Expansion	1-Fixed
TA-06	C/C	B-6806 x 42 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 42)	Draft (New)	ED Expansion Project	Unassigned
BAR-GTW	8	Bar, Grab, Toilet/Shower, Two Wall w/ Peened	Bobrick Washroom Equipment, Inc. (B-6861.99)	Project	ED Expansion Project ED Expansion	1-Fixed
TA-08	C/C	Surface B-6861.99 Two-Wall Shower Grab Bar	Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	Draft (New)	ED Expansion Project	Unassigned
BAR-SWU	8	Bar, Grab, Toilet/Shower, Swing Arm	Bobrick Washroom Equipment, Inc. (B-4998)	Project	ED Expansion Project ED Expansion	1-Fixed
TA-13	C/C	B-4998 Swing-Up	Bobrick Washroom Equipment, Inc. (B-4998)	Draft (New)	ED Expansion Project	Unassigned
BIN-SJR	5	Bin, Shredding, Secure	Shred-it, Inc. ( )	Operating	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/V	Mini Console	Shred-it, Inc. ( )	Draft (New)	ED Expansion Project	Unassigned
BIN-SLY	100	Bin, Supply	Pegasus Medical Concepts, Inc. (2-205BK)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Hanging Bin 2-205BK	Pegasus Medical Concepts, Inc. (2-205BK)	Draft (New)	ED Expansion Project	Unassigned
BIN-STD	1	Bin, Shredding, Secure	Shred-it, Inc. ( )	Operating	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/V	Standard Front Load	Shred-it, Inc. ( )	Draft (New)	ED Expansion Project	Unassigned
BKT-CWS	29	Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	Project	ED Expansion Project ED Expansion	1-Fixed
	C/C	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Draft (New)	ED Expansion Project	Unassigned

Item Summary

Alt ID / Item ID	Qty / F/I	Description / Model	Manufacturer (Mfr #) / Vendor (Vendor #)	Funding Source / Item Status	Cost Center / Budget Name	Arch Code / Custom Code
BKT-PCW	1	Bracket, Computer Workstation	GCX Corporation (ITK-0003-02)	Project	ED Expansion Project ED Expansion	1-Fixed
	C/C	VHM Extended w/ Ergo & CPU Mount	GCX Corporation (ITK-0003-02)	Draft (New)	ED Expansion Project	Unassigned
BKT-TVT	5	Bracket, Television, Wall, Flat Panel	Peerless-AV (ST640)	Project	ED Expansion Project ED Expansion	1-Fixed
	C/C	SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640)	Draft (New)	ED Expansion Project	Unassigned
BKT-VTS	29	Bracket, Monitor, Wall	GCX Corporation (WC-0002-05/AG-0018-21)	Project	ED Expansion Project ED Expansion	1-Fixed
	C/C	19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21)	Draft (New)	ED Expansion Project	Unassigned
BUK-MWR	1	Bucket, Mopping	Filmop USA LLC (0100SL2601C)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Maxi Jolly Split Bucket System	Filmop USA LLC (0100SL2601C)	Draft (New)	ED Expansion Project	Unassigned
CAB-W2G	2	Cabinet, Warming, Dual, Freestanding	Skytron (SS2207-MG)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/C	SS2207-MG (Glass Doors)	Skytron (SS2207-MG)	Draft (New)	ED Expansion Project	Unassigned
CAM-CCT	1	Camera, CCTV, Color	Hanwha Techwin America (QND-8080R)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/V	Hanwha QND-8080R	Hanwha Techwin America (QND-8080R)	Draft (New)	ED Expansion Project	Unassigned
CLK-AWL	31	Clock, Analog, Synchronized, Wireless	La Crosse Technology (WT-3122A)	Project	ED Expansion Project ED Expansion	1-Fixed
	C/C	WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A)	Draft (New)	ED Expansion Project	Unassigned
CMD-A2M	33	Computer, Desktop, All-in-One	Lenovo (M700z)	Project	ED Expansion Project ED Expansion	6-IT/Computers
	O/O	M810Z w/ Dual Monitors	Lenovo (M700z)	Draft (New)	ED Expansion Project	Unassigned
CMP-AL1	29	Computer, Desktop, All-in-One	Dell Inc. ( )	Project	ED Expansion Project ED Expansion	6-IT/Computers
	O/O	OptiPlex 7400 All-In-One	Dell Inc. ( )	Draft (New)	ED Expansion Project	Unassigned
CMP-EXC	3	Compression Unit, Extremity Pump, Rapid Inflation	Arjo Inc (526000-01)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Flowtron Continuous/Sequential DVT Pump - ACS900	Arjo Inc (526000-01)	Draft (New)	ED Expansion Project	Unassigned
COF-SGC	3	Coffee Maker, Single Cup, Plumbed	Keurig Green Mountain (K150P)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	K150P Commercial Brewing System - Plumbed	Keurig Green Mountain (K150P)	Draft (New)	ED Expansion Project	Unassigned
COM-VID	4	Communication Device, Video Interpreter	Stratus Video (Stratus Stand)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Stratus Stand w/iPad Air 2	Stratus Video (Stratus Stand)	Draft (New)	ED Expansion Project	Unassigned

Item Summary

Alt ID / Item ID	Qty / F/I	Description / Model	Manufacturer (Mfr #) / Vendor (Vendor #)	Funding Source / Item Status	Cost Center / Budget Name	Arch Code / Custom Code
CRT-5DE	6	Cart, Procedure, General	Armstrong Medical Industries (AMC-1B-E)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	5-Drw Steel Mini Bge/Bge (Electronic)	Armstrong Medical Industries (AMC-1B-E)	Draft (New)	ED Expansion Project	Unassigned
CRT-CDE	2	Cart, Procedure, Resuscitation	Armstrong Medical Industries (AR-6 / EB-1)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	AR-6 Standard Steel w/ EB-1 Deluxe Acc'y Pkg	Armstrong Medical Industries (AR-6 / EB-1)	Draft (New)	ED Expansion Project	Unassigned
CRT-CST	1	Cart, Procedure, Cast	InterMetro Industries Corp (FLCAST)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Flexline Cast FLCAST	InterMetro Industries Corp (FLCAST)	Draft (New)	ED Expansion Project	Unassigned
CRT-DFA	1	Cart, Procedure, Difficult Airway	InterMetro Industries Corp (SXRSDIFAIR)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Starsys Difficult Airway SXRSDIFAIR	InterMetro Industries Corp (SXRSDIFAIR)	Draft (New)	ED Expansion Project	Unassigned
CRT-EC6	2	Cart, Cylinder, D&E, Multi	Anthony Welded Products, Inc. (6064)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	6064 (6 Cap.)	Anthony Welded Products, Inc. ( )	Draft (New)	ED Expansion Project	Unassigned
CRT-ENT	1	Cart, Procedure, ENT	InterMetro Industries Corp (SXRSENT1)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	StarSys ENT Cart (Single)	InterMetro Industries Corp (SXRSENT1)	Draft (New)	ED Expansion Project	Unassigned
CRT-F20	1	Cart, Foodservice, Meal/Tray	Aladdin Temp-Rite, LLC (MD20SLP6B4-45)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	MD20SLP -20 Tray	Aladdin Temp-Rite, LLC (MD20SLP6B4-45)	Draft (New)	ED Expansion Project	Unassigned
CRT-GPN	31	Cart, Procedure, General	InterMetro Industries Corp (FLBED)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Flexline Bedside FLBED	InterMetro Industries Corp ( )	Draft (New)	ED Expansion Project	Unassigned
CRT-HKP	1	Cart, Housekeeping, Polymer	Filmop USA LLC (AA1807706U002)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Alpha ES EquoDose 50 Complete Workstation	Filmop USA LLC (AA1807706U002)	Draft (New)	ED Expansion Project	Unassigned
CRT-L48	1	Cart, Supply, Linen, 48 inch	InterMetro Industries Corp (A2448NC/74UP/2448FG/5MP/5MPB/EP37C/EP57C/VUCMB)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Super Erecta w/Cover (24"x48")	InterMetro Industries Corp (A2448NC/74UP/2448FG/5MP/5MPB/EP37C/EP57C/VUCMB)	Draft (New)	ED Expansion Project	Unassigned
CRT-LTK	1	Cart / Truck, Linen, Bulk	InterMetro Industries Corp (TXPB-BLK48SEC)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	MetroTrux Secure TXPB-BLK48	InterMetro Industries Corp (TXPB-BLK48SEC)	Draft (New)	ED Expansion Project	Unassigned

Item Summary

Alt ID / Item ID	Qty / F/I	Description / Model	Manufacturer (Mfr #) / Vendor (Vendor #)	Funding Source / Item Status	Cost Center / Budget Name	Arch Code / Custom Code
CRT-MD6	1	Cart, Procedure, General	Global Industrial Equipment Company (WBB815770)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	TrippNT 51071 6 Drawer Blue WBB815770	Global Industrial Equipment Company ( )	Draft (New)	ED Expansion Project	Unassigned
CRT-PG5	2	Cart, Procedure, General	InterMetro Industries Corp (FLP22010)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Flexline Standard 5-Drwr w/Passive Lock FLP22010	InterMetro Industries Corp (FLP22010)	Draft (New)	ED Expansion Project	Unassigned
CRT-S48	6	Cart, Supply, Chrome, 48 inch	InterMetro Industries Corp ((5x)A1848NC/(4x)63UP/5MP/5MPB)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Super Adjustable Super Erecta 48x18x69 (5-Tier)	InterMetro Industries Corp ((5x)A1848NC/(4x)63UP/5MP/5MPB)	Draft (New)	ED Expansion Project	Unassigned
CRT-SBK	3	Cart, Supply, Bin/ Basket	Pegasus Medical Concepts, Inc. (SG-8-E)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	E-Style Single Rack Unit (SG-8-E)	Pegasus Medical Concepts, Inc. (SG-8-E)	Draft (New)	ED Expansion Project	Unassigned
CRT-SUT	1	Cart, Supply, Suture	InterMetro Industries Corp (FL24K w/Options)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Flexline 5-Drwr w/Touchpad & Dividers (Green)	InterMetro Industries Corp (FL24K w/Options)	Draft (New)	ED Expansion Project	Unassigned
CRT-U3S	1	Cart, Utility, Stainless	Lakeside Manufacturing, Inc. (939)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	939 Tough Transport	Lakeside Manufacturing, Inc. (939)	Draft (New)	ED Expansion Project	Unassigned
CRT-WOW	1	Cart, Computer, Workstation	JACO Inc. (520-L500 w/ 51-3648 Scanner Holder)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	UltraLite 520 (LCD Mount, L500)	JACO Inc. (520-L500 w/ 51-3648 Scanner Holder)	Draft (New)	ED Expansion Project	Unassigned
CSW-SWM	1	Chair, Clinical, Shower, Wall Mount	PBA ( )	Project	ED Expansion Project ED Expansion	1-Fixed
TA-01	C/C	4CS.447.UL01 - ADA Shower Seat	PBA ( )	Draft (New)	ED Expansion Project	Unassigned
CUR-CUB	29	Curtain, Cubicle, Disposable	Medline Industries Inc. (Curtain/Disposable)	Project	ED Expansion Project ED Expansion	5-Furniture
	O/C	Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable)	Draft (New)	ED Expansion Project	Unassigned
DFB-PCE	2	Defibrillator, Monitor, w/Pacing	Zoll Medical Corporation (3 0520 0000 0111 0013)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	R Series Plus w/Exp Pkg and Pacing	Zoll Medical Corporation (3 0520 0000 0111 0013)	Draft (New)	ED Expansion Project	Unassigned
DIA-RNL	3	Dialysis Unit, Renal Replacement	Baxter Healthcare (113081)	Existing (Reuse)	ED Expansion Project ED Expansion	2-Movable, Elect
EXISTING	O/O	PrismaFlex	Baxter Healthcare (113081)	Draft (Existing)	ED Expansion Project	Unassigned
DOP-VSC	1	Doppler, Vascular	Arjo - Huntleigh Healthcare, Inc (D900-P-USA/EZ8)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Dopplex D900 w/EZ8 Probe	Arjo Inc (D900-P-USA/EZ8)	Draft (New)	ED Expansion Project	Unassigned

Item Summary

Alt ID / Item ID	Qty / F/I	Description / Model	Manufacturer (Mfr #) / Vendor (Vendor #)	Funding Source / Item Status	Cost Center / Budget Name	Arch Code / Custom Code
DSL-2GW	1	Disposal, Sharps, Wall Mount	Stericycle (C-02RES-0203-OC)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	Bio Systems C-02RES-0203-OC	Stericycle (C-02RES-0203-OC)	Draft (New)	ED Expansion Project	Unassigned
DSP-CLN	1	Dispenser, Cleaning Solution	Diversey Care (D3764735)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	J-Fill QuattroSelect (Air Gap)	Diversey Care (D3764735)	Draft (New)	ED Expansion Project	Unassigned
DSP-DWP	29	Dispenser, Disinfectant Wipes, Wall Mount	Medline Industries Inc. (MSC351128)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	MSC351128	Medline Industries Inc. (MSC351128)	Draft (New)	ED Expansion Project	Unassigned
DSP-EMS	29	Dispenser, Emesis Bag, Wall Mount	Medline Industries Inc. (NONEMBGDISP)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP)	Draft (New)	ED Expansion Project	Unassigned
DSP-GV3	31	Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	305362 Clear PETG	Omnimed, Inc (305362)	Draft (New)	ED Expansion Project	Unassigned
DSP-HSZ	39	Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Draft (New)	ED Expansion Project	Unassigned
DSP-MAU	1	Dispenser, Medication, Auxiliary	BD - Becton, Dickinson and Company (M4A7DRW7)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/V	Pyxis MedStation 4000 (7-Drwr, 7 Cubie)	BD - Becton, Dickinson and Company (M4A7DRW7)	Draft (New)	ED Expansion Project	Unassigned
DSP-MDM	1	Dispenser, Medication, Host (Main)	BD - Becton, Dickinson and Company (M4MB6DR7W3)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/V	MedStation 4000 (6-Drwr, 3 Cubie)	BD - Becton, Dickinson and Company (M4MB6DR7W3)	Draft (New)	ED Expansion Project	Unassigned
DSP-MLK	1	Dispenser, Medication, Lock Module	BD - Becton, Dickinson and Company (MSRM)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/V	SMART Remote Manager	BD - Becton, Dickinson and Company (MSRM)	Draft (New)	ED Expansion Project	Unassigned
DSP-MTS	1	Dispenser, Medication, Auxiliary	BD - Becton, Dickinson and Company ( )	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/V	Pyxis MedStation ES Single Column	BD - Becton, Dickinson and Company ( )	Draft (New)	ED Expansion Project	Unassigned
DSP-PPE	2	Dispenser, Personal Protection, Wall Mount, Recessed	Bowman Dispensers (RE101-0012)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	RE101-0012 Semi-Recessed	Bowman Dispensers (RE101-0012)	Draft (New)	ED Expansion Project	Unassigned
DSP-PSS	44	Dispenser, Paper Towel, Surface Mount, Stainless Steel	Kimberly-Clark Professional (09216)	Project	ED Expansion Project ED Expansion	1-Fixed
TA-09	O/C	SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	Draft (New)	ED Expansion Project	Unassigned

Item Summary

Alt ID / Item ID	Qty / F/I	Description / Model	Manufacturer (Mfr #) / Vendor (Vendor #)	Funding Source / Item Status	Cost Center / Budget Name	Arch Code / Custom Code
DSP-SPG TA-10	44 O/C	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01) GOJO Industries (5134-01)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
DSP-STN TA-03	1 C/C	Dispenser, Sanitary Napkin, Stainless Steel B-35139 TrimLine Series Surface-Mounted	Bobrick Washroom Equipment, Inc. (B-35139) Bobrick Washroom Equipment, Inc. (B-35139)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
DSP-TLP TA-02	8 O/C	Dispenser, Toilet Paper, Surface Mount, Stainless Steel Coreless Double Roll [09606]	Kimberly-Clark Professional (09606) Kimberly-Clark Professional (09606)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
DSP-TSC TA-04	1 O/C	Dispenser, Toilet Seat Cover Scott Personal Seat Cover Dispenser	Kimberly-Clark Professional (09512) Kimberly-Clark Professional (09512)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
DSP-WCT	1 O/C	Dispenser, Water, Filtered Innowave Chiller 3	Waterlogic Commercial Products, LLC (Innowave Chiller 3) Waterlogic Commercial Products, LLC (Innowave Chiller 3)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
DSY-OTO	29 O/C	Diagnostic System, Integrated Green Series 777 [77791-2MPX]	Hillrom - Welch Allyn, Inc. (77791-2MPX) Hillrom - Welch Allyn, Inc. (77791-2MPX)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
ECG-CRT	4 O/O	Electrocardiograph (ECG), Interpretive MAC VU360 Resting ECG Workstation w/ Basic Trolley	GE Healthcare - Cardiology (MAC VU360) GE Healthcare - Cardiology (MAC VU360)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
HMP-32G	4 O/O	Hamper, Linen Delta 32 Gallon Linen Hamper	Filmop USA LLC (0000C0412xx) Filmop USA LLC (0000C0412xx)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	3-Movable, Non-Elect Unassigned
HOK-COT TA-11	8 C/C	Hook, Coat/Robe, Wall Mount B-9542 Surface-Mounted Coat Hook	Bobrick Washroom Equipment, Inc. (B-9542) Bobrick Washroom Equipment, Inc. (B-9542)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
HYP-GEN	2 O/O	Hypo-Hyperthermia Unit, General Arctic Sun 5000e	Medivance, Inc. - Subsidiary of Bard Medical (5000-00-00e) Medivance, Inc. - Subsidiary of Bard Medical (5000-00-00e)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
ICE-7CT	2 C/C	Ice Machine, Dispenser, Nugget, Countertop 7 Series 7CI100A-IW-CF-ST-00	Follett LLC (7CI100A-IW-CF-ST-00) Follett LLC (7CI100A-IW-CF-ST-00)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned

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ICE-C12	2 C/C	Ice Machine, Dispenser, Nugget, Countertop Symphony Plus 12CI425A-S	Follett LLC (12CI425A-S) Follett LLC (12CI425A-S)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
ICE-FLT	4 C/C	Water Treatment System, Ice Maker, Wall Mount Standard Capacity Filter System 00130229	Follett LLC (00130229) Follett LLC (00130229)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
IMG-BLD	1 O/O	Ultrasound, Imaging, Urology BladderScan Prime w/Mobile Cart	Verathon (0270-0870 / 0800-0532) Verathon (0270-0870 / 0800-0532)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	3-Movable, Non-Elect Unassigned
IMG-UMP	2 O/O	Ultrasound, Imaging, Multipurpose LOGIQ E10	GE Healthcare - Imaging Systems (H4918U) GE Healthcare - Imaging Systems (H4918U)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
INS-SRG	1 O/O	Instruments, Surgical TBD	Aesculap, Inc. ( ) Aesculap, Inc. ( )	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	4-Instruments Unassigned
LFT-O1B EXISTING	1 O/V	Lift, Patient, Ceiling, 1-Bed MS 1000 4F ECS w/ Scale	Arjo Inc (LF21409 w/ 700-5441 w/ 700-05401-BOX w/ 700.00525) Arjo Inc (LF21409 w/ 700-5441 w/ 700-05401-BOX w/ 700.00525)	Existing (Reuse) Draft (Existing)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
LOC-VEN	2 O/O	Locator, Vein AV500 Vein Viewing System	AccuVein (AV500) AccuVein (AV500)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
LRY-SMB	1 O/O	Laryngoscope Set, Video GlideScope Core Single-Use Premium WS + BFlex	Verathon (0270-0991) Verathon (0270-0991)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
MDG-AIR	32 O/O	Flowmeter, Air Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO) Precision Medical (1MFA2005PTO)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	3-Movable, Non-Elect Unassigned
MDG-OXF	64 O/O	Flowmeter, Oxygen Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO) Precision Medical (1MFA1005PTO)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	3-Movable, Non-Elect Unassigned
MDG-SCI	64 O/O	Regulator, Suction, Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303) Precision Medical (PM3303)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	3-Movable, Non-Elect Unassigned
MIR-V24 TA-12	8 C/C	Mirror, Vanity B-166 - 2448	Bobrick Washroom Equipment, Inc. ( ) Bobrick Washroom Equipment, Inc. ( )	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned

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MON-BSM	2 O/O	Monitor, Physiologic, Bedside, With Mobile Stand Intellivue MP5 (4 wave w/stand)	Philips Healthcare - Monitoring Systems (M8105A/A04/B41/989803002531) Philips Healthcare - Monitoring Systems (M8105A/A04/B41/989803002531)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
MON-CNS	2 O/O	Monitor, Central Station, 9 - 15 Patient IntelliVue	Philips Healthcare - Monitoring Systems ( ) Philips Healthcare - Monitoring Systems ( )	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
MON-GLC	1 O/O	Monitor, Blood Glucose, Point-of-Care ACCU-CHEK Inform II Meter & Base Unit	Roche Diagnostics Corporation (05060311001/05060290001) Roche Diagnostics Corporation (05060311001/05060290001)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
MON-PHS	29 O/O	Monitor, Physiologic, Bedside IntelliVue MP30	Philips Healthcare - Monitoring Systems (M8002A) Philips Healthcare - Monitoring Systems (M8002A)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
MON-VSS	2 O/O	Monitor, Physiologic, Vital Signs, w/Stand Connex Spot 7500 Wireless (BP, Covidien SpO2, SureTemp)	Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3) Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
MTP-RFZ	2 O/O	Monitor, Temperature, Refrigerator/Freezer Traceable Hi-Accuracy Refrigerator Thermometer	Fisher Scientific Company (15078215) Fisher Scientific Company (15078215)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	3-Movable, Non-Elect Unassigned
OVM-CTS	2 C/C	Oven, Domestic, Microwave, Countertop SCM853	Summit Appliance (SCM853) Summit Appliance (SCM853)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
PCD-AL1	2 O/O	Computer, Desktop, All-in-One M810Z	Lenovo (M700z) Lenovo (M700z)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	6-IT/Computers Unassigned
PMP-IF1	10 O/O	Pump, Infusion, Single Ivenix Large Volume Infusion Pump (LVP)	Fresenius Kabi USA (Ivenix Large Volume Infusion Pump (LVP)) Fresenius Kabi USA (Ivenix Large Volume Infusion Pump (LVP))	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
PMP-IFR	1 O/O	Pump, Infusion, Rapid Rapid Infuser RI-2 (750ml)	Belmont Medical Technologies (903-00039) Belmont Medical Technologies (903-00039)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
PMP-SAG	2 O/O	Pump, Suction/Aspirator, General, Portable SSCOR VX-2	SSCOR, Inc. (2310V) SSCOR, Inc. (2310V)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned

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PNU-STR	2 C/C	Pneumatic Tube System, Station 6" Recessed Station w/ IQ Panel	Swisslog Healthcare Solutions (56488101 + 56575103) Swisslog Healthcare Solutions (56488101 + 56575103)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
PRT-LBL	13 O/O	Printer, Label, Barcode GK420t (Thermal Transfer)	Zebra Technologies Corp (GK42-102510-000) Zebra Technologies Corp (GK42-102510-000)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	6-IT/Computers Unassigned
PRT-LSN	1 O/O	Printer, Laser, Network LaserJet Enterprise M605dn	Hewlett-Packard (E6B70A#BGJ) Hewlett-Packard (E6B70A#BGJ)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	6-IT/Computers Unassigned
PRT-MFC	6 O/O	Printer, Laser, Multifunction Color LaserJet Enterprise MFP M577f	Hewlett-Packard (B5L47A#BGJ) Hewlett-Packard (B5L47A#BGJ)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	6-IT/Computers Unassigned
PRT-MFL	4 O/O	Printer, Laser, Multifunction bizhub 558e	Konica Business Machines ( ) Konica Business Machines ( )	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	6-IT/Computers Unassigned
PRT-MFP	2 O/O	Printer, Laser, Multifunction HP LaserJet Pro MFP M479fdn	Hewlett-Packard (W1A79A#BGJ) Hewlett-Packard (W1A79A#BGJ)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	6-IT/Computers Unassigned
PRT-WRT	1 O/O	Printer, Wristband ZD510-HC (Healthcare, Direct Thermal)	Zebra Technologies Corp (DT ZD510-HC) Zebra Technologies Corp (DT ZD510-HC)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
PRT-WRT	2 O/O	Printer, Wristband ZD510-HC (Healthcare, Direct Thermal)	Zebra Technologies Corp (DT ZD510-HC) Zebra Technologies Corp (DT ZD510-HC)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	6-IT/Computers Unassigned
RCK-CRU	1 C/C	Rack, Crutch/Cane/Walker RR32 Universal Wall Storage (Pair)	Ideal Medical Products Inc. (RR32) Ideal Medical Products Inc. (RR32)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	1-Fixed Unassigned
RDC-CDD	1 O/O	Recorder, CD/DVD Discproducer PP-100III CD/DVD/Blu-ray	Epson America, Inc. (C11CH40001) Epson America, Inc. (C11CH40001)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
REF-19S	1 C/C	Refrigerator, Domestic FPRU19F8WF (19 cu.ft./Stainless Steel)	Frigidaire - Div. Electrolux (FPRU19F8WF) Frigidaire - Div. Electrolux (FPRU19F8WF)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned
REF-MDU	3 C/C	Refrigerator, Medical Grade, Undercounter Performance Plus REF4P-0R-00-00	Follett LLC (REF4P-0R-00-00) Follett LLC (REF4P-0R-00-00)	Project Draft (New)	ED Expansion Project ED Expansion ED Expansion Project	2-Movable, Elect Unassigned

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REF-USS	1	Refrigerator, Domestic, Undercounter	Summit Appliance (AL752BKSSTB)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	C/C	AL752BKSSTB (ADA Compliant)	Summit Appliance (AL752BKSSTB)	Draft (New)	ED Expansion Project	Unassigned
RFZ-10S	1	Refrigerator, Domestic with Freezer	Summit Appliance (FF1159SS)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	C/C	FF1159SS (10.3 cu.ft./Stainless Steel)	Summit Appliance (FF1159SS)	Draft (New)	ED Expansion Project	Unassigned
SCL-WHC	2	Scale, Clinical, Adult, Wheelchair	Hillrom - Scale-Tronix (6702W/60224/845010/845233)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	6702W Oversized Wheelchair w/Handrail,Ht Gauge,Pwr	Hillrom - Scale-Tronix (6702W/60224/845010/845233)	Draft (New)	ED Expansion Project	Unassigned
SCN-BCD	29	Scanner, Barcode	Zebra Technologies Corp (DS8178-SR7U2100SFW)	Project	ED Expansion Project ED Expansion	6-IT/Computers
	O/O	DS8100 Series Corded and Cordless Handheld Imagers	Zebra Technologies Corp (DS8178-SR7U2100SFW)	Draft (New)	ED Expansion Project	Unassigned
SCN-BCS	2	Scanner, Barcode	Zebra Technologies Corp (LS2208-SR20007R-NA)	Project	ED Expansion Project ED Expansion	6-IT/Computers
	O/O	Symbol LS2208 (USB Kit with Stand)	Zebra Technologies Corp (LS2208-SR20007R-NA)	Draft (New)	ED Expansion Project	Unassigned
SCN-CTP	5	Scanner, Document, Countertop	Fujitsu (PA03750-B005)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	fi-7030	Fujitsu (PA03750-B005)	Draft (New)	ED Expansion Project	Unassigned
SHP-WMT	30	Disposal, Sharps, Wall Mount	Stericycle (C-04RES-04/WB-04)	Project	ED Expansion Project ED Expansion	1-Fixed
	O/C	Bio Systems C-04RES-04 w/Locking Bracket	Stericycle (C-04RES-04/WB-04)	Draft (New)	ED Expansion Project	Unassigned
SPK-CLG	10	Speaker, Ceiling Mount - MUSIC	Black Diamond Video (BDV-CM-SPK)	Project	ED Expansion Project ED Expansion	1-Fixed
	C/C	BDV-CM-SPK (Electro-Voice EVID C8.2LP)	Black Diamond Video (BDV-CM-SPK)	Draft (New)	ED Expansion Project	Unassigned
STD-IV4	10	Stand, IV, Chrome	Steelcraft, Inc. (1099)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	1099 (5-leg, 4 hook)	Steelcraft, Inc. (1099)	Draft (New)	ED Expansion Project	Unassigned
STL-CSN	29	Stool, Exam, Cusion-Seat w/ Glides	Midmark Corporation - Medical (274-001)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Ritter 274 Classic Series	Midmark Corporation - Medical (274-001)	Draft (New)	ED Expansion Project	Unassigned
STL-SHR	3	Stool, Step, w/Handrail	Blickman Industries (1011251000)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	1251 Chrome	Blickman Industries (1011251000)	Draft (New)	ED Expansion Project	Unassigned
STR-BRI	1	Stretcher, Bariatric w/ Scale	Pedigo Products, Inc (7500-W-SPEC)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	7500 Wide Trauma / Transport Special Package	Pedigo Products, Inc (7500-W-SPEC)	Draft (New)	ED Expansion Project	Unassigned

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STR-GYN	1	Stretcher, Procedure, OB/GYN	Hillrom - Bed & Stretcher Group (P8050)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	OB-GYN P8050	Hillrom - Bed & Stretcher Group (P8050)	Draft (New)	ED Expansion Project	Unassigned
STR-PRC	31	Stretcher, Procedure / Recovery w/ 30" Mattress w/ Scale	Hillrom - Bed & Stretcher Group (P8000)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Procedural Stretcher P8000	Hillrom - Bed & Stretcher Group (P8000)	Draft (New)	ED Expansion Project	Unassigned
SVR-CWL	1	Server, Synchronized, Wireless Clock System	Primex, Inc ( )	Project	ED Expansion Project ED Expansion	1-Fixed
	C/C	OneVue Sync Transmitter	Primex, Inc ( )	Draft (New)	ED Expansion Project	Unassigned
TBL-CGR	1	Table, Changing, Infant, Wall Mount	Koala Kare Products (KB310-SSRE)	Project	ED Expansion Project ED Expansion	1-Fixed
TA-14	C/C	Horizontal Recessed Stainless Steel KB310-SSRE	Koala Kare Products (KB310-SSRE)	Draft (New)	ED Expansion Project	Unassigned
TEL-DKE	6	Telephone, Desktop, Analog (EMERGENCY-YELLOW)	TBD (TBD)	Project	ED Expansion Project ED Expansion	6-IT/Computers
	O/C	TBD	TBD (TBD)	Draft (New)	ED Expansion Project	Unassigned
TEL-DSK	33	Telephone, Desktop	TBD ( )	Project	ED Expansion Project ED Expansion	6-IT/Computers
	O/C	TBD	TBD ( )	Draft (New)	ED Expansion Project	Unassigned
TEL-WMT	3	Telephone, Wall	TBD ( )	Project	ED Expansion Project ED Expansion	6-IT/Computers
	O/C	TBD	TBD ( )	Draft (New)	ED Expansion Project	Unassigned
THM-STD	2	Thermometer, Digital	Hillrom - Welch Allyn, Inc. (01692-700/08273-000)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	SureTemp Plus 692 w/ M690 Mobile Stand	Hillrom - Welch Allyn, Inc. (01692-700/08273-000)	Draft (New)	ED Expansion Project	Unassigned
THM-TMP	3	Thermometer, Temporal Artery	Exergen Corp (124275)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	TAT 5000	Exergen Corp (124275)	Draft (New)	ED Expansion Project	Unassigned
TKC-IVP	29	Track, Ceiling, IV, Straight	A.R. Nelson Co. (4000B)	Project	ED Expansion Project ED Expansion	1-Fixed
	C/C	4000B Telescoping Bottle Holder (Straight)	Medline Industries Inc. (IV4000108A)	Draft (New)	ED Expansion Project	Unassigned
TRY-OBS	29	Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	Project	ED Expansion Project ED Expansion	0-Unassigned
	O/O	P490B - Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	Draft (New)	ED Expansion Project	Unassigned
TV4-3CM	4	Television, 36-43 in., Flat Panel	LG Commercial Products (43UT672M0UC)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	43 in. UT672M Series 4K UHD Pro:Centric Smart	LG Commercial Products (43UT672M0UC)	Draft (New)	ED Expansion Project	Unassigned

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TV4-3CM	1	Television, 36-43 in., Flat Panel	LG Commercial Products (43UT672M0UC)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/V	43 in. UT672M Series 4K UHD Pro:Centric Smart	LG Commercial Products (43UT672M0UC)	Draft (New)	ED Expansion Project	Unassigned
VNT-PTB	1	Ventilator, Portable	Philips Healthcare - Respironics ( )	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Trilogy EV-300	Philips Healthcare - Respironics ( )	Draft (New)	ED Expansion Project	Unassigned
VNT-TRP	1	Ventilator, Adult / Pediatric / Neonatal	Hamilton Medical, Inc. (161006)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Hamilton T1	Hamilton Medical, Inc. ( )	Draft (New)	ED Expansion Project	Unassigned
WHC-ADB	4	Wheelchair, Adult, Transport	STAXI Corporation Ltd. (RA010-C)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Ranger Chair w/ Cushion [RA010-C]	STAXI Corporation Ltd. (RA010-C)	Draft (New)	ED Expansion Project	Unassigned
WHL-ATR	4	Wheelchair, Adult, Transport	Stryker Medical (1460-000-000)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Prime TC (Swing Away Flip-up Footrests)	Stryker Medical (1460-000-000)	Draft (New)	ED Expansion Project	Unassigned
WMR-FLU	2	Warmer, Fluid/ Blood, Portable	3M Health Care (24500)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Ranger Blood/Fluid Warming System Model 245	3M Health Care (24500)	Draft (New)	ED Expansion Project	Unassigned
WMR-HYP	2	Warmer, Patient, Hypothermia	3M Infection Prevention Division (87500)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Bair Paws System Model 875	3M Infection Prevention Division (87500)	Draft (New)	ED Expansion Project	Unassigned
WSL-PH8	4	Waste Disposal, Pharmaceutical, Container	Bemis Manufacturing Company (4008050)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/O	Sentinel 4008 050 (8 Gallon)	Bemis Manufacturing Company (4008050)	Draft (New)	ED Expansion Project	Unassigned
WST-18W	44	Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Draft (New)	ED Expansion Project	Unassigned
WST-23B	1	Waste Can, Bio-Hazardous	Continental Commercial Products (23RD)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	23RD Step-On	Continental Commercial Products (23RD)	Draft (New)	ED Expansion Project	Unassigned
WST-23R	5	Waste Can, Recycle	Continental Commercial Products (8322-1)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1)	Draft (New)	ED Expansion Project	Unassigned
WST-23R	1	Waste Can, Recycle	Continental Commercial Products (8322-1)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1)	Draft (New)	ED Expansion Project	Unassigned

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WST-24W	7	Waste Can, Step-On	Rubbermaid Commercial Products (1883552)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	1883552 Slim Jim Resin Front Step 24 Gal Beige	Rubbermaid Commercial Products (1883552)	Draft (New)	ED Expansion Project	Unassigned
WST-28Q	21	Waste Can, Open Top	Continental Commercial Products (2818BK)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	2818BK (28 qt.)	Continental Commercial Products (2818BK)	Draft (New)	ED Expansion Project	Unassigned
WST-32W	1	Waste Can, 32-40 Gallon	Rubbermaid Commercial Products (FG263200GRAY/FG263100GRAY/FG264000BLA)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	2632 BRUTE Gray w/2631 Lid & 2640 Dolly	Rubbermaid Commercial Products (FG263200GRAY/FG263100GRAY/FG264000BLA)	Draft (New)	ED Expansion Project	Unassigned
WST-DLR	1	Waste Can, Dolly	Rubbermaid Commercial Products (1980602)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Slim Jim Resin Trainable Dolly	Rubbermaid Commercial Products (1980602)	Draft (New)	ED Expansion Project	Unassigned
WST-PLO	5	Waste Can, Roll Out/Pull Out w/ Trash And Recycle Can	Hafele America Co. ( )	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Waste Bin/Pull Out-KessebohmerTrack And Can-(1) Grey/Trash-(1) Blue/Recycle	Hafele America Co. ( )	Draft (New)	ED Expansion Project	Unassigned
WST-SWG	1	Waste Can, Swing Top	Rubbermaid Commercial Products (FG354060GRAY/FG267360GRAY)	Project	ED Expansion Project ED Expansion	3-Movable, Non-Elect
	O/O	Slim Jim Vented 23 Gal/Gray w/Swing Lid	Rubbermaid Commercial Products (FG354060GRAY/FG267360GRAY)	Draft (New)	ED Expansion Project	Unassigned
XRY-MBL	1	X-Ray Unit, Mobile, Digital	Carestream Health (1019397)	Project	ED Expansion Project ED Expansion	2-Movable, Elect
	O/V	DRX-Revolution	Carestream Health (1019397)	Draft (New)	ED Expansion Project	Unassigned

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Legend:
O - Owner Furnish/Install
C - Contractor Furnish/Install
V - Vendor Furnish/Install

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CRT-WOW	_____	O/O	Cart, Computer, Workstation [UltraLite 520 (LCD Mount, L500)]
CUR-CUB	_____	O/C	Curtain, Cubicle, Disposable [Curtain/Disposable]
DFB-PCE	_____	O/O	Defibrillator, Monitor, w/Pacing [R Series Plus w/Exp Pkg and Pacing]
DIA-RNL	EXISTING	O/O	Dialysis Unit, Renal Replacement [PrismaFlex]
DOP-VSC	_____	O/O	Doppler, Vascular [Dopplex D900 w/EZ8 Probe]
DSL-2GW	_____	O/C	Disposal, Sharps, Wall Mount [Bio Systems C-02RES-0203-OC]
DSP-CLN	_____	O/C	Dispenser, Cleaning Solution [J-Fill QuattroSelect (Air Gap)]
DSP-DWP	_____	O/C	Dispenser, Disinfectant Wipes, Wall Mount [MSC351128]
DSP-EMS	_____	O/C	Dispenser, Emesis Bag, Wall Mount [NONEMBGDISP]
DSP-GV3	_____	O/C	Dispenser, Glove, Triple Box [305362 Clear PETG]
DSP-HSZ	_____	O/C	Dispenser, Hand Sanitizer, Wall Mount [Purell ES8 Touch-Free (7724-01)]
DSP-MAU	_____	O/V	Dispenser, Medication, Auxiliary [Pyxis MedStation 4000 (7-Drwr, 7 Cubie)]
DSP-MDM	_____	O/V	Dispenser, Medication, Host (Main) [MedStation 4000 (6-Drwr, 3 Cubie)]
DSP-MLK	_____	O/V	Dispenser, Medication, Lock Module [SMART Remote Manager]
DSP-MTS	_____	O/V	Dispenser, Medication, Auxiliary [Pyxis MedStation ES Single Column]
DSP-PPE	_____	O/C	Dispenser, Personal Protection, Wall Mount, Recessed [RE101-0012 Semi-Recessed]
DSP-PSS	TA-09	O/C	Dispenser, Paper Towel, Surface Mount, Stainless Steel [SCOTTFOLD Compact [09216]]
DSP-SPG	TA-10	O/C	Dispenser, Soap, Wall Mount [PURELL CS4 Soap Dispenser Push-Style (Graphite)]
DSP-STN	TA-03	C/C	Dispenser, Sanitary Napkin, Stainless Steel [B-35139 TrimLine Series Surface-Mounted]
DSP-TLP	TA-02	O/C	Dispenser, Toilet Paper, Surface Mount, Stainless Steel [Coreless Double Roll [09606]]
DSP-TSC	TA-04	O/C	Dispenser, Toilet Seat Cover [Scott Personal Seat Cover Dispenser]
DSP-WCT	_____	O/C	Dispenser, Water, Filtered [Innowave Chiller 3]
DSY-OTO	_____	O/C	Diagnostic System, Integrated [Green Series 777 [77791-2MPX]]
ECG-CRT	_____	O/O	Electrocardiograph (ECG), Interpretive [MAC VU360 Resting ECG Workstation w/ Basic Trolley]
HMP-32G	_____	O/O	Hamper, Linen [Delta 32 Gallon Linen Hamper]
HOK-COT	TA-11	C/C	Hook, Coat/Robe, Wall Mount [B-9542 Surface-Mounted Coat Hook]
HYP-GEN	_____	O/O	Hypo-Hyperthermia Unit, General [Arctic Sun 5000e]
ICE-7CT	_____	C/C	Ice Machine, Dispenser, Nugget, Countertop [7 Series 7CI100A-IW-CF-ST-00]
ICE-C12	_____	C/C	Ice Machine, Dispenser, Nugget, Countertop [Symphony Plus 12CI425A-S]
ICE-FLT	_____	C/C	Water Treatment System, Ice Maker, Wall Mount [Standard Capacity Filter System 00130229]
IMG-BLD	_____	O/O	Ultrasound, Imaging, Urology [BladderScan Prime w/Mobile Cart]
IMG-UMP	_____	O/O	Ultrasound, Imaging, Multipurpose [LOGIQ E10]
INS-SRG	_____	O/O	Instruments, Surgical,
LFT-O1B	EXISTING	O/V	Lift, Patient, Ceiling, 1-Bed [MS 1000 4F ECS w/ Scale]
LOC-VEN	_____	O/O	Locator, Vein [AV500 Vein Viewing System]
LRY-SMB	_____	O/O	Laryngoscope Set, Video [GlideScope Core Single-Use Premium WS + BFlex]
MDG-AIR	_____	O/O	Flowmeter, Air [Chrome (0-15 lpm, Ohmeda, Power Take Off)]
MDG-OXF	_____	O/O	Flowmeter, Oxygen [Chrome (0-15 lpm, Ohmeda, Power Take Off)]
MDG-SCI	_____	O/O	Regulator, Suction, Intermittent/Continuous [PM3303 (DISS HT/Tubing Npl)]
MIR-V24	TA-12	C/C	Mirror, Vanity [B-166 - 2448]
MON-BSM	_____	O/O	Monitor, Physiologic, Bedside, With Mobile Stand [Intellivue MP5 (4 wave w/stand)]

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Cutsheets
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Alt ID	Item ID	F / I	Description
MON-CNS	_____	O/O	Monitor, Central Station, 9 - 15 Patient [IntelliVue]
MON-GLC	_____	O/O	Monitor, Blood Glucose, Point-of-Care [ACCU-CHEK Inform II Meter & Base Unit]
MON-PHS	_____	O/O	Monitor, Physiologic, Bedside [IntelliVue MP30]
MON-VSS	_____	O/O	Monitor, Physiologic, Vital Signs, w/Stand [Connex Spot 7500 Wireless (BP, Covidien SpO2, SureTemp)]
MTP-RFZ	_____	O/O	Monitor, Temperature, Refrigerator/Freezer [Traceable Hi-Accuracy Refrigerator Thermometer]
OVM-CTS	_____	C/C	Oven, Domestic, Microwave, Countertop [SCM853]
PCD-AL1	_____	O/O	Computer, Desktop, All-in-One [M810Z]
PMP-IF1	_____	O/O	Pump, Infusion, Single [Ivenix Large Volume Infusion Pump (LVP)]
PMP-IFR	_____	O/O	Pump, Infusion, Rapid [Rapid Infuser RI-2 (750ml)]
PMP-SAG	_____	O/O	Pump, Suction/Aspirator, General, Portable [SSCOR VX-2]
PNU-STR	_____	C/C	Pneumatic Tube System, Station [6" Recessed Station w/ IQ Panel]
PRT-LBL	_____	O/O	Printer, Label, Barcode [GK420t (Thermal Transfer)]
PRT-LSN	_____	O/O	Printer, Laser, Network [LaserJet Enterprise M605dn]
PRT-MFC	_____	O/O	Printer, Laser, Multifunction [Color LaserJet Enterprise MFP M577f]
PRT-MFL	_____	O/O	Printer, Laser, Multifunction [bizhub 558e]
PRT-MFP	_____	O/O	Printer, Laser, Multifunction [HP LaserJet Pro MFP M479fdn]
PRT-WRT	_____	O/O	Printer, Wristband [ZD510-HC (Healthcare, Direct Thermal)]
RCK-CRU	_____	C/C	Rack, Crutch/Cane/Walker [RR32 Universal Wall Storage (Pair)]
RDC-CDD	_____	O/O	Recorder, CD/DVD [Discproducer PP-100III CD/DVD/Blu-ray]
REF-19S	_____	C/C	Refrigerator, Domestic [FPRU19F8WF (19 cu.ft./Stainless Steel)]
REF-MDU	_____	C/C	Refrigerator, Medical Grade, Undercounter [Performance Plus REF4P-0R-00-00]
REF-USS	_____	C/C	Refrigerator, Domestic, Undercounter [AL752BKSSTB (ADA Compliant)]
RFZ-10S	_____	C/C	Refrigerator, Domestic with Freezer [FF1159SS (10.3 cu.ft./Stainless Steel)]
SCL-WHC	_____	O/O	Scale, Clinical, Adult, Wheelchair [6702W Oversized Wheelchair w/Handrail,Ht Gauge,Pwr]
SCN-BCD	_____	O/O	Scanner, Barcode [DS8100 Series Corded and Cordless Handheld Imagers]
SCN-BCS	_____	O/O	Scanner, Barcode [Symbol LS2208 (USB Kit with Stand)]
SCN-CTP	_____	O/O	Scanner, Document, Countertop [fi-7030]
SHP-WMT	_____	O/C	Disposal, Sharps, Wall Mount [Bio Systems C-04RES-04 w/Locking Bracket]
SPK-CLG	_____	C/C	Speaker, Ceiling Mount - MUSIC [BDV-CM-SPK (Electro-Voice EVID C8.2LP)]
STD-IV4	_____	O/O	Stand, IV, Chrome [1099 (5-leg, 4 hook)]
STL-CSN	_____	O/O	Stool, Exam, Cusion-Seat w/ Glides [Ritter 274 Classic Series]
STL-SHR	_____	O/O	Stool, Step, w/Handrail [1251 Chrome]
STR-BRI	_____	O/O	Stretcher, Bariatric w/ Scale [7500 Wide Trauma / Transport Special Package]
STR-GYN	_____	O/O	Stretcher, Procedure, OB/GYN [OB-GYN P8050]
STR-PRC	_____	O/O	Stretcher, Procedure / Recovery w/ 30" Mattress w/ Scale [Procedural Stretcher P8000]
SVR-CWL	_____	C/C	Server, Synchronized, Wireless Clock System [OneVue Sync Transmitter]
TBL-CGR	TA-14	C/C	Table, Changing, Infant, Wall Mount [Horizontal Recessed Stainless Steel KB310-SSRE]
TEL-DKE	_____	O/C	Telephone, Desktop, Analog (EMERGENCY-YELLOW) [TBD]
TEL-DSK	_____	O/C	Telephone, Desktop [TBD]
TEL-WMT	_____	O/C	Telephone, Wall [TBD]
THM-STD	_____	O/O	Thermometer, Digital [SureTemp Plus 692 w/ M690 Mobile Stand]

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Specification Cutsheets
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University Hospital - ED Expansion Project
Cover Sheet

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Amplifier, Power, Stereo**

Manufacturer: Black Diamond Video ((877) 549-6600)

Vendor: Black Diamond Video ((877) 549-6600)

Model: Samson SERVO 120A

Alt ID: AMF-SRO

Mfr #: BDV-AMP

Vendor #: BDV-AMP

Single rack-space stereo power amplifier. delivers 60 watts of power per channel into 4 Ohms (or, in Bridge mode, 120 watts into 8-Ohms) over the full frequency spectrum, from 3 Hz to 65 kHz. Both balanced 1/4? TRS and unbalanced RCA-type input connectors are provided, along with 5-way binding post output connectors.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	19.00 in (483 mm)	**Left:**	N/A
Depth:	11.50 in (292 mm)	**Right:**	N/A
Height:	1.75 in (44 mm)	**Front:**	N/A
Max Weight:	15 lbs (6.8 kg)	**Back:**	N/A
Mounting:	Special	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	N/A
Hz:	60	**Amps:**	N/A
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Rack mounted

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	ZZZ	Miscellaneous Costs	Project	Draft (New)	1	
				Total:	**1**	

PRO

AMPLIFIERS

PRODUCT SPECIFICATION SHEET

TYPE:
POWER AMPLIFIERS

SAMSON

PRODUCT
SERVO 120A

DESCRIPTION
POWER AMPLIFIER

SERIES
SERVO

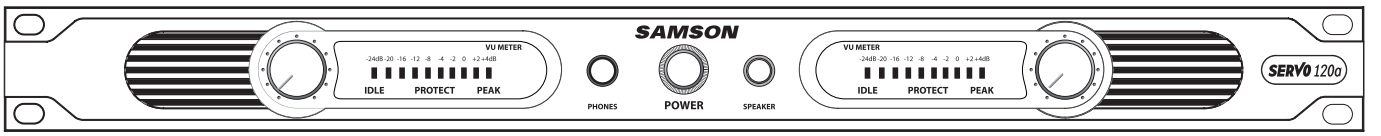
CATEGORY
AMPLIFIERS

GENERAL DESCRIPTION

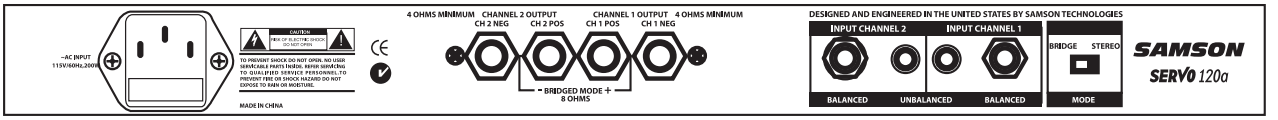
The Servo 120a is a single rack-space stereo power amplifier which is optimized for use in both professional and project recording studio environments as well as for live performance. It delivers 60 watts of power per channel into 4 Ohms (or, in Bridge mode, 120 watts into 8-Ohms) over the full frequency spectrum, from 3 Hz to 65 kHz. Both balanced 1/4″ TRS and unbalanced RCA-type input connectors are provided, along with 5-way binding post output connectors. Front-panel controls and displays include a power switch, independent left- and right-channel input level controls, ten-segment LED meters, a Protection LED, and a convenient headphone jack and speaker on/off switch for private cue monitoring. Suggested applications for the Servo 120a include:

- Amplification for nearfield monitors or cue headphones in both professional and project studios - Its superb audio specs and whisper-quiet performance (its convection cooling design means there is no fan), along with its unique front-panel speaker on-off switch and dedicated headphone jack, make the Servo 120a the perfect complement to any recording studio.
- Home Theatre applications - The power and flexibility offered by the Servo 120a (it can be used either as a 60 watt stereo amplifier, or, in bridge mode, as a 120 watt monophonic amp) makes it the perfect addition to any home theatre, in conjunction with any DVD player or other surround sound system. For example, use it in stereo mode to drive your main front left/right speakers, using your home stereo to drive the rear satellite speakers—or use the Servo 120a in Bridge mode to drive your center channel or subwoofer with power galore.
- As an extension to a home hi-fi system - The Servo 120a boasts professional specs which far exceed that of most consumer products. For a real “studio” experience in your own home, try connecting your home hi-fi amplifier’s auxiliary outputs to the Servo 120a’s inputs (thus using your hi-fi amp as a preamplifier) and then connect your existing speakers to the Servo 120a’s outputs. If you fall in love with the sound (as we’re sure you will), you might want to substitute a professional pre-amplifier for your existing hi-fi amp—and, from there, you may well end up graduating to higher-level speakers. High quality sound is addicting—don’t say we didn’t warn you!
- Powering public address systems in permanent installations - The Servo 120a can be used to effectively drive PA speakers in installations such as classrooms and corporate conference rooms.
- Onstage monitoring - In small and medium-sized onstage areas (such as in clubs, lounges, etc.), the Servo 120a can be used to drive stage monitors, allowing the performers to hear themselves without having to rely on onstage equipment amplification.
- MIDI rack monitoring - Taking only a single rack space, MIDI musicians can easily incorporate the Servo 120a into their existing rack of gear. Combined with a pair of high quality stage or studio speakers, this makes for an excellent monitoring system that can accurately reproduce the broad range of frequencies typically output by devices such as synthesizers, samplers, and digital audio workstations.

FRONT PANEL



BACK PANEL



PRODUCT SPECIFICATION SHEET

SERIES
SERVO 120A

DESCRIPTION
POWER AMPLIFIER

CATEGORY
AMPLIFIERS

SERVO 120A

FEATURES

> Power to spare - Each channel delivers 60 watts of power into 4 Ohms (or, in Bridge mode, 120 watts into 8 Ohms).

> Clean, crisp sound - Impressive audio specifications such as .01% THD, S/N of 105 dB, crosstalk of 75 dB, and frequency response of 3 Hz to 65 kHz guarantee ultra-clean sound quality in any live or recording environment.

> Independent input level controls for each channel with 41-position detents.

> Ten-segment LED meters for each channel continuously display power output levels and allow you to correct for overloading (clipping) conditions.

> Front-panel Protection LED shows you at a glance overheating or faulty wiring conditions.

> Innovative front-panel Speaker on/off switch and dedicated headphone jack enables private cue monitoring of the input signal.

> Both electronically balanced 1/4″ TRS and unbalanced RCA-type input connector jacks are provided along with 5-way binding post output connectors.

> Convection cooling (no fan) makes for whisper-quiet operation even in critical listening environments such as recording studios.

> Unique bipolar circuit design that continuously keeps DC output during idling at or near 0 volts (thus keeping idle speakers at their zero point). This serves to minimize heat overload problems by effectively preventing the Servo 120a from applying power when unnecessary.

> Protection relay circuitry (linked to the DC offset circuitry) that prevents “thumps” when powering on or off. This means that you can use the Servo 120a with a single power strip into which a mixer or other audio devices are connected, without danger of damage to connected speakers.

> Toroidal transformer power supply.

> Rugged construction (an all-steel chassis with a titanium finish and a lightweight anodized aluminum heat sink) makes the Servo 120a eminently roadworthy.

> Flexible design allows the Servo 120a to be used free-standing or, with the use of included rack ears, mounted in any standard 19″ rack (taking just a single rack space).

> Three-year warranty.

ARCHITECT’S & ENGINEER’S SPECIFICATIONS

The Samson Servo 120a shall be a single space rackmount stereo power amplifier. It shall deliver 60 watts per channel at 4 Ohms or 120 watts into 8 Ohms in bridge mono mode. It shall have 1/4″ balanced inputs and RCA unbalanced inputs. It shall be a bi-polar design and use a toroidal transformer. The front panel shall have volume controls and LED metering for each channel. The front panel shall also have a headphone output jack and an associated speaker mute switch. The rear panel shall also have binding posts for the amplifier outputs.

SERVO 120A SPECIFICATIONS

Rated Output Power, per channel (@ 1 kHz)
Stereo mode
4 Ohm, <0.05% THD+N ..... 60 W
4 Ohm, 1% THD+N ..... 80 W
8 Ohm, <0.05% THD+N ..... 50 W
8 Ohm, 1% THD+N ..... 55 W

Bridge mode
8 Ohm, <0.05% THD+N ..... 120 W
8 Ohm, 1% THD+N ..... 150 W

Typical Distortion, per channel
THD+N (80 kHz LPF @ 1 kHz rated output power).... 0.01%
IMD (SMPTE 4:1, 60 Hz & 7 kHz @ rated output power)... 0.03%

Signal To Noise Ratio
(22Hz - 22kHz bandwidth @ 1dB below rated output power)..... 105 dB

Frequency Response..... 10 Hz - 20 kHz +0, -0.5 dB
3 Hz - 65 kHz, +0, -3.0 dB

Input Sensitivity..... -10dBv on the RCA inputs, +4 dBu on the 1/4" inputs to achieve rated power. (Level control set to maximum)

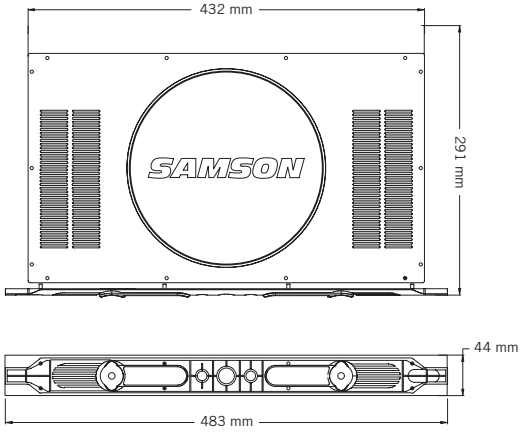
Crosstalk (adjacent channels) ..... -75 dB, 1 kHz

Output DC Offset Voltage ..... ± 50 mV, DC Servo Controlled

Headphone Output Level..... 400 mW (into 100Ω @ 1% THD+N)

Dimensions (W x D x H) ..... 19″ x 11.5″ x 1.75″
483mm x 292mm x 44mm

Weight..... 15.4 lbs (7 kg)



Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Analyzer, Lab, Urinalysis, Semi-Automated**

Alt ID: ANZ-URN

Manufacturer: Siemens Healthcare Diagnostics ((847) 267-5300)

Mfr #: 1780

Vendor: Siemens Healthcare Diagnostics ((847) 267-5300)

Vendor #: 1780

Model: Clinitek Status +

Semi-Automated Urinalysis Lab Analyzer. Features: for routine urine tests (albumin, bilirubin, creatine, glucose, ketone, leukocytes, nitrite, pH, protein, specific gravity, urobilinogen) in urine samples. Automatic checks of test strips for humidity exposure and strip identification. Touch screen, RS232 interface. Connectivity to data management software or LIS/HIS.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	6.70 in (170 mm)	**Left:**	N/A
Depth:	10.70 in (272 mm)	**Right:**	N/A
Height:	6.20 in (157 mm)	**Front:**	N/A
Max Weight:	4 lbs (1.7 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	110	**Watts:**	N/A
Hz:	60	**Amps:**	N/A
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Electrical Requirements:
Connect power cord to AC electrical wall outlet. Electrical Rating: 100V - 240V AC, 50-60 Hz (with in-line lead)

Power 9V DC, 7.2 VA
or Battery Powered: 6 AA batteries

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
				Total:	**1**	

SIEMENS

www.siemens.com/diagnostics

Convenient Point-of-Care Urinalysis with Improved Clinical Information

The CLINITEK Status+ Analyzer—Improved data integrity with enhanced clinical information for point-of-care urinalysis testing

Automatic Checks

The CLINITEK Status®+ Analyzer is a CLIA-waived, point-of-care urinalysis analyzer that automates testing and provides improved clinical information when using new urinalysis test strips by Siemens Healthcare Diagnostics.

Ease of Use/Convenience

- Simple, intuitive touch screen operation
- Load test—analyzer does the rest
- Fast results—in-office test results in about 1 minute
- Automatic printed report—no manual transcription needed

Improved Data Integrity

- New analyzer, along with patented test strip technology, enables automatic checks (Auto-Checks) for:
  - Identification of Siemens strip type
  - Sample interference notes if common sample interferences are detected–availability dependent on strip type (This feature is not available in the U.S.)
  - Automatic error messages if strip has been exposed to humidity—only available with test strips that have the leukocyte pad
- Removes subjectivity of visual read results

Complete Point-of-Care Test Portfolio

- Multistix 10SG is the most widely used urinalysis test strip for routine testing
- Albumin-to-creatinine ratio automatically calculated with CLINITEK Microalbumin strips for early detection of kidney disease in patients with diabetes
- Analyzer accommodates cassette for CLINITEST® hCG testing for pregnancy

Future Ready

- Upgrade kits are available:
  - For analyzer connectivity to LIS/HIS, EMR (Electronic Medical Record) or data management software
  - For barcode reading capability

Answers for life.

CLINITEK Status+ Analyzer Specifications

Intended Use

The CLINITEK Status®+ Analyzer is a point-of-care urinalysis analyzer designed to read only Siemens Healthcare Diagnostics urine test strips and CLINITEST hCG cassettes.

Semi-quantitative Tests Measured

Routine urine tests: albumin, bilirubin, creatinine, glucose, ketone, leukocytes, nitrite, pH, protein, specific gravity, and urobilinogen

Kidney disease test: albumin-to-creatinine ratio

Pregnancy Test: Human Chorionic Gonadotropin (hCG)

User Interface

Touch Screen

Computer Interface

Uni-directional via Serial Port (RS232)

Data Entry

On-board Touch Screen

Power Requirements

Electrical Rating	100V - 240V AC, 50-60 Hz (with in-line lead)
Battery Operation	6 AA Batteries, non-rechargable

Dimensions/Weight

Depth:	10.70 in. or 27.2 cm
Width:	6.70 in. or 17.1 cm
Height:	6.20 in. or 15.8 cm
Weight:	3.65 lbs or 1.66 kg

Operation

Temperature Range:	18 to 30°C (64 to 86°F)
Humidity Range:	18-80% Relative Humidity, non-condensing

Calibration

Automatic, self-calibrating

Compliance

CLIA-waived, CE-marked, UL, EMC

New Features

Memory

Patient Test Results	950
QC Test Results	0
Operator IDs	700

Automatic Checks (Auto-Checks)*

Identification of strip type

Humidity exposure tested on every strip with leukocyte pad

Common sample-interference check available depending upon strip type (Not available in the U.S.)

* Available only when using Siemens test strips with IR or color bands.

Siemens Healthcare Diagnostics, a global leader in clinical diagnostics, provides healthcare professionals in hospital, reference, and physician office laboratories and point-of-care settings with the vital information required to accurately diagnose, treat, and monitor patients. Our innovative portfolio of performance-driven solutions and personalized customer care combine to streamline workflow, enhance operational efficiency, and support improved patient outcomes.

Product availability may vary from country to country and is subject to varying regulatory requirements. Please contact your local representative for availability.

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www.siemens.com/diagnostics

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Bar, Grab, Toilet/Shower

Alt ID: BAR-G18

Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Mfr #: B-6806 x 18

Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Vendor #: B-6806 x 18

Model: B-6806 x 18 Straight Grab Bar

Grab bar. 18 inches long. Stainless steel with satin-finish. 18-gauge wall thickness and 1-1/2 inch outside diameter. Concealed mounting flange 1/8 inch thick, type 304 stainless steel plate 2in.W x 3 1/8in.H with screw holes for concealed anchors. can support loads in excess of 250 pounds. Contributes to LEED.

Item ID: TA-07A

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	18.00 in (457 mm)	**Left:**	N/A
Depth:	3.00 in (76 mm)	**Right:**	N/A
Height:	3.25 in (83 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.5 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect bar mounted horizontally.
Clearance between the grab bar and wall 1-1/2 inches.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	Provide blocking as required.
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	Provide blocking as required.
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	Provide blocking as required.
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	Provide blocking as required.
				Total:	**8**	

BOBRICK

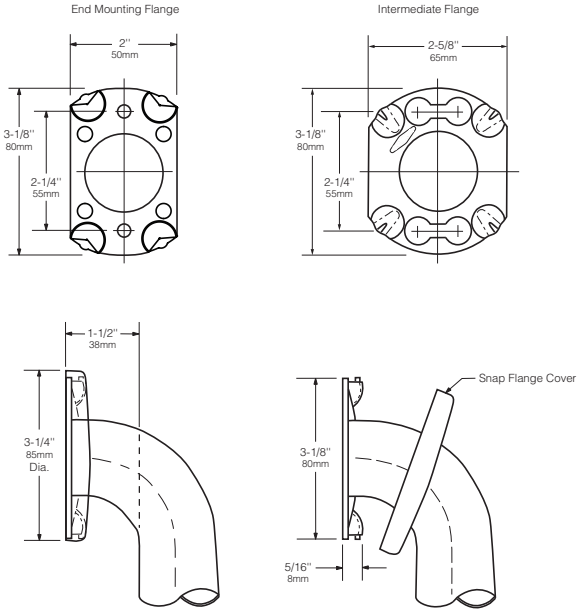
Technical Data

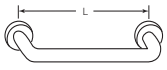
1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

B-6806 SERIES

Specify Finish Required:

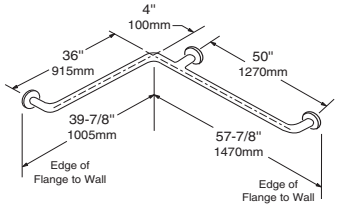
- ☐ Satin-finish, slip-resistant surface
- ☐ Peened surface; add suffix .99 to model number





HORIZONTAL

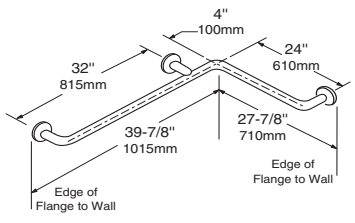
VERTICAL



TWO-WALL WHEELCHAIR COMPARTMENT

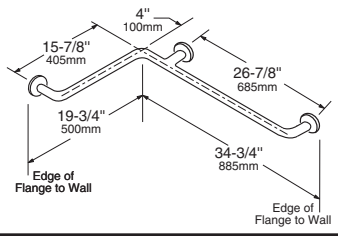
B-6806 x 12, 18, 24, 30, 36, 42, 48

B-68137



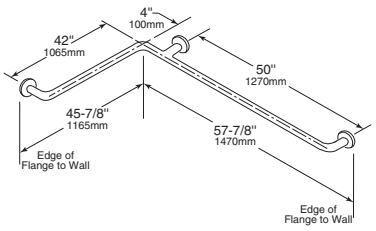
HORIZONTAL TUB / SHOWER COMPARTMENT BAR 24 x 36

B-68616



HORIZONTAL TWO-WALL BAR for Shower Stall

B-6861



TWO-WALL TOILET COMPARTMENT BAR 42 x 54

B-6897

continued . . .

Rev. 11/11/19 S/B Printed in U.S.A.

MATERIALS:

Grab Bar — 18-8 S, type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish, slip-resistant surface. 1-1/2" (38mm) outside diameter. Ends are heliarc welded to flanges. Clearance between the grab bar and wall is 1-1/2" (38mm).

Concealed Mounting Flanges — 18-8 S, type-304, 11-gauge (3.2mm) thick, stainless steel plate; end flanges 2" x 3-1/8" (50 x 80mm) with holes for attachment to wall. Intermediate flanges 2-5/8" x 3-1/8" (65 x 80mm) wide x 3-1/8" (80mm) diameter.

Snap Flange Covers — 18-8 S, type-304, 22-gauge (0.8mm) drawn stainless steel with satin-finish. 3-1/4" (85mm) diameter x 1/2" (13mm) deep. Each cover snaps over mounting flange to conceal mounting screws.

STRENGTH:

Bobrick grab bars that provide 1-1/2" (38mm) clearance from wall can support loads in excess of 900 pounds (408kg) if properly installed. Other grab bar configurations can support loads in excess of 250 pounds (113kg) if properly installed, complying with accessible design (including ADAAG in the U.S.A.) for structural strength

Safety Warning: Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observed damage to the welds.

INSTALLATION:

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten concealed mounting flanges to anchor device or backing with at least two screws opposing each other in each flange. Snap flange covers over each mounting flange to conceal mounting screws. Concealed anchor devices and mounting screws are not included with Bobrick grab bars and must be specified as an accessory.

For Grab Bars with an Intermediate Flange(s), Pull Snap-Flange Covers away from mounting flanges. Place grab bar in desired mounting location. Use intermediate flange as a template to mark location of mounting screws at intermediate flange only. Mark screw locations at the center of the slot in the middle of the double-keyhole shaped mounting holes (2) in the intermediate flange. Remove grab bar from wall. Drive the intermediate flange mounting screws into wall at marked locations. **Note:** Make sure to leave a space of just over 1/8" (3.17mm) between the underside of the screw head and the wall. Install grab bar on the wall by placing the round ends of the intermediate flange double-keyhole shaped mounting holes over the mounting screws (2) are located in the middle of the flange slots. Install the mounting screws into the wall at the end flanges and secure tightly. Tighten the mounting screws at the intermediate flange. Press all snap-flange covers into place to conceal mounting flanges.

Note: Recommend use of 1/4" or #14 sheet metal or wood screws to install Intermediate Flange. #12 screws may also be used.

Important Notes:

1. **Mounting Kits —** Bobrick offers a mounting kit for installing grab bars; **one Bobrick mounting kit is required for each flange.**

Mounting Kit No.	Description
252-30	Consists of # (3) 14 x 2½" type-304 stainless steel, Phillips round-head, sheet-metal screws.

2. **Grab Bar Fastener —** Bobrick offers a grab bar fastening system that secures all Bobrick grab bar series; **one Bobrick fastener is required for each flange.** Install grab bar without backing in wall requires minimum 5/8" (16mm) thick painted or tiled drywall.

WingIt™ Fastener No.	Description
251-4	Consists of 10–32 x 5/16" round-head, Phillips 18/8 stainless steel screws. (1) WingIt grab bar fastener.

3. **Optional Anchor Device —** Bobrick grab bar anchor device includes stainless steel machine screws to be used for attaching grab bars to anchors. **one Bobrick concealed anchor device is required for each flange.**

Optional Anchor No.	Description
2583	Anchor for 3/4" to 1" (19-25mm) panel 1 anchor required for each flange.
2586	Anchor for 1/2" to 1" (13mm) panel 1 anchor required for each flange.

SPECIFICATION:

Grab bar shall be type-304 stainless steel with satin-finish, slip-resistant surface. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1-1/2" (38mm) outside diameter. Clearance between the grab bar and wall shall be 1-1/2" (38mm). Concealed mounting flanges shall be 11-gauge (3.2mm) thick stainless steel plate, 2" x 3-1/8" (50 x 80mm), and equipped with at least two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8mm), 3-1/4" (85mm) diameter x 1/2" (13mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG in the U.S.A.) for structural strength.

Grab Bar shall be Model _____ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Bar, Grab, Toilet/Shower w/ Peened Surface** **Alt ID:** BAR-G18

Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600) **Mfr #:** B-6806 x 18 w/ Peened Surface

Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600) **Vendor #:** B-6806 x 18 w/ Peened Surface

Model: B-6806 x 18 Straight Grab Bar

Grab bar. 18 inches long. Stainless steel with satin-finish. 18-gauge wall thickness and 1-1/2 inch outside diameter. Concealed mounting flange 1/8 inch thick, type 304 stainless steel plate 2in.W x 3 1/8in.H with screw holes for concealed anchors. can support loads in excess of 250 pounds. Contributes to LEED.

Item ID: TA-07B

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	18.00 in (457 mm)	**Left:**	N/A
Depth:	3.00 in (76 mm)	**Right:**	N/A
Height:	3.25 in (83 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.5 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect bar mounted horizontally.
Clearance between the grab bar and wall 1-1/2 inches.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	Provide blocking as required.
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	Provide blocking as required.
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	Provide blocking as required.
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	Provide blocking as required.
				Total:	**8**	

BOBRICK

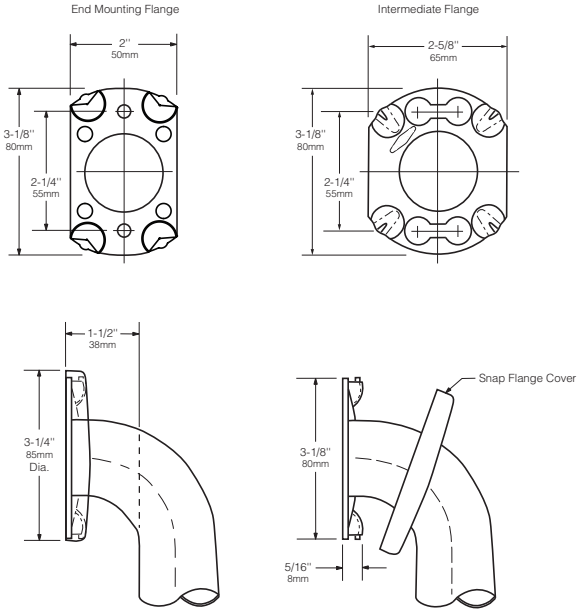
Technical Data

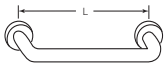
1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

B-6806 SERIES

Specify Finish Required:

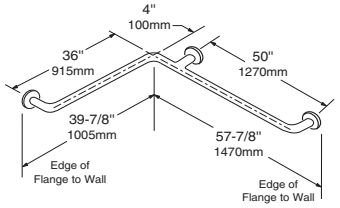
- ☐ Satin-finish, slip-resistant surface
- ☐ Peened surface; add suffix .99 to model number





HORIZONTAL

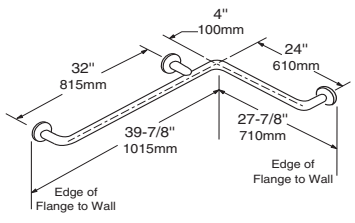
VERTICAL



TWO-WALL WHEELCHAIR COMPARTMENT

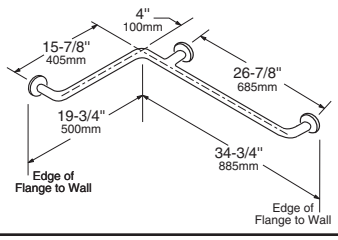
B-6806 x 12, 18, 24, 30, 36, 42, 48

B-68137



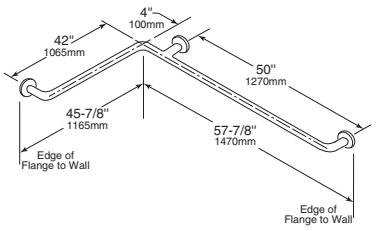
HORIZONTAL TUB / SHOWER COMPARTMENT BAR 24 x 36

B-68616



HORIZONTAL TWO-WALL BAR for Shower Stall

B-6861



TWO-WALL TOILET COMPARTMENT BAR 42 x 54

B-6897

continued . . .

Rev. 11/11/19 S/B Printed in U.S.A.

MATERIALS:

Grab Bar — 18-8 S, type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish, slip-resistant surface. 1-1/2" (38mm) outside diameter. Ends are heliarc welded to flanges. Clearance between the grab bar and wall is 1-1/2" (38mm).

Concealed Mounting Flanges — 18-8 S, type-304, 11-gauge (3.2mm) thick, stainless steel plate; end flanges 2" x 3-1/8" (50 x 80mm) with holes for attachment to wall. Intermediate flanges 2-5/8" x 3-1/8" (65 x 80mm) wide x 3-1/8" (80mm) diameter.

Snap Flange Covers — 18-8 S, type-304, 22-gauge (0.8mm) drawn stainless steel with satin-finish. 3-1/4" (85mm) diameter x 1/2" (13mm) deep. Each cover snaps over mounting flange to conceal mounting screws.

STRENGTH:

Bobrick grab bars that provide 1-1/2" (38mm) clearance from wall can support loads in excess of 900 pounds (408kg) if properly installed. Other grab bar configurations can support loads in excess of 250 pounds (113kg) if properly installed, complying with accessible design (including ADAAG in the U.S.A.) for structural strength

Safety Warning: Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observed damage to the welds.

INSTALLATION:

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten concealed mounting flanges to anchor device or backing with at least two screws opposing each other in each flange. Snap flange covers over each mounting flange to conceal mounting screws. Concealed anchor devices and mounting screws are not included with Bobrick grab bars and must be specified as an accessory.

For Grab Bars with an Intermediate Flange(s), Pull Snap-Flange Covers away from mounting flanges. Place grab bar in desired mounting location. Use intermediate flange as a template to mark location of mounting screws at intermediate flange only. Mark screw locations at the center of the slot in the middle of the double-keyhole shaped mounting holes (2) in the intermediate flange. Remove grab bar from wall. Drive the intermediate flange mounting screws into wall at marked locations. **Note:** Make sure to leave a space of just over 1/8" (3.17mm) between the underside of the screw head and the wall. Install grab bar on the wall by placing the round ends of the intermediate flange double-keyhole shaped mounting holes over the mounting screws (2) are located in the middle of the flange slots. Install the mounting screws into the wall at the end flanges and secure tightly. Tighten the mounting screws at the intermediate flange. Press all snap-flange covers into place to conceal mounting flanges.

Note: Recommend use of 1/4" or #14 sheet metal or wood screws to install Intermediate Flange. #12 screws may also be used.

Important Notes:

1. **Mounting Kits —** Bobrick offers a mounting kit for installing grab bars; **one Bobrick mounting kit is required for each flange.**

Mounting Kit No.	Description
252-30	Consists of # (3) 14 x 2½" type-304 stainless steel, Phillips round-head, sheet-metal screws.

2. **Grab Bar Fastener —** Bobrick offers a grab bar fastening system that secures all Bobrick grab bar series; **one Bobrick fastener is required for each flange.** Install grab bar without backing in wall requires minimum 5/8" (16mm) thick painted or tiled drywall.

WingIt™ Fastener No.	Description
251-4	Consists of 10–32 x 5/16" round-head, Phillips 18/8 stainless steel screws. (1) WingIt grab bar fastener.

3. **Optional Anchor Device —** Bobrick grab bar anchor device includes stainless steel machine screws to be used for attaching grab bars to anchors. **one Bobrick concealed anchor device is required for each flange.**

Optional Anchor No.	Description
2583	Anchor for 3/4" to 1" (19-25mm) panel 1 anchor required for each flange.
2586	Anchor for 1/2" to 1" (13mm) panel 1 anchor required for each flange.

SPECIFICATION:

Grab bar shall be type-304 stainless steel with satin-finish, slip-resistant surface. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1-1/2" (38mm) outside diameter. Clearance between the grab bar and wall shall be 1-1/2" (38mm). Concealed mounting flanges shall be 11-gauge (3.2mm) thick stainless steel plate, 2" x 3-1/8" (50 x 80mm), and equipped with at least two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8mm), 3-1/4" (85mm) diameter x 1/2" (13mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG in the U.S.A.) for structural strength.

Grab Bar shall be Model _____ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Bar, Grab, Toilet/Shower

Alt ID: BAR-G36

Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Mfr #: B-6806 x 36

Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Vendor #: B-6806 x 36

Model: B-6806 x 36 Straight Grab Bar

Grab bar. 36 inches long. Stainless steel with satin-finish. 18-gauge wall thickness and 1-1/2 inch outside diameter. Concealed mounting flange 1/8 inch thick, type 304 stainless steel plate 2in.W x 3 1/8in.H with screw holes for concealed anchors. can support loads in excess of 250 pounds. Contributes to LEED.

Item ID: TA-05

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	38.00 in (965 mm)	**Left:**	N/A
Depth:	3.00 in (76 mm)	**Right:**	N/A
Height:	3.25 in (83 mm)	**Front:**	N/A
Max Weight:	3 lbs (1.4 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect bar mounted horizontally.
Clearance between the grab bar and wall 1-1/2 inches.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	Provide blocking as required.
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	Provide blocking as required.
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	Provide blocking as required.
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	Provide blocking as required.
				Total:	**8**	

BOBRICK

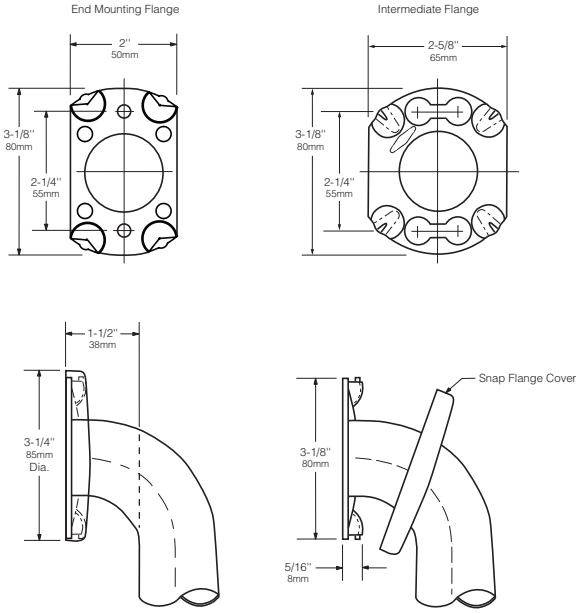
Technical Data

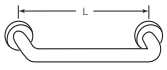
1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

B-6806 SERIES

Specify Finish Required:

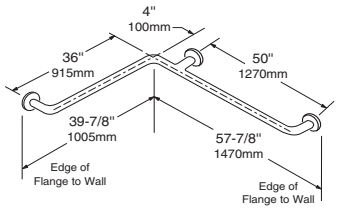
- ☐ Satin-finish, slip-resistant surface
- ☐ Peened surface; add suffix .99 to model number





HORIZONTAL

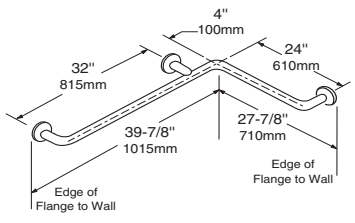
VERTICAL



TWO-WALL WHEELCHAIR COMPARTMENT

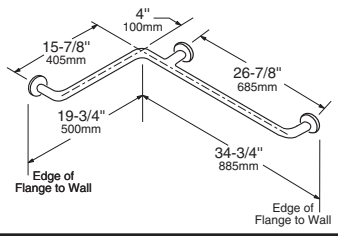
B-6806 x 12, 18, 24, 30, 36, 42, 48

B-68137



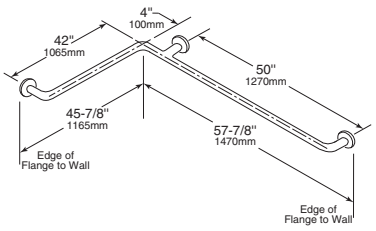
HORIZONTAL TUB / SHOWER COMPARTMENT BAR 24 x 36

B-68616



HORIZONTAL TWO-WALL BAR for Shower Stall

B-6861



TWO-WALL TOILET COMPARTMENT BAR 42 x 54

B-6897

continued . . .

Rev. 11/11/19 S/B Printed in U.S.A.

MATERIALS:

Grab Bar — 18-8 S, type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish, slip-resistant surface. 1-1/2" (38mm) outside diameter. Ends are heliarc welded to flanges. Clearance between the grab bar and wall is 1-1/2" (38mm).

Concealed Mounting Flanges — 18-8 S, type-304, 11-gauge (3.2mm) thick, stainless steel plate; end flanges 2" x 3-1/8" (50 x 80mm) with holes for attachment to wall. Intermediate flanges 2-5/8" x 3-1/8" (65 x 80mm) wide x 3-1/8" (80mm) diameter.

Snap Flange Covers — 18-8 S, type-304, 22-gauge (0.8mm) drawn stainless steel with satin-finish. 3-1/4" (85mm) diameter x 1/2" (13mm) deep. Each cover snaps over mounting flange to conceal mounting screws.

STRENGTH:

Bobrick grab bars that provide 1-1/2" (38mm) clearance from wall can support loads in excess of 900 pounds (408kg) if properly installed. Other grab bar configurations can support loads in excess of 250 pounds (113kg) if properly installed, complying with accessible design (including ADAAG in the U.S.A.) for structural strength

Safety Warning: Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observed damage to the welds.

INSTALLATION:

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten concealed mounting flanges to anchor device or backing with at least two screws opposing each other in each flange. Snap flange covers over each mounting flange to conceal mounting screws. Concealed anchor devices and mounting screws are not included with Bobrick grab bars and must be specified as an accessory.

For Grab Bars with an Intermediate Flange(s), Pull Snap-Flange Covers away from mounting flanges. Place grab bar in desired mounting location. Use intermediate flange as a template to mark location of mounting screws at intermediate flange only. Mark screw locations at the center of the slot in the middle of the double-keyhole shaped mounting holes (2) in the intermediate flange. Remove grab bar from wall. Drive the intermediate flange mounting screws into wall at marked locations. **Note:** Make sure to leave a space of just over 1/8" (3.17mm) between the underside of the screw head and the wall. Install grab bar on the wall by placing the round ends of the intermediate flange double-keyhole shaped mounting holes over the mounting screws (2) are located in the middle of the flange slots. Install the mounting screws into the wall at the end flanges and secure tightly. Tighten the mounting screws at the intermediate flange. Press all snap-flange covers into place to conceal mounting flanges.

Note: Recommend use of 1/4" or #14 sheet metal or wood screws to install Intermediate Flange. #12 screws may also be used.

Important Notes:

1. **Mounting Kits —** Bobrick offers a mounting kit for installing grab bars; **one Bobrick mounting kit is required for each flange.**

Mounting Kit No.	Description
252-30	Consists of # (3) 14 x 2½" type-304 stainless steel, Phillips round-head, sheet-metal screws.

2. **Grab Bar Fastener —** Bobrick offers a grab bar fastening system that secures all Bobrick grab bar series; **one Bobrick fastener is required for each flange.** Install grab bar without backing in wall requires minimum 5/8" (16mm) thick painted or tiled drywall.

WingIt™ Fastener No.	Description
251-4	Consists of 10–32 x 5/16" round-head, Phillips 18/8 stainless steel screws. (1) WingIt grab bar fastener.

3. **Optional Anchor Device —** Bobrick grab bar anchor device includes stainless steel machine screws to be used for attaching grab bars to anchors. **one Bobrick concealed anchor device is required for each flange.**

Optional Anchor No.	Description
2583	Anchor for 3/4" to 1" (19-25mm) panel 1 anchor required for each flange.
2586	Anchor for 1/2" to 1" (13mm) panel 1 anchor required for each flange.

SPECIFICATION:

Grab bar shall be type-304 stainless steel with satin-finish, slip-resistant surface. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1-1/2" (38mm) outside diameter. Clearance between the grab bar and wall shall be 1-1/2" (38mm). Concealed mounting flanges shall be 11-gauge (3.2mm) thick stainless steel plate, 2" x 3-1/8" (50 x 80mm), and equipped with at least two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8mm), 3-1/4" (85mm) diameter x 1/2" (13mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG in the U.S.A.) for structural strength.

Grab Bar shall be Model _____ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Bar, Grab, Toilet/Shower

Alt ID: BAR-G42

Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Mfr #: B-6806 x 42

Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Vendor #: B-6806 x 42

Model: B-6806 x 42 Straight Grab Bar

42 inch grab bar. Constructed of 18 gauge type 304 satin finish stainless steel tubing. Features concealed mounting flange and 1-1/2 inch diameter tubing. Supports loads in excess of 900-lbs.

Item ID: TA-06

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	43.75 in (1111 mm)	**Left:**	N/A
Depth:	3.00 in (76 mm)	**Right:**	N/A
Height:	3.25 in (83 mm)	**Front:**	N/A
Max Weight:	4 lbs (1.8 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect bar mounted horizontally.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	Provide blocking as required.
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	Provide blocking as required.
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	Provide blocking as required.
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	Provide blocking as required.
				Total:	**8**	

BOBRICK

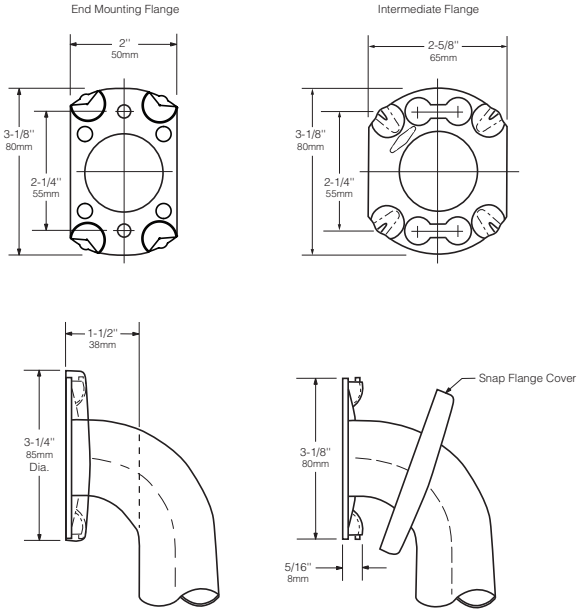
Technical Data

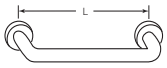
1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

B-6806 SERIES

Specify Finish Required:

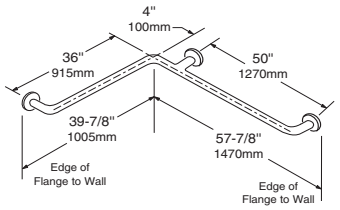
- ☐ Satin-finish, slip-resistant surface
- ☐ Peened surface; add suffix .99 to model number





HORIZONTAL

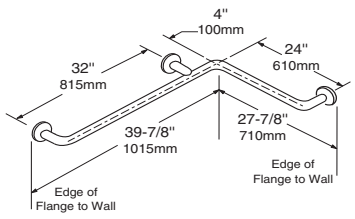
VERTICAL



TWO-WALL WHEELCHAIR COMPARTMENT

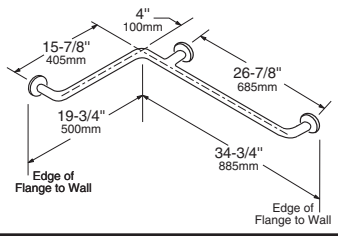
B-6806 x 12, 18, 24, 30, 36, 42, 48

B-68137



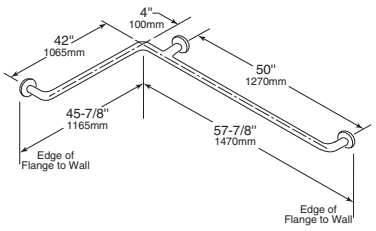
HORIZONTAL TUB / SHOWER COMPARTMENT BAR 24 x 36

B-68616



HORIZONTAL TWO-WALL BAR for Shower Stall

B-6861



TWO-WALL TOILET COMPARTMENT BAR 42 x 54

B-6897

continued . . .

Rev. 11/11/19 S/B Printed in U.S.A.

MATERIALS:

Grab Bar — 18-8 S, type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish, slip-resistant surface. 1-1/2" (38mm) outside diameter. Ends are heliarc welded to flanges. Clearance between the grab bar and wall is 1-1/2" (38mm).

Concealed Mounting Flanges — 18-8 S, type-304, 11-gauge (3.2mm) thick, stainless steel plate; end flanges 2" x 3-1/8" (50 x 80mm) with holes for attachment to wall. Intermediate flanges 2-5/8" x 3-1/8" (65 x 80mm) wide x 3-1/8" (80mm) diameter.

Snap Flange Covers — 18-8 S, type-304, 22-gauge (0.8mm) drawn stainless steel with satin-finish. 3-1/4" (85mm) diameter x 1/2" (13mm) deep. Each cover snaps over mounting flange to conceal mounting screws.

STRENGTH:

Bobrick grab bars that provide 1-1/2" (38mm) clearance from wall can support loads in excess of 900 pounds (408kg) if properly installed. Other grab bar configurations can support loads in excess of 250 pounds (113kg) if properly installed, complying with accessible design (including ADAAG in the U.S.A.) for structural strength

Safety Warning: Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observed damage to the welds.

INSTALLATION:

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten concealed mounting flanges to anchor device or backing with at least two screws opposing each other in each flange. Snap flange covers over each mounting flange to conceal mounting screws. Concealed anchor devices and mounting screws are not included with Bobrick grab bars and must be specified as an accessory.

For Grab Bars with an Intermediate Flange(s), Pull Snap-Flange Covers away from mounting flanges. Place grab bar in desired mounting location. Use intermediate flange as a template to mark location of mounting screws at intermediate flange only. Mark screw locations at the center of the slot in the middle of the double-keyhole shaped mounting holes (2) in the intermediate flange. Remove grab bar from wall. Drive the intermediate flange mounting screws into wall at marked locations. **Note:** Make sure to leave a space of just over 1/8" (3.17mm) between the underside of the screw head and the wall. Install grab bar on the wall by placing the round ends of the intermediate flange double-keyhole shaped mounting holes over the mounting screws (2) are located in the middle of the flange slots. Install the mounting screws into the wall at the end flanges and secure tightly. Tighten the mounting screws at the intermediate flange. Press all snap-flange covers into place to conceal mounting flanges.

Note: Recommend use of 1/4" or #14 sheet metal or wood screws to install Intermediate Flange. #12 screws may also be used.

Important Notes:

1. **Mounting Kits —** Bobrick offers a mounting kit for installing grab bars; **one Bobrick mounting kit is required for each flange.**

Mounting Kit No.	Description
252-30	Consists of # (3) 14 x 2½" type-304 stainless steel, Phillips round-head, sheet-metal screws.

2. **Grab Bar Fastener —** Bobrick offers a grab bar fastening system that secures all Bobrick grab bar series; **one Bobrick fastener is required for each flange.** Install grab bar without backing in wall requires minimum 5/8" (16mm) thick painted or tiled drywall.

WingIt™ Fastener No.	Description
251-4	Consists of 10–32 x 5/16" round-head, Phillips 18/8 stainless steel screws. (1) WingIt grab bar fastener.

3. **Optional Anchor Device —** Bobrick grab bar anchor device includes stainless steel machine screws to be used for attaching grab bars to anchors. **one Bobrick concealed anchor device is required for each flange.**

Optional Anchor No.	Description
2583	Anchor for 3/4" to 1" (19-25mm) panel 1 anchor required for each flange.
2586	Anchor for 1/2" to 1" (13mm) panel 1 anchor required for each flange.

SPECIFICATION:

Grab bar shall be type-304 stainless steel with satin-finish, slip-resistant surface. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1-1/2" (38mm) outside diameter. Clearance between the grab bar and wall shall be 1-1/2" (38mm). Concealed mounting flanges shall be 11-gauge (3.2mm) thick stainless steel plate, 2" x 3-1/8" (50 x 80mm), and equipped with at least two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8mm), 3-1/4" (85mm) diameter x 1/2" (13mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG in the U.S.A.) for structural strength.

Grab Bar shall be Model _____ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface** **Alt ID:** BAR-GTW

Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600) **Mfr #:** B-6861.99

Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600) **Vendor #:** B-6861.99 w/ Peened Surface

Model: B-6861.99 Two-Wall Shower Grab Bar

Toilet/shower grab bar. Features: 900 lb. capacity, horizontal two-wall bar for shower stall with peened surface. 18 gauge stainless steel. Satin finish. **Item ID:** TA-08

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	34.75 in (883 mm)	**Left:**	N/A
Depth:	19.75 in (502 mm)	**Right:**	N/A
Height:	3.25 in (83 mm)	**Front:**	N/A
Max Weight:	8 lbs (3.6 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	Provide blocking as required.
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	Provide blocking as required.
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	Provide blocking as required.
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	Provide blocking as required.
				Total:	**8**	

BOBRICK

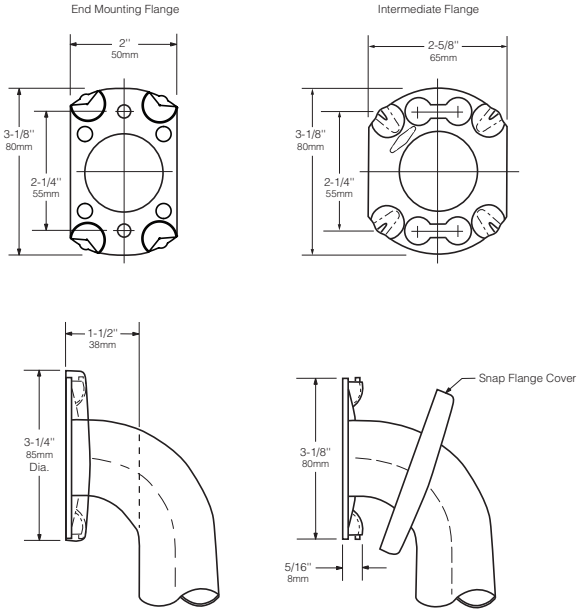
Technical Data

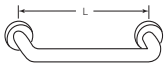
1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

B-6806 SERIES

Specify Finish Required:

- ☐ Satin-finish, slip-resistant surface
- ☐ Peened surface; add suffix .99 to model number





HORIZONTAL

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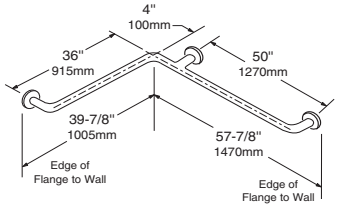
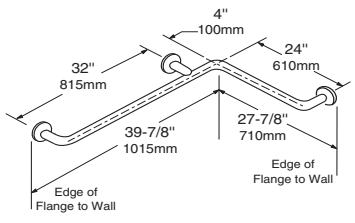


TWO-WALL WHEELCHAIR COMPARTMENT

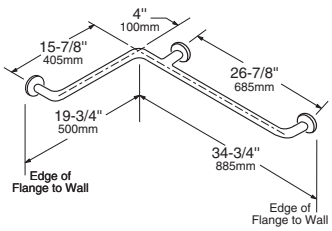
B-6806 x 12, 18, 24, 30, 36, 42, 48

B-68137



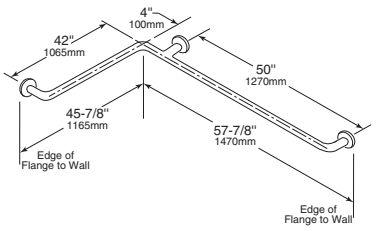
HORIZONTAL TUB / SHOWER COMPARTMENT BAR 24 x 36

B-68616



HORIZONTAL TWO-WALL BAR for Shower Stall

B-6861



TWO-WALL TOILET COMPARTMENT BAR 42 x 54

B-6897

continued . . .

Rev. 11/11/19 S/B Printed in U.S.A.

MATERIALS:

Grab Bar — 18-8 S, type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish, slip-resistant surface. 1-1/2" (38mm) outside diameter. Ends are heliarc welded to flanges. Clearance between the grab bar and wall is 1-1/2" (38mm).

Concealed Mounting Flanges — 18-8 S, type-304, 11-gauge (3.2mm) thick, stainless steel plate; end flanges 2" x 3-1/8" (50 x 80mm) with holes for attachment to wall. Intermediate flanges 2-5/8" x 3-1/8" (65 x 80mm) wide x 3-1/8" (80mm) diameter.

Snap Flange Covers — 18-8 S, type-304, 22-gauge (0.8mm) drawn stainless steel with satin-finish. 3-1/4" (85mm) diameter x 1/2" (13mm) deep. Each cover snaps over mounting flange to conceal mounting screws.

STRENGTH:

Bobrick grab bars that provide 1-1/2" (38mm) clearance from wall can support loads in excess of 900 pounds (408kg) if properly installed. Other grab bar configurations can support loads in excess of 250 pounds (113kg) if properly installed, complying with accessible design (including ADAAG in the U.S.A.) for structural strength

Safety Warning: Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observed damage to the welds.

INSTALLATION:

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten concealed mounting flanges to anchor device or backing with at least two screws opposing each other in each flange. Snap flange covers over each mounting flange to conceal mounting screws. Concealed anchor devices and mounting screws are not included with Bobrick grab bars and must be specified as an accessory.

For Grab Bars with an Intermediate Flange(s), Pull Snap-Flange Covers away from mounting flanges. Place grab bar in desired mounting location. Use intermediate flange as a template to mark location of mounting screws at intermediate flange only. Mark screw locations at the center of the slot in the middle of the double-keyhole shaped mounting holes (2) in the intermediate flange. Remove grab bar from wall. Drive the intermediate flange mounting screws into wall at marked locations. **Note:** Make sure to leave a space of just over 1/8" (3.17mm) between the underside of the screw head and the wall. Install grab bar on the wall by placing the round ends of the intermediate flange double-keyhole shaped mounting holes over the mounting screws (2) are located in the middle of the flange slots. Install the mounting screws into the wall at the end flanges and secure tightly. Tighten the mounting screws at the intermediate flange. Press all snap-flange covers into place to conceal mounting flanges.

Note: Recommend use of 1/4" or #14 sheet metal or wood screws to install Intermediate Flange. #12 screws may also be used.

Important Notes:

1. **Mounting Kits —** Bobrick offers a mounting kit for installing grab bars; **one Bobrick mounting kit is required for each flange.**

Mounting Kit No.	Description
252-30	Consists of # (3) 14 x 2½" type-304 stainless steel, Phillips round-head, sheet-metal screws.

2. **Grab Bar Fastener —** Bobrick offers a grab bar fastening system that secures all Bobrick grab bar series; **one Bobrick fastener is required for each flange.** Install grab bar without backing in wall requires minimum 5/8" (16mm) thick painted or tiled drywall.

WingIt™ Fastener No.	Description
251-4	Consists of 10–32 x 5/16" round-head, Phillips 18/8 stainless steel screws. (1) WingIt grab bar fastener.

3. **Optional Anchor Device —** Bobrick grab bar anchor device includes stainless steel machine screws to be used for attaching grab bars to anchors. **one Bobrick concealed anchor device is required for each flange.**

Optional Anchor No.	Description
2583	Anchor for 3/4" to 1" (19-25mm) panel 1 anchor required for each flange.
2586	Anchor for 1/2" to 1" (13mm) panel 1 anchor required for each flange.

SPECIFICATION:

Grab bar shall be type-304 stainless steel with satin-finish, slip-resistant surface. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1-1/2" (38mm) outside diameter. Clearance between the grab bar and wall shall be 1-1/2" (38mm). Concealed mounting flanges shall be 11-gauge (3.2mm) thick stainless steel plate, 2" x 3-1/8" (50 x 80mm), and equipped with at least two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8mm), 3-1/4" (85mm) diameter x 1/2" (13mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG in the U.S.A.) for structural strength.

Grab Bar shall be Model _____ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Bar, Grab, Toilet/Shower, Swing Arm

Alt ID: BAR-SWU

Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Mfr #: B-4998

Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Vendor #: B-4998

Model: B-4998 Swing-Up

Swing-up, wall mounted grab bar. Satin-finish 18-gauge type 304 stainless steel tubing 1-1/4 inch (32mm) diameter. Supports loads in excess of 250 lbs. Meets ICC/ANSI A117.1-2003 Accessibility Standards in U.S.A.

Item ID: TA-13

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	6.13 in (156 mm)	**Left:**	N/A
Depth:	29.00 in (737 mm)	**Right:**	N/A
Height:	8.75 in (222 mm)	**Front:**	N/A
Max Weight:	10 lbs (4.5 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	36.00 in (914 mm)
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	Provide blocking as required.
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	Provide blocking as required.
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	Provide blocking as required.
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	Provide blocking as required.
				Total:	**8**	

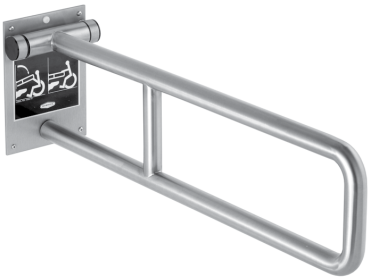
BOBRICK

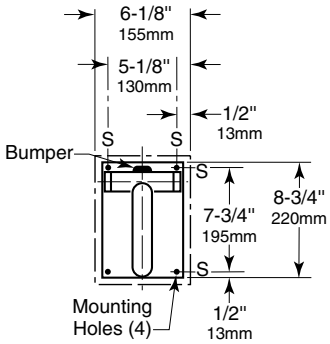
Technical Data

SWING-UP GRAB BAR

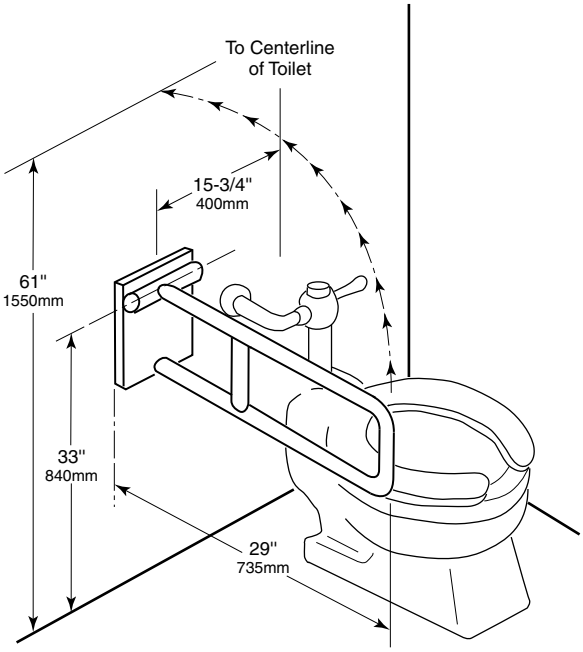
B-4998

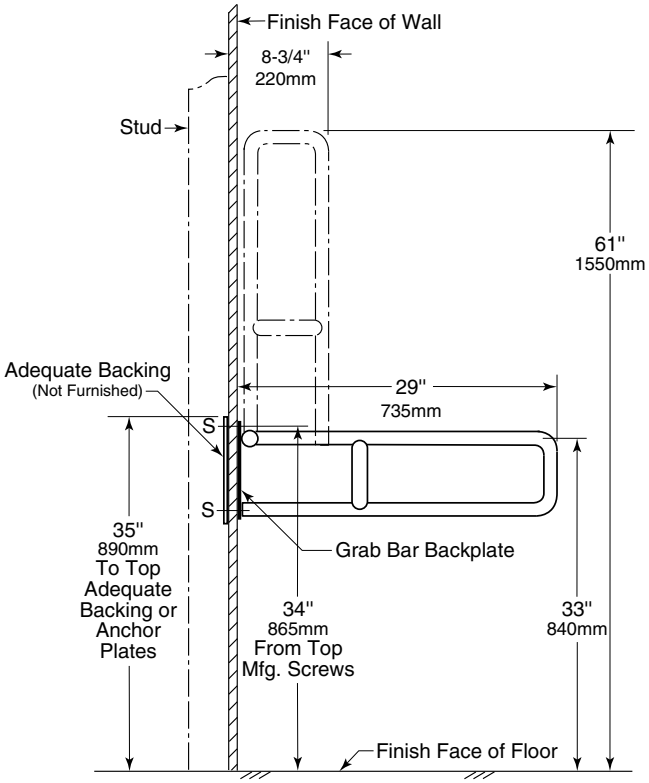
Specify Finish Required: ☐ Satin-finish
☐ Satin-finish with peened gripping surface; add suffix .99 to model number





Grab Bar Backplate





MATERIALS:

Grab Bar — 18-8, Type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish. 1–1/4" (32mm) outside diameter. Ends are heliarc welded to flanges.

Backplate — 18-8, Type-304, 3/16" (5mm) thick, satin-finish stainless steel with four screw holes for attachment to wall.

continued . . .

Revised 9/17/18 Printed in U.S.A.

OPERATION:

Swing-up grab bar is manually raised for approach or departure and lowered to horizontal position for support; once grab bar is raised to the full upright (vertical) position, counterweighted design prevents grab bar from falling back down to the full horizontal position.

STRENGTH:

Swing-up grab bar can support loads in excess of 500 pounds (227kg) if properly installed.

Safety Warning: Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observe damage to the welds.

INSTALLATION:

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten grab bar to anchor device or backing. Concealed anchor devices and mounted screws are not included with Bobrick grab bars and must be specified as an optional accessory.

SPECIFICATION:

Grab bar shall be Type-304 stainless steel with satin finish. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1–1/4" (32mm) outside diameter. Backplate shall be 3/16" (5mm) thick stainless steel, equipped with screw holes for attachment to wall. Swing-up grab bar shall be manually raised for approach or departure and lowered to horizontal position for support; counterweighted design shall prevent grab bar from falling back down to the full horizontal position once grab bar is raised to the full upright (vertical) position.

Swing-Up Grab Bar shall be Model _____ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

B-4998 Rev. 9/17/18 Printed in U.S.A.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Bin, Shredding, Secure
Manufacturer: Shred-it, Inc. ((847) 386-2700)
Vendor: Shred-it, Inc. ((847) 386-2700)
Model: Mini Console

Alt ID: BIN-SJR
Mfr #:
Vendor #:
Item ID:

Front loading console for containment of discarded, sensitive documents. Designed to fit under workstation. Beveled slot and internal security plate, security lock. Holds 36.01 gallons of paper (250 pieces of paper). Provided free-of-charge with Shred-It service contract.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	20.25 in (514 mm)	**Left:**	N/A
Depth:	19.50 in (495 mm)	**Right:**	N/A
Height:	26.00 in (660 mm)	**Front:**	N/A
Max Weight:	30 lbs (13.6 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Fits under workstation.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C469	Scheduling (3)	Operating	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Operating	Draft (New)	2	
ED/1st Flr	C027	Workstation/Care Team (13)	Operating	Draft (New)	2	
				Total:	**5**	

Security Consoles

Making sure it's secure.™

Top Load Console (pictured)
36″ H x 20.25″ W x 19.5″ D
Holds 39.54 gallons of paper.

See reverse for more Consoles and Bins.

Shred-it's ultra-strong security consoles give you the efficiency, durability and flexibility you expect.

- Paper securely held in durable polyester bag for efficient and secure retrieval

Higher capacity than most of the consoles in the industry — saving you money

- Wide variety of lock systems for added security and assurance
- Custom finish options available (Cherry, Mahogany, Light Oak, Birch) to coordinate with your office environment
- Specifically designed with wide feed slots that can take up to 400 pieces of paper at a time and cannot be retrieved

Made with recycled wood materials compliant with the Environmentally Preferred Product Certification (EPP), ensuring better office air quality.

- Multi-media consoles feature multiple feed slot design for various applications (paper, CDs, hard drives, videotapes, pill bottles, etc.)

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Security Consoles and Bins

Making sure it's secure.™

Available in a variety of styles to meet your application and security needs.

Front Load Console
36″ H x 20.25″ W x 19.5″ D
Front-loading beveled slot and internal security plate ensure documents cannot be removed. Holds 39.54 gallons of paper.

Mini Console
26″ H x 20.25″ W x 19.5″ D
Designed to fit under a workstation where space is at a premium. Holds 36.01 gallons of paper. (Each Mini Console will hold up to 250 pieces of paper.)

Double Console
62″ H x 20.25″ W x 19.5″ D
Stacks two high. Designed to fit in tight spaces. Holds 81.98 gallons of paper.

Wood-Finish Top Load Console
36″ H x 20.25″ W x 19.5″ D
Top-loading beveled slot and internal security plate ensure documents cannot be removed. Holds 39.54 gallons of paper.

- **Mahogany**
- **Birch**
- **Light Oak**
- **Cherry**

Multi-Media Console
35″ H x 10″ W x 19.5″ D
Designed for use of media items such as DVDs. Features multiple feed slot. Holds 21.1 gallons of paper.

Shred-it's high volume security bins are extremely durable and easy to maneuver.

- Top-loading, durable plastic containers for high paper volumes
- Ideal for higher volume areas such as mailrooms, copy rooms or warehouses
- Security slot to ensure paper cannot be retrieved from inside
- Wheeled and well-balanced for easy handling
- Hasp design for padlock security

2-Bag Bin
36″ H x 40″ W x 20″ D
Holds 60 gallons of paper.

4-Bag Bin
35″ H x 40″ W x 27.5″ D
Holds 90 gallons of paper.

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Bin, Supply
Manufacturer: Pegasus Medical Concepts, Inc. ((888) 276-4750)
Vendor: Pegasus Medical Concepts, Inc. ((888) 276-4750)
Model: Hanging Bin 2-205BK

Alt ID: BIN-SLY
Mfr #: 2-205BK
Vendor #: 2-205BK

Supply bin. Features polypropylene material, black color, 6 lbs capacity, and 30 quantity per case.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	3.75 in (95 mm)	**Left:**	N/A
Depth:	3.63 in (92 mm)	**Right:**	N/A
Height:	1.75 in (44 mm)	**Front:**	N/A
Max Weight:	4 lbs (1.7 kg)	**Back:**	N/A
Mounting:	Special	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

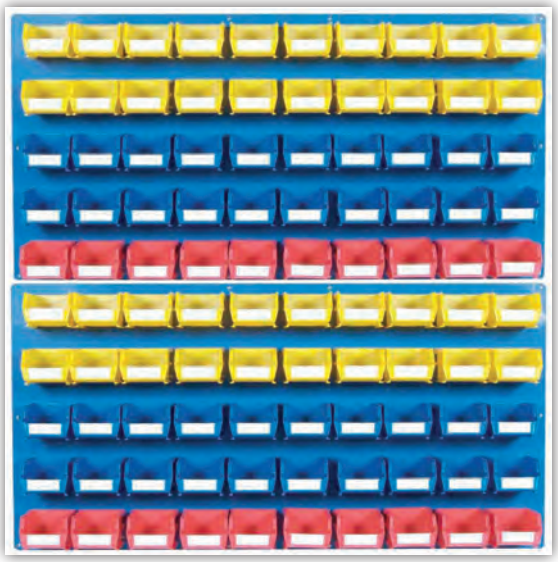
Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C019	Clean Supply	Project	Draft (New)	100	
				Total:	**100**	

Louvered Hanging Bin Panels

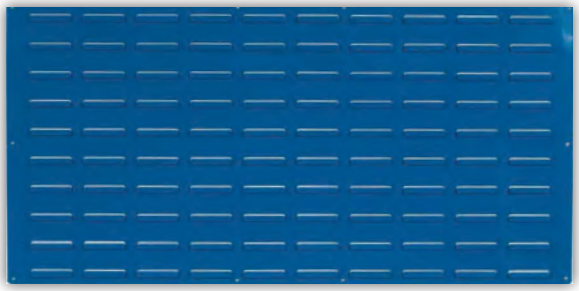


- *Easy method to hang plastic bins and sort parts by part number, size or usage.*
- *Louvered panels are blue epoxy coated heavy duty 18 gauge steel.*
- *Louvered panels are available as mobile and stationary bin storage options.*
- *Ideal 5S and Lean Manufacturing solution for keeping small parts and accessories organized.*
- *Hanging bins are easy to remove and replace on louvers improving MRO and factory productivity.*
- *Hang up to 50 bins on each panel using LocBins or any plastic hanging bin.*
- *LPC-1 and LPC-2 offers a heavy duty Mobile Bin Cart to get parts to the work area with ease.*
- *All mounting hardware to attach panels to a flat concrete, stud, or hollow wall included.*

LocBins sold separately (page 10)

LVP-2

LVP-1



Also available as Mobile Tool Carts (page 15)

P/N	Description	Pkg. Qty.	Size	Color	Material	Thickness	Ship Weight	LocBin Load Capacity (lbs) 3-210	3-220	3-235	3-240
LVP-1	Louvered Panel	1	24 in. x 48 in. x 5/8 in.	Blue	Steel	18 ga.	20.0 lbs	10	10	50	60
LVP-2	Louvered Panel	2	24 in. x 48 in. x 5/8 in.	Blue	Steel	18 ga.	40.0 lbs	10	10	50	60

Hanging Bins

2-205B

- *Plastic Hanging Bins provide easy organization for small parts. They can sit on any flat surface or mount on a wall using 5-600 Wall Mount Rail System or on Louvered Panels. Bins are available in red, yellow, blue, black or translucent for sorting multiple kinds of parts including unlimited styles of hardware, small tools and accessories and more. Bins are guaranteed not to crack or peel under normal use.*
- *Plastic Hanging Bins assist in organizing small parts and tool accessories.*
- *Bins are made of commercial grade polypropylene.*
- *Hanging bins can be used on flat surfaces, or mounted with Triton 5-600 wall mount rails, on the LVP-1, LVP-2 or any standard louvered panel, or on 77500 BinClip™.*
- *DuraHook® 77500 BinClip™(s) are universally compatible for mounting Plastic Hanging Bins on 1/4" and 1/8" pegboard.*
- *Includes identification labels.*

2-205R

2-205Y

2-205BK

2-205TR

P/N	Description	Material	Outside Dim. L x W x H	Inside Dim. L x W x H	Color	Load Capacity	Qty. Per Case
2-205B	Hanging Bin	High Density Polypropylene	4 3/8" x 4 3/16" x 2"	3 3/4" x 3 5/8" x 1 3/4"	Blue	6 lbs.	30
2-205R	Hanging Bin	High Density Polypropylene	4 3/8" x 4 3/16" x 2"	3 3/4" x 3 5/8" x 1 3/4"	Red	6 lbs.	30
2-205Y	Hanging Bin	High Density Polypropylene	4 3/8" x 4 3/16" x 2"	3 3/4" x 3 5/8" x 1 3/4"	Yellow	6 lbs.	30
2-205BK	Hanging Bin	High Density Polypropylene	4 3/8" x 4 3/16" x 2"	3 3/4" x 3 5/8" x 1 3/4"	Black	6 lbs.	30
2-205TR	Hanging Bin	High Density Polypropylene	4 3/8" x 4 3/16" x 2"	3 3/4" x 3 5/8" x 1 3/4"	Translucent	6 lbs.	30

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Bin, Shredding, Secure
Manufacturer: Shred-it, Inc. ((847) 386-2700)
Vendor: Shred-it, Inc. ((847) 386-2700)
Model: Standard Front Load

Alt ID: BIN-STD
Mfr #:
Vendor #:

Front loading console for containment of discarded, sensitive documents. Beveled slot and internal security plate, security lock. Provided free-of-charge with Shred-It service contract. Holds 39.54 gallons of paper. Also available as top loading.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	20.25 in (514 mm)	**Left:**	N/A
Depth:	19.50 in (495 mm)	**Right:**	N/A
Height:	36.00 in (914 mm)	**Front:**	N/A
Max Weight:	45 lbs (20.4 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C467	Registration (5)	Operating	Draft (New)	1	
				Total:	**1**	

Security Consoles

Making sure it's secure.™

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See reverse for more Consoles and Bins.

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- Specifically designed with wide feed slots that can take up to 400 pieces of paper at a time and cannot be retrieved

Made with recycled wood materials compliant with the Environmentally Preferred Product Certification (EPP), ensuring better office air quality.

- Multi-media consoles feature multiple feed slot design for various applications (paper, CDs, hard drives, videotapes, pill bottles, etc.)

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Security Consoles and Bins

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Double Console
62″ H x 20.25″ W x 19.5″ D
Stacks two high. Designed to fit in tight spaces. Holds 81.98 gallons of paper.

Wood-Finish Top Load Console
36″ H x 20.25″ W x 19.5″ D
Top-loading beveled slot and internal security plate ensure documents cannot be removed. Holds 39.54 gallons of paper.

- **Mahogany**
- **Birch**
- **Light Oak**
- **Cherry**

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- Security slot to ensure paper cannot be retrieved from inside
- Wheeled and well-balanced for easy handling
- Hasp design for padlock security

2-Bag Bin
36″ H x 40″ W x 20″ D
Holds 60 gallons of paper.

4-Bag Bin
35″ H x 40″ W x 27.5″ D
Holds 90 gallons of paper.

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Bracket, Computer Workstation**
Manufacturer: Ergotron Inc.
Vendor: Ergotron Inc.
Model: LX Sit-Stand Wall Mount System w/Medium CPU Holder

Alt ID: BKT-CWS
Mfr #: 45-358-026
Vendor #: 45-358-026
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	18.20 in (462 mm)	**Left:**	N/A
Depth:	42.00 in (1067 mm)	**Right:**	N/A
Height:	34.00 in (864 mm)	**Front:**	N/A
Max Weight:	42 lbs (19.0 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect unit extended at max. Dimensions when folded:
25.75 in. W x 6 in. D x 34 in. H.

Structural:

Electrical:

Plumbing:

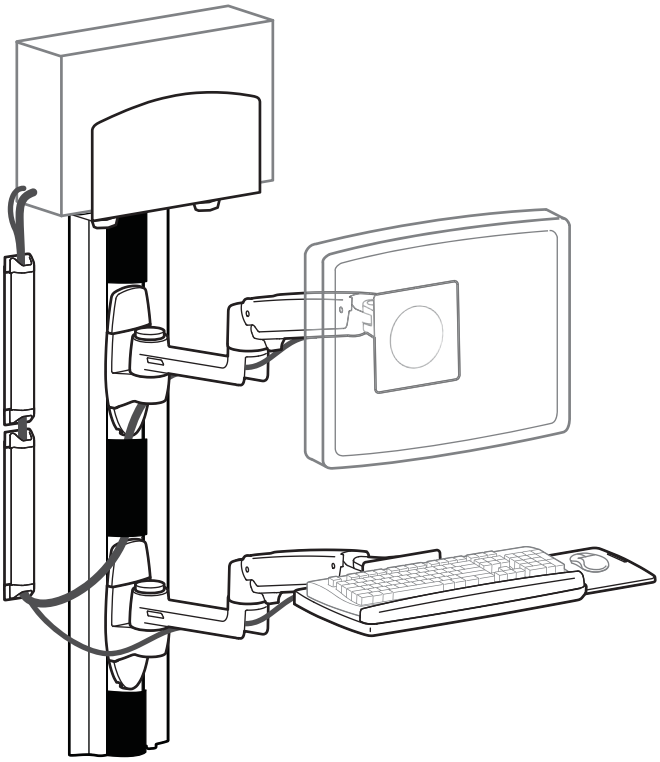
Mechanical:

Location

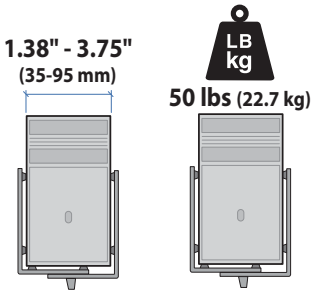
Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Sit-Stand Wall Mount System

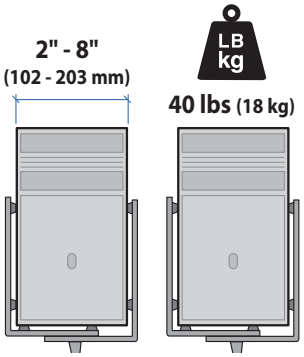
Dimensional & Range of Motion Illustrations



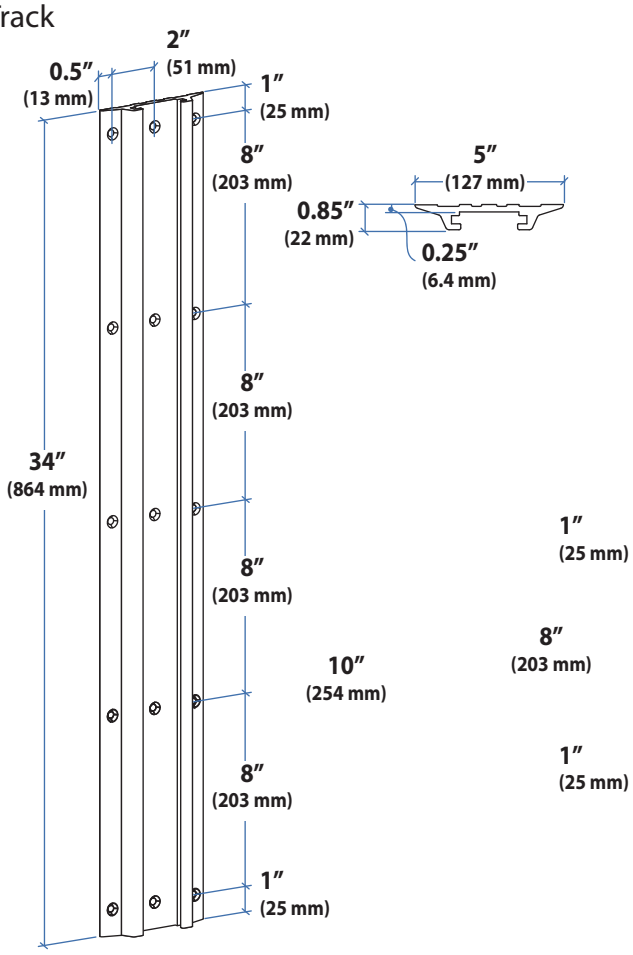
Small CPU Holder



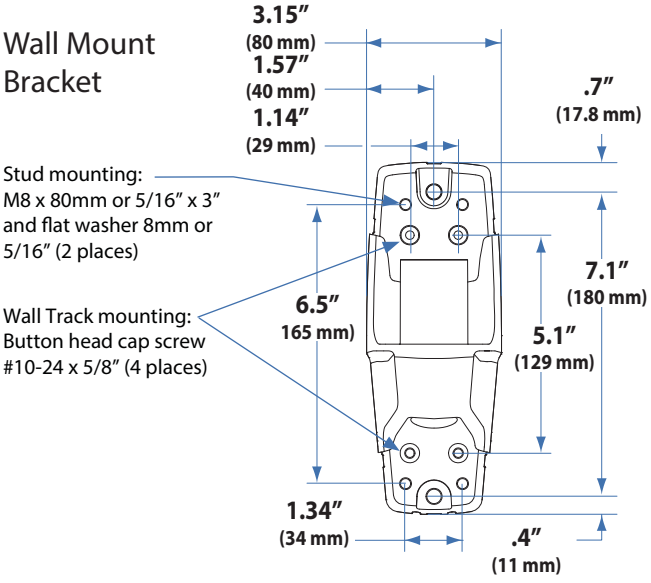
Medium CPU Holder



Wall Track



Wall Mount Bracket



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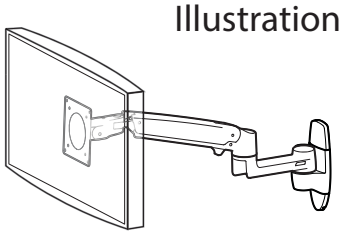
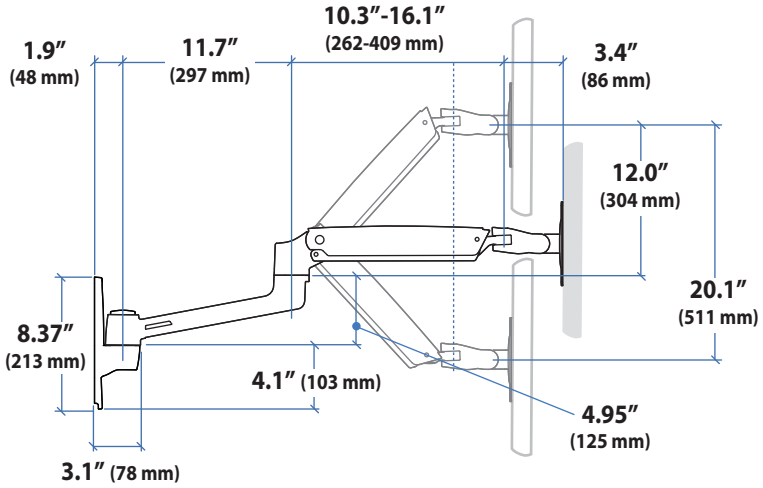
Sit-Stand Wall Mount System

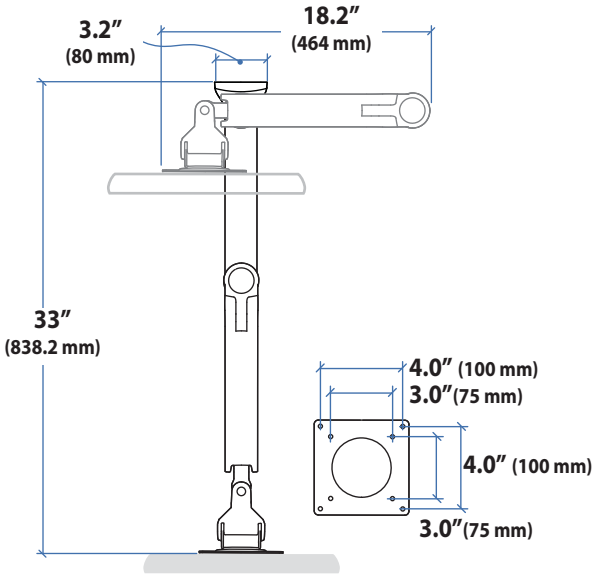
Dimensional & Range of Motion Illustrations



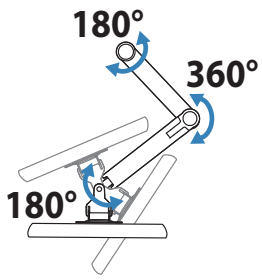
LCD Arm

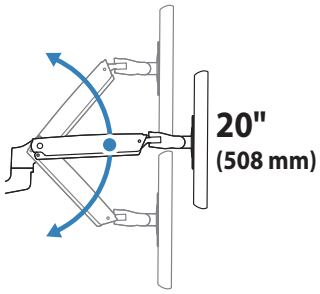
Dimensions

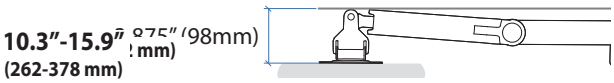


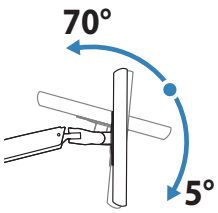


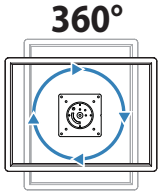
Range of Motion



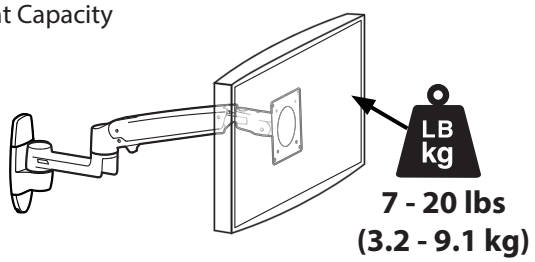








Weight Capacity



Monitor depth greater than 2.5" (64 mm) may diminish capacity.
Call Ergotron for more information.

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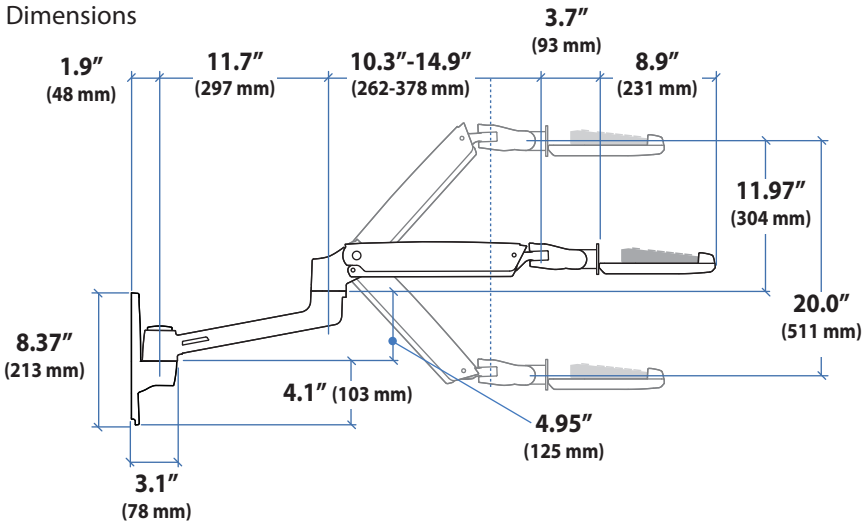
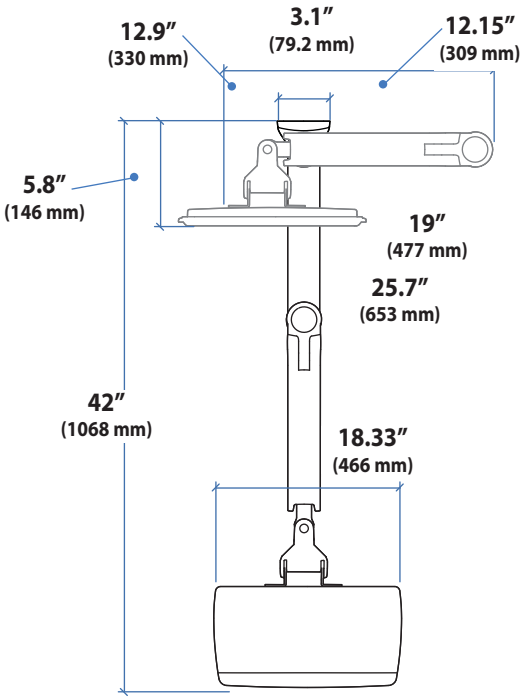
Dimensional &
Range of Motion
Illustrations

Sit-Stand Wall Mount System

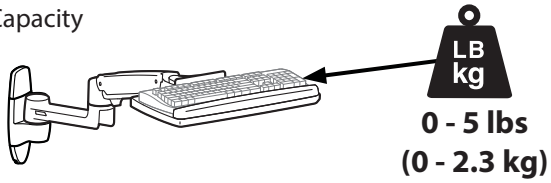
Keyboard Arm

Dimensions

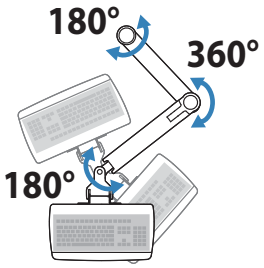


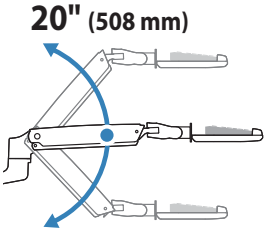


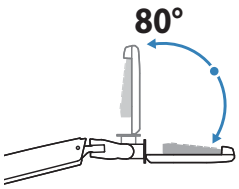
Weight Capacity



Range of Motion







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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Bracket, Computer Workstation**
Manufacturer: GCX Corporation ((707) 773-1100)
Vendor: GCX Corporation ((707) 773-1100)
Model: VHM Extended w/ Ergo & CPU Mount

Alt ID: BKT-PCW
Mfr #: ITK-0003-02
Vendor #: ITK-0003-02

Wall mounted computer bracket. Adjustable height arm on 37" Seismic wall channel. Package includes: 37" Seismic wall channel (WC-0002-11), Variable Height Mount arm (VHM) w/8" Extension (WS-0004-54), Folding flat panel and keyboard Ergo bracket (FLP-0004-89), 20.8" keyboard tray with left/right mouse trays (WM-0023-47), CPU mount 3" - 4.5" (WM-0007-41).

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	21.00 in (533 mm)	**Left:**	N/A
Depth:	44.75 in (1137 mm)	**Right:**	N/A
Height:	37.00 in (940 mm)	**Front:**	N/A
Max Weight:	60 lbs (27.2 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

VHM™ Series Workstation with Rear Extension

Mounting Channel WC-0002-11
- 37”/94 cm Seismic channel
- Includes mounting hardware and instructions

VHM with 8”/20.3 cm Rear Extension WS-0004-54
- Variable Height Mount with 8”/20.3 cm rear extension
- Provides lateral positioning, extension, gas spring-assisted height adjustment, and swivel adjustments for optimal viewing angle
- Features a parallel linkage for constant viewing angle throughout the vertical range of motion
- Vertical motion range +/- 60 degrees with 17”/43.2 cm total travel
- Lateral motion range (from perpendicular to the wall) +/- 90 degrees
- Folds flush for minimal foot print while stowed
- Dual pivoting extension is ideal for obtaining additional reach and allows fold over feature
- Optional rotation stop at front pivot of extension +/-100 (200 degrees total range)
- Cable management
- Maximum load: 30 lbs/13.6 kg

Add the weight of all devices, including GCX mounting accessories, to ensure the total weight does not exceed the arm’s weight limit

(Optional VHM Arms)

VHM with 8”/20.3 cm Rear Extension WS-0004-57
(40 lb/18.1 kg Maximum Load)

VHM with 14”/35.6 cm Rear Extension WS-0004-55
(30 lb/13.6 kg Maximum Load)

VHM with 14”/35.6 cm Rear Extension WS-0004-58
(40 lb/18.1 kg Maximum Load)

Mounting Bracket for Monitor/Keyboard Combinations FLP-0004-89
- Folding ergo-bracket allows the keyboard tray/plate to be folded upward for security or to save space
- Provides ergonomic separation of display and keyboard with independent display tilt adjustment
- Product weight: 9.2 lbs/4.2 kg

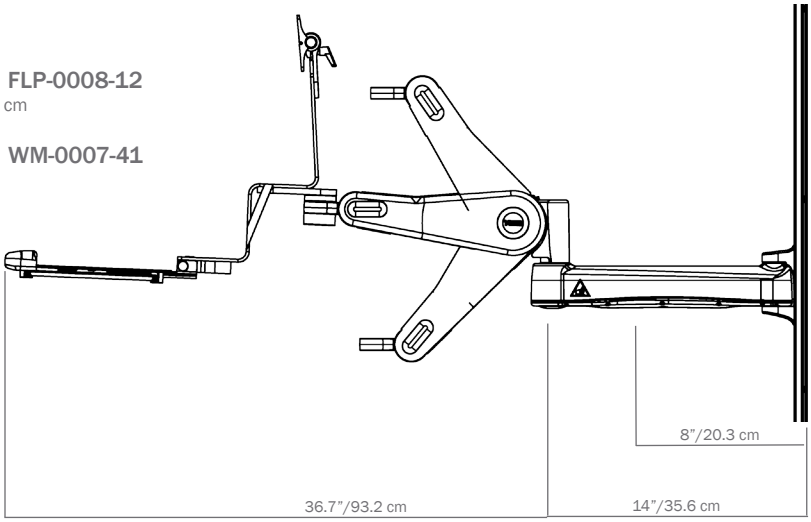
Keyboard Tray with Slide-Out Mouse Trays WM-0023-47
- 20.8”/52.8 cm Wide tray for standard keyboard with left/right slide-out keyboard trays
- 8”/20.3 cm x 6.5”/16.5 cm Slide-out mouse trays
- Padded wrist rest
- Includes mouse house, mouse pads
- Product weight: 5.5 lbs/2.5 kg

Accessories:

Display Handle FLP-0008-12
- Adjustable width to accommodate displays from 11.5”/29.2 cm - 18.5”/47 cm
- Product weight: 3 lbs/1.4 kg

CPU Mount WM-0007-41
- 25 lbs/11.3 kg max load
- 14”/35.6 cm max height
- 14”/35.6 cm max depth
- Product weight: 5 lbs/2.3 kg

Note: Additional CPU mounts available



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GCX Mounting Channels

Mounting channels are used to secure GCX mounting products and accessories. Channels are made of high strength aluminum and have a durable clear anodized satin finish.

Channels permit mounting solutions to be set anywhere within the length of the channel. Various lengths of channel are available to accommodate applications and devices with different vertical height requirements. When considering long lengths of channel, it may be useful to consider utilizing two shorter sections of channel with enough space between the two sections to permit ease of installation and maintenance of the mounted devices.

Three types of channels are available: Standard, Seismic, and Flangeless.

Standard and Seismic channels: Intended to be secured to metal or wood studs with gypsum board or similar wall covering material. Seismic channels provide additional anchor points for security. The 19" seismic channel is California OSHPD pre-approved. Refer to OSHPD documents OPA-0079-07 and OPA-0697-07.

Flangeless channels: Intended to be secured to hard surfaces, e.g., metal walls, surfaces of anesthesia machines, or other devices. Flangeless channels can also be secured to prefabricated headwall systems such as those manufactured by Hill-Rom, Modular Services and Hospital Systems.

Safe installation of a channel is important and is the installer's responsibility. Installation should be performed by qualified personnel. Please contact GCX if you have questions about channel selection or installation.

STANDARD CHANNELS

Length:	GCX P/N:
7"/17.8 cm	WC-0002-01
19"/48.3 cm	WC-0002-04

SEISMIC CHANNELS

Length:	GCX P/N:
13"/33 cm	WC-0002-03
19"/48.3 cm	WC-0002-05
25"/63.5 cm	WC-0002-07
31"/78.7 cm	WC-0002-09
37"/94 cm	WC-0002-11
43"/109.2 cm	WC-0002-13
49"/124.5 cm	WC-0002-15
55"/139.7 cm	WC-0002-17

FLANGELESS CHANNELS

Length:	GCX P/N:
7"/17.8 cm	WC-0010-01
13"/33 cm	WC-0010-02
19"/48.3 cm	WC-0010-03
25"/63.5 cm	WC-0010-04
31"/78.7 cm	WC-0010-05
43"/109.2 cm	WC-0010-07
55"/139.7 cm	WC-0010-09

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Bracket, Television, Wall, Flat Panel
Manufacturer: Peerless-AV ((800) 865-2112)
Vendor: Peerless-AV ((800) 865-2112)
Model: SmartMount ST640 Univ. Tilt (Security, 32'- 50')

Alt ID: BKT-TVT
Mfr #: ST640
Vendor #: ST640

Tilting wall mount bracket for 32" - 50" displays. Adjustable 15 degrees of forward tilt, -5 degrees backward tilt. Horizontal screen adjustment up to 6". 150 lbs weight capacity. Mounts to one or two wood studs, concrete, cinder block or metal studs (metal stud accessory required). Security hardware for mounting included.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	22.14 in (562 mm)	**Left:**	N/A
Depth:	2.62 in (67 mm)	**Right:**	N/A
Height:	16.89 in (429 mm)	**Front:**	N/A
Max Weight:	6 lbs (2.8 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Depth when tilted: 5.4 inches

Load capacity: 150 lbs.
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C027; C050	Alcove/Patient Tracking-Corridors	Project	Draft (New)	2	
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
ED/1st Flr	C329	Waiting Rm	Project	Draft (New)	1	
ED/1st Flr	C466	Waiting Rm/Public	Project	Draft (New)	1	
				Total:	**5**	

ST640(P)

Mounting Pattern
458 x 405mm
(18.02" x 15.95")

Max Load
150lb
(68kg)

SMARTMOUNT®

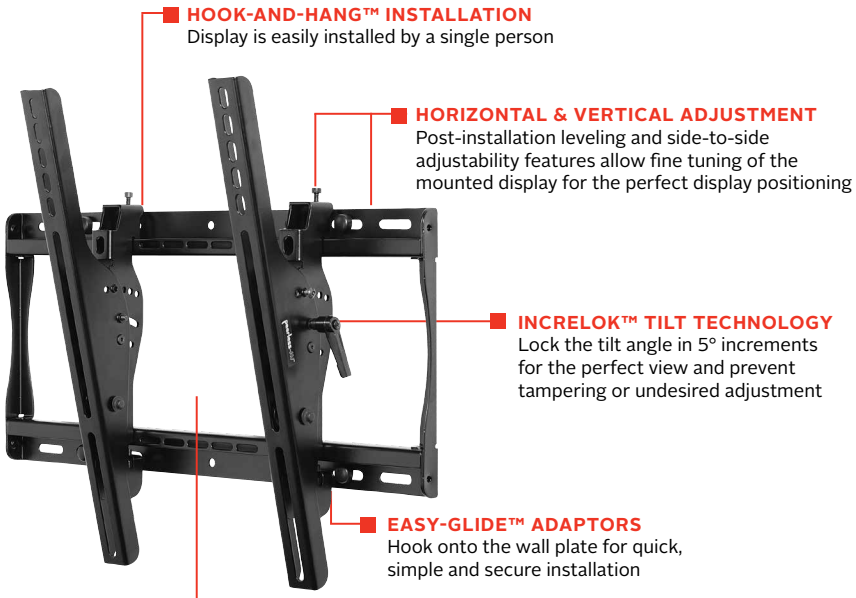
Universal Tilt Wall Mount

FOR 32" TO 50" DISPLAYS

The SmartMount® Universal Tilt Wall Mount series offers the most versatile installation features and mounting options. Horizontal and vertical adjustment abilities allow for post installation leveling and side-to-side positioning, making it easier than ever to find the perfect TV position. Lock the tilt angle at installation to prevent tampering or moving with the IncreLok™ tilt technology. Security screws provided in the ST640 models deter tampering and theft. The open wall plate design offers total wall access, increasing the electrical and cable management options. The display can now simply be installed by a single person with the Hook-and-Hang™ system. The Easy-Glide™ adaptors hook onto the wall plate for an overall quick, simple and secure installation.

- Universal mount fits displays with mounting patterns up to 458 x 405mm (18.02" W x 15.95" H) and accommodates up to 400 x 400mm VESA® patterns
- Adjustable 15° forward tilt and 5° backward tilt for finding the optimal viewing angle
- Easy-Grip™ ratcheting handle locks tilt angle into place
- Up to 0.25" (6mm) of vertical adjustment on each universal display adaptor bracket for post-installation leveling and height adjustment fine-tuning
- Horizontal display adjustment up to 6.00" (152mm) for centering display on wall
- Landscape to portrait mounting options increases installation versatility. Please check display dimensions against the wall plate when used in portrait mode*
- Includes all necessary wall and display attachment hardware
- Integrated security options available
- Design is UL listed and tested to four times stated load capacity
- For mounts requiring theft resistant hardware, installed with security tool (included), please purchase ST640
- For mounts requiring standard hardware, installed with a Philips screwdriver, please purchase ST640P

* Requires display to be removed and reset on mount



+15°/-5° of tilt for versatile viewing angles.

Comes in color packaging with included installation hardware and easy to follow instructions.

Please visit peerless-av.com/en-us/patents for patent information.

info@peerless-av.com
peerless-av.com

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Driving Technology Through Innovation

Model Numbers

WARRANTY: Limited 5-year

ST640P	SmartMount® Universal Tilt Wall Mount for 32” to 50” Displays - Standard Models
ST640	SmartMount® Universal Tilt Wall Mount for 32” to 50” Displays - Security Models

Product Specifications

	DIMENSIONS (W x H x D)	PRODUCT WEIGHT	LOAD CAPACITY	FINISH	AVAILABLE COLORS
ST640(P)	22.14” x 16.89” x 2.62”-5.40” (562 x 429 x 67-137mm)	6.07lb (2.75kg)	150lb (68kg)	Scratch Resistant Fused Epoxy	Semi-Gloss Black

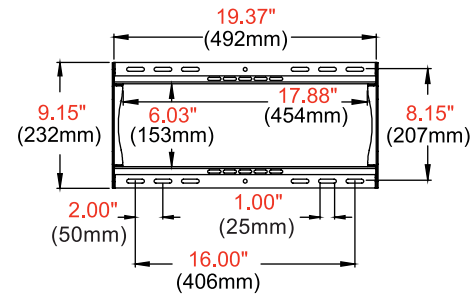
Package Specifications

	PACKAGE SIZE (W x H x D)	PACKAGE SHIP WEIGHT	PACKAGE UPC CODE	PACKAGE CONTENTS	UNITS IN PACKAGE
ST640(P)	21.69” x 2.95” x 10.71” (551 x 75 x 272mm)	7.82lb (3.55kg)	ST640: 735029235699 ST640P: 735029235712	Wall Mount, Wall and Display Installation Hardware, Installation Instructions	1

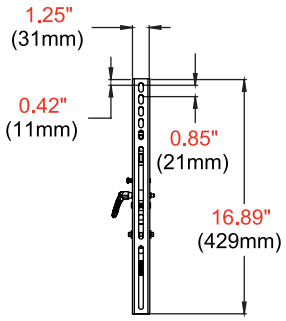
Accessories

ACC415:	4-pack Metal Stud Fastener Kit	ACC-WMVCS:	Video Conferencing Shelf
ACC309:	Video Conference Shelf	ESHV models:	AV Wall Shelves
ACC-UCM:	Universal AV Component Mount	IBA4-W:	Easy Mount Recessed Low Voltage Cable Plate

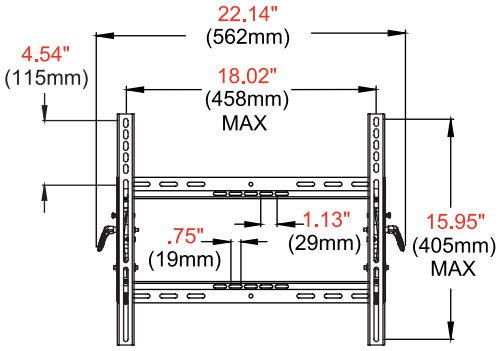
All dimensions = inch (mm)



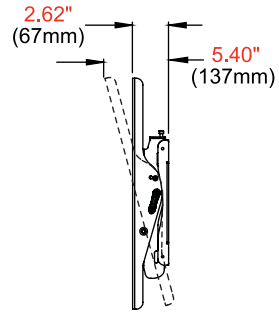
WALL PLATE



VERTICAL ADAPTOR



FRONT VIEW



SIDE VIEW
+15/-5° TILT

Architect Specifications

The SmartMount® Tilt Wall Mount shall be a Peerless-AV model ST640(P) and shall be located where indicated on the plans. Assembly and installation shall be done according to instructions provided by the manufacturer.

Visit peerless-av.com to see the complete line of AV solutions from Peerless-AV, including outdoor displays, wireless, kiosks, digital audio, display mounts, projector mounts, carts/stands, and a full assortment of accessories.

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Driving Technology Through Innovation

LIT-0592 rev.7

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Bracket, Monitor, Wall**
Manufacturer: GCX Corporation ((707) 773-1100)
Vendor: GCX Corporation ((707) 773-1100)
Model: 19' Seismic Channel w/12' M Series Arm

19 inch seismic wall channel with pivoting arm for Philips IntelliVue MP5, MP20/30, MP40/50 and MX600/700/800. Includes down post for Flexible Module Server (FMS).

Alt ID: BKT-VTS
Mfr #: WC-0002-05/AG-0018-21
Vendor #: WC-0002-05/AG-0018-21
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	4.00 in (102 mm)	**Left:**	N/A
Depth:	16.10 in (409 mm)	**Right:**	N/A
Height:	19.00 in (483 mm)	**Front:**	N/A
Max Weight:	6 lbs (2.7 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Weight and size varies depending on selected mfg/mdl monitoring equipment.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Philips IntelliVue MP5 on M Series Pivot Arm Channel Mount

PRODUCT DETAILS

Philips IntelliVue - 12"/30.5 cm M Series Pivot Arm

AG-0018-21

- Down post for Flexible Module Server (FMS)
- Compatible with IntelliVue MP20/30, MP40/50, MP60/70, MX600/MX700/MX800, MX450/MX400

Note: Channel sold separately

RECOMMENDED ACCESSORIES

19" / 48.3 cm Channel

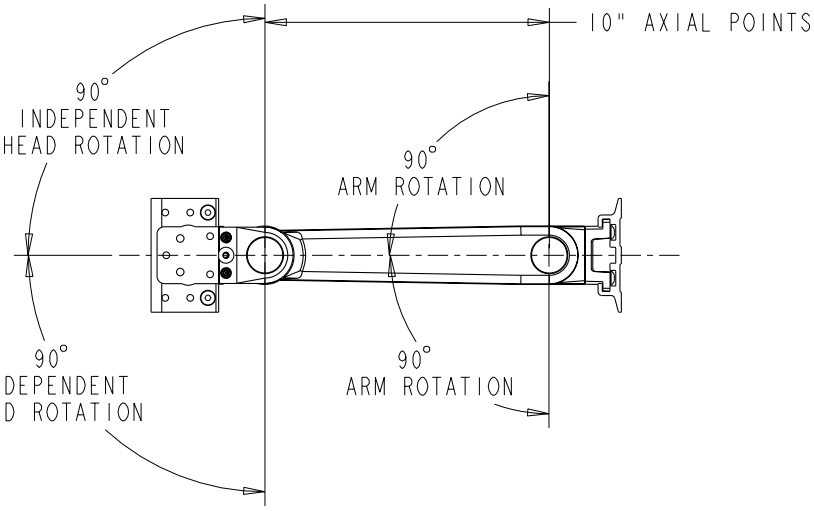
WC-0002-05

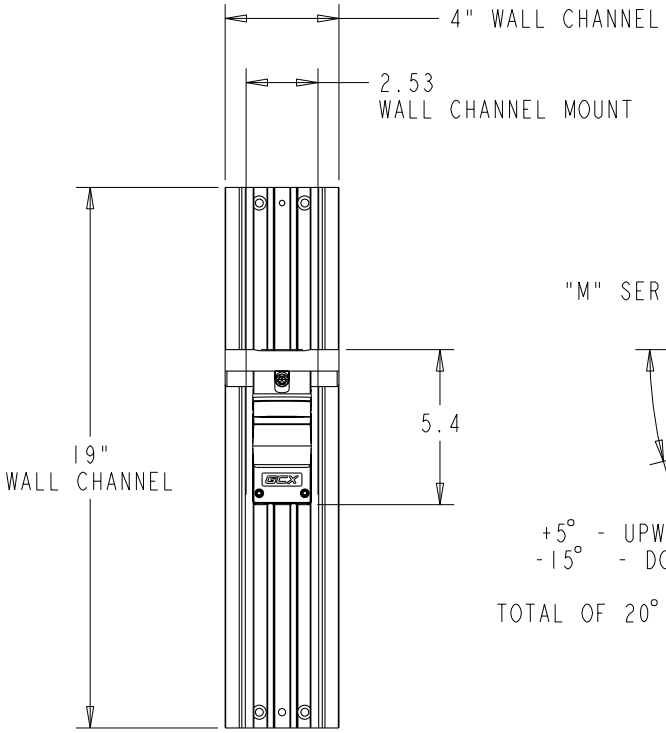
- Seismic channel
- Includes mounting hardware and instructions
- OSHPD Pre-Approval: WC-0002-03, -05, -07, -09, -11, and -15.

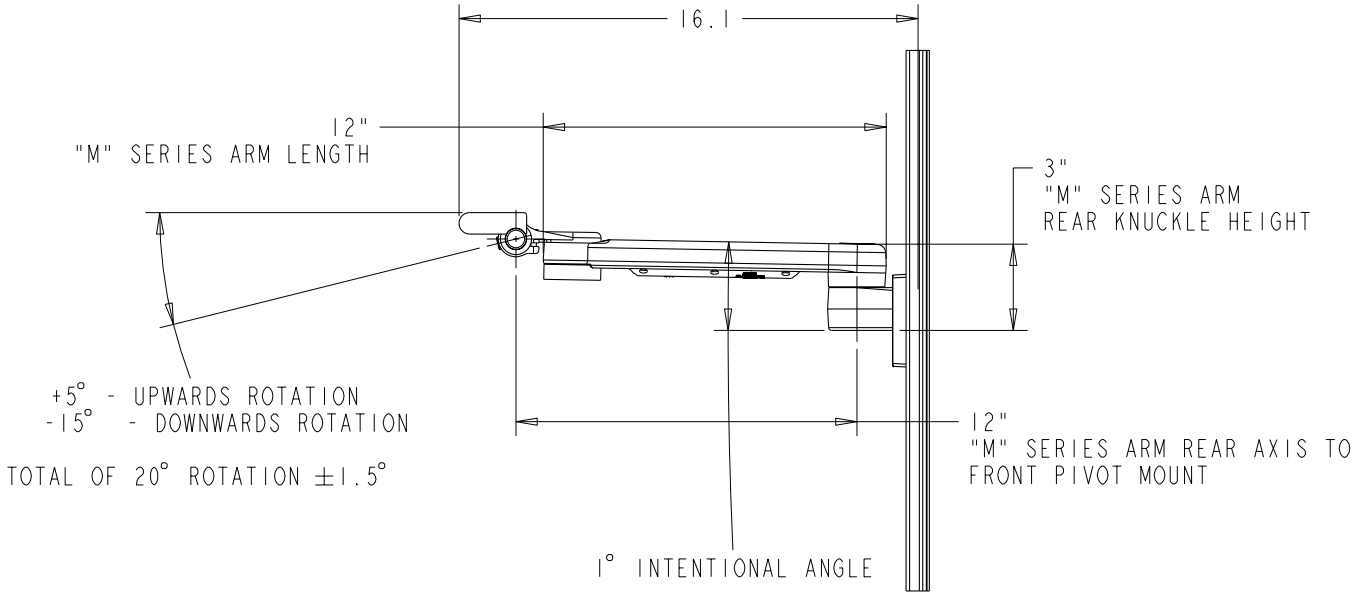
GCX Mounting Solutions

www.gcx.com

TOTAL WEIGHT: 5.4 POUNDS
19" WALL CHANNEL=2 POUNDS
12" M-SERIES ARM ASSY = 3.4 POUNDS







Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Bucket, Mopping**

Manufacturer: Filmop USA LLC (888-741-0707)

Vendor: Filmop USA LLC (888-741-0707)

Model: Maxi Jolly Split Bucket System

Alt ID: BUK-MWR

Mfr #: 0100SL2601C

Vendor #: 0100SL2601C

8 gal. split mop bucket system with side press wringer. Features: Separation of cleaning solution from rinse water and open bottom wringers. Long looped microfiber mop technology (3-Dimensional long looped microfiber mops). Mop sold separately.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	15.00 in (381 mm)	**Left:**	N/A
Depth:	19.00 in (483 mm)	**Right:**	N/A
Height:	22.00 in (559 mm)	**Front:**	N/A
Max Weight:	16 lbs (7.3 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C041	EVS	Project	Draft (New)	1	
				Total:	**1**	

Green Cleaning

FILMOP USA

Industrial Cleaning Equipment

Maxi Jolly Split bucket system

The ideal solution for professional janitorial mopping

Four concepts join together for better cleaning:

1. ***Separation of cleaning solution from rinse water***
   Split bucket system with removable division plate and rear drain
2. ***Open bottom wringers***
   For easy mop rinsing working with Spin-n-drop system (rinse through wringer)
3. ***Spin-n-drop flat mop system***
   Folding mop holder designed to attach, lock, hold and fold flat mops
4. ***Long looped microfiber mop technology***
   3-Dimensional long looped microfiber mops

Benefits

- ***Reduces cross-contamination***
- ***Reduces drying time***
- ***Increases productivity***
- ***Controls chemical usage***
- ***Saves water***
- ***Saves time***
- ***Saves labor***
- ***Ergonomic system***

Dip mop into cleaning solution in front tank

Wring and mop surface

After mopping, rinse mop in back tank to remove soil

Wring out soil ..repeat process

Removable plastic division plate with overmolded rubber seal

PATENTED

Rear drain eliminates bucket liftings

Rinse tank draining

Remove divider to completely drain

SPLIT BUCKET SYSTEMS

Maxi Jolly Split bucket systems

With patented roller wringer

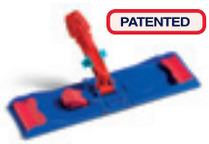
Item# 0122SL2601C
With roller wringer
2.08" dia dark gray roller

Folding Flat Mop Holders

Item# 00008116AB 16"

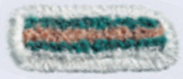
Item# 00008316AB 16"
With locking connector

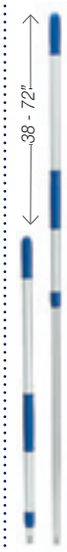
PATENTED



Scrub mops

Item# 6090122D 16"





Item# 0000AM3040A

Item# 0126SL2601C
With roller wringer
2.28" dia black roller

Folding Flat Mop Holders

Item# 00008116AB 16"

Item# 00008316AB 16"
With locking connector

PATENTED

Good — Micro-Activa

Item# 0000PN07012 16"

new

Better — Micro-Fast

Item# 0000PN07014 16"

new

Best — Rapido / Rapido Soaker

Item# 60908516 16"

Item# 60908516A 16"

Item# 6090121D 16"

- **Item# 6090121AA** 16"
- **Item# 6090121BB** 16"
- **Item# 6090121CC**16"
- **Item# 6090121FF** 16"
- **Item# 6090MC121D** 16"

With side press wringer

Item# 0100SL2601C
With side press wringer
open bottom

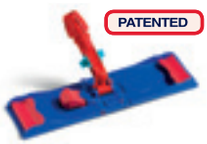
Item# 0000AM3040A

Folding Flat Mop Holders

Item# 00008116AB 16"

Item# 00008316AB 16"
With locking connector

PATENTED



Item# 8125 20"

Good — Micro-Activa

Item# 0000PN07012 16"
Item# 0000PN07030 20"

new

Better — Micro-Fast

Item# 0000PN07014 16"

new

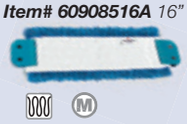
Scrub mops

Item# 6090122D 16"
Item# 6090612D 20"

Best — Rapido / Rapido Soaker

Item# 60908516 16"

Item# 60908516A 16"



Item# 6090121D 16"
Item# 6090611D 20"

- **Item# 6090121AA** 16"
- **Item# 6090121BB** 16"
- **Item# 6090121CC**16"
- **Item# 6090121FF** 16"
- **Item# 6090MC121D** 16"

Accessories

Item# P190010E
Fill hose 42"

Item# P179002A
Support for chemical tray

Item# 60402A
Chemical tray

Dimensions: 15"W x 19"D x 22"H; Weight: 60 lbs.

LEGEND

- Loops
- Four colors tag
- Cotton
- Polyester
- Microfiber

FILMOP USA
Industrial Cleaning Equipment

FILMOP® USA LLC.
13410 Highway 105 West CONROE - TEXAS - 77304 (U.S.A.)
Toll-Free: 888 741 0707
e-mail: info@filmopusa.com

www.filmopusa.com

Creative Studio s.r.l (Pd) Italia 03 2011 rev.00

SPLIT BUCKET SYSTEMS

www.filmopusa.com

Maxi Jolly

For All Mops

Item# 0100SL2601C
with side press wringer
open bottom

For Spin-n-Drop 16"
Scrub Mop
(Item# 6090122D)

Item# 0122SL2601C
with roller wringer
2.08" dia dark gray roller

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Cabinet, Warming, Dual, Freestanding**
Manufacturer: Skytron ((800) 759-8766)
Vendor: Skytron ((800) 759-8766)
Model: SS2207-MG (Glass Doors)

Alt ID: CAB-W2G
Mfr #: SS2207-MG
Vendor #: SS2207-MG

Freestanding warming cabinet with 2 compartments and glass doors. Data Logging of Real Time and Temperature with USB Retrieval. Features 3 adjustable shelves, digital controls with lockout, and audible alarm. Overall size 30 W x 74.5 H x 26.5 D (inches).

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	30.00 in (762 mm)	**Left:**	N/A
Depth:	26.50 in (673 mm)	**Right:**	N/A
Height:	74.50 in (1892 mm)	**Front:**	N/A
Max Weight:	430 lbs (195.0 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	750
Hz:	60	**Amps:**	12
Phase:	Single	**BTU/hr:**	2557
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C019	Clean Supply	Project	Draft (New)	2	
				Total:	**2**	

5085 Corporate Exchange Blvd. S.E.
Grand Rapids, MI 49512 • 616.656.2900

SS2207-M
SS2207-MG

DUAL COMPARTMENT STAINLESS STEEL WARMING CABINET

Introduction

SKYTRON Stainless Blanket and Solution Warming Cabinets are designed to provide evenly heated storage of blankets, sterile water and saline solutions used in the care of patients in surgery, recovery, OB/GYN, ICU, ER, trauma areas, and patient floors. The SKYTRON Model SS2207-M(G) offers a dual compartment full height unit that is able to hold a combination of warm blankets and fluids in individually controlled compartments for today's busy environments.

Technical Data

SKYTRON Warming Cabinets are manufactured from stainless steel with double wall insulation and polished to a #4 satin finish. The door is constructed of double pan stainless steel and insulated and polished to a #4 finish. Optional glass door is an aluminum framework with double pane tempered glass for low heat loss. Warming chamber designed to maintain temperatures +/- 3 degrees of set point though the use of digital controls. Door is manufactured with a full perimeter accordion style magnetic gasket. Cabinet shall be furnished with three adjustable shelves and two fixed shelves.

Features

USB port for data retrieval
Keyed temperature lockout
Digital operation
Continuous readout of chamber temperature and set point temperature
Temperature accuracy +/- 3 degrees
Audible and visual over-temp alarms
Rapid uniform heating in 2-6 hours
Chamber sizes:
- **Upper: 5.27 cubic ft. (149 liters)**
- **Lower: 11.93 cubic ft. (338 liters)**

Temperature range 90°-160° F (32-71 °C)

Options

Solid Door Configuration	**SS2205-M**
Glass Door Configuration	**SS2205-MG**
Mobile Stand	**-MS**
Caster Kit	**-MB**
Additional Shelves	**SMW0055**
Seismic Braces	**-SB**
Keyed Door Locks	**-DLU**
Celsius Controls	**-C**

Note: Fahrenheit is standard unless Celsius control option is selected, not field adjustable.

TEC-F-0517 REV0
05/15/2013

Dimensions

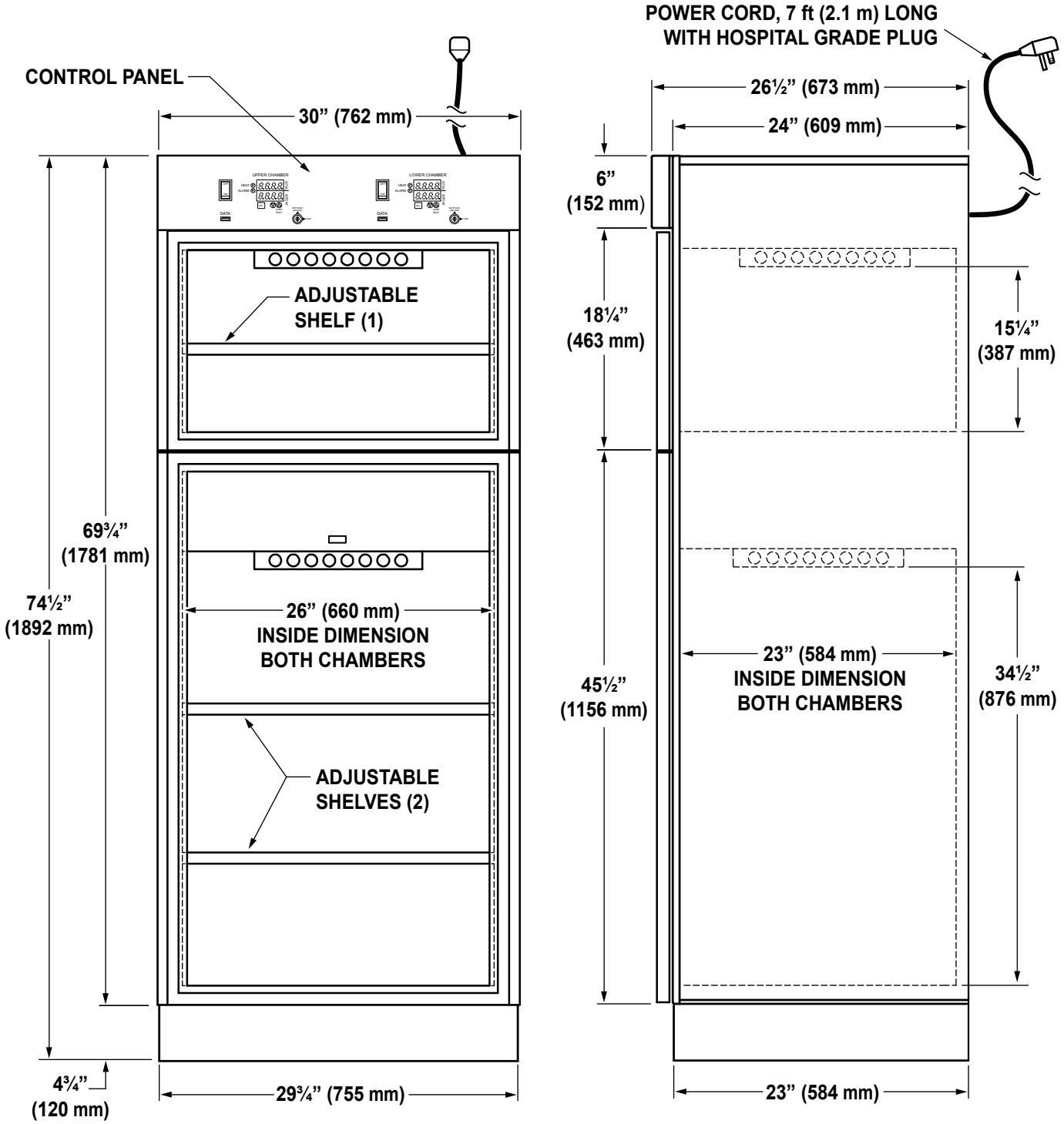
Exterior: 30” W x 74½” H x 26½” D
762 mm x 1892 mm x 673 mm

Interior:

Upper: 26” W x 15¼” H x 23” D
660 mm x 387 mm x 584 mm

Lower: 26” W x 34½” H x 23” D
660 mm x 876 mm x 584 mm

Electrical: 120V, 60Hz, Single Phase
Power Consumption: 1570 Watts
Amperage: Approx 13.08 Amps
Weight: 430 lbs (195.5 kg)
BTUs: 2557/hr



Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Camera, CCTV, Color
Manufacturer: Hanwha Techwin America (877.213.1222)
Vendor: Hanwha Techwin America (877.213.1222)
Model: Hanwha QND-8080R

Alt ID: CAM-CCT
Mfr #: QND-8080R
Vendor #: QND-8080R

Color CCTV camera. Features: 5 Megapixel resolution, 3.2~10mm (3.1x) motorized varifocal lens, 30fps@all resolutions (H.265/H.264), H.265, H.264, MJPEG codec supported, multiple streaming, day and night (ICR), WDR (120dB), defocus detection, directional detection, motion detection, enter/exit, tampering, virtual line, micro SD (128GB) memory slot, PoE, IR viewable length 20m, hallway view support, analog video out for easy installation, and LDC support (Lens Distortion Correction).

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	4.74 in (120 mm)	**Left:**	N/A
Depth:	4.74 in (120 mm)	**Right:**	N/A
Height:	4.02 in (102 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.4 kg)	**Back:**	N/A
Mounting:	Ceiling	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
PoE : Maximum 8.9W, typical 6.6W

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

QND-8080R

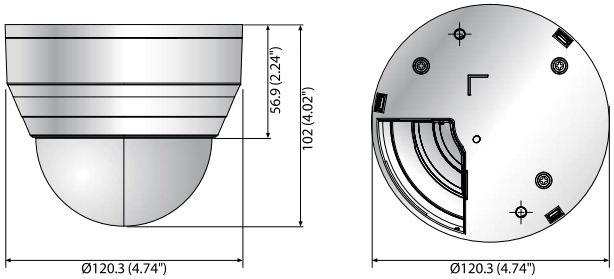
5 MP Network IR Dome Camera

Key Features

- 5 Megapixel (2592 x 1944) resolution
- 3.2~10mm(3.1x) motorized varifocal lens
- 0.15Lux (Color), 0Lux (B/W, IR LED on)
- 30fps@5 MP (H.265 / H.264)
- H.265, H.264, MJPEG codec support, Multiple streaming
- Day & Night, WDR (120dB)
- Defocus detection, Directional/Virtual Line detection, Motion detection, Enter/Exit, Tampering
- Micro SD / SDHC / SDXC memory slot (Maximum 128GB)
- Hallway view, WiseStream II support
- IR Viewable length 20m, PoE

Dimensions

Unit : mm (inch)



Accessories (Optional)

SBP-120WMW SBP-122HMW SBP-300LMW

SBP-300CMW SBP-300WMW1 SBP-300WMW

Hanwha Techwin

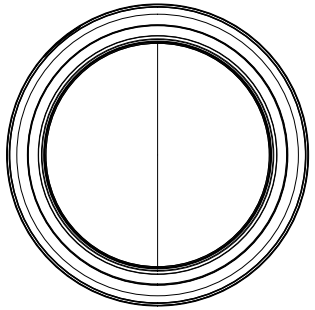
	QND-8080R
VIDEO	
Imaging Device	1/2.8" 5 MP CMOS
Effective Pixels	2592(H) x 1944(V)
Minimum Illumination	Color : 0.15Lux (F1.6, 1/30sec) BW : 0Lux (IR LED on)
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720 x 480 for installation
LENS	
Focal Length (Zoom Ratio)	3.2~10mm (3.1x) motorized varifocal
Maximum Aperture Ratio	F1.6 (Wide)~F2.9 (Tele)
Angular Field of View	H : 100.3°(Wide)~31.2°(Tele) / V : 72.3°(Wide)~23.5°(Tele) / H : 133.1°(Wide)~38.8°(Tele)
Focus Control	Simple focus
PAN / TILT / ROTATE	
Pan / Tilt / Rotate Range	0°~350° / 0°~67° / 0°~355°
OPERATIONAL	
IR Viewable Length	20m (65.62ft)
Camera Title	Displayed up to 85 characters, 5 lines, English / Numeric / Special & International characters, 6 colors, Transparency, Auto scale by resolution
Day & Night	Auto (ICR)
Backlight Compensation	BLC, WDR, SSDR
Wide Dynamic Range	120dB
Digital Noise Reduction	SSNR
Motion Detection	4ea, polygonal zones
Privacy Masking	6ea, rectangular zones
Gain Control	Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC	Support
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1/5~1/12,000sec)
Video Rotation	Flip, Mirror, Hallway view (90°/270°)
Analytics	Defocus detection, Directional/Virtual Line detection, Motion detection, Enter/Exit, Tampering
Alarm I/O	Input 1ea / Output 1ea
Alarm Triggers	Analytics, Network disconnect, Alarm input
Alarm events	File upload via FTP and e-mail, Notification via e-mail, Handover SD/SDHC/SDXC or NAS recording at event triggers, Alarm output
NETWORK	
Ethernet	RJ-45 (10/100BASE-T)
Video Compression	H.265/H.264 : Main/High, MJPEG
Resolution	2592 x 1944, 1920 x 1080, 1280 x 960, 1280 x 720, 800 x 600, 800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360
Maximum Framerate	H.265/H.264 : Maximum 30fps / MJPEG : Maximum 15fps
Smart Codec	Manual (5ea area), WiseStream II
Video Quality Adjustment	H.264/H.265 : Target bitrate level control / MJPEG : Quality level control
Bitrate Control	H.264/H.265 : CBR or VBR / MJPEG : VBR
Streaming	Unicast (6 users) / Multicast, Multiple streaming (Up to 3 profiles)
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP
Security	HTTPS(SSL) login authentication, Digest login authentication, IP address filtering, User access log, 802.1X authentication (EAP-TLS, EAP-LEAP)
Edge Storage	Micro SD/SDHC/SDXC 1 slot maximum 128GB
Application Programming Interface	ONVIF Profile S/G/T SUNAPI (HTTP API) Wisenet open platform
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch

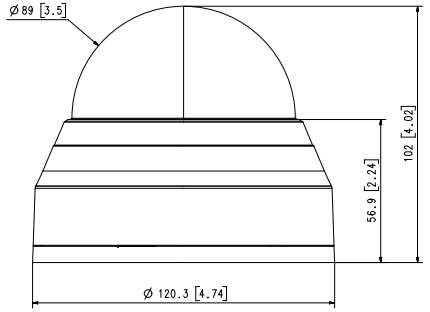
FIRST EDITION 07-2019

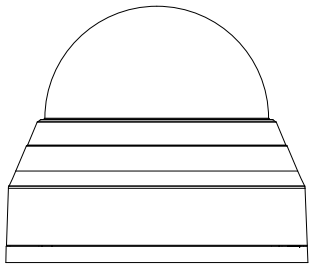
	QND-8080R
Web Viewer	Supported OS : Windows 7, 8.1, 10, Mac OS X 10.10, 10.11, 10.12, 10.13, 10.14 Recommended Browser : Google Chrome Supported Browser : MS Explorer 11, MS Edge, Mozilla Firefox (Windows 64-bit only), Apple Safari (Mac OS X only)
Memory	512MB RAM, 256MB Flash
ENVIRONMENTAL	
Operating Temperature / Humidity	-10°C ~ +50°C (+14°F ~ +122°F) / Less than 90% RH
Storage Temperature / Humidity	-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH
ELECTRICAL	
Input Voltage	PoE (IEEE802.3af, Class3)
Power Consumption	PoE : Maximum 8.9W, typical 6.6W
MECHANICAL	
Color / Material	White / Plastic
RAL Code	RAL9003
Product dimensions / weight	Ø120.3 x 102.0mm (Ø4.74 x 4.02"), 430g (0.948 lb)

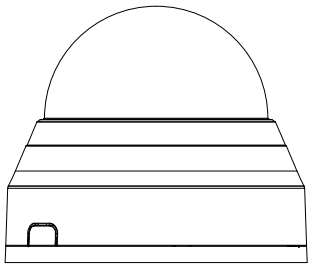
* The lastest product information / specification can be found at hanwhasecurity.com
* Design and specifications are subject to change without notice.
* Wisenet is the proprietary brand of Hanwha Techwin.

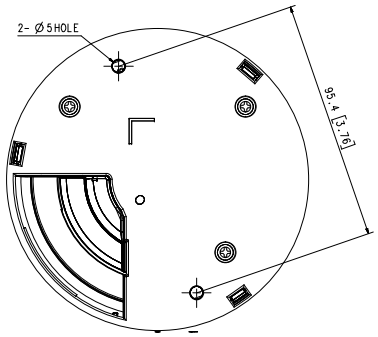
QND-8080R
UNIT : mm[inch]











QND-8080R

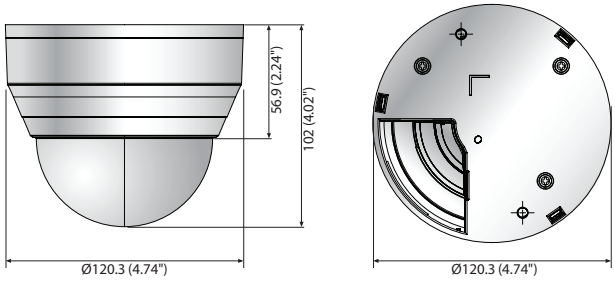
5 MP Network IR Dome Camera

Key Features

- 5 Megapixel (2592 x 1944) resolution
- 3.2~10mm(3.1x) motorized varifocal lens
- 0.15Lux (Color), 0Lux (B/W, IR LED on)
- 30fps@5 MP (H.265 / H.264)
- H.265, H.264, MJPEG codec support, Multiple streaming
- Day & Night, WDR (120dB)
- Defocus detection, Directional/Virtual Line detection, Motion detection, Enter/Exit, Tampering
- Micro SD / SDHC / SDXC memory slot (Maximum 128GB)
- Hallway view, WiseStream II support
- IR Viewable length 20m, PoE

Dimensions

Unit : mm (inch)



Accessories (Optional)

SBP-120WMW SBP-122HMW SBP-300LMW

SBP-300CMW SBP-300WMW1 SBP-300WMW

Hanwha Techwin

	QND-8080R
VIDEO	
Imaging Device	1/2.8" 5 MP CMOS
Effective Pixels	2592(H) x 1944(V)
Minimum Illumination	Color : 0.15Lux (F1.6, 1/30sec) BW : 0Lux (IR LED on)
Video Out	CVBS : 1.0 Vp-p / 75Ω composite, 720 x 480 for installation
LENS	
Focal Length (Zoom Ratio)	3.2~10mm (3.1x) motorized varifocal
Maximum Aperture Ratio	F1.6 (Wide)~F2.9 (Tele)
Angular Field of View	H : 100.3°(Wide)~31.2°(Tele) / V : 72.3°(Wide)~23.5°(Tele) / H : 133.1°(Wide)~38.8°(Tele)
Focus Control	Simple focus
PAN / TILT / ROTATE	
Pan / Tilt / Rotate Range	0°~350° / 0°~67° / 0°~355°
OPERATIONAL	
IR Viewable Length	20m (65.62ft)
Camera Title	Displayed up to 85 characters, 5 lines, English / Numeric / Special & International characters, 6 colors, Transparency, Auto scale by resolution
Day & Night	Auto (ICR)
Backlight Compensation	BLC, WDR, SSDR
Wide Dynamic Range	120dB
Digital Noise Reduction	SSNR
Motion Detection	4ea, polygonal zones
Privacy Masking	6ea, rectangular zones
Gain Control	Low / Middle / High
White Balance	ATW / AWC / Manual / Indoor / Outdoor
LDC	Support
Electronic Shutter Speed	Minimum / Maximum / Anti flicker (1/5~1/12,000sec)
Video Rotation	Flip, Mirror, Hallway view (90°/270°)
Analytics	Bcdmasq bcrcargm l * Bgpcargm l _j-Tgprs_j Jg l c bcrcargm l * Kmrgm l bcrcargm l * C l rcp-Cvgr* R_k ncpg l e
Alarm I/O	Input 1ea / Output 1ea
Alarm Triggers	Analytics, Network disconnect, Alarm input
Alarm events	File upload via FTP and e-mail, Notification via e-mail, Handover SD/SDHC/SDXC or NAS recording at event triggers, Alarm output
NETWORK	
Ethernet	RJ-45 (10/100BASE-T)
Video Compression	H.265/H.264 : Main/High, MJPEG
Resolution	2592 x 1944, 1920 x 1080, 1280 x 960, 1280 x 720, 800 x 600, 800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360
Maximum Framerate	H.265/H.264 : Maximum 30fps / MJPEG : Maximum 15fps
Smart Codec	Manual (5ea area), WiseStream II
Video Quality Adjustment	H.264/H.265 : Target bitrate level control / MJPEG : Quality level control
Bitrate Control	H.264/H.265 : CBR or VBR / MJPEG : VBR
Streaming	Unicast (6 users) / Multicast, Multiple streaming (Up to 3 profiles)
Protocol	IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP
Security	HTTPS(SSL) login authentication, Digest login authentication, IP address filtering, User access log, 802.1X authentication (EAP-TLS, EAP-LEAP)
Edge Storage	Micro SD/SDHC/SDXC 1 slot maximum 128GB
Application Programming Interface	ONVIF Profile S/G/T SUNAPI (HTTP API) Wisenet open platform
Webpage Language	English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch

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	QND-8080R
Web Viewer	Supported OS : Windows 7, 8.1, 10, Mac OS X 10.10, 10.11, 10.12, 10.13, 10.14 Recommended Browser : Google Chrome Supported Browser : MS Explorer 11, MS Edge, Mozilla Firefox (Windows 64-bit only), Apple Safari (Mac OS X only)
Memory	512MB RAM, 256MB Flash
ENVIRONMENTAL	
Operating Temperature / Humidity	-10°C ~ +50°C (+14°F ~ +122°F) / Less than 90% RH
Storage Temperature / Humidity	-30°C ~ +60°C (-22°F ~ +140°F) / Less than 90% RH
ELECTRICAL	
Input Voltage	PoE (IEEE802.3af, Class3)
Power Consumption	PoE : Maximum 8.9W, typical 6.6W
MECHANICAL	
Color / Material	White / Plastic
RAL Code	RAL9003
Product dimensions / weight	Ø120.3 x 102.0mm (Ø4.74 x 4.02"), 430g (0.948 lb)

* The lastest product information / specification can be found at hanwhasecurity.com
* Design and specifications are subject to change without notice.
* Wisenet is the proprietary brand of Hanwha Techwin.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Clock, Analog, Synchronized, Wireless
Manufacturer: La Crosse Technology (608-782-1982)
Vendor: La Crosse Technology (608-782-1982)
Model: WT-3122A 12.5 inch Atomic Wall Clock

Alt ID: CLK-AWL
Mfr #: WT-3122A
Vendor #: WT-3122A

Wall mounted, atomic analog clock. 12.5 inch diameter, wood frame w/ walnut finish, battery operated. Automatically sets to exact time, manual setting option, 4 time zone settings, automatic daylight savings time updates.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	12.50 in (318 mm)	**Left:**	N/A
Depth:	1.50 in (38 mm)	**Right:**	N/A
Height:	12.50 in (318 mm)	**Front:**	N/A
Max Weight:	3 lbs (1.1 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Requires 1 AA battery. Depth from Manufacturer website. Weight from vendor.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**31**	

CARE AND MAINTENANCE

- Always purchase the correct size and grade of battery most suitable for intended use.
- Clean the battery contacts and also those of your clock prior to battery installation.
- Ensure the battery is installed with correct polarity (+ and -).
- Remove battery from your clock when it is not used for an extended period of time.
- Promptly remove an expired battery.

SPECIFICATIONS

Battery Requirements: 1 AA (IEC LR6) required in movement (Alkaline recommended)

Battery life: 1 battery; over 12 months

WARRANTY AND SUPPORT

La Crosse Technology, Ltd. provides a 1-year limited time warranty (from date of purchase) on this product relating to manufacturing defects in materials & workmanship.

Before returning a product, please contact our friendly customer support with questions or visit our online help.

Phone: 1-608-782-1610
Online: www.lacrossetechnology.com/support/

⚠ **WARNING:** This product can expose you to chemicals including styrene, which is known in the State of California to cause cancer. For more information go to: https://www.p65warnings.ca.gov/

LA CROSSE®
TECHNOLOGY

12.5 Inch Atomic Wall Clock

Model: WT-3122A
DC: 052518

For information about WWVB, atomic time signal visit:
http://bit.ly/AtomicTime

POWER UP

1. Select Time Zone and DST ON or OFF.

2. Insert 1 AA battery into your clock.

3. For best reception, place your clock on a wall that faces Ft. Collins, Colorado. During the night, your clock will set itself.

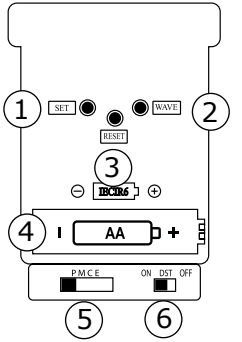
IMPORTANT:

- Hands will move to 12:00 and search for the atomic time signal.
- After 8-10 minutes if no atomic time signal is received, the clock will start running from 12:00.
- Your clock will continue to search for the WWVB atomic time signal.
- Allow up to 5 nights for the clock to receive the atomic time signal.

MANUALLY SET TIME

- In certain areas, your clock may not be able to receive the atomic time signal due to signal strength or interference.
- In this case, your clock can be set manually and operate as a quartz clock until the WWVB signal can be received.

Note: The atomic time signal will override manual settings.



1. SET
2. WAVE (Atomic search)
3. RESET
4. Battery
5. Time Zone Selector
6. Daylight Saving Time Selector

Set Time:

1. Hold SET for 3 seconds
2. Press and Hold SET to move hands quickly.
3. Press and release SET to move hands forward step by step.

Reset:

If the clock does not respond when trying to manually set your time, press the RESET button on the movement case.

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Computer, Desktop, All-in-One
Manufacturer: Lenovo (855-253-6686)
Vendor: Lenovo (855-253-6686)
Model: M810Z w/ Dual Monitors

Alt ID: CMD-A2M
Mfr #: M700z
Vendor #: M700z
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C468	Office	Project	Draft (New)	1	
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	5	
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	3	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	11	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	13	
				Total:	**33**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Computer, Desktop, All-in-One**
Manufacturer: Dell Inc. ((877) 717-3355)
Vendor: Dell Inc. ((877) 717-3355)
Model: OptiPlex 7400 All-In-One

Alt ID: CMP-AL1
Mfr #:
Vendor #:

All-in-one desktop computer. Features: 12th Gen Intel Core i5-12500 (18 MB cache, 6 cores, 12 threads, 3.00 GHz to 4.60 GHz Turbo, 65 W) processor. Windows 11 Pro, English, French, Spanish operating system. Intel Integrated Graphics. 8 GB, 1 x 8 GB, DDR4 memory. M.2 2230 256GB PCIe NVMe Class 35 Solid State Drive. Energy Star certified. Pricing may vary on option selected.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	21.26 in (540 mm)	**Left:**	N/A
Depth:	2.07 in (53 mm)	**Right:**	N/A
Height:	13.54 in (344 mm)	**Front:**	N/A
Max Weight:	15 lbs (6.8 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	432
Hz:	60	**Amps:**	3.60
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

OptiPlex 7400 All-in-One

Setup and Specifications

Regulatory Model: W26C
Regulatory Type: W26C005/W26C006
March 2022
Rev. A00

3

Specifications of OptiPlex 7400 All-in-One

Dimensions and weight

The following table lists the height, width, depth, and weight of your OptiPlex 7400 All-in-One.

Table 2. Dimensions and weight

Description	Values
Height:	
Front height	344.00 mm (13.54 in.)
Rear height	344.00 mm (13.54 in.)
Width	540.20 mm (21.26 in.)
Depth	52.60 mm (2.07 in.)
Weight **NOTE:** The weight of your computer depends on the configuration ordered and manufacturing variability.	Weight without stand • 6.83 Kg (15.06 lbs.)—maximum • 6.18 Kg (13.62 lbs.)—minimum

Processor

The following table lists the details of the processors supported by your OptiPlex 7400 All-in-One.

NOTE: Global Standard Products (GSP) are a subset of Dell's relationship products that are managed for availability and synchronized transitions on a worldwide basis. They ensure the same platform is available for purchase globally. This allows customers to reduce the number of configurations managed on a worldwide basis, thereby reducing their costs. They also enable companies to implement global IT standards by locking in specific product configurations worldwide.

Device Guard (DG) and Credential Guard (CG) are the new security features that are only available on Windows 10 Enterprise today. Device Guard is a combination of enterprise-related hardware and software security features. When you configure together, it locks a device and it can only run trusted applications. Credential Guard uses virtualization-based security to isolate secrets (credentials) and only privileged system software can access the system. Unauthorized access to these secrets can lead to credential theft attacks. Credential Guard prevents these attacks by protecting NTLM password hashes and Kerberos Ticket Granting Tickets.

NOTE: Processor numbers are not a measure of performance. Processor availability subject to change and may vary by region/country.

Table 3. Processor

Description	Option one	Option two	Option three	Option four	Option five	Option six	Option seven
Processor type	12th Generation Intel Core i3-12100	12th Generation Intel Core i3-12300	12th Generation Intel Core i5-12400	12th Generation Intel Core i5-12500	12th Generation Intel Core i5-12600	12th Generation Intel Core i7-12700	12th Generation Intel Core i9-12900
Processor wattage	60 W	60 W	65 W	65 W	65 W	65 W	65 W

Table 3. Processor (continued)

Description	Option one	Option two	Option three	Option four	Option five	Option six	Option seven
Processor core count	4	4	6	6	6	12	16
Processor thread count	8	8	12	12	12	20	24
Processor speed	3.30 GHz to 4.30 GHz	3.50 GHz to 4.40 GHz	2.50 GHz to 4.40 GHz	3 GHz to 4.60 GHz	3.30 GHz to 4.80 GHz	2.10 GHz to 4.90 GHz	2.40 GHz to 5.10 GHz
Processor cache	12 MB	12 MB	18 MB	18 MB	18 MB	25 MB	30 MB
Integrated graphics	Intel UHD Graphics 730	Intel UHD Graphics 730	Intel UHD Graphics 730	Intel UHD Graphics 770	Intel UHD Graphics 770	Intel UHD Graphics 770	Intel UHD Graphics 770

Chipset

The following table lists the details of the chipset supported by your OptiPlex 7400 All-in-One.

Table 4. Chipset

Description	Values
Chipset	Intel Q670 PCH
Processor	12th Generation Intel Core i3/i5/i7/i9
DRAM bus width	• 64-bit (for single-channel) • 128-bit (for dual-channel)
Flash EPROM	32 MB
PCIe bus	Up to Gen 3.0

Operating system

Your OptiPlex 7400 All-in-One supports the following operating systems:

- windows 11 Home, 64-bit
- Windows 11 Home National Academic, 64-bit
- Windows 11 Pro, 64-bit
- Windows 11 Pro National Academic, 64-bit
- Windows 11 CMIT Government Edition, 64-bit (China only)
- Windows 11 Downgrade (Windows 10 image)
- Ubuntu Linux 20.04 LTS, 64-bit
- Kylin Linux Desktop version 10.1 (China only)

For more information about Dell OS Recovery image, see How to Download and Use the Dell OS Recovery Image in Microsoft Windows, at Dell support site.

Commercial platform Windows 11 N-2 and 5-year operating system supportability:

All newly introduced 2019 and later commercial platforms (Latitude, OptiPlex, and Dell Precision) will qualify and ship with the most current factory installed Semi-Annual Channel Windows 11 version (N) and qualify (but not ship) the previous two versions (N-1, N-2). The OptiPlex 7400 All-in-One will RTS with Windows 11 version v20H2 at time of launch, and this version will determine the N-2 versions that are initially qualified for this platform.

For future versions of Windows 11, Dell continues to test the commercial platform with coming Windows 11 releases during device production and for five years post-production, including both fall and spring releases from Microsoft.

For additional information about N-2 and 5-year Windows operating system supportability, see the Dell Windows as a Service (WaaS), at Dell support site.

EOML 411

The OptiPlex 7400 All-in-One continues to test the coming Semi-Annual Channel Windows 11 version releases for five years post-production, including both fall and spring releases from Microsoft.

Memory

The following table lists the memory specifications of your OptiPlex 7400 All-in-One.

Table 5. Memory specifications

Description	Values
Memory slots	Two-SoDIMM
Memory type	DDR4
Memory speed	3200 MHz
Maximum memory configuration	64 GB
Minimum memory configuration	4 GB
Memory size per slot	4 GB, 8 GB, 16 GB, 32 GB
Memory configurations supported	• 4 GB, 1 x 4 GB, DDR4, 3200 MHz • 8 GB, 1 x 8 GB, DDR4, 3200 MHz • 16 GB, 1 x 16 GB, DDR4, 3200 MHz • 16 GB, 2 x 8 GB, DDR4, 3200 MHz, dual-channel • 32 GB, 1 x 32 GB, DDR4, 3200 MHz • 32 GB, 2 x 16 GB, DDR4, 3200 MHz, dual-channel • 64 GB, 2 x 32 GB, DDR4, 3200 MHz, dual-channel

Memory matrix

The following table lists the memory configurations supported for your OptiPlex 7400 All-in-One.

Table 6. Memory matrix

Configuration	Slot	
	SO-DIMM1	SO-DIMM2
4 GB DDR4	4 GB	NA
8 GB DDR4	8 GB	NA
16 GB DDR4	16 GB	NA
16 GB DDR4	8 GB	8 GB
32 GB DDR4	32 GB	NA
32 GB DDR4	16 GB	16 GB
64 GB DDR4	32 GB	32 GB

External ports

The following table lists the external ports of your OptiPlex 7400 All-in-One.

Table 7. External ports

Description	Values
Network port	One RJ45 Ethernet port (rear)
USB ports	• One USB 3.2 Gen 2x2 Type-C port (side) • One USB 3.2 Gen 1 port with PowerShare (side) • Two USB 3.2 Gen 2 ports (rear) • Two USB 3.2 Gen 1 ports with Smart Power On (rear)
Audio port	• One universal audio port (side) • One Line-out audio port (rear)
Video port	• One DisplayPort++ 1.4a/HDCP 2.3 port • One HDMI-IN—HDMI 1.4a port • One HDMI-OUT—HDMI 2.0 port
Media-card reader	One SD 4.0 card slot (side)
Power-adapter port	Not supported
Security-cable slot	One Kensington security-cable slot

- PowerShare port—Provides data transfer speed up to 5 Gbps. PowerShare enables you to charge your USB devices even when your computer is turned off.
- Smart Power On port—Provides data transfer speed up to 5 Gbps. Wakes the computer from standby with the keyboard or mouse connected to this port through BIOS settings.

Internal slots

The following table lists the internal slots of your OptiPlex 7400 All-in-One.

Table 8. Internal slots

Description	Values
PCIe expansion card slots	Not supported
mSATA	Not supported
SATA	One SATA slot for 2.5-inch hard drive (with UMA configuration)
M.2	• One M.2 2230 slot for Wi-Fi and Bluetooth card • Two M.2 2230/2280 slots for SSD **NOTE:** To learn more about the features of different types of M.2 cards, see the knowledge base article 000144170 at www.dell.com/support.

Ethernet

The following table lists the wired Ethernet Local Area Network (LAN) specifications of your OptiPlex 7400 All-in-One.

Table 9. Ethernet specifications

Description	Values
Model number	Intel i219-LM
Transfer rate	10/100/1000 Mbps

Wireless module

The following table lists the Wireless Local Area Network (WLAN) module specifications of your OptiPlex 7400 All-in-One.

Table 10. Wireless module specifications

Description	Option one	Option two	Option three
Model number	Intel AX201	Intel AX211	Realtek RTL8822CE
Transfer rate	Up to 2400 Mbps	Up to 2400 Mbps	Up to 867 Mbps
Frequency bands supported	2.4 GHz/5 GHz	2.4 GHz/5 GHz/6 GHz	2.4 GHz/5 GHz
Wireless standards	• WiFi 802.11a/b/g • Wi-Fi 4 (WiFi 802.11n) • Wi-Fi 5 (WiFi 802.11ac) • Wi-Fi 6 (WiFi 802.11ax)	• WiFi 802.11a/b/g • Wi-Fi 4 (WiFi 802.11n) • Wi-Fi 5 (WiFi 802.11ac) • Wi-Fi 6E (WiFi 802.11ax)	• Wi-Fi 802.11a/b/g • Wi-Fi 4 (Wi-Fi 802.11n) • Wi-Fi 5 (Wi-Fi 802.11ac)
Encryption	• 64-bit/128-bit WEP • AES-CCMP • TKIP	• 64-bit and 128-bit WEP • AES-CCMP • TKIP	• 64-bit/128-bit WEP • AES-CCMP • TKIP
Bluetooth	Bluetooth 5.2	Bluetooth 5.2	Bluetooth 5.0

Audio

The following table lists the audio specifications of your OptiPlex 7400 All-in-One.

Table 11. Audio specifications

Description	Values
Audio controller	Realtek Codec ALC3289
Stereo conversion	Realtek Codec ALC3289 capability supporting 44.1 k/48 k/96 k/192 kHz sample rate DAC conversion
Internal audio interface	High definition audio interface
External audio interface	Universal audio jack
Number of speakers	Two (Stereo speakers with Waves MaxxAudio® Pro, 5W x 2 = 10 W total)
Internal-speaker amplifier	Realtek Amplifier ALC1302

Table 11. Audio specifications (continued)

Description		Values
External volume controls		No hardware volume buttons
Speaker output:		
	Average speaker output	5 W
	Peak speaker output	6 W
Subwoofer output		Not applicable
Microphone		Two—MEMS microphones

Storage

This section lists the storage options on your OptiPlex 7400 All-in-One.

Table 12. Storage matrix

Storage		Single M.2 socket	2nd M.2 socket
M.2 SSD Boot		Yes	Yes
M.2 SSD Boot	SSD	Yes	Yes
M.2 SSD Boot	SSD	RAID0 or RAID1	RAID0 or RAID1

Table 13. Storage specifications

Storage type	Interface type	Capacity
M.2 2230, Class 35 SSD	PCIe NVMe Gen3 x4	Up to 1 TB
M.2 2230, Class 35 SSD, self-encrypting drive	PCIe NVMe Gen3 x4	256 GB
M.2 2280, Class 40 SSD	PCIe NVMe Gen4 x4	Up to 2 TB
M.2 2280, Class 40 SSD, self-encrypting drive	PCIe NVMe Gen3 x4	Up to 1 TB

RAID (Redundant Array of Independent Disks)

For optimal performance when configuring drives as a RAID volume, it requires identical drive models.

RAID 0 (Striped, Performance) volumes benefit from higher performance when drives are matched because the data is split across multiple drives: any IO operations with block sizes larger than the stripe size will split the IO and become constrained by the slowest of the drives. For RAID 0 IO operations where block sizes are smaller than the stripe size, whichever drive the IO operation targets will determine the performance, which increases variability and results in inconsistent latencies. This variability is particularly pronounced for write operations and it can be problematic for applications that are latency sensitive. One such example of this is any application that performs thousands of random writes per second in very small block sizes.

RAID 1 (Mirrored, Data Protection) volumes benefit from higher performance when drives are matched because the data is mirrored across multiple drives: all IO operations must be performed identically to both drives, thus variations in drive performance when the models are different, results in the IO operations completing only as fast as the slowest drive. While this does not suffer the variable latency issue in small random IO operations as with RAID 0 across heterogeneous drives, the impact is nonetheless large because the higher performing drive becomes limited in all IO types. One of the worst examples of constrained performance here is when using unbuffered IO. To ensure writes are fully committed to non-volatile regions of the RAID volume, unbuffered IO bypasses cache (for example by using the Force Unit Access bit in the NVMe protocol) and the IO

operation will not complete until all the drives in the RAID volume have completed the request to commit the data. This kind of IO operation completely negates any advantage of a higher performing drive in the volume.

Care must be taken to match not only the drive vendor, capacity, and class, but also the specific model. Drives from the same vendor, with the same capacity, and even within the same class, can have very different performance characteristics for certain types of IO operations. Thus, matching by model ensures that the RAID volumes is comprised of an homogeneous array of drives that will deliver all the benefits of a RAID volume without incurring the additional penalties when one or more drives in the volume are lower performing.

Media-card reader

The following table lists the media cards supported by your OptiPlex 7400 All-in-One.

Table 14. Media-card reader specifications

Description	Values
Media-card type	One Secure Digital (SD) 4.0 card
Media-cards supported	• Secure Digital High Capacity (SDHC) • Secure Digital Extended Capacity (SDXC) • Secure Digital (SD) 4.0 • SD UHS-I (UHS104) • SD UHS-II
NOTE: The maximum capacity supported by the media-card reader varies depending on the standard of the media card installed in your computer.	

Camera

The following table lists the camera specifications of your OptiPlex 7400 All-in-One.

Table 15. Full HD RGB Infrared Webcam

Description	Values
Number of cameras	One
Camera type	FHD RGB camera/Infrared camera
Camera location	Front pop-up camera
Camera sensor type	CMOS sensor technology
Focus detail	• Fixed focus • Focus area—23 cm ~ Infinity
Camera resolution:	
Still image	2.07 megapixels
Video	1920 x 1080 (FHD) at 30 fps
Infrared camera resolution:	
Still image	0.30 megapixels
Video	640 x 480 (VGA) at 30 fps
Diagonal viewing angle:	

Table 15. Full HD RGB Infrared Webcam (continued)

Description		Values
	Camera	77.50 degrees
	Infrared camera	82.90 degrees

Table 16. Full HD RGB Webcam

Description		Values
Number of cameras		One
Camera type		FHD RGB camera
Camera location		Front pop-up camera
Camera sensor type		CMOS sensor technology
Camera resolution:		
	Still image	2.07 megapixels
	Video	1920 x 1080 (FHD) at 30 fps
Diagonal viewing angle:		77.40 degrees

Power ratings

The following table lists the power rating specifications of OptiPlex 7400 All-in-One.

Table 17. Power ratings

Description	Option one	Option two
Type	160 W Bronze	220 W Platinum
Input voltage	90 VAC to 264 VAC	90 VAC to 264 VAC
Input frequency	47 Hz to 63 Hz	47 Hz to 63 Hz
Input current (maximum)	3.6 A	3.6 A
Output current (continuous)	• +19.5 VA/7.5 A • +19.5 VB/7.0 A Standby mode: • +19.5 VA/0.5 A • +19.5 VB/1.75 A	• +19.5 VA/8.5 A • +19.5 VB/9.2 A Standby mode: • +19.5 VA/0.5 A • +19.5 VB/1.75 A
Rated output voltage	• +19.5 VA • +19.5 VB	• +19.5 VA • +19.5 VB
Temperature range		
Operating	5°C to 42°C (41°F to 107°F)	5°C to 42°C (41°F to 107°F)
Storage	-40°C to 70°C (-40°F to 158°F)	-40°C to 70°C (-40°F to 158°F)

Power supply connector

The following table lists the Power supply connector specifications of your OptiPlex 7400 All-in-One.

Table 18. Power supply connector

160 W (80 PLUS Bronze)	• One 16 pin connector for system board

Table 18. Power supply connector (continued)

	• One 2 pin connector for LED
220 W (80 PLUS Platinum)	• One 16 pin connector for system board • One 2 pin connector for LED

Display

The following table lists the display specifications of your OptiPlex 7400 All-in-One.

Table 19. Display specifications

Description		Option one (non-touch display)	Option two (touch-display)
Display type		Full High Definition (FHD), Low Blue Light	Full High Definition (FHD)
Display-panel technology		Wide Viewing Angle (WVA)	Wide Viewing Angle (WVA)
Display-panel dimensions (active area):			
	Height	296.46 mm (11.67 in.)	296.46 mm (11.67 in.)
	Width	527.04 mm (20.75 in.)	527.04 mm (20.75 in.)
	Diagonal	604.70 mm (23.81 in.)	604.70 mm (23.81 in.)
Display-panel native resolution		1920 x 1080	1920 x 1080
Luminance		• 250 Nits (typical) • 200 Nits (minimum)	• 250 Nits (typical) • 200 Nits (minimum)
Megapixels		2.07	2.07
Color gamut		99% sRGB (typical)	72% NTSC typical
Pixels Per Inch (PPI)		92	92
Contrast ratio		• 700:1 (minimum) • 1000:1 (typical)	• 700:1 (minimum) • 1000:1 (typical)
Response time		• 25 ms (maximum) • 14 ms (typical)	• 25 ms (maximum) • 14 ms (typical)
Refresh rate		60 Hz	60 Hz
Horizontal view angle		• 170 degrees (minimum) • 178 degrees (typical)	• 170 degrees (minimum) • 178 degrees (typical)
Vertical view angle		• 170 degrees (minimum) • 178 degrees (typical)	• 170 degrees (minimum) • 178 degrees (typical)
Pixel pitch		0.2745 x 0.2745 mm	0.2745 x 0.2745 mm
Power consumption (maximum)		12.70 W	13.48 W
Anti-glare vs glossy finish		Anti-glare	Anti-glare
Adaptive sync		Not applicable	Not applicable
Stylus support		Not applicable	Capacitive touch

Table 19. Display specifications (continued)

Description	Option one (non-touch display)	Option two (touch-display)
Multi-touch feature supported	Not applicable	10-points multi-touch
Display surface	Anti-glare treatment of the front polarizer (Haze 25%, 3H)	Anti-glare treatment of the front polarizer (Haze 25%, 3H)

GPU—Integrated

The following table lists the specifications of the integrated Graphics Processing Unit (GPU) supported by your OptiPlex 7400 All-in-One.

Table 20. GPU—Integrated

Controller	Memory size	Processor
Intel UHD Graphics 730	Shared system memory	12th Generation Intel Core i3-12100, i3-12300, and i5-12400 processors
Intel UHD Graphics 770	Shared system memory	12th Generation Intel Core i5-12500/ i5-12700/i7/i9 processors

Multiple display support matrix

The following table lists the multiple display support matrix for your OptiPlex 7400 All-in-One.

Table 21. Multiple display support matrix

Description	Option 1	Option 2
Integrated Graphics Card	Intel UHD Graphics 730	Intel UHD Graphics 770
Optional Module	NA	NA
Supported 4K Displays	• On board integrated DP1.4 HBR3 (5120 x 3200 @ 60 Hz) • On board integrated HDMI 2.0 (4096 x 2160 @ 60 Hz)	• On board integrated DP1.4 HBR3 (5120 x 3200 @ 60 Hz) • On board integrated HDMI 2.0 (4096 x 2160 @ 60 Hz)
Supported 5K Displays	On board integrated DP1.4 HBR3 (5120 x 3200 @ 60 Hz)	On board integrated DP1.4 HBR3 (5120 x 3200 @ 60 Hz)

GPU—Discrete

The following table lists the specifications of the discrete Graphics Processing Unit (GPU) supported by your OptiPlex 7400 All-in-One.

Table 22. GPU—Discrete

Controller	Memory size	Memory type
AMD Radeon RX 6500M	4 GB	GDDR6

Multiple display support matrix

The following table lists the multiple display support matrix for your OptiPlex 7400 All-in-One.

Table 23. Multiple display support matrix

Graphics Card	Memory	Ports	Supported external displays with Direct Connect	Supported external displays with DP Multi-Stream	Supported 4K Displays	Supported 5K Displays	Resolution	Total Power
AMD Radeon RX 6500M	4 GB GDDR 6	HDMI OUT—HDMI 2.0 port	One HDMI 2.0 port	Not supported	Yes	Not supported	3840 x 2160 @ 60 Hz	50 W

Hardware security

The following table lists the hardware security of your OptiPlex 7400 All-in-One.

Table 24. Hardware security

Hardware security
Dell Lockable port cover (optional)
Chassis lock slot support
Noble Custom AIO Plate Lock (optional)
Supply chain tamper alerts
Chassis intrusion switch
Trusted Platform Module (Discrete TPM Enabled)
SafeBIOS including Dell Off-host BIOS Verification
BIOS Resilience
BIOS Recovery, and additional BIOS Controls
SafeID including Trusted Platform Module (TPM) 2.0
Self-Encrypting Drives (SED)
Smart card keyboard (FIPS)
D-Pedigree (Secure Supply Chain Functionality)
Dell wired mouse with fingerprinter reader

Environmental

The following table lists the environmental specifications of your OptiPlex 7400 All-in-One.

Table 25. Environmental

Feature	Values
Recyclable packaging	Yes
BFR/PVC—free chassis	No
Vertical orientation packaging support	Yes
Multi-Pack packaging	No

Table 25. Environmental (continued)

Feature	Values
Energy-Efficient Power Supply	Standard
ENV0424 compliant	Yes

NOTE: Wood-based fiber packaging contains a minimum of 35% recycled content by total weight of wood-based fiber. Packaging that contains without wood-based fiber can be claimed as Not Applicable. The anticipated required criteria for EPEAT 2018.

Regulatory compliance

The following table lists the regulatory compliance of your OptiPlex 7400 All-in-One.

Table 26. Regulatory compliance

Regulatory compliance
Product Safety, EMC and Environmental Datasheets
Dell Regulatory Compliance Home page
Dell and the Environment

Operating and storage environment

This table lists the operating and storage specifications of your OptiPlex 7400 All-in-One.

Airborne contaminant level: G1 as defined by ISA-S71.04-1985

Table 27. Computer environment

Description	Operating	Storage
Temperature range	10°C to 35°C (50°F to 95°F)	-40°C to 65°C (-40°F to 149°F)
Relative humidity (maximum)	20% to 80% (non-condensing)	5% to 95% (non-condensing)
Vibration (maximum)*	0.26 GRMS	1.37 GRMS
Shock (maximum)	110 G†	160 G†
Altitude range	-15.2 m to 3048 m (-49.87 ft to 10000 ft)	-15.2 m to 10668 m (-49.87 ft to 35000 ft)
CAUTION: Operating and storage temperature ranges may differ among components, so operating or storing the device outside these ranges may impact the performance of specific components.		

* Measured using a random vibration spectrum that simulates user environment.

† Measured using a 2 ms half-sine pulse.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Compression Unit, Extremity Pump, Rapid Inflation**

Manufacturer: Arjo Inc ((800) 323 1245)

Vendor: Arjo Inc ((800) 323 1245)

Model: Flowtron Continuous/Sequential DVT Pump - ACS900

Alt ID: CMP-EXC

Mfr #: 526000-01

Vendor #: 526000-01

Item ID:

Continuous and Sequential DVT compression pump. Used for enhancing the circulation of blood in the legs' deep veins, reducing venous stasis, and preventing DVT formation. Delivers both uniform and sequential compression for treating Deep Vein Thrombosis (DVT). Garments are non-thermal sleeves with moisture management properties, a combination of garments can be used simultaneously including combinations of the foot, calf, and thigh. SmartSense auto garment recognition technology automatically detects the attached garments and supplies the correct pressure. One button start-up, One-button start-up, real-time pressure indicator, positive pressure start/stop button, integrated carry handle, and integrated battery.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	9.10 in (231 mm)	**Left:**	N/A
Depth:	7.50 in (191 mm)	**Right:**	N/A
Height:	9.00 in (229 mm)	**Front:**	N/A
Max Weight:	9 lbs (4.1 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	40
Hz:	60	**Amps:**	0.3
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	3	
				Total:	**3**	

Flowtron ACS900

ARJOHUNTLEIGH
GETINGE GROUP

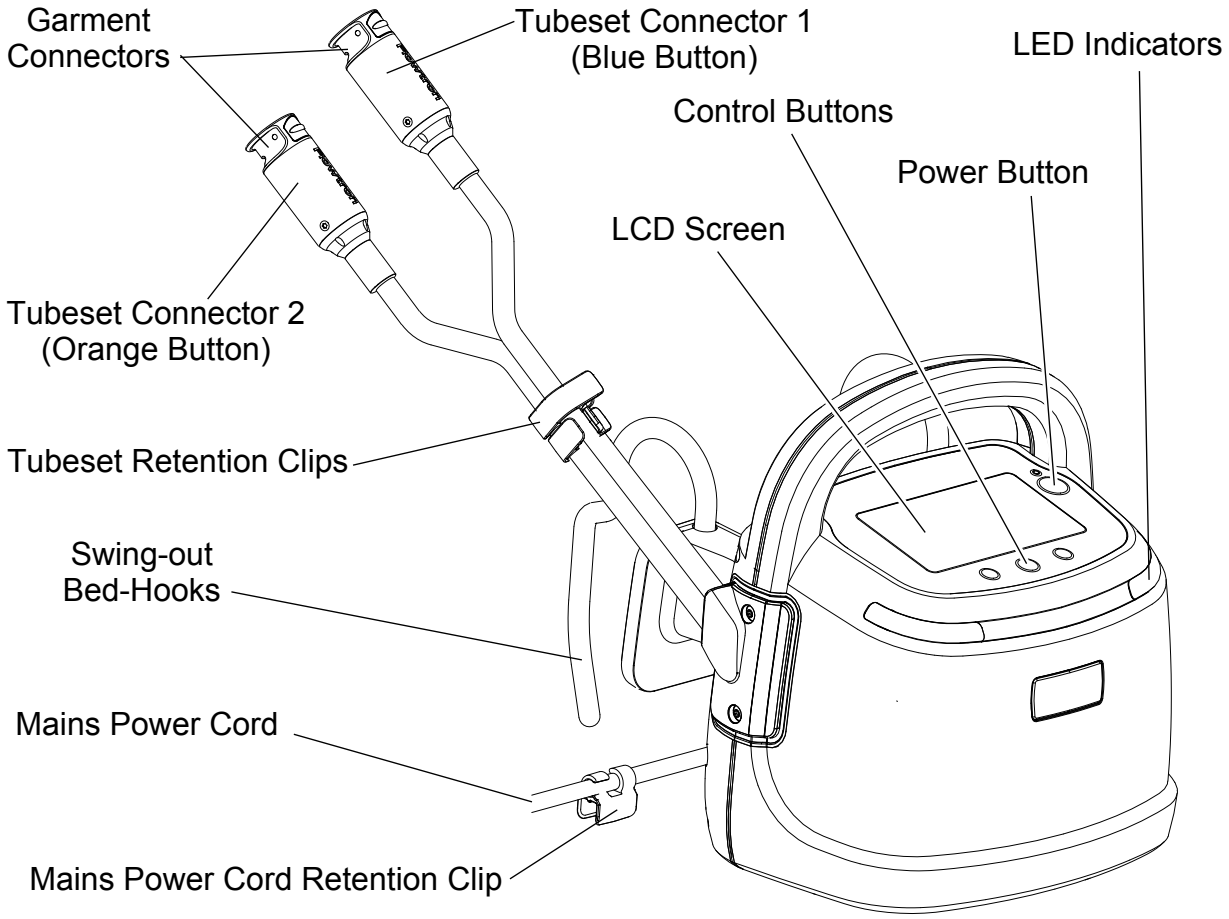
EN

...with people in mind

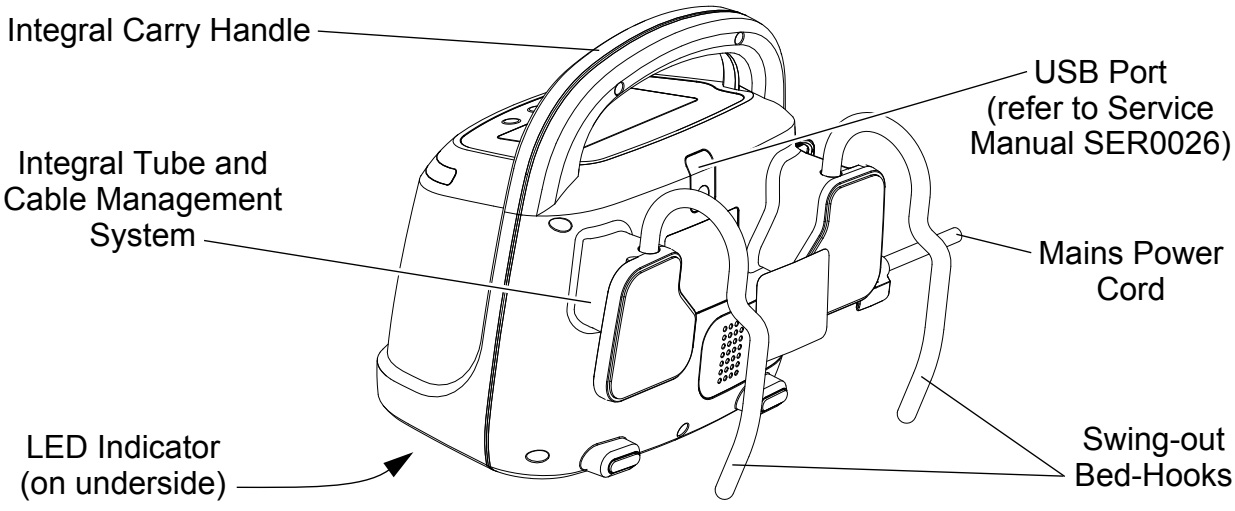
The *Flowtron* ACS900 system is intended for use ONLY in professional healthcare facilities. It is not intended for use in the home healthcare environment (for example private dwellings).

A full technical description of the *Flowtron* ACS900 system can be found in the *Flowtron* ACS900 Service Manual, part number SER0026, available from your local ArjoHuntleigh sales office.

Pump: Front View



Pump: Rear View



9. Technical Specification

Pump Specification

PUMP					
Model	*Flowtron* ACS900				
Part Numbers	Part Number	Configuration[a]	Country	Supply Voltage (V)	Supply Frequency (Hz)
	526000-01	STD	Americas	100 - 230	50 - 60
	526000-02	OR			
	526000-03	STD	United Kingdom		
	526000-04	OR			
	526000-05	STD	Australia		
	526000-06	OR			
	526000-07	STD	Europe		
	526000-08	OR			
	526000-09	STD	Switzerland		
	526000-10	OR			
	526000-11	STD	Japan		
	526000-12	OR			
	526000-13	STD	China		
	526000-14	OR			
	526000-15	STD	South Africa/ India		
	526000-16	OR			
	526000-17	STD	Kingdom of Saudi Arabia	230	60
	526000-18	OR			
	526000-19	STD	Brazil	100 - 230	50 - 60
	526000-20	OR			
	526000-21	STD	International		
	526000-22	OR			
	526000-23	STD	Middle East		
	526000-24	OR			
	526000-25	STD	Asia		
	526000-26	OR			
Power Input	10 - 40 VA				
Size	230 x 228 x 190 mm (9.1 x 9.0 x 7.5 in.)				
Weight	4.1 kg (9.0 lb)				

a. Configuration:
STD is the Standard pump which has a standard length tubeset (2.1 m / 7 ft).
OR is the Operating Room pump which has a longer tubeset (4 m / 13 ft long).

PUMP (continued)	
Case Material	Flame Retardant ABS Plastic
Mains Power Plug Fuse Rating	5A to BS1362 (UK ONLY)
Degree of protection against electric shock	Class II, Double Insulated Type BF
Degree of protection against liquid ingress	IPX3 - Protected against spraying water
Mode of operation	Continuous
Pressure Range	Foot Garment: 130 ± 10 mmHg Uniform (DVT) Calf and Calf & Thigh Garments: Range: 35 - 65 ± 5 mmHg Factory Default: 40 ± 5 mmHg Sequential (Tri Pulse) Calf and Calf & Thigh Garments: 45 ± 5 mmHg

ENVIRONMENTAL INFORMATION			
Condition	**Temperature Range**	**Relative Humidity**	**Atmospheric Pressure**
Operating	+10 °C to +40 °C (+50 °F to +104 °F)	30% to 75% (non-condensing)	700 hPa to 1060 hPa
Storage and Transport (Long Term)	+10 °C to +40 °C (+50 °F to +104 °F)	20% to 95% (non-condensing)	700 hPa to 1060 hPa
Storage and Transport (Short Term)	-20 °C to +50 °C (-4 °F to +122 °F)	20% to 95%	500 hPa to 1060 hPa

☞ *If the pump is stored in conditions outside of the "Operating" ranges, it should be allowed time to stabilise at normal operating conditions before use.*

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Coffee Maker, Single Cup, Plumbed**

Manufacturer: Keurig Green Mountain ((802) 244-5621)

Vendor: Keurig Green Mountain ((802) 244-5621)

Model: K150P Commercial Brewing System - Plumbed

Alt ID: COF-SGC

Mfr #: K150P

Vendor #: K150P

Item ID:

Single cup coffee maker. Direct line plumbed for continuous use. Brews 4, 6, 8, 10 and 12 oz. cup sizes. Features removable water reservoir, 3 language options (English is standard), removable drip tray, LCD interactive touchscreen display, fully programmable, and adjustable brew temperature. NSF Certified.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	10.40 in (264 mm)	**Left:**	N/A
Depth:	14.00 in (356 mm)	**Right:**	N/A
Height:	13.90 in (353 mm)	**Front:**	N/A
Max Weight:	18 lbs (8.2 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	1400
Hz:	60	**Amps:**	11.7
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	Yes	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:

Weight reflects empty brewing system.

Manufacturer recommends 15 amp dedicated, grounded circuit.

Requires the use of an external water filter such as Omnipure KQ8. Sold seperately.

Does not require drain. Drain hose in back of unit - water drains into pitcher.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	1	
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
				Total:	**3**	

Keurig® K150P Commercial Brewing System (Medium Office Brewer)

Ideal for offices with up to 30 employees.

Why We Recommend This Brewer

With Keurig®, it's always a fresh cup. The K150P is a fully programmable brewer with an interactive touchscreen that allows you to program the brew temperature, Auto On/Off and set your language preference to English, Spanish or French. The K150P brewer has a choice of five cup sizes (4 oz., 6 oz., 8 oz., 10 oz., 12 oz.), offers a removable drip tray to accommodate travel mugs and a drainable internal hot water tank for transport or storage.

Office Size	Ease of Use	Variety	Value
30	10/10	10/10	7/10

Specifications

- MODEL: Keurig K150P
- COLOR: Stainless Steel / Black
- DIMENSIONS: 14"(d) x 10.4"(w) x 13.9"(h)
- BREW SIZES: 4 oz., 6 oz., 8 oz., 10 oz., 12 oz.
- PLUG TYPE: 2-Wire Plus Ground
- AMPS: 15
- WEIGHT: 18lbs
- CORD ATTACHED: Yes
- OFFICE SIZE: Up to 30 Employees

corporate essentials

fuel culture. work happy.

Office: 973.402.1088 Fax: 973.402.4395
drinkcoffee.com

Keurig® K150P Commercial Brewing System (Medium Office Brewer)

Ideal for offices with up to 30 employees.

KEURIG®

FEATURES

Direct Plumbed makes for an water supply ready for back-to-back brewing.

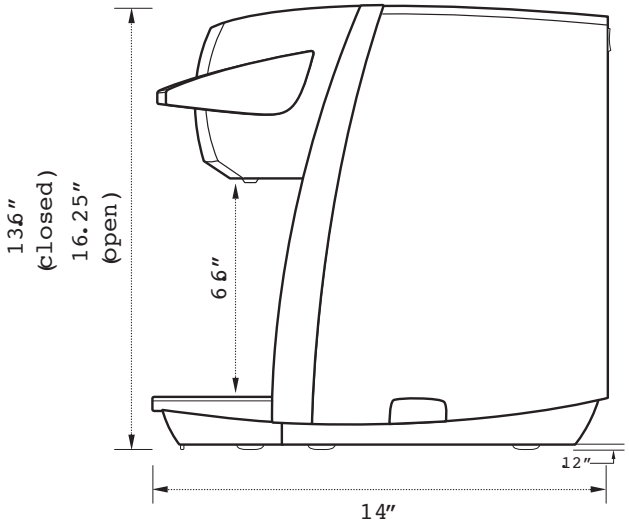
Commercial Grade ensures built to commercial specifications and UL-Listed for commercial use. The K150P is a rugged machine.

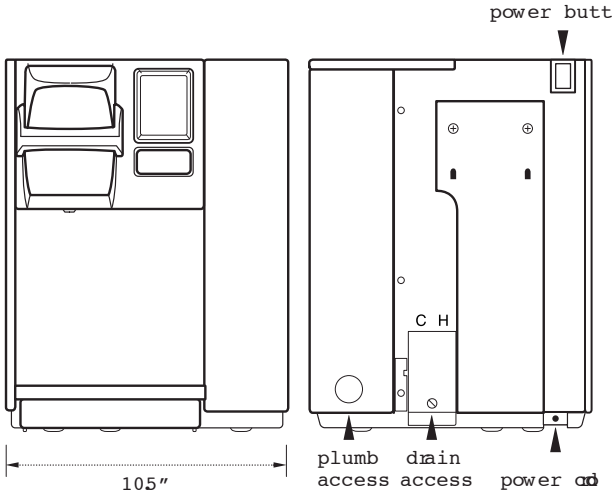
Satisfy Every Taste with your choice of 5 brew sizes. (4 oz., 6 oz., 8 oz., 10 oz., and 12 oz.)

Versatile Drip Tray is designed to accommodate accidental spills so as to prevent mess. It's easy to clean and is dishwasher safe.

NSF CERTIFIED means this brewer has passed extensive testing and analysis of the National Sanitation Foundation.

Brew Time & Brew Volume is fast and fixed. 4, 6, 8, 10, or 12 ounces of freshly brewed coffee in under one minute at the touch of a button.





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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Communication Device, Video Interpreter**
Manufacturer: Stratus Video (855-663-1231)
Vendor: Stratus Video (855-663-1231)
Model: Stratus Stand w/iPad Air 2

Alt ID: COM-VID
Mfr #: Stratus Stand
Vendor #: Stratus Stand

Mobile video remote interpretation (VRI) device. Combines the benefits of face-to-face interpretation with the on-demand nature of over-the-phone interpretation (OPI). Patients can see and hear a medically qualified interpreter in their language. Audio service offers 24/7 access to over-the-phone interpreters in more than 200 languages. Audio can be reached both over a telephone or on the Stratus Video application. With the InPerson app you can request an in-person interpreter.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	21.50 in (546 mm)	**Left:**	N/A
Depth:	21.50 in (546 mm)	**Right:**	N/A
Height:	45.00 in (1143 mm)	**Front:**	N/A
Max Weight:	30 lbs (13.6 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	12
Hz:	60	**Amps:**	1
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Power is for iPad AC (USB) adapter.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	4	
				Total:	**4**	

Announcing the new STRATUS™ STAND

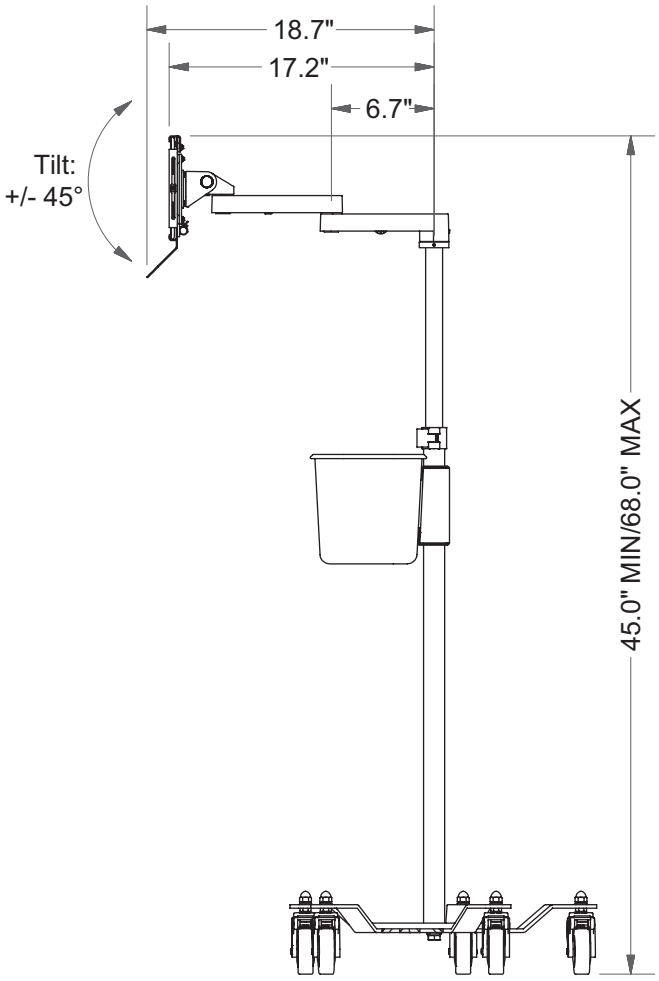
Our new and unique design offers great mobility and accessibility while affording improved visibility. With the conveniently attached stand bin you can store language identification cards, sani-wipes, and speakers, making it easier for you to find the supplies and instructions you need, right when you need them.

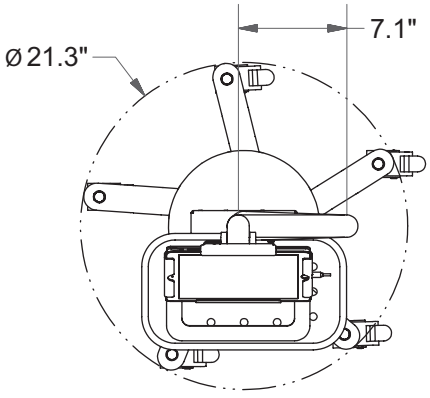
- ✓ extendable arm for maximum reach over patient's bed
- ✓ tiliting face for patient accessibility
- ✓ up to 72" of adjustable height to reach over bed guards
- ✓ smooth, cleanable surfaces for infectious disease control
- ✓ wheeled, sturdy base for ease of mobility

Stratus Video - www.stratusvideo.com - 727.451.9766 - 33 N Garden Ave Suite 1000 Clearwater, FL 33755

Video Interpreting Cart

SPECIFICATIONS





(TOP DOWN VIEW)

Total weight: 30 lbs
(with iPad installed)

Apple iPad Air 2

Specifications

DISPLAY /

Touchscreen	Multi-Touch
Multi-Touch Display	Yes
LCD Backlight Technology	LED backlight
Technology	TFT active matrix
TFT Technology	IPS
Diagonal Size	9.7 in
Diagonal Size (metric)	24.63 cm
Native Resolution	2048 x 1536
Pixel Density (ppi)	264

MISCELLANEOUS /

Features	AirDrop, AirPlay, parental controls, AirPrint, Apple M8 motion coprocessor, AssistiveTouch, Dictation, MIMO technology, VoiceOver screen reader, charging via USB, iBeacon microlocation
Color	space gray
Color Category	black

PROCESSOR /

64-bit Computing	Yes
Type	A8x
Manufacturer	Apple

MEMORY /

Storage	16 GB

COMMUNICATIONS /

Wireless Protocol	802.11a/b/g/n/ac, Bluetooth 4.0

CAMERA /

Features	8-megapixel iSight camera, Burst mode, FaceTime HD camera, Slow motion video, Time lapse mode, autofocus, face detection in still images, photo and video geotagging, tap to focus, video stabilizer

NETWORKING /

Wireless Connectivity	Bluetooth 4.0, IEEE 802.11a, IEEE 802.11ac, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n

ENVIRONMENTAL PARAMETERS /

Min Operating Temperature	32 °F
Max Operating Temperature	95 °F
Humidity Range Operating	5 - 95% (non-condensing)
Min Storage Temperature	-4 °F
Max Storage Temperature	113 °F

INPUT DEVICE /

Security Devices	fingerprint reader

MULTIMEDIA /

Audio	Two microphones, speaker

BATTERY /

Run Time (Up To)	10 sec
Capacity	27.3 Wh

HEADER /

Brand	Apple
Product Line	Apple iPad Air 2
Model	Wi-Fi
Localization	English
Country Kits	United States
Packaged Quantity	1

EXPANSION AND CONNECTIVITY /

Interfaces	1 x headphones 1 x Lightning

SYSTEM /

Platform	Apple iOS
Handheld Type	tablet
Security Devices	fingerprint reader

FLASH MEMORY /

Installed Size	16 GB

DIGITAL CAMERA /

Cameras (for SD)	rear camera + front camera
Rear-facing Camera	Yes
HD Video Recording	1080p
Features	8-megapixel iSight camera, Burst mode, FaceTime HD camera, Slow motion video, Time lapse mode, autofocus, face detection in still images, photo and video geotagging, tap to focus, video stabilizer

AUDIO OUTPUT /

Type	speaker

AUDIO INPUT /

Type	two microphones

OS PROVIDED /

Type	Apple iOS 8

POWER DEVICE /

Type	power adapter

BATTERY LIFE DETAILS /

Run Time (Up To)	10 hour(s)
Usage Mode	audio playback, video playback, web browsing over Wi-Fi

INTERFACE PROVIDED /

Interface	Lightning, headphones
Qty	1

SYSTEM REQUIREMENTS /

OS Required	Apple MacOS X 10.6.8 or later, Microsoft Windows 7, Microsoft Windows Vista, Microsoft Windows XP Home Edition SP3 or later, Microsoft Windows XP Professional SP3 or later, Windows 8

CABLE DETAILS /

Type	Lightning to USB cable

PDA SOFTWARE /

Type	App Store, Calendar, Music, Newsstand, Notes, Photo Booth, Photos, Podcasts, Reminders, Safari, Siri, Videos, Camera, iBooks, iCloud, iTunes Store, Clock, Contacts, FaceTime, Game Center, Mail, Maps, Messages

DIMENSIONS & WEIGHT /

Width	6.7 in
Depth	6.1 mm
Height	9.4 in
Weight	15.41 oz

SERVICE & SUPPORT /

Type	1 year warranty

SERVICE & SUPPORT DETAILS /

Type	limited warranty, technical support
Service Included	phone consulting
Full Contract Period	1 year, 90 days

GENERAL /

Manufacturer	Apple

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Procedure, General

Manufacturer: Armstrong Medical Industries ((800) 323-4220)

Vendor: Armstrong Medical Industries ((800) 323-4220)

Model: 5-Drw Steel Mini Bge/Bge (Electronic)

Alt ID: CRT-5DE

Mfr #: AMC-1B-E

Vendor #: AMC-1B-E

Item ID:

5-drawer bedside/procedure cart. Electronic touch pad locking with key override. Beige frame with beige drawers. Aluminum construction with beige exterior and drawers. 24 inches total drawer height: 3 inch H (3), 6 inch H, 9 inch H.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	21.35 in (542 mm)	**Left:**	N/A
Depth:	20.61 in (523 mm)	**Right:**	N/A
Height:	35.07 in (891 mm)	**Front:**	N/A
Max Weight:	103 lbs (46.7 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	3	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	3	
				Total:	**6**	

NURSE SERVER/BEDSIDE Carts

AMC-3BG-E

AMC-1SG-E

AMC-21CW-E

Aluminum Electronic Touchpad Locking Narrow Cart

AMC-3Color-E 6-Drawer 30" Electronic Touchpad Locking Narrow Cart

Beige shell with eleven drawer colors available (see page 105).

Features:

- Aluminum construction; weighs only 85 lbs.
- Stabilizing frame w/ bumper
- Plastic top
- Four 5" swivel casters (two with brake and one tracking)
- Electronic Touchpad locking with key override

Overall: 43.81"H x 25.23"D x 24.68"W (includes bumper and casters).
Drawer size: 17"D x 15"W.
Drawer heights: 3"H (3), 6"H (2), 9"H (1).

Steel Five-Drawer 24" Electronic Touchpad Locking Mini Cart

AMC-1Color-E 5-Drawer 24" Electronic Touchpad Locking Mini Cart with Key Override

Beige shell with eleven drawer colors available (see page 104).

Overall: 35.07"H x 20.61"D x 21.35"W.
Drawer size: 17"D x 15"W.
Drawer heights: 3"H (3), 6"H, 9"H.
Weight: 103 lbs.
Four 3" swivel casters (two with brake and one tracking)

Steel Four-Drawer 21" Electronic Touchpad Locking Mini Cart

AMC-21Color-E 4-Drawer 21" Electronic Touchpad Locking Mini Cart with Key Override

Beige shell with eleven drawer colors available (see page 104).

Overall: 32.12"H x 20.61"D x 21.35"W.
Drawer size: 17"D x 15"W.
Drawer heights: 3"H (2), 6"H, 9"H.
Four 3" swivel casters (two with brake and one tracking)

Organize Your Carts With
Mini/Narrow Cart Trays
Bottom of page 118

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Procedure, Resuscitation

Manufacturer: Armstrong Medical Industries ((800) 323-4220)

Vendor: Armstrong Medical Industries ((800) 323-4220)

Model: AR-6 Standard Steel w/ EB-1 Deluxe Acc'y Pkg

Alt ID: CRT-CDE

Mfr #: AR-6 / EB-1

Vendor #: AR-6 / EB-1

Item ID:

Basic 6-drawer red emergency cart. Breakaway lock system and deluxe emergency package (EB-1): Collapsible side shelf, I.V. pole with brackets, plastic top, heavy-duty railing, oxygen tank brackets, cardiac board with brackets, plastic breakaway seals (100/pkg), utility hooks, two 5"H trays with four short) and two long dividers. Four AC- 3"H trays with eight short and four long dividers (fills two drawers).

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	34.15 in (867 mm)	**Left:**	N/A
Depth:	25.40 in (645 mm)	**Right:**	N/A
Height:	70.00 in (1778 mm)	**Front:**	N/A
Max Weight:	165 lbs (74.8 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect approximate size with the AR-6 cart. Approximate dimensions with shelf and IV pole in up position: 86"H x 25.4"D x 51.5"W

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

Standard Steel Solid Color Emergency Carts

BREAKAWAY LOCKING

Manufactured To ISO 9001:2008 Certified Standards. *A-SMART®.*

6-Drawer 30" Standard Emergency Cart

ABL-B-6 Emergency Cart, Beige
Drawer sizes: 3" (4), 6", 12"

5-Drawer 24" Standard Emergency Cart

ABL-B-5 Emergency Cart, Beige
Drawer sizes: 3" (3), 6", 9"

4-Drawer 24" Standard Emergency Cart

ABL-B-4 Emergency Cart, Beige
AR-4 Emergency Cart, Red
(not pictured)
Drawer sizes: 3" (2), 6", 12"

6-Drawer 30" Standard Emergency Cart

AR-6 Emergency Cart, Red
Drawer sizes: 3" (4), 6", 12"

4-Drawer 24" Standard Emergency Cart

AR-4 Emergency Cart, Red
Drawer sizes: 3" (2), 6", 12"

6-Drawer 27" Standard Emergency Cart

AR-27 Emergency Cart, Red
Overall Dim.: 42.20"H x 25.40"D x 34.25"W (includes bumper, handles, and casters)
Drawer sizes: 3" (4), 6", 9"
Weight: 160 lbs.

See page 72 for Standard Cart features and page 74 for dimensions.

NOTE: Carts require some assembly.

A-SMART® Standard Steel Cart Features

How to CUSTOMIZE An A-SMART® Standard Steel Cart:

1. CHOOSE FRAME SIZE & DRAWER CONFIGURATION

What kind of locking system do you need? How much drawer space do you want?

ABL Series:
Breakaway Locks

ABL-6

6 Drws. = 30" drawer space

ABL-6 = 6 Drws. with 30" dr. space *(shown above)*

ABL-4 = 4 Drws. with 24" dr. space

ABL-5 = 5 Drws. with 24" dr. space

6-Dr. ABL Cart Dim.:
Overall: 45.40"H x 25.40"D x 34.15"W (includes bumper/handles/casters).
Drawer size: $17^{1}/_{16}$"D x $22^{1}/_{4}$"W.
Drawer configuration: 30" total drawer height.
6-Drawer: $2^{7}/_{8}$"H (4), $6^{1}/_{8}$"H (1), $12^{1}/_{2}$"H (1).
Weight: 165 lbs.

4-Dr. and 5-Dr. ABL Cart Dim.:
Overall: 38.90"H x 25.40"D x 34.25"W (includes bumper/handles/casters).
Drawer size: $17^{1}/_{16}$"D x $22^{1}/_{4}$"W.
Drawer configuration: 24" total drawer height.
4-Drawer: $2^{7}/_{8}$"H (2), $6^{1}/_{8}$"H (1), $12^{1}/_{2}$"H (1).
5-Drawer: $2^{7}/_{8}$"H (3), $6^{1}/_{8}$"H (1), $9^{3}/_{8}$"H (1).
Weight: 145 lbs.

AKL Series:
Key Locks

AKL-6

6 Drws. = 30" drawer space

AKL-6 = 6 Drws. with 30" dr. space *(shown above)*

AKL-4 = 4 Drws. with 30" dr. space

AKL-5 = 5 Drws. with 24" dr. space

4-Dr. and 6-Dr. AKL Cart Dim.:
Overall: 45.40"H x 25.40"D x 34.15"W (includes bumper/handles/casters).
Drawer size: $17^{1}/_{16}$"D x $22^{1}/_{4}$"W.
Drawer configuration: 30" total drawer height.
4-Drawer: $2^{7}/_{8}$"H (1), $9^{3}/_{8}$"H (3).
6-Drawer: $2^{7}/_{8}$"H (3), $6^{1}/_{8}$"H (2), $9^{3}/_{8}$"H (1).
Weight: 165 lbs.

5-Dr. AKL Cart Dim.:
Overall: 38.90"H x 25.40"D x 34.25"W (includes bumper/handles/casters).
Drawer size: $17^{1}/_{16}$"D x $22^{1}/_{4}$"W.
Drawer configuration: 24" total drawer height.
5-Drawer: $2^{7}/_{8}$"H (3), $6^{1}/_{8}$"H (1), $9^{3}/_{8}$"H (1).
Weight: 145 lbs.

ATE Series:
Touchpad Locks w/Key Override

ATE-6

6 Drws. = 30" drawer space

ATE-6 = 6 Drws. with 30" dr. space *(shown above)*

ATE-5 = 5 Drws. with 24" dr. space

Standard Electronic Touchpad Locking Carts, page 100

6-Dr. ATE Cart Dim.:
Overall: 45.81"H x 25.23"D x 34.08"W (includes bumper/handles/casters).
Drawer size: $17^{1}/_{16}$"D x $22^{1}/_{4}$"W.
Drawer configuration: 30" total drawer height.
6-Drawer: $2^{7}/_{8}$"H (3), $6^{1}/_{8}$"H (2), $9^{3}/_{8}$"H (1).
Weight: 165 lbs.

5-Dr. ATE Cart Dim.:
Overall: 39.31"H x 25.23"D x 34.08"W (includes bumper/handles/casters).
Drawer size: $17^{1}/_{16}$"D x $22^{1}/_{4}$"W.
Drawer configuration: 24" total drawer height.
5-Drawer: $2^{7}/_{8}$"H (3), $6^{1}/_{8}$"H (1), $9^{3}/_{8}$"H (1).
Weight: 145 lbs.

2. PICK YOUR OPTIONS

Choose your drawer fronts…
Choose from any one of our eighteen designer colors on the right. If you want the ABL-4 as shown with **Teal** drawer fronts, your cart would be ABL-**T**-4. Customer Service will gladly assist you with questions.

Four drawer sizes available:
3" **6"** **9"** **12"**
If standard drawer arrangements don't suit your needs, slides can be moved 3" up or down (additional charge per cart). Call Customer Service for details: 800/323-4220.

How do we ship our carts? *See page 75*

18 Designer Colors

SG - Sage Green
MG - Moss Gray
TC - Terra Cotta
SB - Slate Blue
L - Lavender
M - Mauve
Y - Yellow
CB - Taupe
T - Teal
B - Beige
AB - Crash Cart Blue
CR - Cranberry
BG - Blue Grey
HG - Hunter Green
AA - Deep Blue
AR - Red
S- Silver
CW- Cherry Woodgrain

Standard Emergency Cart Accessory Packages

BREAKAWAY LOCKING

Deluxe Emergency Accessory Package

EB-1 Deluxe Accessory Package ***(Does not include cart)***

Complete Package as shown, EB-1 with AR-6 6-Drawer 30" Emergency Cart

- **ASN-3** Collapsible Side Shelf
- **PIV-1** I.V. Pole with Brackets
- **APT-2** Plastic Top
- **PSR-1** Heavy-duty Railing
- **AOB-1** Oxygen Tank Bracket
- **ACB-1** Cardiac Board with Brackets
- **APS-5** Plastic Breakaway Seals, 100/pkg.
- **AUH-1** Utility Hooks, 2/pkg
- Two **AC-672S** 5"H Trays with four **AC-685S** (short) Dividers & two **AC-690S** (long) Dividers (fills one drawer)
- Four **AC-670S** 3"H Trays with eight **AC-675S** (short) Dividers and four **AC-680S** (long) Dividers (fills two drawers)

ACB-1 *mounts to back of cart.*

Look for the Armstrong A-SMART® label on every cart. ***It stands for quality.***
MADE IN THE USA

AR-6

ABL-AR-6

Economy Emergency Accessory Package

BE-1 Economy Accessory Package ***(Does not include cart)***

Complete Package as shown, BE-1 with ABL-AR-6 6-Drawer 30" Emergency Cart

- **PIV-1** I.V. Pole with Bracket
- **PSR-1** Heavy-duty Railing
- **ACB-1** Cardiac Board with Brackets
- **APT-2** Plastic Top
- **APS-5** Plastic Breakaway Seals, 100/pkg.
- **AOB-1** Oxygen Tank Bracket

See page 74 for Standard Cart features and page 76 for dimensions.

NOTE: Carts require some assembly.

ADS-IN, Defib One Shelf with Swivel Top, *page 116*

AE-6976 Cart-mounted DUET with Retention Bracket *(requires AHP-3)*, *see page 39*

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Procedure, Cast
Manufacturer: InterMetro Industries Corp (800.992.1776)
Vendor: InterMetro Industries Corp (800.992.1776)
Model: Flexline Cast FLCAST

Alt ID: CRT-CST
Mfr #: FLCAST
Vendor #: FLCAST

Cast procedure cart. Features: With 30 inches of drawer space and Microban Antimicrobial protection. (3) 3 in., (2) 6 in. and (1) 9 in. drawers. Includes an overbridge with 2 shelves, pass-thru shelf, wastebasket, (4) non-locking side bins and drawer dividers.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	32.25 in (819 mm)	**Left:**	N/A
Depth:	22.38 in (568 mm)	**Right:**	N/A
Height:	70.75 in (1797 mm)	**Front:**	N/A
Max Weight:	180 lbs (81.6 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Packages include carts and accessories.

Code Response Package FLCRP1

Code Response Package FLCRP2

Code Response Package FLCRP3

Code Response Package FLCRP4

Code Response Pediatrics FLPED1

Anesthesia Package FLXANES1

Isolation Package FLISO1

Isolation Pediatrics FLISO3

Bedside Package FLBED

Treatment Package FLXTMENT1 & FLWTMENT1

Treatment Package FLTMENT2

Procedure Package FLXPROC1

Procedure Package FLXPROC2

Cast Package FLCAST

Endoscopic Package FLXENDO & FLWENDO

Dressing Package FLDRS

Flexline Application-Specific Carts

Carts shown on the previous pages are configured with the components and accessories listed here.

Accessories

Model No.	Description	FLCRP1	FLCRP2	FLCRP3	FLCRP4	FLPED1	FLXANES1	FLISO1	FLISO2	FLISO3	FLBED	FLXTMENT1	FLTMENT2	FLXPROC1	FLXPROC2	FLXCOM-LT	FLCAST	FLXENDO	FLDRS	FLXIV	FLXCCU1	FLCCU2	FLXMDSRG	FLXCLINE	FLXAIR	FLNURSE
FL113	3" Drawer Divider Kit						1			1			2		3		1		2	2		1		2	X	
FL116	6"/9" Drawer Divider Kit						2			3			2		1		1		1	2		1		1	1	
FL131	Ampule Insert and 12 Divider for 3" Drawer Tray																			1						
FL151	3" Drawer Divider Tray with Dividers	2	3	2	3																					
FL159	6" Drawer Divider Tray with Dividers	1	1	2	2																					
FL211	Side Bin (1) — Locking	2		3	4													3			4	3	3	2		
FL212	Side Bin (1) — Non Locking						4	2						3	3	3	4	3	4		4	3	1	2	3	2
FL221	Waste Basket 28 Quart and Holder						X										X		X					X		
FL234	O_2 Tank Holder — Standard Cart, 4" diameter tank	X	X																							
FL235	O_2 Tank Holder — 45" Tall Cart, 4" diameter tank				X	X																				
FL237	Glove Box Holder — Triple									X																
FL251	Lockable Sharps Container		X				X								X					X			X	X		
FL302	Cord Manager		X	X	X																					
FL303	Defibrillator Strap Kit		X																							
LEC304	Adjustable Defibrillator Tray	X		X	X																					
FL305-4US	Hospital Grade 4-Outlet Strip and Holder	X	X	X	X									X				X				X				
LEC306	Suction Pump Shelf			X	X	X																				
LEC308	Backboard with Front Assembly Kit	X																								
LEC309	Backboard with Back Assembly Kit		X	X	X	X																				
FL310A	Articulating Laptop Arm (wt. range 2-13 lbs.)															X										
FL318A	Articulating Monitor Arm (wt. range 7.5-25 lbs.)																	X								
FL313	Peel Pouch/Catheter Holder						X																			
FL314	Pull Out Side Shelf			X	X	X				X					X		X	X				X	X			
FL315	2HK I.V. Pole with Cart Mount	X	X	X	X	X		X		X										X						
LEC320	Plastic Security Seals 100 pack	X	X	X	X	X																				
FL402	Individual Drawer Seal Lock Bar — Flex 42" Cart			X																						
FL403	Individual Drawer Seal Lock Bar — Flex 45" Cart					X																				
FLX412	Basic Touchpad (250 users, Auto Lock)											X								X					X	
FLX420	Advanced LCD Touchpad						X							X	X	X		X			X		X	X		
FLX420W	Advanced LCD Touchpad w/ Wireless																									
FL510	Overbridge with 2 Hanger Rails						X							X												
FL515	Overbridge with Top Shelf and Hanger Rail														X						X	X	X			
FL520	Overbridge with 2 Shelves																X									
FL544	Tilt Bin 4 for Overbridge						X																			
FL546	Tilt Bin 6 for Overbridge						X														X					
FL581	Half-Size Utility Bin													X												
FL583	Label/Tape Dispenser													X												
FL585	Wire Supply Basket														X							X				
FL586	Utility Bin with Cover													X									X			

Carts

Model No.	Description	FL-CB	FL-CB	FL-CB	FL-CB	FL-PED9	FL-SB	FL-YL	FL-YL	FL-YL	FL-VL	FL-GR	FL-SB	FL-SB	FL-TPE	FL-SB	FL-OR	FL-GN	FL-SB	FL-RD	FL-RD	FL-RD	FL-GN	FL-DTE	FL-SB	FL-VL
FL21P	36" (914 mm) Cart — Passive Lock	X						X																		X
FL24P	39" (991 mm) Cart — Passive Lock		X																							
FL27P	42" (1067 mm) Cart — Passive Lock			X															X							
FL30P	45" (1143 mm) Cart — Passive Lock				X	X											X									
FLN24P	39" (991 mm) Narrow Cart — Passive Lock								X																	
FLN30P	45" (1143 mm) Narrow Cart — Passive Lock									X																
FL24K	39" (991 mm) Cart — Key Lock													X						X						
FL27K	42" (1067 mm) Cart — Key Lock														X	X		X				X	X		X	
FL30K	45" (1143 mm) Cart — Key Lock						X														X			X		
FLN21K	36" (914 mm) Narrow Cart — Key Lock										X	X														
FLN27K	42" (1067 mm) Narrow Cart — Key Lock												X													

FL- Drawer Pull Color

Drawers

Model No.	Description	FL-CB	FL-CB	FL-CB	FL-CB	FL-PED9	FL-SB	FL-YL	FL-YL	FL-YL	FL-VL	FL-GR	FL-SB	FL-SB	FL-TPE	FL-SB	FL-OR	FL-GN	FL-SB	FL-RD	FL-RD	FL-RD	FL-GN	FL-DTE	FL-SB	FL-VL
FL101	3" (76 mm) Pull Out Shelf														1			1				1				
FL102	Keyboard Tray															1		1								
FL103L	3" (76 mm) Narcotics Box/Individual Locking Drawer						1																			
FL103	3" (76 mm) Drawer	2	3	4	3	8	2		1	1	2	1	2	2	3	1	3	2	3	3	3	1	2	3	3	2
FL106	6" (152 mm) Drawer	1	1	1	2	1	2	2	2		1	3	2	1	0	2	2			1	2	1	2	2		1
FL109	9" (229 mm) Drawer	1	1	1	1		1	1	1	3	1		1		2	1	1	1	2	1	1	1	1	1	2	1
FL112	12" (305 mm) Drawer													1												

Flexline® Carts and Drawers

We put space to work.

Specifications

- **Cart Body:** Blow molded high density polyethylene (HDPE) body panels and top with Microban antimicrobial product protection. Top has integrated push handle. Side panels provide integrated accessory strips to allow no tool assembly of most accessories. Bins are available as locking or non-locking.
- **Cart Frame:** Epoxy coated 14 gauge, cold rolled steel
- **Locking Mechanism:** 12 gauge stainless steel bar with polycarbonate drawer mounted lock tabs. Passive security provided for drawers and left side bins (optional) with plastic security seal. Key lock mechanism provided for drawers and right side bins (optional). Electronic touchpads are optional for key lock carts.
- **Casters:** Four 5" (127 mm) diameter stem casters with polyurethane tread and polymer horn: 2 Swivel lock — Rear, 2 total lock (brake and swivel lock) — Front.
- **Wheel Base:** Built-in extended base frame provides cart stability to adequately support articulating arms and overbridge accessories.
- **Drawers:** ABS injection molded drawer body, blow molded HDPE with Microban antimicrobial drawer front, ABS and Microban antimicrobial injection molded colored drawer pull and full extension, self-closing, ball bearing drawer slides.

Inside Dimension: 16 3/4" x 20" (425 x 508 mm)

	Weight Capacity	Inside Height
3" (76 mm) =	15 lbs. (6.75 kg)	2.75" (70 mm)
6" (152 mm) =	25 lbs. (11.25 kg)	5.75" (146 mm)
9" (228 mm) =	45 lbs. (20.25 kg)	8.75" (222 mm)
12" (305 mm) =	45 lbs. (20.25 kg)	11.75" (298 mm)

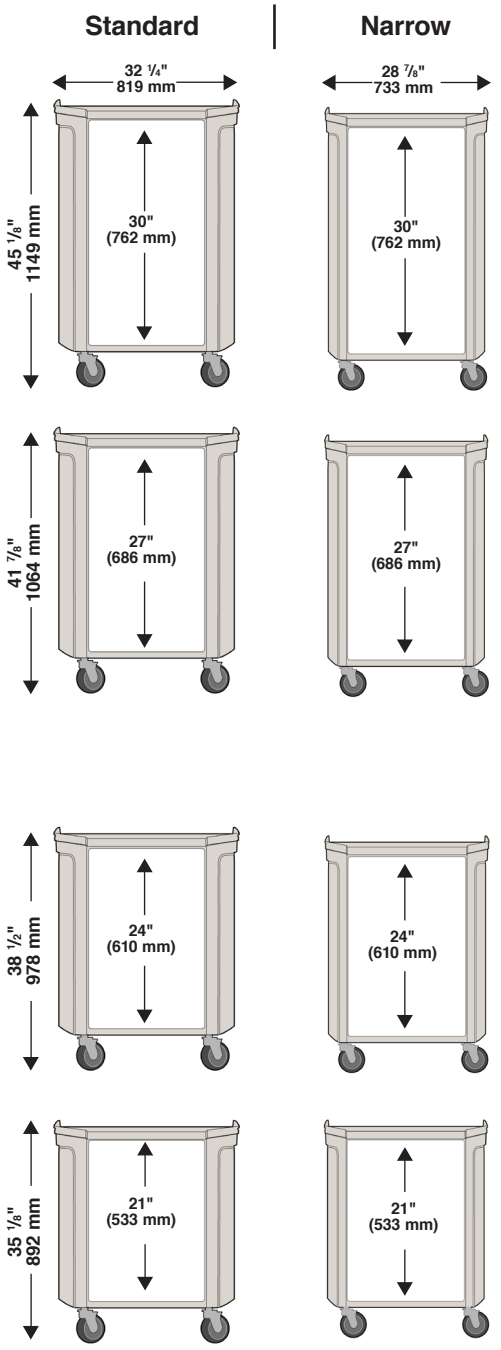
- **Pullout shelf:** 1.75" (44mm) high epoxy coated 16 gauge cold rolled steel, with full extension, self-closing, ball bearing drawer slides. Weight Capacity: 45 lbs. (20.25kg)

Standard Cart Dimensions (D x L x H):

22 3/8" x 32 1/4" x 45 1/4" (568 x 819 x 1149 mm)
22 3/8" x 32 1/4" x 41 7/8" (568 x 819 x 1064 mm)
22 3/8" x 32 1/4" x 38 1/2" (568 x 819 x 978 mm)
22 3/8" x 32 1/4" x 35 1/8" (568 x 819 x 892 mm)

Narrow Cart Dimensions (D x L x H):

22 3/8" x 28 7/8" x 45 1/4" (568 x 733 x 1149 mm)
22 3/8" x 28 7/8" x 41 7/8" (568 x 733 x 1064 mm)
22 3/8" x 28 7/8" x 38 1/2" (568 x 733 x 978 mm)
22 3/8" x 28 7/8" x 35 1/8" (568 x 733 x 892 mm)



Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Procedure, Difficult Airway

Manufacturer: InterMetro Industries Corp (800.992.1776)

Vendor: InterMetro Industries Corp (800.992.1776)

Model: Starsys Difficult Airway SXRSDIFAIR

Alt ID: CRT-DFA

Mfr #: SXRSDIFAIR

Vendor #: SXRSDIFAIR

Difficult airway procedure cart. Features: Provides storage for laryngoscope equipment, endotracheal tubes, supraglottic devices, surgical airway devices. Holds manual jet ventilator with regulator, tube wrap, O2 tank, enclosed Bronchoscope holder.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	24.30 in (617 mm)	**Left:**	N/A
Depth:	31.00 in (787 mm)	**Right:**	N/A
Height:	57.80 in (1468 mm)	**Front:**	N/A
Max Weight:	235 lbs (106.6 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Power strip optional and must be specified separately.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Item # _____

Job _____

STARSYS™
DIFFICULT AIRWAY CART

Areas such as the Emergency Department have varying case loads and requirements on a daily basis. In addition, they must mobilize or reset to address dramatic changes in process and flow, as experienced in disaster response. Starsys provides ultimate flexibility to reconfigure the space at a moments notice.

— Holds Manual Jet Ventilator with Regulator
— Tube Wrap
— O_2 Tank Holder
— Enclosed Bronchoscope Holder

Storage for:
— Preparation
— Laryngoscope equipment accessories
— Endotracheal tubes and Styletes
— Supraglottic devices
— Surgical Airway devices

- **Complete Storage System** — Addresses applications facility-wide.
- **Interchangeable Components** — Provides flexibility to address changing needs.
- **Modular Design** — Provides flexibility to change layout and/or location.
- **Polymer Construction** — Maintains function and aesthetic over time.

Metro incorporates several elements in its product design to support a facility's cleaning protocols:

- Microban® antimicrobial protection helps prevent the growth of stain and odor causing bacteria on the product. Look for the "red check" symbol for this added protection.
- Advanced polymer and other proprietary finishes provide corrosion resistance
- Smooth rounded corners to allow for easier cleaning

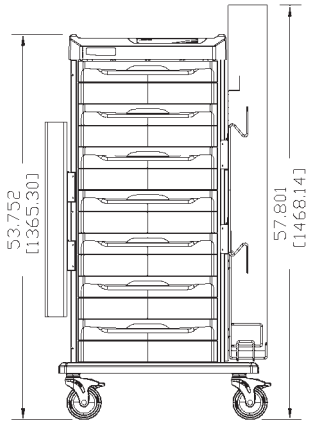
Passive locking with plastic seals provides a level of visual security that indicates potential supply discrepancy without compromising access.

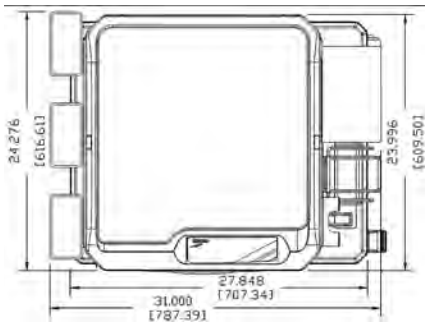
- **Saves Time** —Provides instant inventory check. Secures each drawer individually. Inventory only those drawers that have a broken seal.
- **Increases Productivity** — Removable totes reduce down time by allowing instant replenishment with pre-stocked totes.
- **Improves Ergonomics** — Drawers are easily reconfigured without tools allowing the most frequently used drawers to be relocated to the top of the cart.

InterMetro Industries Corporation
North Washington Street
Wilkes-Barre, PA 18705
www.metro.com

Job _____

STARSYS™ DIFFICULT AIRWAY CART





Left side of cart contents:
Bougie stylete (coude)
Airway exchanger (8fr and 14fr)
Fiberoptic Lighted stylete (pediatric and adult size)

Right side of cart contents:
Harness to hold O_2 tank
Hooks to hold jet ventilator regulator
Hooks to hold jet vent catheters
Enclosed Bronchoscope Holder

Dimensions

Model No.	Overall Dimensions (Including Accessories) (in.)	(mm)
SXRSDIFAIR	31 L. x 24.3 W. x 57.8 H.	787 L. x 617W. x 1468H.

Storage and Organization Options for Airway Cart Drawers *(Contents not included)*

***Drawer 1:* Contents — Preparation Drawer**
(Working top left corner, down)
Berman intubating oral airways (for intubating bronchoscope)
Oral airways
End-tidal CO_2 disposable detector
Betadine solution
Lidocaine ointment (2% Xylocaine)
Hurricaine/Benzocaine topical anesthetic spray
Oxymethalozone nasal spray
Nasal airways
Suction devices (i.e. suction tubing, yankauer, frazier suction and suction catheter)
Bite blocks

***Drawer 2:* Laryngoscope Equipment/Accessories**
Assorted syringes
Batteries for laryngoscope handles
Assorted laryngoscope blades
Disposable AirTraq device
Laryngoscope handles

***Drawer 3:* Endotraceal Tubes and Styletes**
Disposable LMAs (Sizes 3, 4 and 5)
LMA ET tubes (Sizes 6, 6.5, 7, 7.5 and 8)
Stabilizer rods
Styletes (adult and pediatric sizes)

Drawer 4:
Supraglottic Device
King airways (Size 3, 4 and 5)

Drawer 5:
Surgical Airway Devices
Melker Cricothyrotomy kits
Surgical airway kits
Tracheostomies, with cannulas (assorted sizes)
Transtracheal Jet Ventilator regulator
Transtracheal Jet Ventilation catheter (pediatric and adult sizes)

All Metro Catalog Sheets are available on our Web Site: **www.metro.com**

InterMetro Industries Corporation
North Washington Street, Wilkes-Barre, PA 18705
Product Information. U.S. and Canada: 1.800.992.1776
Outside U.S. and Canada: www.metro.com/contactus

L03-280
Printed in U.S.A. 9/10

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Cart, Cylinder, D&E, Multi**
Manufacturer: Anthony Welded Products, Inc. (877-721-7211)
Vendor: Anthony Welded Products, Inc. (877-721-7211)
Model: 6064 (6 Cap.)

Alt ID: CRT-EC6
Mfr #: 6064
Vendor #:

Cylinder cart. Holds up to 6 cylinders (D & E size). 10 inch rear wheels and 4 inch front casters with locks.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	18.00 in (457 mm)	**Left:**	N/A
Depth:	15.00 in (381 mm)	**Right:**	N/A
Height:	42.00 in (1067 mm)	**Front:**	N/A
Max Weight:	33 lbs (15.0 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

Anthony
WELDED PRODUCTS, INC.®

OFTEN COPIED / NEVER EQUALED™
SINCE 1958

The ultimate in durability, these units are designed for applications where multiple **M7, M9, C, D, & E** size cylinder transport, storage or manifolding is required. Individual spacing, positive cylinder placement and weight distribution allows for easy handling on uneven or irregular surfaces. The all-welded steel construction of angle iron and steel round bar insures greater durability and strength.

NO. 6064

HEIGHT: 42" DEPTH: 15"
WIDTH: 18" WEIGHT: 33 lbs.
CYL. CAP: 6

WHEEL NO: W-11
10" SOLID RUBBER

CASTER NO: W-22
4" RUBBER SWIVEL / BRAKE

All products can be ordered in Red and/or Yellow finish for certain storage compliance regulations. An additional cost will apply.

For RED finish add "R" to end of part number	*For YELLOW finish add "Y" to end of part number*

SOUND DEADENING KITS

"Makes delivering cylinders completely invisible to the ears"

Anthony has developed an exclusive sound deadening system for their multiple cylinder carts, used to distribute cylinders in and around hospitals, rest homes, convalescent homes etc. or where **QUIET** is essential.

These sound deadening kits include heavy-duty sound deadening matting & plastic bumper guards. This formula eliminates the rattling & clanging of steel & aluminum cylinders while in transport.

SOUND DEADENING KIT PART NO: SDK-6E
FIT ANTHONY MODELS - 6064
CYLINDER CAPACITY - 6

1.877.721.7211
WWW.ANTHONYCARTS.COM

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Procedure, ENT **Alt ID:** CRT-ENT

Manufacturer: InterMetro Industries Corp (800.992.1776) **Mfr #:** SXRSENT1

Vendor: InterMetro Industries Corp (800.992.1776) **Vendor #:** SXRSENT1

Model: StarSys ENT Cart (Single)

ENT procedure cart. Features: With Microban antimicrobial protection. Configured with (2) 3-inch drawers, (2) 6-inch drawers, (1) 9-inch drawer, inner panel/drawer kit. Overhead cabinet, drawer pull, single wide mobile WC, cabinet poly shelf, clear door with top mounted lock.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	23.60 in (599 mm)	**Left:**	N/A
Depth:	28.60 in (726 mm)	**Right:**	N/A
Height:	81.50 in (2070 mm)	**Front:**	N/A
Max Weight:	267 lbs (121.1 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Preconfigured Mobile WorkCenters
Mobile WorkCenters with Laminate Tops

Cat. No. **SXRSENT1**

Cat. No. **SXRDENT2**

Cat. No. **SXRD40MW10**

Cat. No. **SXRT38MW14**

Alternate top materials and finishes available.

Cat. No. **SXRK32MW5**

Cat. No. **SXRK32MW6**

Cat. No. **SXRK41MW7**

To configure a Starsys unit to your exact specifications, please visit www.metroconfigurator.com

METRO

CLEAN DESIGN

STARSYS

Overhead cabinet shelves are removable, easy-to-clean, and are available in both solid polymer and epoxy-coated, open-wire shelf designs.

Overhead cabinets can be specified with a variety of available doors, clear or solid style, locking or non-locking.

Standard countertop choices include laminate, stainless steel, phenolic and solid surface.

Microban® antimicrobial protection inhibits the growth of stain and odor-causing bacteria on Starsys, keeping the surface areas "cleaner between cleanings."

Starsys drawer options include choice of polymer drawers or heavy-duty drawers featuring stainless steel drawer interior. Heavy-duty drawers are available in both single- and double-wide modules.

Latex FREE

Starsys mobile workcenter units can be specified with or without overhead cabinets attached. Available overhead heights include 24", 27", 30", and 36".

Overhead cabinet accessories include light fixture, cassette bins for small item storage and organization, and poly shelf dividers.

Color-coded drawer pulls are available in an array of choices to fit any system or decor.

Starsys Doors, available in multiple heights, can be specified with or without window, as well as locking and non-locking.

Additional caster options are available through Starsys configurator.com or by contacting your Metro representative.

5" (127mm) polymer total-lock casters provide a stable work station when locked and smooth rolling cart when not.

Starsys Mobile WorkCenters are built for change. They allow you to easily adapt to a changing work environment and even inspire change in your work environment.

Available Widths: Starsys Mobile WorkCenters are available in four widths; single: 24" (610mm), double: 44" (1118mm), triple: 63" (1600mm) & single-kneewell-single: 73" (1854mm).

Kneewell Options: Starsys Mobile WorkCenters configurations have several kneewell options including a keyboard tray, pencil drawer and support bracket. The triple unit has a right oriented kneewell option with a nominal opening of 42" (1067mm) and the single-kneewell-single configuration has a nominal opening of 30" (762mm).

Total Unit Height: All units with overhead storage have a total height of 82" (2083mm) (with 5" casters). Deduct 2" from unit height when specifying 3" Total-Lock casters or Leveling casters.

Working heights with Overheads: 33", 36", 39", 42" (45" height is not available with overhead storage)

Working Heights: Available working heights without overhead storage: 33", 36", 39", 42", 45" (with 5" casters). Deduct 2" (51mm) from unit height when specifying 3" Total-Lock casters or Leveling casters.

3" Total-Lock Caster: Utilize 3" total-lock plate casters for limited mobile applications or when additional storage area is required.

B3P-TL

5" Total-Lock, All-Polymer Caster: Recommended for corrosive environments. All-polymer total-lock plate caster is an economical alternative to stainless casters.

B5PC-TL

Stabilizer/Leveling Caster: Recommended for applications where benchtop equipment demands unit stability and/or a level worksurface. Engage caster foot for stability, release for mobility.

B3N-AS

Starsys Carts are built to exact customer specifications, therefore, they are non-cancelable, non-returnable.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Foodservice, Meal/Tray

Manufacturer: Aladdin Temp-Rite, LLC ((800) 888-8018)

Vendor: Aladdin Temp-Rite, LLC ((800) 888-8018)

Model: MD20SLP -20 Tray

Alt ID: CRT-F20

Mfr #: MD20SLP6B4-45

Vendor #: MD20SLP6B4-45

Single door meal delivery cart. 20 tray capacity. Side loading, 2 trays per shelf, adjustable/removable tray slides. Accommodates trays 14in. x 18in. and 15in. x 20in. with 4.5in. tray spacing. Floor drains and plugs, louvered vents.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	38.00 in (965 mm)	**Left:**	N/A
Depth:	29.00 in (737 mm)	**Right:**	N/A
Height:	58.00 in (1473 mm)	**Front:**	N/A
Max Weight:	208 lbs (94.3 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
				Total:	**1**	

Aladdin Temp-Rite®

Project _____	Item No. _____
Model _____	Quantity _____

Meal Delivery Carts

Premium Series Models MDELP and MDSLP

From heart monitors to infusion pumps to patient TVs, noise can be overwhelming. It not only disturbs patients, it can cause spikes in blood pressure, stress hormones and heart rates. It can interfere with wound healing and pain management. Not to mention the stress it causes the staff!

Reduce noise pollution in your facility with Premium Series Meal Delivery Carts from Aladdin: the carts that have "quiet" engineered in. Our Premium Series carts are designed and built to reduce noise, rattle and vibration during use.

Double-sided pocket doors have internal sound dampening material to reduce noise. Performance casters roll quietly. Polymer door bumpers and tray slide ladder plastic inserts add to the overall quiet transport of meals to patient floors.

Lightweight and durable, their modern design features an ergonomic polymer top that doubles as a workspace. With a "front-of-the-house" look, and "back-of-the-house" strength, they're available in a variety of configurations and capacities to meet your specific patient tray delivery needs.

Standard configurations:

- Single tray/shelf capacities: 14, 18, 24 or 27 trays.
- Double tray/shelf capacities: 10, 16, 20, 24, 28, 32 or 36 trays.
- Fits popular tray sizes: 14" x 18" and 15" x 20".
- 4-1/2" tray spacing.

Aladdin Premium Meal Delivery Carts include many standard features at no additional price.

Standard Features	Quiet Transport	Ease of Use
• 4-sided integrated molded polymer top rail for transporting additional items to patient floors	Designed and built to reduce noise and vibration during transport/use	Design is optimized for efficient tray delivery
• Full-perimeter, non-marking plastic bumper for full cart and wall protection	Double-sided pocket door(s) have internal sound dampening material for noise reduction	Heavy gauge stainless steel construction with durable, lightweight polymer top and bumpers
• Floor drain with plug and sloped cart floor for ease of cleaning (one per bay)	Non-marking caster tread wheels roll quietly, with a cushion ride	Performa 6" balloon casters roll easily on a variety of different floor surfaces (carpet, tile, etc.)
• Louvered side vents to assist heat dissipation and reduce condensation buildup	Polymer door bumpers and stainless steel tray slide ladders with plastic inserts add to the overall quiet transport of meals to patient floors	2 swivel casters with brakes and 2 fixed casters mean easy maneuverability and straight line steering
• 2" wide stainless steel tray slides for secure tray transport (ladder-style ledge panels)		"Wheel-ahead" casters offset configuration means easy elevator and threshold transition *(2- and 3-bay models)*
• Convenient 270° door swing for unobstructed access (middle door on 3-bay models includes 180° swing)		Round stainless steel push handle for easy handling
• Secure door latching when door(s) are open or closed		
• Easily removable tray slide ladders for easy cleaning (no tools required)		

** Note: Available options must be specified when ordering. Specifications are subject to change without notice.*

AMERICAN MADE

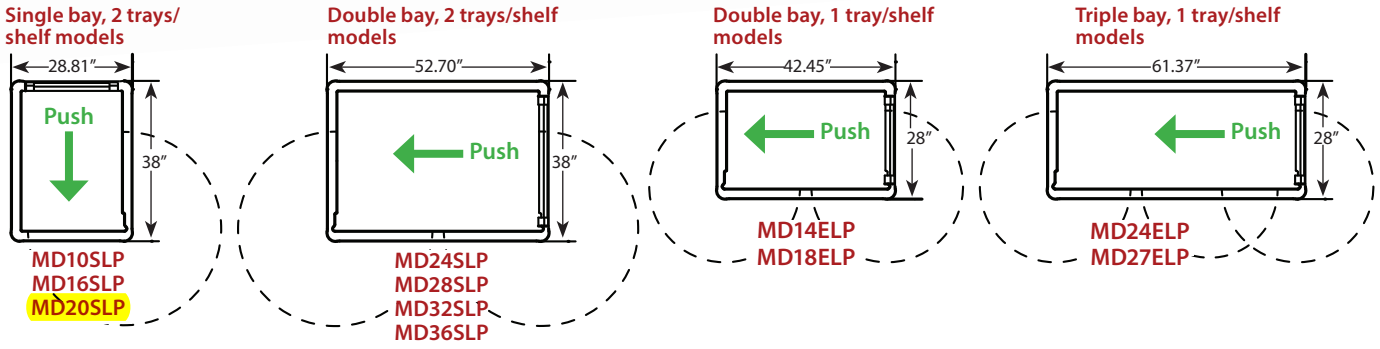
250 E. Main St. | Hendersonville, TN 37075 | **Customer Service:** 800.888.8018 | **Tech Service:** 800.888.5426 | Fax: 888.812.9956 | *www.aladdintemprite.com*

ID 20141216

Aladdin Temp-Rite®

Meal Delivery Carts

Premium Series Models MDELP and MDSLP



Base Model Number	Tray Capacity	Number of Bays (Doors)	Tray Spacing	Length	Width (Door Clearance)	Height	Net Weight	Shipping Weight (lbs.)
Side-Loaded Tray Carts								
☐ MD10SLP	10	1	4.5″	38″ (96.5 cm)	28.81″ (73.2 cm)	42.83″ (107.9 cm)	177	235
☐ MD16SLP	16	1	4.5″	38″ (96.5 cm)	28.81″ (73.2 cm)	48.98″ (142.4 cm)	182	240
☐ MD20SLP	20	1	4.5″	38″ (96.5 cm)	28.81″ (73.2 cm)	57.98″ (147.3 cm)	208	267
☐ MD24SLP	24	2	4.5″	52.7″ (133.9 cm)	38″ (96.5 cm)	40.12″ (101.9 cm)	246	324
☐ MD28SLP	28	2	4.5″	52.7″ (133.9 cm)	38″ (96.5 cm)	44.62″ (113.3 cm)	261	339
☐ MD32SLP	32	2	4.5″	52.7″ (133.9 cm)	38″ (96.5 cm)	49.12″ (124.8 cm)	281	361
☐ MD36SLP	36	2	4.5″	52.7″ (133.9 cm)	38″ (96.5 cm)	53.62″ (136.2 cm)	303	383
End-Loaded Tray Carts								
☐ MD14ELP	14	2	4.5″	42.45″ (107.8 cm)	28″ (71.1 cm)	44.62″ (113.3 cm)	215	279
☐ MD18ELP	18	2	4.5″	42.45″ (107.8 cm)	28″ (71.1 cm)	53.62″ (136.2 cm)	243	307
☐ MD24ELP	24	3	4.5″	61.37″ (155.9 cm)	28″ (71.1 cm)	49.12″ (124.8 cm)	280	356
☐ MD27ELP	27	3	4.5″	61.37″ (155.9 cm)	28″ (71.1 cm)	53.63″ (136.2 cm)	310	386

NOTE: Available Options Must Be Specified When Ordering

Available Options	Base Model Number	Tray Capacity	8″ Casters	Polymer Casters	6-Wheel Configuration	Tow Hitch	Pass-Through Door Option
8″ Performa casters for varying applications such as towing, carpeted/bumpy floors *(adds 2″ to overall cart height)*	**Side-Loaded Tray Cart Models**						
	☐ MD10SLP	10	☐	☐	N/A	☐	☐
	☐ MD16SLP	16	☐	☐	N/A	☐	☐
	☐ MD20SLP	20	☐	☐	N/A	☐	N/A
6″ polymer casters for carpet applications only	☐ MD24SLP[1]	24	☐	☐	☐	☐	☐
	☐ MD28SLP[1]	28	☐	☐	☐	☐	☐
8″ polymer casters for carpet applications only *(adds 2″ to overall cart height)*	☐ MD32SLP[2]	32	☐	☐	☐	☐	N/A
	☐ MD36SLP[2]	36	☐	☐	☐	☐	N/A
6-wheel caster configuration for easy maneuverability includes 4 swivel casters on corners and 2 center-fixed casters *(2-bay and 3-bay models only)*.	**End-Loaded Tray Cart Models**						
	☐ MD14ELP	14	☐	☐	☐	☐	N/A
	☐ MD18ELP	18	☐	☐	☐	☐	N/A
Tow-hitch package	☐ MD24ELP[2]	24	☐	☐	☐	☐	N/A
Pass-through doors	☐ MD27ELP[2]	27	☐	☐	☐	☐	N/A

[1] 6-wheel configuration recommended to ensure optimum manueverability
[2] 8″ casters with 6-wheel configuration recommended to ensure ease of use and optimum manueverability

AMERICAN MADE

250 E. Main St. | Hendersonville, TN 37075 | **Customer Service:** 800.888.8018 | **Tech Service:** 800.888.5426 | Fax: 888.812.9956 | *www.aladdintemprite.com*

ID 20141216

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Procedure, General

Manufacturer: InterMetro Industries Corp (800.992.1776)

Vendor: InterMetro Industries Corp (800.992.1776)

Model: Flexline Bedside FLBED

Alt ID: CRT-GPN

Mfr #: FLBED

Vendor #:

Item ID:

General procedure cart. Features: With 21 inch of drawer space and Microban Antimicrobial protection. Measures 29W x 22.50D x 35.25H (inch). (2) 3 inches, (1) 6 inches and (1) 9 inches drawers. Key lock. Violet drawer pulls.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	28.88 in (733 mm)	**Left:**	N/A
Depth:	22.38 in (568 mm)	**Right:**	N/A
Height:	35.13 in (892 mm)	**Front:**	N/A
Max Weight:	157 lbs (71.2 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	2	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**31**	

Packages include carts and accessories.

Code Response Package FLCRP1

Code Response Package FLCRP2

Code Response Package FLCRP3

Code Response Package FLCRP4

Code Response Pediatrics FLPED1

Anesthesia Package FLXANES1

Isolation Package FLISO1

Isolation Pediatrics FLISO3

Bedside Package FLBED

Treatment Package FLXTMENT1 & FLWTMENT1

Treatment Package FLTMENT2

Procedure Package FLXPROC1

Procedure Package FLXPROC2

Cast Package FLCAST

Endoscopic Package FLXENDO & FLWENDO

Dressing Package FLDRS

Flexline Application-Specific Carts

Carts shown on the previous pages are configured with the components and accessories listed here.

Accessories

Model No.	Description	FLCRP1	FLCRP2	FLCRP3	FLCRP4	FLPED1	FLXANES1	FLISO1	FLISO2	FLISO3	FLBED	FLXTMENT1	FLTMENT2	FLXPROC1	FLXPROC2	FLXCOM-LT	FLCAST	FLXENDO	FLDRS	FLXIV	FLXCCU1	FLCCU2	FLXMDSRG	FLXCLINE	FLXAIR	FLNURSE
FL113	3" Drawer Divider Kit						1			1			2		3		1		2	2		1		2	X	
FL116	6"/9" Drawer Divider Kit						2			3			2		1		1		1	2		1		1	1	
FL131	Ampule Insert and 12 Divider for 3" Drawer Tray																			1						
FL151	3" Drawer Divider Tray with Dividers	2	3	2	3																					
FL159	6" Drawer Divider Tray with Dividers	1	1	2	2																					
FL211	Side Bin (1) — Locking	2		3	4													3			4	3	3	2		
FL212	Side Bin (1) — Non Locking						4	2						3	3	3	4	3	4		4	3	1	2	3	2
FL221	Waste Basket 28 Quart and Holder						X										X		X					X		
FL234	O_2 Tank Holder — Standard Cart, 4" diameter tank	X	X																							
FL235	O_2 Tank Holder — 45" Tall Cart, 4" diameter tank				X	X																				
FL237	Glove Box Holder — Triple									X																
FL251	Lockable Sharps Container		X				X								X					X			X	X		
FL302	Cord Manager		X	X	X																					
FL303	Defibrillator Strap Kit		X																							
LEC304	Adjustable Defibrillator Tray	X		X	X																					
FL305-4US	Hospital Grade 4-Outlet Strip and Holder	X	X	X	X									X				X				X				
LEC306	Suction Pump Shelf			X	X	X																				
LEC308	Backboard with Front Assembly Kit	X																								
LEC309	Backboard with Back Assembly Kit		X	X	X	X																				
FL310A	Articulating Laptop Arm (wt. range 2-13 lbs.)															X										
FL318A	Articulating Monitor Arm (wt. range 7.5-25 lbs.)																	X								
FL313	Peel Pouch/Catheter Holder						X																			
FL314	Pull Out Side Shelf			X	X	X				X					X		X	X				X	X			
FL315	2HK I.V. Pole with Cart Mount	X	X	X	X	X		X		X										X						
LEC320	Plastic Security Seals 100 pack	X	X	X	X	X																				
FL402	Individual Drawer Seal Lock Bar — Flex 42" Cart			X																						
FL403	Individual Drawer Seal Lock Bar — Flex 45" Cart					X																				
FLX412	Basic Touchpad (250 users, Auto Lock)											X								X					X	
FLX420	Advanced LCD Touchpad						X							X	X	X		X			X		X	X		
FLX420W	Advanced LCD Touchpad w/ Wireless																									
FL510	Overbridge with 2 Hanger Rails						X							X												
FL515	Overbridge with Top Shelf and Hanger Rail														X						X	X	X			
FL520	Overbridge with 2 Shelves																X									
FL544	Tilt Bin 4 for Overbridge						X																			
FL546	Tilt Bin 6 for Overbridge						X														X					
FL581	Half-Size Utility Bin													X												
FL583	Label/Tape Dispenser													X												
FL585	Wire Supply Basket														X							X				
FL586	Utility Bin with Cover													X									X			

Carts

Model No.	Description	FL-CB	FL-CB	FL-CB	FL-CB	FL-PED9	FL-SB	FL-YL	FL-YL	FL-YL	FL-VL	FL-GR	FL-SB	FL-SB	FL-TPE	FL-SB	FL-OR	FL-GN	FL-SB	FL-RD	FL-RD	FL-RD	FL-GN	FL-DTE	FL-SB	FL-VL
FL21P	36" (914 mm) Cart — Passive Lock	X						X																		X
FL24P	39" (991 mm) Cart — Passive Lock		X																							
FL27P	42" (1067 mm) Cart — Passive Lock			X															X							
FL30P	45" (1143 mm) Cart — Passive Lock				X	X											X									
FLN24P	39" (991 mm) Narrow Cart — Passive Lock								X																	
FLN30P	45" (1143 mm) Narrow Cart — Passive Lock									X																
FL24K	39" (991 mm) Cart — Key Lock													X						X						
FL27K	42" (1067 mm) Cart — Key Lock														X	X		X				X	X		X	
FL30K	45" (1143 mm) Cart — Key Lock						X														X			X		
FLN21K	36" (914 mm) Narrow Cart — Key Lock										X	X														
FLN27K	42" (1067 mm) Narrow Cart — Key Lock												X													

FL- Drawer Pull Color

Drawers

Model No.	Description	FL-CB	FL-CB	FL-CB	FL-CB	FL-PED9	FL-SB	FL-YL	FL-YL	FL-YL	FL-VL	FL-GR	FL-SB	FL-SB	FL-TPE	FL-SB	FL-OR	FL-GN	FL-SB	FL-RD	FL-RD	FL-RD	FL-GN	FL-DTE	FL-SB	FL-VL
FL101	3" (76 mm) Pull Out Shelf														1			1				1				
FL102	Keyboard Tray															1		1								
FL103L	3" (76 mm) Narcotics Box/Individual Locking Drawer						1																			
FL103	3" (76 mm) Drawer	2	3	4	3	8	2		1	1	2	1	2	2	3	1	3	2	3	3	3	1	2	3	3	2
FL106	6" (152 mm) Drawer	1	1	1	2	1	2	2	2		1	3	2	1	0	2	2			1	2	1	2	2		1
FL109	9" (229 mm) Drawer	1	1	1	1		1	1	1	3	1		1		2	1	1	1	2	1	1	1	1	1	2	1
FL112	12" (305 mm) Drawer													1												

Flexline® Carts and Drawers

We put space to work.

Specifications

- **Cart Body:** Blow molded high density polyethylene (HDPE) body panels and top with Microban antimicrobial product protection. Top has integrated push handle. Side panels provide integrated accessory strips to allow no tool assembly of most accessories. Bins are available as locking or non-locking.
- **Cart Frame:** Epoxy coated 14 gauge, cold rolled steel
- **Locking Mechanism:** 12 gauge stainless steel bar with polycarbonate drawer mounted lock tabs. Passive security provided for drawers and left side bins (optional) with plastic security seal. Key lock mechanism provided for drawers and right side bins (optional). Electronic touchpads are optional for key lock carts.
- **Casters:** Four 5" (127 mm) diameter stem casters with polyurethane tread and polymer horn: 2 Swivel lock — Rear, 2 total lock (brake and swivel lock) — Front.
- **Wheel Base:** Built-in extended base frame provides cart stability to adequately support articulating arms and overbridge accessories.
- **Drawers:** ABS injection molded drawer body, blow molded HDPE with Microban antimicrobial drawer front, ABS and Microban antimicrobial injection molded colored drawer pull and full extension, self-closing, ball bearing drawer slides.

Inside Dimension: 16 3/4" x 20" (425 x 508 mm)

	Weight Capacity	Inside Height
3" (76 mm) =	15 lbs. (6.75 kg)	2.75" (70 mm)
6" (152 mm) =	25 lbs. (11.25 kg)	5.75" (146 mm)
9" (228 mm) =	45 lbs. (20.25 kg)	8.75" (222 mm)
12" (305 mm) =	45 lbs. (20.25 kg)	11.75" (298 mm)

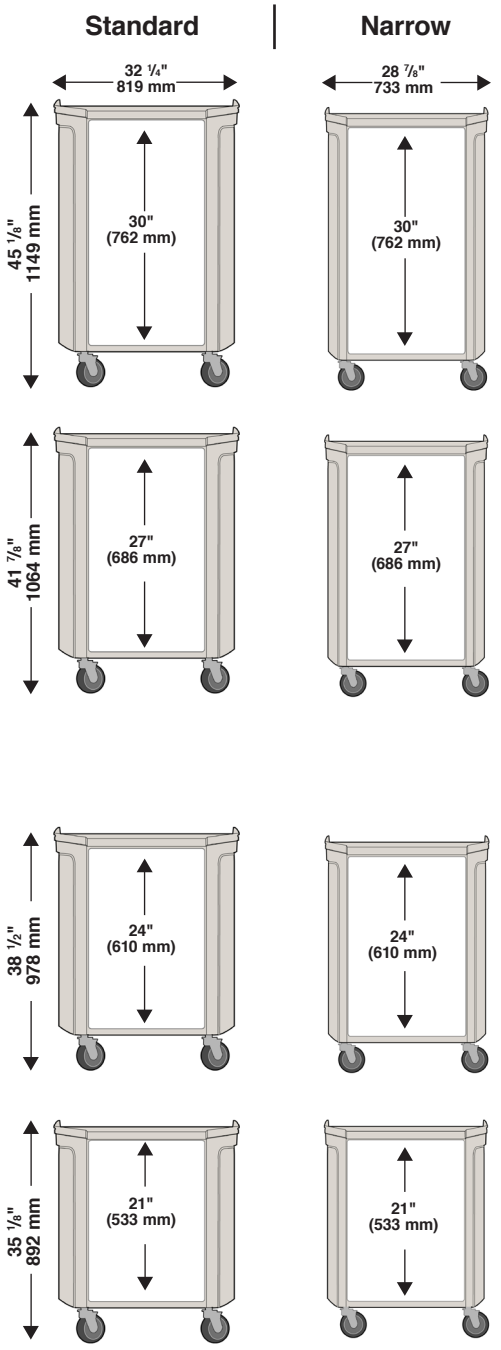
- **Pullout shelf:** 1.75" (44mm) high epoxy coated 16 gauge cold rolled steel, with full extension, self-closing, ball bearing drawer slides. Weight Capacity: 45 lbs. (20.25kg)

Standard Cart Dimensions (D x L x H):

22 3/8" x 32 1/4" x 45 1/4" (568 x 819 x 1149 mm)
22 3/8" x 32 1/4" x 41 7/8" (568 x 819 x 1064 mm)
22 3/8" x 32 1/4" x 38 1/2" (568 x 819 x 978 mm)
22 3/8" x 32 1/4" x 35 1/8" (568 x 819 x 892 mm)

Narrow Cart Dimensions (D x L x H):

22 3/8" x 28 7/8" x 45 1/4" (568 x 733 x 1149 mm)
22 3/8" x 28 7/8" x 41 7/8" (568 x 733 x 1064 mm)
22 3/8" x 28 7/8" x 38 1/2" (568 x 733 x 978 mm)
22 3/8" x 28 7/8" x 35 1/8" (568 x 733 x 892 mm)



Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Housekeeping, Polymer
Manufacturer: Filmop USA LLC (888-741-0707)
Vendor: Filmop USA LLC (888-741-0707)
Model: Alpha ES EquoDose 50 Complete Workstation

Alt ID: CRT-HKP
Mfr #: AA1807706U002
Vendor #: AA1807706U002

Polymer housekeeping cart. Features: 1 tank-1.5 gal, 1 tower (A), trash collection enclosed bag, 27 gal and 1-16 inch Top-Down Charging Bucket.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	22.00 in (559 mm)	**Left:**	N/A
Depth:	50.00 in (1270 mm)	**Right:**	N/A
Height:	44.00 in (1118 mm)	**Front:**	N/A
Max Weight:	85 lbs (38.6 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Weight shows estimate only.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C041	EVS	Project	Draft (New)	1	
				Total:	**1**	

ALPHA ES PATIENT ROOM **WORKSTATIONS**

EQUODOSE® CHARGING SYSTEM
50" STANDARD WORKSTATION

Item# **AA1807706U002**
22"W x 50"L x 44"H

Patient Room Alpha ES Workstation 50 Complete
1 tank-1.5 gal, 1 tower (A), trash collection enclosed bag, 27 gal, 1-16" Top-Down Charging Bucket

Item# **AA1807707U002**
22"W x 50"L x 44"H

Patient Room Alpha ES Workstation 50 Complete
2 tank-1.5 gal each, 1 tower (A), trash collection enclosed bag (27 gal), 1-16" Top-Down Charging Bucket

TOP-DOWN® CHARGING SYSTEM
50" STANDARD WORKSTATION

Item# **AA1607702U001**
22"W x 50"L x 44"H

Patient Room Alpha ES Workstation 48 Complete
2 towers (A&C), no trash; 2-16" Top-Down Charging Buckets

Item# **AA10807701U014**
22"W x 50"L x 44"H

Patient Room Alpha ES Workstation 50 Complete
1 tower (A); trash collection enclosed bag 27 gal.; 1-16" Top-Down Charging Bucket

TRASH COLLECTION

Item# **AA0902004U001**
22"W x 38"L x 41"H

Collection Alpha ES 38
Trash collection enclosed bag holders 2x40 gal; 5" wheels with foot pedal

EQUIPMENT

FLOOR CLEANING

Velcro Mop

Uniko Pocket Mop

Jobby Collection

Baggy Collection

Squeegee & Broom for Floor Collection

Dry-Up Super Absorbent Pad/Disposable

SURFACE CLEANING

Brilllante Hand Trowel

Brillante Pads (for glass, mirrors, stainless steel))

Rapido Pads

Microfiber Cloths

Spillo Microfiber Duster

Refer to pages 21-25 for product specifications and product numbers

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Cart, Supply, Linen, 48 inch**

Manufacturer: InterMetro Industries Corp (800.992.1776)

Vendor: InterMetro Industries Corp (800.992.1776)

Model: Super Erecta w/Cover (24'x48')

Alt ID: CRT-L48

Mfr #: A2448NC/74UP/2448FG/5MP/5MP B/EP37C/EP57C/VUCMB

Vendor #: A2448NC/74UP/2448FG/5MP/5MP B/EP37C/EP57C/VUCMB

48 inch linen supply cart. Features: With grid style wire enclosure panels and cover. 48W x 24D x 79H (inch). Includes (4) 48 inches wide chrome adjustable wire shelves, (1) solid stainless steel bottom shelf, (4) 74 inches tall posts, (2) 5 inches swivel casters, (2) 5 inches swivel casters with brakes. (2) 12-3/8 inches x 70-1/2 inches enclosure panels, (3) 18-3/8" x 70-1/2 inches end/back enclosure panels and (1) Uncoated mariner blue 200 Denier nylon Velcro closure. Custom Configuration: A2448NC (x4)/74UP (x4)/2448FG (x1)/5MP (x2)/5MPB (x2)/EP37C (x2)/EP57C (x3)/ 24x48x74VUCMB (x1).

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	Yes
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	48.00 in (1219 mm)	**Left:**	N/A
Depth:	24.00 in (610 mm)	**Right:**	N/A
Height:	79.00 in (2007 mm)	**Front:**	N/A
Max Weight:	201 lbs (91.2 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height includes 5 inches casters.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C019	Clean Supply	Project	Draft (New)	1	
				Total:	**1**	

Item # _____

Job _____

SUPER ADJUSTABLE™ SUPER ERECTA SHELF®
WIRE SHELVING

Super Adjustable™ Super Erecta Wire Shelving is the most advanced and innovative wire storage system available.

- **Maximum Space Utilization:** The Corner Release System encourages repositioning of shelves during initial assembly to reclaim wasted vertical space. In some cases, reclaimed vertical space will allow an extra shelving tier to be added to the storage unit resulting in a 25% increase in storage capacity!
- **Easily Assembled:** The unique Corner Release System enables quick and easy repositioning of shelves during the initial set up to accommodate different package or container sizes. “Total Assembly” is complete only after the shelves are properly spaced to maximize storage. SiteSelect™ Posts, with the double-groove visual guide feature, have circular grooves at 1" (25mm) increments and are numbered at 2" (51mm) intervals to easily identify proper shelf locations.
- **Easily Adjustable:** The unique shelf design and SiteSelect™ Posts enable “tool-free”, quick adjustment at 1" (25mm) increments along the entire height of the post.
- **Improved Rigidity:** An enhanced Corner Release System has made Super Adjustable™ the most rigid, easily adjustable shelving system ever.
- **Strong:** Super Adjustable™ shelves hold as much weight as traditional Super Erecta wire shelving. Stationary units hold a maximum of 2,000 lb. (910kg). Maximum weight capacity per shelf (48" [1219mm] or shorter = 800 lb. [364kg]; longer than 48" [1219mm] = 600 lb. [273kg])
- **Choice of Finishes:** Super Adjustable™ Super Erecta shelving is available in a variety of finishes: chrome-plated for dry storage; Metroseal 3™ with antimicrobial product protection and Type 304 stainless steel for corrosive environments.
- **Accessories:** Compatible with the entire system of Super Erecta shelves and accessories. See Catalog Sheets 10.04, 10.05, 10.06 for more information.

Dry Storage — Chrome

NSF

Corner Release System

Super Adjustable™ Advantage . . .

Easy "no tool" shelf adjustment

1" 25mm spacing minimizes dead space

Efficient use of space allows more storage levels to be added.

Storage efficiency can increase by 25% or more!

*MICROBAN® and the MICROBAN® symbol are registered trademarks of the Microban Products Company, Huntersville, NC.

InterMetro Industries Corporation
North Washington Street
Wilkes-Barre, PA 18705
www.metro.com

Job _____

SUPER ADJUSTABLE™ SUPER ERECTA SHELF®
WIRE SHELVING

Dimensions

Super Adjustable™ Super Erecta Wire Shelving

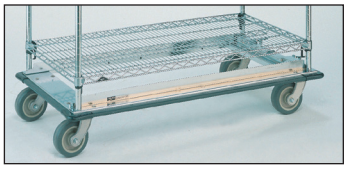
Model No. Chrome	Model No. Metroseal 3	Model No. Stainless	Shelf Width/Length (in.)	(mm)	Approx. Pkd. Wt. (lbs.)	(kg)
A1424NC	A1424NK3	A1424NS	14x24	355x610	6	2.7
A1430NC	A1430NK3	A1430NS	14x30	355x760	7	3.2
A1436NC	A1436NK3	A1436NS	14x36	355x914	8	3.6
A1442NC	A1442NK3	A1442NS	14x42	355x1066	9 1/2	4.3
A1448NC	A1448NK3	A1448NS	14x48	355x1219	10 1/2	4.7
A1460NC	A1460NK3	A1460NS	14x60	355x1524	14	6.3
A1472NC	A1472NK3	A1472NS	14x72	355x1829	17	7.7
A1824NC	A1824NK3	A1824NS	18x24	457x610	7	3.2
A1830NC	A1830NK3	A1830NS	18x30	457x760	8	3.6
A1836NC	A1836NK3	A1836NS	18x36	457x914	9 1/2	4.3
A1842NC	A1842NK3	A1842NS	18x42	457x1066	11	5.0
A1848NC	A1848NK3	A1848NS	18x48	457x1219	12	5.4
A1854NC	A1854NK3	A1854NS	18x54	457x1370	14 1/2	6.6
A1860NC	A1860NK3	A1860NS	18x60	457x1524	17	7.7
A1872NC	A1872NK3	A1872NS	18x72	457x1829	20	9.1
A2124NC	A2124NK3	A2124NS	21x24	530x610	8	3.6
A2130NC	A2130NK3	A2130NS	21x30	530x760	9	4.1
A2136NC	A2136NK3	A2136NS	21x36	530x914	11	5.0
A2142NC	A2142NK3	A2142NS	21x42	530x1066	12	5.4
A2148NC	A2148NK3	A2148NS	21x48	530x1219	14	6.4
A2154NC	A2154NK3	A2154NS	21x54	530x1370	16	7.3
A2160NC	A2160NK3	A2160NS	21x60	530x1524	18	8.2
A2172NC	A2172NK3	A2172NS	21x72	530x1829	24	10.9
A2424NC	A2424NK3	A2424NS	24x24	610x610	9	4.1
A2430NC	A2430NK3	A2430NS	24x30	610x760	11	5.0
A2436NC	A2436NK3	A2436NS	24x36	610x914	13	5.9
A2442NC	A2442NK3	A2442NS	24x42	610x1066	15	6.8
A2448NC	A2448NK3	A2448NS	24x48	610x1219	16	7.3
A2454NC	A2454NK3	A2454NS	24x54	610x1370	18	8.6
A2460NC	A2460NK3	A2460NS	24x60	610x1524	21	9.5
A2472NC	A2472NK3	A2472NS	24x72	610x1829	26	11.8
A3036NC			30x36	760x914	15	6.8
A3048NC			30x48	760x1219	21	9.5
A3060NC			30x60	760x1524	26 1/2	11.8
A3072NC			30x72	760x1829	31	14.0
A3636NC			36x36	914x914	18	8.2
A3648NC			36x48	914x1219	23	10.4
A3660NC			36x60	914x1524	29	13.1
A3672NC			36x72	914x1829	34 1/2	15.4

NOTE: MICROBAN® protects the Metroseal 3 coating from bacteria, mold, mildew and fungi that cause odors, stains and product degradation. For Metroseal 3 shelving information see sheet #10.10A.

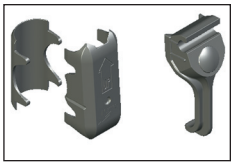
All Environments — Metroseal 3™ with *Microban® Antimicrobial Product Protection

Mobile Options

Stem Casters



Dolly Trucks



Replacement Parts
Each kit includes components for one original Super Adjustable or Super Adjustable shelf; (4) wedges, (4) sleeves, (4) shelf releases.
Model No. SAKITA2

SiteSelect™ Posts

STATIONARY Actual Height* (in.)	(mm)	Model No. Plated	Model No. Metroseal 3	Model No. Stainless	MOBILE Actual Height* (in.)	(mm)	Model No. Plated	Model No. Metroseal 3	Model No. Stainless	Approx. Pkd. Wt. (lbs.)	(kg)
7 3/8	187	7P	7PK3	7PS	6 3/4	171	7UP	7UPK3	7UPS	1/2	0.3
14 3/8	365	13P	13PK3	13PS	13 3/4	349	13UP	13UPK3	13UPS	1	0.5
28 3/8	720	27P	27PK3	27PS	27 3/4	704	27UP	27UPK3	27UPS	1 3/4	0.75
34 3/8	873	33P	33PK3	33PS	33 3/4	857	33UP	33UPK3	33UPS	2	0.9
54 7/16	1382	54P	54PK3	54PS	53 13/16	1366	54UP	54UPK3	54UPS	3	1.4
62 7/16	1585	63P	63PK3	63PS	61 13/16	1570	63UP	63UPK3	63UPS	3 1/2	1.6
—	—	—	—	—	69 3/4	1771	70UP	—	—	3 3/4	1.7
74 1/2	1892	74P	74PK3	74PS	73 7/8	1876	74UP	74UPK3	74UPS	4	1.8
86 1/2	2197	86P	86PK3	86PS	85 7/8	2181	86UP	86UPK3	86UPS	4 1/2	2.0
96 1/2	2450	**96P	96PK3	96PS						5 1/2	2.5

*Actual height for the stationary post includes the post cap and the leveling bolt completely tightened.

Important: When ordering by components remember that for maximum stability, units should be kept as wide and low as possible.

All Metro Catalog Sheets are available on our Web Site: **www.metro.com**

InterMetro Industries Corporation
North Washington Street, Wilkes-Barre, PA 18705
Phone: 570-825-2741 • Fax: 570-825-2852

For Product Information:
U.S. and Canada: 1-800-992-1776
Outside U.S. and Canada: www.metro.com/contactus

L02-006A
Printed in U.S.A. Rev. 2/17

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart / Truck, Linen, Bulk
Manufacturer: InterMetro Industries Corp (800.992.1776)
Vendor: InterMetro Industries Corp (800.992.1776)
Model: MetroTrux Secure TXPB-BLK48

Alt ID: CRT-LTK
Mfr #: TXPB-BLK48SEC
Vendor #: TXPB-BLK48SEC

Bulk linen truck, security, with integrated ergonomic handle and routing clips. Features: 2 swivel & 2 rigid casters. Polymer with Microban antimicrobial product protection. Color - Medium Blue. For transport of clean or soiled linens.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	Yes
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	29.50 in (749 mm)	**Left:**	N/A
Depth:	48.00 in (1219 mm)	**Right:**	N/A
Height:	73.30 in (1862 mm)	**Front:**	N/A
Max Weight:	143 lbs (64.9 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
				Total:	**1**	

Item # _____

Job _____

MetroTrux™

Redefining the standard in linen distribution

MetroTrux™ units are constructed of an advanced polymer material with molded contours that provide a ruggedized body to endure the toughest daily use. Its contemporary aesthetic provides elegance to fit into any décor. Its innovative design is lightweight and ergonomic and includes "Clean Design" elements featuring Microban® antimicrobial product protection and corrosion proof components for years of reliable service.

- **Aesthetic:** Sleek lines, contoured silhouette and attractive blue color, provide a distinctive appearance suitable for any professional environment.
- **Quiet and Maneuverable:** Lightweight polymer construction, ergonomic full height integrated handle, and smooth rolling sound dampening casters roll effortlessly, even over uneven surfaces.
- **Cleans Easily:** Smooth polymer surface, rounded corners, stainless steel shelves and hardware, combined with standard drain holes on the bottom of the cart, allows for easy washing and drainage.
- **Identifiable:** Proprietary routing slip clip offers a clean way to identify the truck's destination.
- **Convertible MetroTrux:** Full open front with slanted stainless steel, convertible shelving that can be positioned either horizontal or vertical to create three different truck configurations:
  1. Both horizontal — for easy transport of, and accessibility to, stored items such as folded linens.
  2. Both vertical — creates a spacious rolling bin for the collection and the transportation of bulk items.
  3. Lower vertical & Upper horizontal — creates a combination lower compartment for bulk items and upper storage shelf for traditional storage.

  Shelves in the vertical position can be flipped out and up, enabling easier access and retrieval of stored items.
- **Bulk MetroTrux:** Provides the perfect solution for storage and transport of bulky, hard to handle items. Use for transport of bulk soiled or clean laundry within a facility or from an offsite location, transport large bulky items, collect refuse or recyclables such as corrugated boxes. Can be ordered with or without gate and lid enclosures.

TXPA-CLT48S
Convertible truck

TXPA-BLK48
Bulk truck, with no enclosures

*Microban® antimicrobial protection inhibits the growth of stain and odor-causing bacteria, keeping the surface areas "cleaner between cleanings."

Metro incorporates several elements in its product design to support a facility's cleaning protocols:
- Microban® antimicrobial protection helps prevent the growth of stain and odor causing bacteria on the product.
- Advanced polymer and other proprietary finishes provide corrosion resistance
- Smooth rounded corners to allow for easier cleaning

Look for the "red check" symbol for this added protection.

InterMetro Industries Corporation
North Washington Street
Wilkes-Barre, PA 18705
www.metro.com

Job _____

MetroTrux™
Redefining the standard in linen distribution

Specifications

Body: Rotational molded polymer construction with Microban® antimicrobial product protection, includes routing slip clip, and molded in handle.
Color: Medium Blue

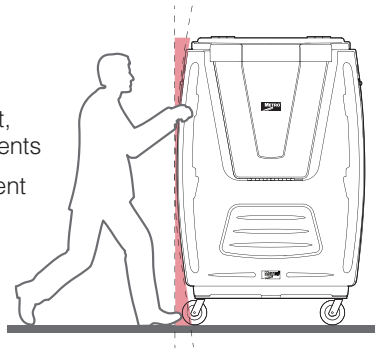
Handle: Integrated into cart, full height, with Microban® antimicrobial product protection and the following features:

— Keeps user's hands on the exterior of cart, preventing contact with soiled/clean contents

— Inset to keep user hands inboard to prevent incidental contact with surroundings

— Arched to position user to see around truck while pushing

— Curved outward to provide user more leg clearance while pushing



TXPA-BLK48SEC
Bulk truck, with enclosures

Gate and Lid: (option for bulk truck) Molded polymer construction with Microban® antimicrobial product protection, with stainless steel hinges, latch and hardware. Color: Medium Blue

Shelves: (for convertible truck) Stainless steel wire, convertible, bolted to cart body, sloped to rear of convertible truck to help contain stored items

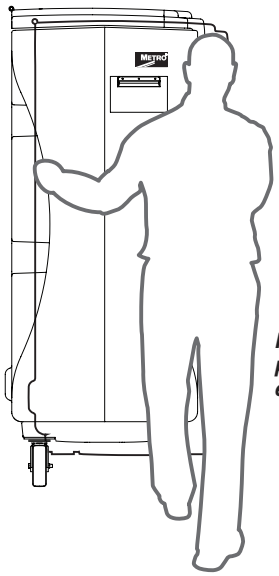
Dolly: Molded advanced polymer construction. Color: Charcoal Gray

Casters: Thermoplastic rubber (TPR) wheel with rounded tread design provides a softer, quieter ride than traditional flat faced wheels. The non-marking material also resists flat spotting and repels floor debris

— 6"D (150mm) wheel, with 2"W (50mm) rounded face

— TPR wheels and zinc plated horn; 4 swivel or 2 swivel, 2 rigid

— Double seal precision axle bearing, Double ball bearing swivel raceway with grease seal and zerk fitting



Handle design provides added ergonomics

Weight Capacity:

— Shelf: 200 lbs. (91kg)

— Truck: 600 lbs. (274kg)

Cart Cover:

400 Denier Nylon
Velcro Closure
Color: Navy Blue

Model No.	Description	Dimensions (DxWxH) (in.)	(mm)	Approx. Pkd. W.t (lbs.)	(kg)
TXPA-BLK48	Trux, Bulk with 4 Swivel Casters	29 1/2 x 48 x 72	749 x 1219 x 1829	128	58.1
TXPB-BLK48	Trux, Bulk with 2 Swivel/2 Rigid Casters	29 1/2 x 48 x 72	749 x 1219 x 1829	128	58.1
TXPA-BLK48SEC	Trux, Bulk with 4 Swivel Casters with Closures	29 1/2 x 48 x 73 1/3	749 x 1219 x 1863	148	67.1
TXPB-BLK48SEC	Trux, Bulk, with 2 Swivel/2 Rigid Casters, with Closures	29 1/2 x 48 x 73 1/3	749 x 1219 x 1863	148	67.1
TXPA-CLT48S	Trux, Convertible, 2 SS Shelves, 4 Swivel Casters	29 1/2 x 48 x 72	749 x 1219 x 1829	152	69.0
TXPB-CLT48S	Trux, Convertible, 2 SS Shelves, 2 Swivel/2 Rigid Casters	29 1/2 x 48 x 72	749 x 1219 x 1829	152	69.0
TX-48CVUCNB	Trux, Cart Cover, Uncoated,Velcro Close, Navy Blue	30 x 49 x 62	762 x 1245 x 1575	5	2.3

Microban® antimicrobial product protection

All Metro Catalog Sheets are available on our website: **www.metro.com**

InterMetro Industries Corporation
North Washington Street, Wilkes-Barre, PA 18705
Phone: 570-825-2741
Product Information. U.S. and Canada: 1.800.992.1776
Outside U.S. and Canada: www.metro.com/contactus

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Procedure, General

Manufacturer: Global Industrial Equipment Company ((800) 645-1232)

Vendor: Global Industrial Equipment Company ((800) 645-1232)

Model: TrippNT 51071 6 Drawer Blue WBB815770

Alt ID: CRT-MD6

Mfr #: WBB815770

Vendor #:

Item ID:

General procedure cart. Features: Blue color. 6 full extension drawers (4 small, 2 large), polyethylene and ABS construction, 5 inch heavy duty casters (2 with brakes), 3 inch deep tray top, built-in handle, 1 key locks all drawers.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	31.00 in (787 mm)	**Left:**	N/A
Depth:	20.00 in (508 mm)	**Right:**	N/A
Height:	48.00 in (1219 mm)	**Front:**	N/A
Max Weight:	114 lbs (51.7 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

ITEM #: WBB815770 MPN #: 51071

TrippNT™ Locking 6 Drawer Procedure Cart, Global Blue, 31"W x 20"D x 48"H

★★★★★ | Questions & Answers (0)

Purchase Information

PRICE

$2,571.00

TrippNT's Procedure Cart with Global Blue Drawers is a wide push cart with high capacity storage for anesthesia procedure. This cart offers 6 full-extension total locking drawers, 4-inch twin wheel casters, 2 locking, 2 swivel, and a built-in tray top with an easy to grab handle. The durable constructio consists of Corrosion resistant Polyethylene, ABS, and PETG. Available in 13 color variants. Ships Fully Assembled.

See more details

Easy online or call-in returns. **Read return policy**

Product Information

TrippNT's Procedure Cart with Global Blue Drawers is a wide push cart with high capacity storage for anesthesia procedure. This cart offers 6 full-extension total locking drawers, 4-inch twin wheel casters, 2 locking, 2 swivel, and a built-in tray top with an easy to grab handle. The durable construction consists of Corrosion resistant Polyethylene, ABS, and PETG. Available in 13 color variants. Ships Fully Assembled.

Features:

- 2 Locking Casters, 2 Swivel Casters, and 6 Total Locking Drawers
- Built-in Recessed Tray in the Top of the Cart
- Corrosion-Resistant, Non-Metal HDPE Construction
- Designed to be Space Saving while Offering Substantial Storage
- 100% Total Replacement Lifetime Guarantee/Made in USA

Specifications

Weights & Dimensions

Wheel Diameter	5 in	Height	48 in
Weight	114 lbs	Width	20 in
Drawer Dimensions	24-3/8 x 4-1/2 (8-3/4) x 15-3/8 WHD	Length	31 in

Product Details

Assembly Required	Assembled	Wheel Type	Non-Marking Rubber Swivel, All With Brakes
Lock Type	Lock Hafele Cam Zinc Plated Steel	Style	General Purpose Cart
Type	Procedure Cart	Material	1/2" HDPE, 1/2" PVC, 3/16" ABS
Color Family	White	Manufacturers Part Number	51071
Number of Drawers	6	Brand	TrippNT

Warranty

Warranty	100% Total Replacement Lifetime Guarantee

Reviews

Review This Product

Help us improve your experience with this product.

Write a Review

Questions & Answers

Get to know about this product from customers who own it.

Ask a Question

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Procedure, General

Manufacturer: InterMetro Industries Corp (800.992.1776)

Vendor: InterMetro Industries Corp (800.992.1776)

Model: Flexline Standard 5-Drwr w/Passive Lock FLP22010

Alt ID: CRT-PG5

Mfr #: FLP22010

Vendor #: FLP22010

General procedure cart. Features: With 30 inches of drawer space and Microban antimicrobial protection. Key lock. Orange drawer pulls. Drawer configuration: (2) 3-inch drawers, (2) 6-inch drawers and (1) 12 inches drawer.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	32.25 in (819 mm)	**Left:**	N/A
Depth:	22.38 in (568 mm)	**Right:**	N/A
Height:	45.25 in (1149 mm)	**Front:**	N/A
Max Weight:	200 lbs (90.7 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

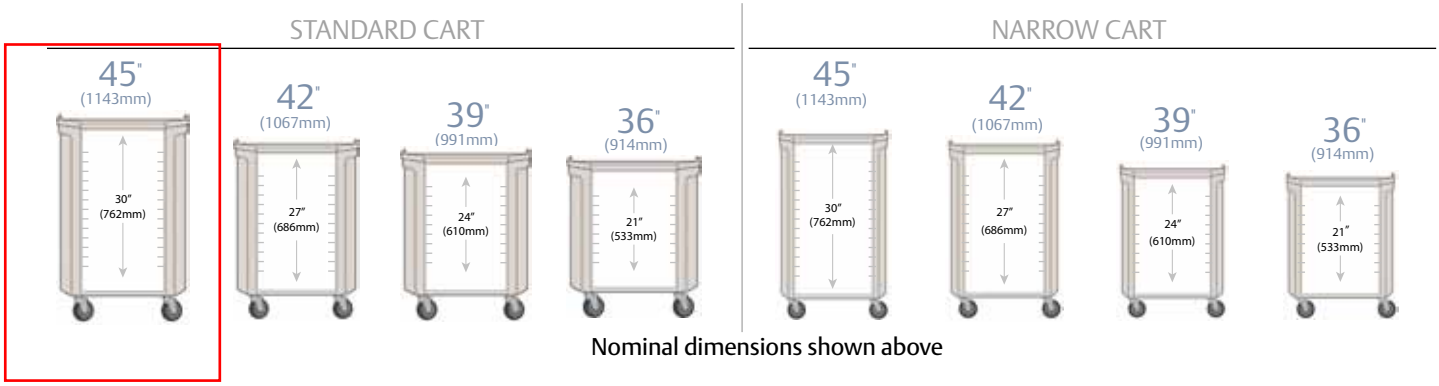
Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C019	Clean Supply	Project	Draft (New)	2	
				Total:	**2**	

FLNK22100

Basic Carts with Drawers

Cart	Drawer Configuration	Lock	Drawer Pull Color	Cat. No.
36" (914mm)H Standard	2 - 3" (76mm) 1 - 6" (152mm) 1 - 9" (229mm)	Key Lock	Violet	**FLK21100**
36" (914mm)H Narrow	3 - 3" (76mm) 2 - 6" (152mm)	Key Lock	Pink	**FLNK32000**
39" (991mm)H Standard	3 - 3" (76mm) 1 - 6" (152mm) 1 - 9" (229mm)	Passive Lock	Red	**FLP31100**
42" (1067mm)H Narrow	2 - 3" (76mm) 2 - 6" (152mm) 1 - 9" (229mm)	Key Lock	Slate Blue	**FLNK22100**
42" (1067mm)H Standard	4 - 3" (76mm) 1 - 6" (152mm) 1 - 9" (229mm)	Passive Lock	Slate Blue	**FLP41100**
42" (1067mm)H Narrow	3 - 9" (229mm)	Key Lock	Dark Taupe	**FLNK00300**
45" (1143mm)H Standard	2 - 3" (76mm) 2 - 6" (152mm) 1 - 12" (305mm)	Passive Lock	Orange	**FLP22010**
45" (1143mm)H Narrow	1 - 3" (76mm) 3 - 6" (152mm) 1 - 9" (229mm)	Passive Lock	Green	**FLNP13100**

Build-a-Cart



Nominal dimensions shown above

Cart Bodies without Drawers

Width/Length/Height (in.)	Width/Length/Height (mm)	Drawer Space (in.)	Drawer Space (mm)	Lock	Width	Cat. No.
22 3/8 x 32 1/4 x 35 1/8	568 x 819 x 892	21	533	Passive Lock	Standard	FL21P
22 3/8 x 32 1/4 x 38 1/2	568 x 819 x 978	24	610	Passive Lock	Standard	**FL24P**
22 3/8 x 32 1/4 x 41 7/8	568 x 819 x 1064	27	686	Passive Lock	Standard	**FL27P**
22 3/8 x 32 1/4 x 45 1/4	568 x 819 x 1149	30	762	Passive Lock	Standard	**FL30P**
22 3/8 x 28 7/8 x 35 1/8	568 x 734 x 892	21	533	Passive Lock	Narrow	**FLN21P**
22 3/8 x 28 7/8 x 38 1/2	568 x 734 x 978	24	610	Passive Lock	Narrow	**FLN24P**
22 3/8 x 28 7/8 x 41 7/8	568 x 734 x 1064	27	686	Passive Lock	Narrow	**FLN27P**
22 3/8 x 28 7/8 x 45 1/4	568 x 734 x 1149	30	762	Passive Lock	Narrow	**FLN30P**
22 3/8 x 32 1/4 x 35 1/8	568 x 819 x 892	21	533	Key Lock	Standard	**FL21K**
22 3/8 x 32 1/4 x 38 1/2	568 x 819 x 978	24	610	Key Lock	Standard	**FL24K**
22 3/8 x 32 1/4 x 41 7/8	568 x 819 x 1064	27	686	Key Lock	Standard	**FL27K**
22 3/8 x 32 1/4 x 45 1/4	568 x 819 x 1149	30	762	Key Lock	Standard	**FL30K**
22 3/8 x 28 7/8 x 35 1/8	568 x 734 x 892	21	533	Key Lock	Narrow	**FLN21K**
22 3/8 x 28 7/8 x 38 1/2	568 x 734 x 978	24	610	Key Lock	Narrow	**FLN24K**
22 3/8 x 28 7/8 x 41 7/8	568 x 734 x 1064	27	686	Key Lock	Narrow	**FLN27K**
22 3/8 x 28 7/8 x 45 1/4	568 x 734 x 1149	30	762	Key Lock	Narrow	**FLN30K**

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Supply, Chrome, 48 inch

Manufacturer: InterMetro Industries Corp (800.992.1776)

Vendor: InterMetro Industries Corp (800.992.1776)

Model: Super Adjustable Super Erecta 48x18x69 (5-Tier)

48 inch chrome supply cart. Features: With 5 shelves. Measures 48W x 18D x 69H (inch). Includes four A1848NC chrome wire shelves, four 63UP chrome plated mobile posts, two MP rigid stem swivel casters and two 5MPB rigid stem swivel casters with brake. Load capacity 800 lbs.

Alt ID: CRT-S48

Mfr #: (5x)A1848NC/(4x)63UP/5MP/5MPB

Vendor #: (5x)A1848NC/(4x)63UP/5MP/5MPB

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	48.00 in (1219 mm)	**Left:**	N/A
Depth:	18.00 in (457 mm)	**Right:**	N/A
Height:	67.50 in (1715 mm)	**Front:**	N/A
Max Weight:	83 lbs (37.6 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height includes casters.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	6	
				Total:	**6**	

Item # _____

Job _____

SUPER ADJUSTABLE™ SUPER ERECTA SHELF®
WIRE SHELVING

Super Adjustable™ Super Erecta Wire Shelving is the most advanced and innovative wire storage system available.

- **Maximum Space Utilization:** The Corner Release System encourages repositioning of shelves during initial assembly to reclaim wasted vertical space. In some cases, reclaimed vertical space will allow an extra shelving tier to be added to the storage unit resulting in a 25% increase in storage capacity!
- **Easily Assembled:** The unique Corner Release System enables quick and easy repositioning of shelves during the initial set up to accommodate different package or container sizes. “Total Assembly” is complete only after the shelves are properly spaced to maximize storage. SiteSelect™ Posts, with the double-groove visual guide feature, have circular grooves at 1" (25mm) increments and are numbered at 2" (51mm) intervals to easily identify proper shelf locations.
- **Easily Adjustable:** The unique shelf design and SiteSelect™ Posts enable “tool-free”, quick adjustment at 1" (25mm) increments along the entire height of the post.
- **Improved Rigidity:** An enhanced Corner Release System has made Super Adjustable™ the most rigid, easily adjustable shelving system ever.
- **Strong:** Super Adjustable™ shelves hold as much weight as traditional Super Erecta wire shelving. Stationary units hold a maximum of 2,000 lb. (910kg). Maximum weight capacity per shelf (48" [1219mm] or shorter = 800 lb. [364kg]; longer than 48" [1219mm] = 600 lb. [273kg])
- **Choice of Finishes:** Super Adjustable™ Super Erecta shelving is available in a variety of finishes: chrome-plated for dry storage; Metroseal 3™ with antimicrobial product protection and Type 304 stainless steel for corrosive environments.
- **Accessories:** Compatible with the entire system of Super Erecta shelves and accessories. See Catalog Sheets 10.04, 10.05, 10.06 for more information.

Dry Storage — Chrome

NSF

Corner Release System

Super Adjustable™ Advantage . . .

Easy "no tool" shelf adjustment

1" 25mm spacing minimizes dead space

Efficient use of space allows more storage levels to be added.

Storage efficiency can increase by 25% or more!

*MICROBAN® and the MICROBAN® symbol are registered trademarks of the Microban Products Company, Huntersville, NC.

InterMetro Industries Corporation
North Washington Street
Wilkes-Barre, PA 18705
www.metro.com

Job _____

SUPER ADJUSTABLE™ SUPER ERECTA SHELF®
WIRE SHELVING

Dimensions

Super Adjustable™ Super Erecta Wire Shelving

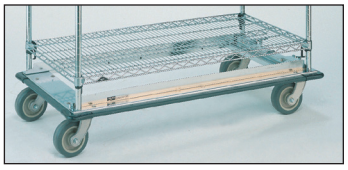
Model No. Chrome	Model No. Metroseal 3	Model No. Stainless	Shelf Width/Length (in.)	(mm)	Approx. Pkd. Wt. (lbs.)	(kg)
A1424NC	A1424NK3	A1424NS	14x24	355x610	6	2.7
A1430NC	A1430NK3	A1430NS	14x30	355x760	7	3.2
A1436NC	A1436NK3	A1436NS	14x36	355x914	8	3.6
A1442NC	A1442NK3	A1442NS	14x42	355x1066	9 1/2	4.3
A1448NC	A1448NK3	A1448NS	14x48	355x1219	10 1/2	4.7
A1460NC	A1460NK3	A1460NS	14x60	355x1524	14	6.3
A1472NC	A1472NK3	A1472NS	14x72	355x1829	17	7.7
A1824NC	A1824NK3	A1824NS	18x24	457x610	7	3.2
A1830NC	A1830NK3	A1830NS	18x30	457x760	8	3.6
A1836NC	A1836NK3	A1836NS	18x36	457x914	9 1/2	4.3
A1842NC	A1842NK3	A1842NS	18x42	457x1066	11	5.0
A1848NC	A1848NK3	A1848NS	18x48	457x1219	12	5.4
A1854NC	A1854NK3	A1854NS	18x54	457x1370	14 1/2	6.6
A1860NC	A1860NK3	A1860NS	18x60	457x1524	17	7.7
A1872NC	A1872NK3	A1872NS	18x72	457x1829	20	9.1
A2124NC	A2124NK3	A2124NS	21x24	530x610	8	3.6
A2130NC	A2130NK3	A2130NS	21x30	530x760	9	4.1
A2136NC	A2136NK3	A2136NS	21x36	530x914	11	5.0
A2142NC	A2142NK3	A2142NS	21x42	530x1066	12	5.4
A2148NC	A2148NK3	A2148NS	21x48	530x1219	14	6.4
A2154NC	A2154NK3	A2154NS	21x54	530x1370	16	7.3
A2160NC	A2160NK3	A2160NS	21x60	530x1524	18	8.2
A2172NC	A2172NK3	A2172NS	21x72	530x1829	24	10.9
A2424NC	A2424NK3	A2424NS	24x24	610x610	9	4.1
A2430NC	A2430NK3	A2430NS	24x30	610x760	11	5.0
A2436NC	A2436NK3	A2436NS	24x36	610x914	13	5.9
A2442NC	A2442NK3	A2442NS	24x42	610x1066	15	6.8
A2448NC	A2448NK3	A2448NS	24x48	610x1219	16	7.3
A2454NC	A2454NK3	A2454NS	24x54	610x1370	18	8.6
A2460NC	A2460NK3	A2460NS	24x60	610x1524	21	9.5
A2472NC	A2472NK3	A2472NS	24x72	610x1829	26	11.8
A3036NC			30x36	760x914	15	6.8
A3048NC			30x48	760x1219	21	9.5
A3060NC			30x60	760x1524	26 1/2	11.8
A3072NC			30x72	760x1829	31	14.0
A3636NC			36x36	914x914	18	8.2
A3648NC			36x48	914x1219	23	10.4
A3660NC			36x60	914x1524	29	13.1
A3672NC			36x72	914x1829	34 1/2	15.4

NOTE: MICROBAN® protects the Metroseal 3 coating from bacteria, mold, mildew and fungi that cause odors, stains and product degradation. For Metroseal 3 shelving information see sheet #10.10A.

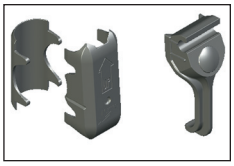
All Environments — Metroseal 3™ with *Microban® Antimicrobial Product Protection

Mobile Options

Stem Casters



Dolly Trucks



Replacement Parts
Each kit includes components for one original Super Adjustable or Super Adjustable shelf; (4) wedges, (4) sleeves, (4) shelf releases.
Model No. SAKITA2

SiteSelect™ Posts

STATIONARY Actual Height* (in.)	(mm)	Model No. Plated	Model No. Metroseal 3	Model No. Stainless	MOBILE Actual Height* (in.)	(mm)	Model No. Plated	Model No. Metroseal 3	Model No. Stainless	Approx. Pkd. Wt. (lbs.)	(kg)
7 3/8	187	7P	7PK3	7PS	6 3/4	171	7UP	7UPK3	7UPS	1/2	0.3
14 3/8	365	13P	13PK3	13PS	13 3/4	349	13UP	13UPK3	13UPS	1	0.5
28 3/8	720	27P	27PK3	27PS	27 3/4	704	27UP	27UPK3	27UPS	1 3/4	0.75
34 3/8	873	33P	33PK3	33PS	33 3/4	857	33UP	33UPK3	33UPS	2	0.9
54 7/16	1382	54P	54PK3	54PS	53 13/16	1366	54UP	54UPK3	54UPS	3	1.4
62 7/16	1585	63P	63PK3	63PS	61 13/16	1570	63UP	63UPK3	63UPS	3 1/2	1.6
—	—	—	—	—	69 3/4	1771	70UP	—	—	3 3/4	1.7
74 1/2	1892	74P	74PK3	74PS	73 7/8	1876	74UP	74UPK3	74UPS	4	1.8
86 1/2	2197	86P	86PK3	86PS	85 7/8	2181	86UP	86UPK3	86UPS	4 1/2	2.0
96 1/2	2450	**96P	96PK3	96PS						5 1/2	2.5

*Actual height for the stationary post includes the post cap and the leveling bolt completely tightened.

Important: When ordering by components remember that for maximum stability, units should be kept as wide and low as possible.

All Metro Catalog Sheets are available on our Web Site: **www.metro.com**

InterMetro Industries Corporation
North Washington Street, Wilkes-Barre, PA 18705
Phone: 570-825-2741 • Fax: 570-825-2852

For Product Information:
U.S. and Canada: 1-800-992-1776
Outside U.S. and Canada: www.metro.com/contactus

L02-006A
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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Supply, Bin/ Basket
Alt ID: CRT-SBK
Manufacturer: Pegasus Medical Concepts, Inc. ((888) 276-4750)
Mfr #: SG-8-E
Vendor: Pegasus Medical Concepts, Inc. ((888) 276-4750)
Vendor #: SG-8-E
Model: E-Style Single Rack Unit (SG-8-E)

Supply Cart. Mobile rack unit on casters holds multiple baskets. Tubular, galvanized steel frame, powder coated. Baskets are not included and must be ordered separately.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	26.25 in (667 mm)	**Left:**	N/A
Depth:	17.75 in (451 mm)	**Right:**	N/A
Height:	78.25 in (1988 mm)	**Front:**	N/A
Max Weight:	125 lbs (56.7 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Cart frame weighs 100 lbs.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C019	Clean Supply	Project	Draft (New)	3	
				Total:	**3**	

HIGH DENSITY STORAGE

HIGH DENSITY RACKS

PRODUCT DESCRIPTION	DEPTH	WIDTH
STARTER RACK - E	451 mm 17-3/4"	668 mm 26-5/16"
ADD-ON RACK - E	451 mm 17-3/4"	643 mm 25-5/16"
STARTER RACK - U	651 mm 25-5/8"	468 mm 18-7/16"
ADD-ON RACK - U	651 mm 25-5/8"	443 mm 17-7/16"

AVAILABLE HEIGHTS : 1988 mm 78-1/4"
MATERIALS: TUBULAR, GALVANIZED, POWDER-COATED STEEL.
RACKS CAN BE FIT WITH OPTIONAL TELESCOPIC SLIDES TO HANDLE IV's OR INSTRUMENT SETS.
NOTE : BASKETS ARE NOT INCLUDED.
AND SHOULD BE ORDERED SEPARATELY.

STARTER RACK - E
SG-8-E

STARTER RACK - U
SG-8-U

ADD-ON RACK - E/U
AG-8-E/U

OPEN CART 20 BASKETS
CRT-150-OP-2

OPEN CART 10 BASKETS
CRT-150-OP-1

OPEN CARTS

PRODUCT DESCRIPTION	DEPTH	WIDTH
OPEN CART 10 BASKETS	699 mm 26-1/2"	688 mm 27-1/16"
OPEN CART 20 BASKETS	699 mm 26-1/2"	1128 mm 44-7/16"

AVAILABLE HEIGHTS : 1710 mm 67"
MATERIALS: TUBULAR, GALVANIZED, POWDER-COATED STEEL.
CARTS CAN BE FIT WITH OPTIONAL TELESCOPIC SLIDES TO HANDLE IV's OR INSTRUMENT SETS.
NOTE : BASKETS ARE NOT INCLUDED.
AND SHOULD BE ORDERED SEPARATELY.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Supply, Suture

Manufacturer: InterMetro Industries Corp (800.992.1776)

Vendor: InterMetro Industries Corp (800.992.1776)

Model: Flexline 5-Drwr w/Touchpad & Dividers (Green)

Alt ID: CRT-SUT

Mfr #: FL24K w/Options

Vendor #: FL24K w/Options

Item ID:

Suture procedure cart. Features 39 inch high FL cart - 24 inch storage space-key lock (FL24K), flexline basic touchpad (FLX412), five green drawer pull (FL-GR), three 3 inch FL Drawer - No Drawer Pull (FL103), 6 inch FL Drawer - No Drawer Pull (FL106), 9 inch FL Drawer - No Drawer Pull (FL109), three flex 3 inch drawer divider kit (FL113) and two 6/9 inch Drawer Divider Kit (FL116).

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	32.25 in (819 mm)	**Left:**	N/A
Depth:	22.50 in (572 mm)	**Right:**	N/A
Height:	38.75 in (984 mm)	**Front:**	N/A
Max Weight:	160 lbs (72.6 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Drawer Pulls to be Sage Green.
Weight shows estimate.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

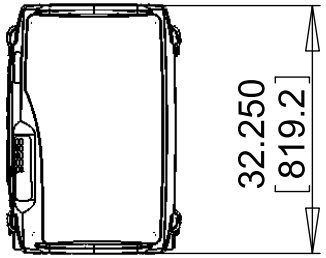
NOTES:
- DIMENSIONS ROUNDED TO THE NEAREST 0.1" (3 mm).
- Drawer Pulls to be Sage Green.

Signed Drawing Is Required To Process Order

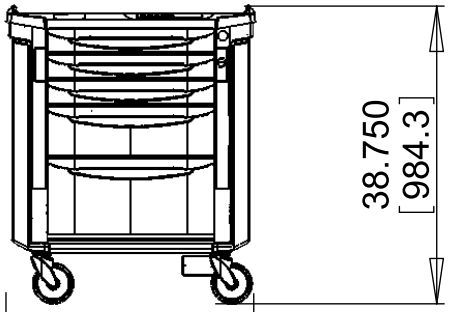
Customer Approval Date

Key unit to lock #INT6
Basic touchpad
Estimated Weight: 160 lbs

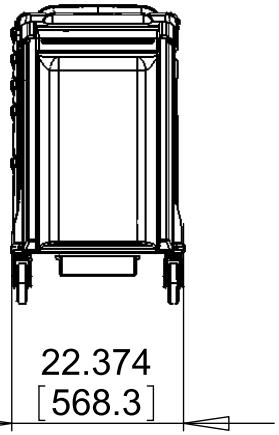
PLAN VIEW



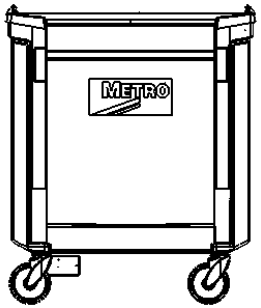
ISOMETRIC VIEW (W/O BACKBOARD)



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

RENDERED ISOMETRIC VIEW

METRO

InterMetro Industries Corp.
651 N. Washington St.
Wilkes-Barre, PA 18705

PHONE: 800-992-1776 FAX: 800-638-9263

PREPARED BY: Eric Holtmeier	CUSTOMER NAME: OhioHealth System
DATE: 9/11/2019	PROJECT NAME: Suture Cart
DESIGN #: C-173122	DESCRIPTION: Flexline Cart
SCALE (ortho): 1:20	CUSTOMER ACCOUNT #: 2300030695

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Cart, Utility, Stainless**
Manufacturer: Lakeside Manufacturing, Inc. ((800) 558-8565)
Vendor: Lakeside Manufacturing, Inc. ((800) 558-8565)
Model: 939 Tough Transport

Alt ID: CRT-U3S
Mfr #: 939
Vendor #: 939

Stainless steel utility cart. 1,000 lb capacity. U- shaped frame with three 18" x 27" shelves. Larger 8” fixed front wheels.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	19.75 in (502 mm)	**Left:**	N/A
Depth:	33.00 in (838 mm)	**Right:**	N/A
Height:	34.25 in (870 mm)	**Front:**	N/A
Max Weight:	80 lbs (36.3 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
				Total:	**1**	

1000 Lb Capacity, (3) 18 x 27 Inch Shelves, NSF

SKU: 939

Expand
Lakeside invented and perfected the stainless steel utility cart so you can rest assured that our carts are your best bet for durability and will be reliable for years to come!

MADE IN THE USA

Specifications

PRODUCT INFORMATION	
Capacity (lbs)	1000
Material	Stainless Steel
Ergonomic Design	Traditional
NSF	Yes
Frame Type	Formed Angle
Shelf Size (WxL) (in)	18 x 27
Number of Shelves	3
Overall Size (WxLxH) (in)	19 3/4 x 33 x 34 1/4
Shelf Clearance (in)	10
Caster Size-Front (in)	8
Caster Size-Rear (in)	5
Caster Type	2 Ea. Swivel, 2 Ea. Fixed, No-Mark Polyurethane, Extra-Load

Specification Sheet	Click to download PDF	
SHIPPING DIMENSIONS		
Weight	80 lbs	36.29 kgs
Dimensions	19.75 × 33 × 34.25 in	50.17 x 83.82 x 87 cm

Description

Ideal for receiving dock and store room uses, loading and moving supplies, transporting equipment and continuous hauling of heavy loads over uneven floor and outdoor surfaces. Rugged “U” shaped frame with angled stainless steel for added strength. All joints are continuous heliarc welded. Shelves are 14 gauge stainless steel with reinforced edges. Stainless steel construction resists staining and rusting. Easy to clean and sanitize, just wipe down or steam clean.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Cart, Computer, Workstation
Manufacturer: JACO Inc. ((800) 649-2278)
Vendor: JACO Inc. ((800) 649-2278)
Model: UltraLite 520 (LCD Mount, L500)

Alt ID: CRT-WOW
Mfr #: 520-L500 w/ 51-3648 Scanner Holder
Vendor #: 520-L500 w/ 51-3648 Scanner Holder

Item ID:

Computer Workstation cart. 20" x 16" large work surface with a monitor mount to hold an LCD display. Monitor mount has 350° rotation, 90° pan up, and 5° pan down. Powered by on-board Lithium Iron Phosphate battery power system (L500, 50V) with 500 watt/hr. battery capacity. Maximum runtime: 12.5 hours with 40W load. Features pneumatic height adjustment from 30" to 46" with 5 degree angle, front steering handle, 8" high compact base, cable management, and 5" casters - two locking. Internal PC bay: 16" x 12" x 2.6". Made of lightweight aluminum with welded steel tube construction. SilverSan embedded antimicrobial powder coat finish. Must select color. Options available: Locking drawer/key light panel, power cord, wire baskets, wipes holder, drawer system, and more.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	20.00 in (508 mm)	**Left:**	N/A
Depth:	16.00 in (406 mm)	**Right:**	N/A
Height:	46.00 in (1168 mm)	**Front:**	N/A
Max Weight:	76 lbs (34.5 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	130
Hz:	60	**Amps:**	1.1
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height adjusts 30" to 46". Weight includes 11 lbs. for 2 batteries.

Dual cell battery, 500 watt-hr capacity.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329	Alcove/WOW-Registration	Project	Draft (New)	1	
				Total:	**1**	

UltraLite 500

Durable Lithium On-Board Power Series

JACO Featured Solutions:

Smart Power™ / ***TRAC™ Steering***

UltraLite 510
Laptop Locking

UltraLite 520
LED/LCD Display Mount

At JACO, our top priority is helping clinicians deliver care. Our carts are known for quality construction and effortless mobility. With JACO's patent pending ***TRAC™*** Steering system and long life Lithium Iron Phosphate batteries, UltraLite Series 500 carts deliver durable power for full-shift mobile computing at the bedside.

JACO Guarantee:

All JACO products are designed, manufactured, and supported in the United States. All mobile cart products are sold with a 5 year warranty for mechanical components and a 3 year warranty for electrical components. Limited liability terms and conditions apply.

The UltraLite 500 Series is a light, durable, and affordable powered mobile medical cart solution.

Each cart is manufactured out of light weight aircraft-grade aluminum, with a non-porous, anti-microbial powder coat surface for optimal infection control. Unique ***TRAC™* Steering** provides effortless mobility.

Base Dims: 13" x 16" x 8.5"

Offered with a wide variety of custom mounts and accessories for laptops, LCD and All-In-One options

Power Options

Long-lasting, on-board Lithium Iron battery for full-shift runtime

Ergonomic Design

Cart construction, casters, and mounting options engineered to maximize productivity and minimize physical effort, reducing operator fatigue and discomfort

Cable Management

Eliminates cord tangle and clutter with internal storage for increased nurse safety and reduced IT maintenance

Made-In-America

Designed, manufactured, assembled and serviced in the USA

UltraLite 500 Series Models

UltraLite 510

Laptop Locking

Large Work Surface
20" x 18"

Internal PC Bay
16" x 12" x 2.6"

Laptop Display Opening
16.5" x 2.75

UltraLite 520

LED/LCD Display

Large Work Surface
20" x 16" w/ Monitor Mount

Internal PC Bay
16" x 12" x 2.6"

X-Large worksurfaces also available

All specifications listed as W x L x H unless noted.

Lithium onboard power for full shift runtimes and fast recharging

Options & Accessories

Lithium Iron Battery		Choice of single or dual cell battery for 250 or 500 watt availability
***TRAC*™ Steering**		Centered "Fifth Wheel" reduces nurse fatigue by up to 40%
Barcode Scanner Holder		Options available for most models
Dual or Single Drawer Cart Storage		Flexible and secure locking medication drawers

JACO Solutions

Smart Power Charging Stations

- Ergonomic, waist-high charging
- Easy to view charge status
- Greatly reduces frayed cords and damaged outlets
- UL60601 patient proximity

Corporate Branding

Reinforce your organization's brand awareness with high quality silk-screened corporate logos and custom accent colors

For a full list of options and accessories: Contact a JACO representative or visit www.jacoinc.com

03-13

JACO

140 Constitution Blvd.
Franklin, MA 02038

info@jacoinc.com
800.649.2278

Certified WBENC Women's Business Enterprise

MADE IN U.S.A.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description:
Manufacturer: PBA
Vendor: PBA
Model: 4CS.447.UL01 - ADA Shower Seat

Alt ID: CSW-SWM
Mfr #:
Vendor #:

Item ID: TA-01

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	
Custom Code:	Unassigned	**Antimicrobial:**	
Furnish Install:	C/C	**Type:** Non-Medical	**Green:**

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:		**Watts:**	
Hz:		**Amps:**	
Phase:	N/A	**BTU/hr:**	
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:		**Gasses:**	
Water - Hot:		**Drain:**	
Water - Treated:		**Steam:**	
Vent:		**Vacuum - Dental / Medical:**	/
Tech Connect:	No		

Structural Requirements

Seismic:		**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	White; Provide blocking as required.
				Total:	**1**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Curtain, Cubicle, Disposable**

Manufacturer: Medline Industries Inc. ((847) 643-3318)

Vendor: Medline Industries Inc. ((847) 643-3318)

Model: Curtain/Disposable

Alt ID: CUR-CUB

Mfr #: Curtain/Disposable

Vendor #: Curtain/Disposable

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	5-Furniture	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Defibrillator, Monitor, w/Pacing**

Manufacturer: Zoll Medical Corporation ((978) 421-9655)

Vendor: Zoll Medical Corporation ((978) 421-9655)

Model: R Series Plus w/Exp Pkg and Pacing

Alt ID: DFB-PCE

Mfr #: 3 0520 0000 0111 0013

Vendor #: 3 0520 0000 0111 0013

Defibrillator with AED mode, Pacing and Expansion package (Real CPR Help which offers quantitative depth and rate in real time, release indicator, interruption timer, See-Thru CPR ECG artifact filtering, WiFi compatibility). Includes audible and visual advisory prompts, single cable capable of monitoring/ pacing/defib, code readiness testing system, rectilinear biphasic technology,compact flash card slot, advisory mode, integrated AC power, built-in test port, 5-year warranty. Rechargeable Lithium Ion Battery is NOT included with device and must be ordered as a separate line item. Order part # 8019-0535-01 at a price of $475.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	10.50 in (267 mm)	**Left:**	N/A
Depth:	12.50 in (318 mm)	**Right:**	N/A
Height:	8.25 in (210 mm)	**Front:**	N/A
Max Weight:	15 lbs (6.8 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	N/A
Hz:	60	**Amps:**	N/A
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	Yes	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	Sits on stainless steel table
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	Sits on stainless steel table
				Total:	**2**	

R Series

Technical Specifications

Taking Resuscitation to Heart

The ZOLL® R Series® monitor/defibrillator provides clinicians with comprehensive support for resuscitation. This includes cutting-edge technology to help you meet current guidelines for achieving high-quality CPR, as well as OneStep™ electrodes that simplify and speed therapy. And to help ensure that the R Series will be Code-Ready®, it conducts an automated self-test daily.

Driving High-Quality CPR

- CPR Dashboard™ featuring Real CPR Help® — Guides rescuers with real-time audio and visual feedback on CPR quality measures. It provides numeric displays of depth and rate and visual indicators of compression release, as well as a unique Perfusion Performance Indicator™.
- See-Thru CPR® — Reduces the duration of pauses during CPR by filtering out the CPR artifact so rescuers can see whether an organized underlying rhythm has developed without stopping compressions.

Comprehensive Readiness Checks

The R Series extends testing beyond the basic test shock to checking more than 100 individual indicators of readiness, including electronics, batteries, cables, electrodes, and defibrillator discharge. A green check mark or a red X on the defibrillator indicates the status of the device, as determined during its last automated self-test. If a problem is detected, the R Series will turn on the display and an alert will be visible. When used with OneStep electrodes, even the electrodes are tested automatically every 24 hours.

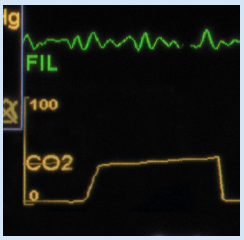
Unmatched Clinical Excellence

- Unique, constant-current 40-msec pacing has the highest capture rate at the lowest average current required, assuring efficacy and patient comfort.[1]
- Our high-current Rectilinear Biphasic™ waveform delivers the highest constant current at the optimal duration for defibrillation.
- The most extensive pediatric capabilities in an ALS defibrillator: CPR feedback coupled with a pediatric AED algorithm.

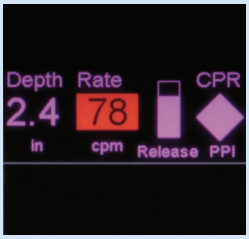
ZOLL®

General

Size: 8.2 in (20.8 cm) high x 10.5 in (26.7 cm) wide x 12.5 in (31.7 cm) deep.
Weight: 13.6 lbs (6.2 kg) with OneStep™ Cable and SurePower™ battery pack; 15.2 lbs (6.9 kg) with paddles.
Power Sources: AC Mains: 100 to 120 V AC (50/60 Hz), 220 to 240 V AC (50 Hz); Battery: Rechargeable lithium ion battery pack.
Low Battery Indicator: A "LOW BATTERY" message appears on the monitor when there are less than 15 minutes of ECG monitoring.
Design Standards: Meets or exceeds applicable requirements of UL 60601, AAMI DF80, IEC 60601-2-4, EN 60601-2-25, and 60601-2-27.
Patient Safety: All patient connections are electrically isolated.
Environmental: Operating Temperature: 0°C to 40°C; Storage and Shipping Temperature: -20°C to 60°C; Humidity: 5% to 95% relative humidity, noncondensing; Vibration: IEC 68-2-6 and IEC 68-2-34; Shock: IEC 68-2-27, 50 g 6mS half-sine; Operating Pressure: 594 to 1060 millibars; Particle and Water Ingress: IEC 529, IP22; Electromagnetic Compatibility (EMC): CISPR 11 Class B Radiated and Conducted Emissions; Electromagnetic Immunity: AAMI DF80, EN 61000-4-3 to 10 V/m; Electrostatic Discharge: AAMI DF80, EN 61000-4-2; Conducted Susceptibility: EN 61000-4-4, 61000-4-5, 61000-4-6.



Mainstream and sidestream capnography options available



CPR Dashboard™ featuring Real CPR Help®

ADVANCING RESUSCITATION. TODAY.®

ZOLL Medical Corporation
Worldwide Headquarters
269 Mill Road
Chelmsford, MA 01824
978-421-9655
800-348-9011

For subsidiary addresses and fax numbers, as well as other global locations, please go to www.zoll.com/contacts.

Defibrillator

Waveform: Rectilinear Biphasic.™
Patient Impedance Range: 15 to 300 ohms.
Energy Selections: 1 to 10, 15, 20, 30, 50, 75, 100, 120, 150, and 200 joules selected using controls on front of the defibrillator or sternum paddles. (Note: When using appropriate pediatric resuscitation electrodes, the 75-joule setting is replaced by 70- and 85-joule settings.)
Smart Step Energy Levels: Automatically escalates energy through a configured adult or pediatric protocol.
Energy Display: Shown on monitor for both selected and delivered.
Charge Time: Less than 7 seconds with a new, fully charged battery (first 15 charges to 200 joules); longer charge times may result with a depleted or older battery.
Synchronized Mode: Synchronizes defibrillator pulse to patient's R wave. "SYNC" message displayed on monitor and markers shown on both monitor and recorded ECG.
Charge Controls: Control from front of defibrillator or apex paddle.
Paddles: External apex/sternum paddles; adult plates slide off to expose pediatric electrode surface.
Code Readiness Testing: Verifies defibrillator hardware, therapy delivery cable (with both paddles and electrodes), electrode condition and expiration (with select OneStep electrodes) without the need for a separate test fixture.

ECG Monitoring

Patient Connection: 3-lead ECG cable, 5-lead ECG cable, paddles, or hands-free electrodes; selectable by front panel switch.
Input Protection: Fully defibrillator protected. Circuits designed to prevent distortion of ECG signal by pacer pulse.
Implanted Pacemaker Spike Display: Circuits designed to detect most implanted pacemaker spikes and display a marker on the ECG trace.
Bandwidth: 0.5 to 21 Hz (-3dB) standard; 0.05 to 150 Hz diagnostic with configurable options of 0.5 Hz to 40 Hz or 1 Hz to 21 Hz.
Lead Selection: I, II, III aVR, aVL, aVF, V, P1, P2, P3 with OneStep Pacing electrode.
ECG Size: 0.5, 1.0, 1.5, 2.0 or 3.0 cm/mV display on monitor.
Heart Rate Display: 0 to 300 bpm ±5%.
Heart Rate Alarm: User selectable for tachycardia at 60 to 280 bpm; for bradycardia at 20 to 100 bpm. On/Off status displayed on the screen.

CPR Dashboard Featuring Real CPR Help

Activated when OneStep Complete, OneStep CPR, or OneStep Pediatric CPR electrodes are connected.
Detection Technology: Accelerometer.
Compression Depth: Detected between 0.75 in (1.9 cm) and 3.0 in (7.6 cm), with an accuracy of ±0.25 inches (0.6 cm).
Compression Rate: Detected between 50 and 150 compressions per minute.
Release Bar: Ensures proper release off of the chest.
Feedback: Configurable audio and visual prompts for rate and depth issued when compressions fall outside of AHA/ERC recommendations.
CPR Idle Time Display: Indicates elapsed time since last detected chest compression.
Perfusion Performance Indicator (PPI): Integrates compression depth and rate in order to rapidly visualize CPR performance per AHA/ERC recommendations.

See-Thru CPR Filter

Removes compression-related artifact from the ECG via an adaptive filtering technique.

Display

Screen Type: Color, VGA liquid crystal display (LCD).
Screen Size: 6.5 inches (16.5 cm) diagonally.
Sweep Speed: 25 mm/sec.
Viewing Time: 5 seconds with standard display format.
Channels: 3.
Information: Heart Rate, Leads/Pads, Alarm On/Off, Selected Energy, Delivered Energy, User Prompts and Warnings, Code Readiness Test Results, SpO_2, NIBP, $EtCO_2$, Pacer Functions, Code Markers, CPR Dashboard.

Battery Packs*

Type: 10.8 V (nominal) rechargeable lithium ion.
Capacity: 5.8 amp hours.
Weight: 1.7 lb (0.77 kg).
Recharge Time: 5 hours or less with integral charger.
Operating Time: >4 hours of continuous ECG monitoring; 100 maximal energy (200 joules) discharges; 3.5 hours of continuous ECG monitoring and pacing at 60 mA, 80 ppm.

Recorder

Technology: 90 mm thermal array; 80 mm grid width.
Speed: 25 mm/sec, 6-second delay.
Printing Modes: Manual or automatic.
Annotations: Time, date, defibrillation energy, patient impedance, heart rate, pacer output, QRS synchronization marker, ECG size, ECG lead, alarm, defibrillator test results, analyze ECG, ECG bandwidth.

I/O, Storage, Communications

Sync In: 0 to 5 V (TTL Level) pulse, active high, 5 to 15 ms in duration, no closer than 200 ms apart; energy transfer begins within 25 ms of the leading edge of the sync in pulse.
Marker Out: 0 to 5 V (TTL Level) pulse, active high, 10 ms in duration, the leading edge of the pulse occurs within 35 ms of R wave peak.
ECG Output: 1.0 V/cm of deflection on recorder; <25 ms delay from the patient ECG input.
Card Slot: Compact flash compatible.
Internal Memory: Disk on chip.

Advisory Defibrillation

Shock Advisory Function: Evaluates ECG rhythm to determine if shock delivery is required.
Shockable Rhythms: Ventricular fibrillation with amplitudes >100 µV, and wide-complex ventricular tachycardia with rates >150 bpm for adults or >200 bpm for pediatric applications. Refer to Operator's Manual for details on sensitivity and specificity performance.
Protocol Configurations: Configurable for either CPR or shock-first-driven protocols. Energy sequences can be configured for single or multiple shocks with fixed or escalating energy levels. The CPR interval length is configurable in 1-minute increments up to 4 minutes.

External Pacing

Type: VVI demand; asynchronous (fixed rate) when used without ECG leads or in asynchronous (ASYNC) pacing mode.
Pulse: Rectilinear, constant current: 40 ms ±2 ms; variable 0 to 140 mA ±5% or 5 mA, whichever is greater. Rate is variable from 30 to 180 ppm ±1.5%.
Output Protection: Fully defibrillator protected and isolated.
OneStep Pacing: Eliminates the need to connect separate ECG leads when used in conjunction with OneStep Pacing and OneStep Complete electrodes.

Pulse Oximetry with Masimo SET® Technology

Saturation Range: 1-100% (%SpO_2) with a resolution of 1%.
Pulse Rate Range: 25-240 ppm with a resolution of 1 ppm.
Saturation Accuracy: Non-motion conditions ±2% for adults/pediatrics; ±3% for neonates. During motion ±3% for all patients.
Pulse Rate Accuracy: Non-motion conditions ±3 ppm. During motion ±5 ppm.

Mainstream CO_2 Capnostat 5 Sensor

Principle of Operation: Nondispersive infrared (NDIR) single-beam optics, dual wavelength, no moving parts.
Warm-up Time: Full specifications within 2 minutes at an ambient temperature of 25°C. Capnogram in 20 seconds.
Environmental: Operating Temperature: 0°C to 45°C, Storage and Shipping Temperature: -40°C to 70°C.

Sidestream CO_2 LoFlo Sensor

Principle of Operation: Nondispersive infrared (NDIR) single-beam optics, dual wavelength, no moving parts.
Warm-Up Time: Full specifications within 2 minutes at an ambient temperature of 25°C. Capnogram in 20 seconds
Environmental: Operating Temperature: 0°C to 40°C, Storage and Shipping Temperature: -40°C to 70°C.

NIBP

Patient Population: Adult, Pediatric.
Method: Oscillometric.
Control: Automatic and manual measurement.

WiFi Capable

WiFi 802.11 a/b/g/n Ambicom-specific 1100C-CF Card P/N 8005-000101-01 compatibility.
Typical Readiness File: 750K.
Typical Code Data File: 1.2 MB.

*Values listed for a new battery operating at 20°C.

[1]Zoll PM, et al. *Circulation.* 1985;71(5):937-44.

Specifications subject to change without notice.

Printed in U.S.A. MCN HP 1606 0215

ZOLL®

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Dialysis Unit, Renal Replacement
Manufacturer: Baxter Healthcare ((224) 948-2000)
Vendor: Baxter Healthcare ((224) 948-2000)
Model: PrismaFlex

Alt ID: DIA-RNL
Mfr #: 113081
Vendor #: 113081

Continuous Renal Replacement Therapy system (CRRT). Four high-precision scales for bag handling, automatic bar-code identification of the filter set. Five pumps, including pre-blood pump for infusion of a supplemental solution for hemodilution or anticoagulation of the extracorporeal circuit. Integrated discharge ring reduces ECG interference caused by roller pumps. Price includes clinical training, annual clinical support, installation and one year warranty.

Item ID: EXISTING

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	25.00 in (635 mm)	**Left:**	N/A
Depth:	24.00 in (610 mm)	**Right:**	N/A
Height:	64.00 in (1626 mm)	**Front:**	N/A
Max Weight:	172 lbs (78.0 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	600
Hz:	60	**Amps:**	5
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect floor space required. Actual unit dimensions: 19"W x 12"D.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Existing (Reuse)	Draft (Existing)	3	
				Total:	**3**	

prismaflex®

Prismaflex® System Specifications

UNIQUE SYSTEM BENEFITS

- Integrated CVVHDF
- Integrated Anticoagulation
- Fluid Accuracy that Meets ADQI Standards
- Cerner® Certified EMR Connectivity
- Backup Battery

Approved for Therapeutic Plasma Exchange (TPE)

GAMBRO®

Prismaflex® System Specifications

Unique System Benefits in Orange

CRRT Therapy Options

Hemodiafiltration (CVVHDF)	Yes
Pre AND/OR Post Dilution	Yes
Hemofiltration (CVVH)	Yes
Pre AND/OR Post Dilution	Yes
Hemodialysis (CVVHD)	Yes
Pre Dilution	Yes
Slow Continuous Ultrafiltration (SCUF)	Yes

Advanced Therapy Capabilities

Therapeutic Plasma Exchange (TPE)	Yes
Pre/Post Dilution Ratio Selection	Yes
Real-Time TMP & Filter Pressure Drop Monitoring	Yes
Prismaflo II Blood Warmer	Yes, Optional

Flow Rate Ranges [Increment]

Blood	10...[10]...450 ml/min[3]
Accuracy	±10% of user's set rate
Replacement Solution[1]	
CVVH, CVVHDF:	0...[50]...8,000 ml/hr
TPE:	0...[50]...5,000 ml/hr
Accuracy	±30 ml/hr
Dialysate[1]	0...[50]...8,000 ml/hr
Accuracy	Accuracy ±30 ml/hr
Pre Blood Pump Solution/Anticoagulant[1]	
CVVH, CVVHD, CVVHDF:	0...[2-50]...4,000 ml/hr
SCUF:	0...[2-50]...2,000 ml/hr
TPE:	0...[2-50]...1,000 ml/hr
Accuracy	±30 ml/hr
Patient Fluid Removal[1,3]**:**	0...[10]...2,000 ml/hr
Plasma Removal (TPE):	0...[10]...1,000 ml/hr
Accuracy	±300 ml/24hr[2]
Effluent Flow Rate:	0...10,000 ml/hr

[1]Replac. + Dial. + PBP + Fluid Rem. < 10,000 ml/hr
[2]Total cumulative fluid accuracy specification
[3]Set Dependent

Pressure Monitoring Range

Access line pressure:	-250...+300 mmHg
Return line pressure:	-50...+350 mmHg
Filter pressure:	-50...+450 mmHg
Effluent line pressure:	-350...+400 mmHg
Accuracy:	Greater of ±8 mmHg/ ±10% of reading

Syringe Pump [Increment]

Syringe Volume (with "luer lock"):	10, 20, 30, 50 cc
10 cc Syringe:	0, 1...[0.1]...5 ml/hr
20 cc Syringe:	0, 0.5...[0.1]...5 ml/hr
30 cc Syringe:	0, 0.5...[0.1]...10 ml/hr
50 cc Syringe:	0, 2...[0.1]...20 ml/hr
Bolus Delivery Rate:	1 ml in ≤ 20 sec.
Bolus Volume Range:	
10-20 cc Syringe:	0, 0.5...[0.1]...5 ml
30 cc Syringe:	0, 1...[0.1]...5 ml
50 cc Syringe:	0, 2...[0.1]...9.9 ml
Delivery Accuracy (0-600 mmHg)	±5% (<±15% for <2ml/h)

Safety Systems

Ultrasonic Air Detection	Single air bubble ≥ 20 µl resolution
Automatic Closed-Circuit Air Removal	Yes
Blood Leak Detector	≥0.50 ml/min resolution (Hct 32% at max. effluent flow rate)
Integrated Bar Code Reader	Automatically sets parameters based on filter size
Battery Backup (Optional)	10+ mins.
Anti-Electrostatic/ECG Interference	Yes

Fluid Control

Gravimetric	4 Retractable Scales
Weight Range/Scale	0...11 Kg

Internal Treatment Memory

Event Memory	90 hrs.

External Treatment Memory

PCMCIA Memory Card Slot	2 GB, 170 treatments max.
Automatic Internal Event Download	Yes

ICU Central Monitoring External Data Ports

RJ-45 Ethernet
PCMCIA Data Card Slot
RS-232 Serial
Remote Alarm Connection

Graphical User Interface/Display

Display	12" TFT-LCD
Touch Screen Setup & Control	Yes

Power Requirements

Autosensing Power Supply	Yes
Voltage	100-120/240 VAC
Input Line Current (max rms)	5 A (100-120 VAC)/2.5 A (240 VAC)
Frequency	50/60 Hz

Physical Dimensions

Height	64 in
Width	19 in
Floor Space	24 x 25 in
Weight	172 lbs

Standards

Electrical Safety	IEC/EN 60601(-1/-1-2/-1-4), EN55011
International Conformity	IEC/EN 60601(-1/-1-1/-1-2/-1-4/-2-16), CSA 601.1-M90/B-90, UL 60601-1
Electromagnetic Emissions	EN 55011, IEC/EN 61000-3(-2/-3)
Electromagnetic Immunity	IEC/EN 61000-4(-2/-3/-4/-5/-6/-8/-11)
Drip Proof	IPX1, IEC 60529
Alarm System	IEC/EN 60601-1-8
Fluid Accuracy	ADQI Compliant[4]
PDMS Connectivity	Yes, EMR Cerner Certification

IPX1 CE 0086

[4]Bunchman, T., Palevsky, P., Tetta, C. ADQI 1 Conference: CRRT. Retrieved 10/16/09 from http://www.ccm.upmc.edu/adqi/adqi01.html

Prismaflex® Disposable Sets

Model	Type of membrane	Filter surface area	Blood Volume in Set	Application	Part Number	Units/Carton
Prismaflex M60 Set	AN69	0.6 m^2	93 ml	CRRT including Low Flow	106696	4
Prismaflex M100 Set	AN69	0.9 m^2	152 ml	CRRT including Standard Flow	106697	4
Prismaflex M150 Set	AN69	1.5 m^2	189 ml	CRRT including High Flow	109990	4
Prismaflex HF1000 Set	PAES	1.1 m^2	165 ml	CRRT including High Flow	107140	4
Prismaflex HF1400 Set	PAES	1.4 m^2	186 ml	CRRT including High Flow	107142	4
Prismaflex TPE2000 Set	Polypropylene	.35 m^2	125 ml	Therapeutic Plasma Exchange	114093	4

For Customer Support call 800-525-2623
14143 Denver West Parkway, Lakewood, CO 80401
visit us at **www.gambro.com**

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Doppler, Vascular

Manufacturer: Arjo - Huntleigh Healthcare, Inc ((800) 323-1245)

Vendor: Arjo Inc ((800) 323 1245)

Model: Dopplex D900 w/EZ8 Probe

Alt ID: DOP-VSC

Mfr #: D900-P-USA/EZ8

Vendor #: D900-P-USA/EZ8

Handheld non-directional vascular doppler with 8 MHz wide beam probe. Features audio only, headphone output, 3 level waveform calibration function, active noise reduction. Includes carry bag, headphones, gel.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	2.90 in (74 mm)	**Left:**	N/A
Depth:	1.10 in (28 mm)	**Right:**	N/A
Height:	5.50 in (140 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.2 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Requires 9 volt alkaline battery-6LR61, 6LF22 or equivalent.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Audio and bi-directional Dopplers

The Dopplex® D900 is an entry-level, audio-only, non directional Doppler, principally used for ABI measurements by community nurses and doctors in managing leg ulcers.

- Clear audio sounds of blood flow
- Compatible with all XS high-sensitivity vascular probes
- Audio output socket
- Large carry bag

The Dopplex® SD2 provides bi-directional blood flow information to the vascular professional including the display of flow direction. It is ideal for clinical specialists wishing to conduct lower limb Doppler studies.

- Provides bi-directional blood flow information
- Compatible with all XS high-sensitivity vascular probes
- Stereo audio output socket
- Large carry bag

Use any of our handheld Dopplers with our EZ8 widebeam probe for easy location of brachial and pedal arteries

Dopplex Vascular Dopplers

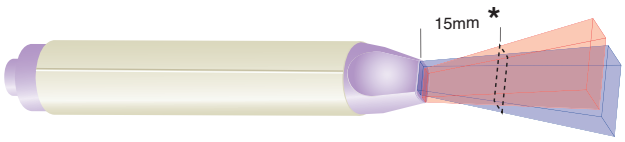
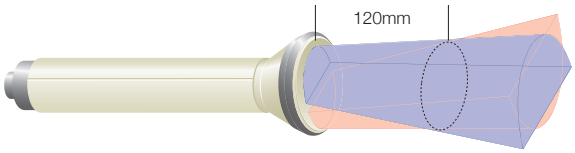
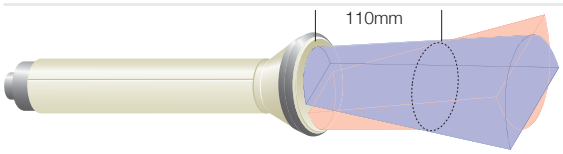
Hand held Dopplers for vascular assessment and intraoperative use

Based on over 20 years of experience in the field of vascular assessment, the latest generation of Dopplex® handheld Dopplers offers even greater performance, quality and reliability.

The range now has significantly enhanced features, including improved audio performance, warranty of 5 years and new features in the *Dopplex DR4* software package.

The *EZ8* ultra wide beam probe has been designed using innovative technology to produce a distinctly wide beam, which completely encompasses the vessel of interest. This unique probe is superb for easier vessel location and helps to maintain vessel contact during cuff inflation and deflation procedures, as well as assisting in reducing variability of ABI measurements.

High Sensitivity Doppler Probes

	Order Code	Frequency	Use
	EZ8	Wide Beam 8MHz	Wide beam technology allows effortless location of vessels. Easier to maintain vessel contact during inflation and deflation
	VP4-HS	4MHz	Detection of deep lying vessels
	VP5-HS	5MHz	For edematous limbs and deep lying vessels. Ideal adjunct to re-sterilizable EZ8 for ABI measurements
	VP8-HS	8MHz	Detection of peripheral vessels and calcified arteries
	VP10-HS	10MHz	Detection of smaller superficial vessels
	IPP3-USA	8MHz	Re-sterilizable intraoperative probe. Ideal for most surgical applications
	OP2-HS	2MHz	Obstetric for fetal heart detection
	OP3-HS	3MHz	Obstetric for fetal heart detection in early gestation

*Approximate distances of peak sensitivity

ABI assessment: is recommended that the user purchase a VP5-HS or *EZ8* probe if normal and edematous limbs are to be assessed for Ankle Brachial Index (ABI) testing.

Technical specification

Product Features	DMXR	DMX	ATP Kit	ABI Kit	SD2	D900	Dopplex Ability
Product order code	DMXR-USA	DMX-USA	ATP-USA	ABI-USA	SD2-P-USA	D900-P-USA	DA100PB
High-resolution color display	•	•	•	•			
Bi-directional Doppler waveform display	•	•	•	•			
Appg capability	▫	▫	•	▫			
Noise reduction	DDNR	DDNR	DDNR	DDNR	Active	Active	
Removable micro SD card storage	•	•	•	•			
Scroll memory (seconds)	20 secs	20 secs	20 secs	20 secs			
Timebase (seconds)	3, 6 and 12 secs	3, 6 and 12 secs	3, 6 and 12 secs	3, 6 and 12 secs			
Compatible with interchangeable XS probes	•	•	•	•	•	•	
Integrated loudspeaker	•	•	•	•	•	•	
Flow separated stereo headphone output	•	•	•	•	•		
Gain control	Auto	Auto	Auto	Auto	Manual		
Obstetric capability with XS probes	•	•	•	•	Audio	Audio	
Dopplex software compatible	DR5	DR5	DR5	DR5			DR4
USB capability	Micro	Micro	Micro	Micro			Mini
Battery type	2 x AA Rechargeable batteries	2 x AA Alkaline batteries	2 x AA Rechargeable batteries	2 x AA Rechargeable batteries	9 volt alkaline — 6LR61, 6LF22 or equivalent recommended (e.g., MN1604)		NiMH integral
110-240 V medical-grade recharging kit (supplied with country adaptors)	•	▫	•	•			
Battery life (number of 1 min exams)	500	500	500	500	250	500	Mains/battery
Warranty*	3-year	3-year	3-year	3-year	5-year	5-year	2-year
Accessories	All handheld models supplied with: gel, soft carry bag, user manual. All kits supplied with large carry case. *Dopplex Ability*: Supplied with one set of standard cuffs, two rolls of paper, pack of sleeves, mains cable and instructions for use.						
Safety standard compliance***	**DMX/D900:** ANSI/AAMI ES60601-1: A1:2012, C1:2009/(R)2012 AND A2:2010/(R)2012, CSA CAN/CSA-C22.2 NO. 60601-1:14, IEC 60601-1 Edition 3.1 (2012) **ABILITY:** IEC 60601-1: 2005 +CORR. 1 (2006) + CORR. 2 (2007): EN 60601-1: 2006 + CORR: 2010; CAN/CSA-C22.2 No. 60601-1 (2008); ANSI/AAMI ES60601-1 (2005+C1:09 + A2:10).						
Weight	11 oz (310 g)	11 oz (310 g)	Kit: 53 oz (1.5 kg)		10 oz (295 g)	10 oz (295 g)	106 oz (3 kg)
Dimensions	Main unit: Height 5.5" (140 mm) Width 3.0" (75 mm) Depth 1.2" (30 mm)		Kit: Height 13.8" (350 mm) Width 15.8" (400 mm) Depth 3.9" (100 mm)		Height 5.5" (140 mm) Width 2.9" (74 mm) Depth 1.1" (27 mm)	Height 6.3" (160 mm) Width 10.25" (260 mm) Depth 9.5" (240 mm)	

• Standard ▪ Option * Refer to separate warranty statements ** Using *Dopplex* HS series of probes will only give audio without waveforms, DDNR or gel filter. *** Depending upon model

As a proud member of the Arjo family, we have been committed to supporting healthcare professionals in improving outcomes and enhancing patient wellbeing since 1979. We do this through our proven solutions for Vascular Assessment & Treatment and Fetal & Patient Monitoring. With innovation and customer satisfaction as our guiding principles, we strive for clinical excellence and improved performance, for life.

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www.huntleigh-diagnostics.us

AW:: 1001047-1

HUNTLEIGH

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Disposal, Sharps, Wall Mount
Manufacturer: Stericycle (866-783-7422)
Vendor: Stericycle (866-783-7422)
Model: Bio Systems C-02RES-0203-OC

Alt ID: DSL-2GW
Mfr #: C-02RES-0203-OC
Vendor #: C-02RES-0203-OC

Sharps container (red) with vertical drop lid, outer cabinet and key. 2 gallon capacity. Provided at no charge with monthly service contract.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	14.50 in (368 mm)	**Left:**	N/A
Depth:	5.75 in (146 mm)	**Right:**	N/A
Height:	15.50 in (394 mm)	**Front:**	N/A
Max Weight:	12 lbs (5.4 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Max weight reflects cabinet with container full.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

Bio Systems 2 & 3 Gallon Sharps Containers

Code # C-03RES-0203

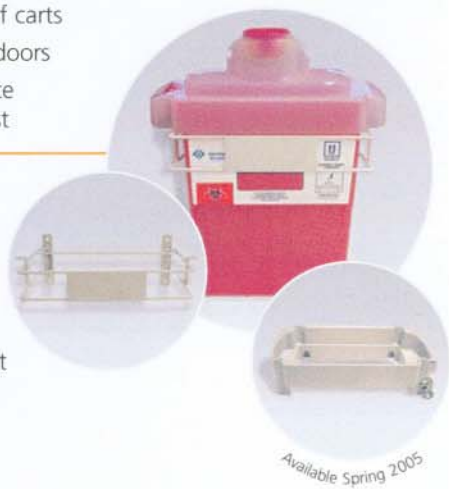
Code # C-02RES-0203

2 & 3 Gallon Sharps Containers offer our hands-free vertical drop lid along with an easy view fill line window. The containers are ideal for patient rooms, medication rooms, medication carts, soiled utility rooms and crash/code carts.

Locking Wall Cabinet
Code # C-02RES-0203-OC
Code # C-03RES-0203-OC
Code # OC-02-2004
Code # OC-03-2004

The locking cabinet allows the 2 & 3 gallon containers to be enclosed in a secure mounted unit. As a security feature the key is only removable when cabinet is in locked position. Locations suitable for the locking cabinet include:

- Patient rooms
- Exterior sides of carts
- Inside cabinet doors
- Anywhere space constraints exist



Locking Wall Bracket
Code # WB-0203
Code # 0203WMA
(Available Spring 2005)

Constructed of powder coated steel or durable plastic, the lockable bracket is ideal for mounting the 2 & 3 gallon containers to:

- Patient rooms
- Exterior sides of carts
- Inside cabinet doors
- Where space constraints exist

Available Spring 2005

Countertop Stability Base
Code # 0203SB

When wall space is limited, this durable plastic base holds both the 2 & 3 gallon containers for use on a stable surface, such as a patient counter or workstation. Base can be mounted permanently to a surface or semi-permanently with adhesive strip.

Available Spring 2005

Container Securement Cap
When the container is removed, the cap is used to secure the container for transport.

***Bio Systems Sharps Management Program** is Stericycle's proactive sharps management service with reusable containers for hospitals and other generators of sharps waste. It is an integrated, turnkey service program from procurement to disposal. The key element is our team of fully-trained, full-time Bio Systems technicians who visit your facility on a regular schedule to exchange sharps containers before they get full. Additionally, all containers are scanned, tracked and documented by our proprietary BioTrack computerized system to verify disposal and regulatory compliance.*

Product Codes

Product Code	Description	Approximate Dimensions (Height x Depth x Width)
C-02RES-0203	2 gallon container (red) with vertical drop lid	15.1" x 4.73" x 12.5"
C-02RES-0203-OC	2 gallon container (red), vertical drop lid, outer cabinet (beige) and key	15.5" x 5.59" x 14.5"
OC-02-2004	2 gallon outer cabinet only (beige)	13.25" x 5.59" x 14.5"
C-03RES-0203	3 gallon container (red) with vertical drop lid	21.1" x 4.73" x 12.5"
C-03RES-0203-OC	3 gallon container (red), vertical drop lid, outer cabinet (beige) and key	21.5" x 5.59" x 14.5"
OC-03-2004	3 gallon outer cabinet only (beige)	19.25" x 5.59" x 14.5"
0203LIDX	2 & 3 gallon vertical drop lid	4.75 x 4.73" x 12.5"
0203WMA	2 & 3 gallon locking wall mount (beige) and key	2.75" x 5.75" x 13"
0203SB	2 & 3 gallon countertop stability base (beige)	4.25" x 7.01" x 11.99"
0203LIDX	4 gallon vertical drop lid	4.78" x 6.85" x 12.25"
04HORZ-2007	4 gallon horizontal drop lid	4.78" x 6.85" x 12.25"
C-04RES-04	4 gallon container (red) with vertical drop lid	21.25" x 6.75" x 11.75"
C-04RES-04HORZ	4 gallon container (red) with horizontal drop lid	21.25" x 6.75" x 11.75"
C-04RES-04-OC	4 gallon container (red), vertical drop lid, outer cabinet (beige) and key	21.81" x 7.47" x 14.5"
C-04RES-04HORZ-OC	4 gallon container (red), horizontal drop lid, outer cabinet (beige) and key	21.81" x 7.47" x 14.5"
OC-04-2004	4 gallon outer cabinet only (beige)	19.25" x 7.47" x 14.5"
WB-04	4 gallon locking wire wall bracket (red) and key	7.12" x 7.75" x 13.62"
C-08-2004LR	8 gallon container only (red)	19.7" x 12.95" x 11.25"
08FT-2004	8 gallon funnel top lid	1.25" x 11.25" x 11.25"
08TT-2004	8 gallon trap top lid	1" x 11.25" x 11.25"
WB-08	8 gallon wire wall bracket (red)	21.5" x 13.25" x 14"
D-08	8 gallon wire dolly (red)	23" x 13" x 13.5"
DWS-08	8 gallon wire step-on dolly (red)	23" x 16.5" x 14.25"
C-17	17 gallon container only (red)	24.75" x 17.5" x 13.25"
L-17	17 gallon transport lid (black)	17.25" x 12.62"
L2-17	17 gallon 2 part slide top lid (black)	17.25" x 12.62"
LH-17	17 gallon hamper top lid (black)	17.25" x 12.62"
DWS-17	17 gallon wire step-on dolly (red) for 2 part slide top lid	29.75" x 22.5" x 14.5"
DWSH-17	17 gallon wire step-on dolly (red) for hamper top lid	29.75" x 22.5" x 14.5"
D-17	17 gallon black dolly (black)	9.75" x 19" x 14.25"

There is good reason thousands of healthcare providers turn to Stericycle Bio Systems. We seek to protect people and reduce risk. Whether you're a small or a large medical facility, a research facility, pharmaceutical or biotechnology facility, we can tailor our Stericycle Bio Systems Sharps Management Program to meet your sharps disposal needs.

Stericycle Bio Systems – Experts in Sharps Management

(888) 9·SHARPS
974-2777

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(Rev. 10/07)

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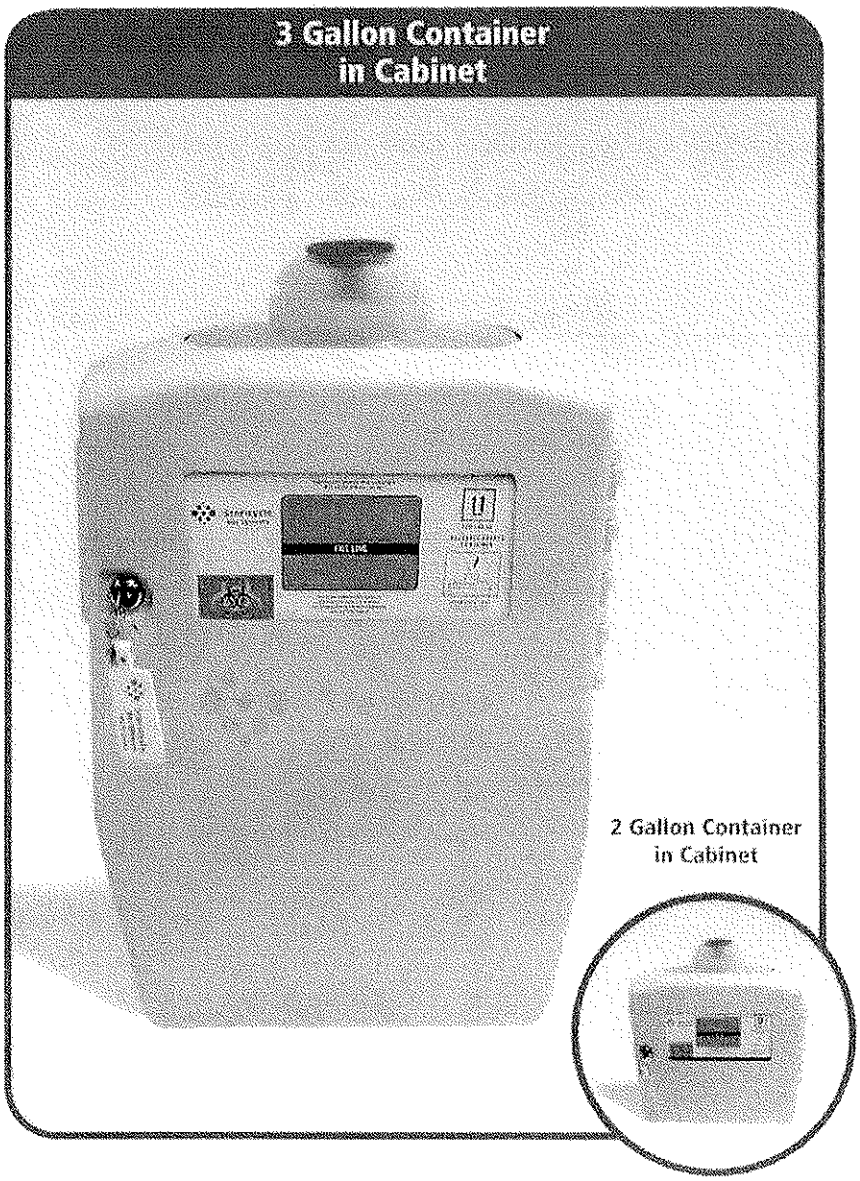
Bio Systems



Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Dispenser, Cleaning Solution
Manufacturer: Diversey Care ((980) 221-3235)
Vendor: Diversey Care ((980) 221-3235)
Model: J-Fill QuattroSelect (Air Gap)

Alt ID: DSP-CLN
Mfr #: D3764735
Vendor #: D3764735

Item ID:

Wall mounted chemical/cleaning solution dispenser (Air Gap). Features a selector switch with rinse water option, numbered / color coded labels that use pictures for instructions, corrosion resistant lockable stainless steel locking cabinet, push button for dispensing solutions, on / off cartridge connection, and MSDS storage slot with MSDS sheets.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	18.50 in (470 mm)	**Left:**	N/A
Depth:	7.50 in (191 mm)	**Right:**	N/A
Height:	24.25 in (616 mm)	**Front:**	N/A
Max Weight:	15 lbs (6.8 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	Yes	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C041	EVS	Project	Draft (New)	1	
				Total:	**1**	

J-Fill® QuattroSelect®

Dispensing System

The J-Fill® platform is a close-looped system which virtually eliminates contact with chemical concentrates. This wall mounted system dispenses four different J-Fill® products into bottles, buckets and floor care machines.

Features & Benefits

- Rugged steel doors with lockable cabinet doors (comes with keys) and product identification windows. Drip tray with drain hose and a remote high flow bucket / auto scrubber fill gun
- Built with one handed 1.5 GPM low flow and low foam bottle fill
- 8' 3.1 GPM high flow bucket fill hose with easy to use point of use activation
- Smartvalve™/MC technology automatically chooses correct flow rate in one operation
- SafeGap™/MC and Air Gap eductors meets ASSE 1055B standard for back flow prevention*
- Uses super-concentrated and hyper-concentrated chemicals, reduces "in-use" cost and solid waste disposal. Spill-Tite™/MC cartridges are leak proof and virtually eliminates chemical exposure, tampering and manually diluting products

Applications

- Wall mounted four product chemical dispenser
- For filling bottles, buckets, or floor care machines
- For use in schools, office buildings, foodservice, hospitality, industrial, retail stores and health care facilities

J-Fill® QuattroSelect®

Dispensing System

Description of Features

QuattroSelect Dispensing System allows you to choose from four different products with the turn of a dial. Simply select the product you desire, choose one handed low flow bottle fill or point of use bucket activation and dispense ready-to-use solutions into spray bottles, buckets and automatic scrubbers. The lockable cabinet helps eliminate unwanted cartridge removal.

* Check local plumbing regulations for proper installation and back flow protection requirements

Technical data	J-Fill® QuattroSelect®
Unit Dimensions	24.25" x 18.5" x 7.5" (62 cm x 47 cm x 19 cm)
Weight	15 Ib. / 6.8 kg
Weight in Carton	19 Ib. / 8.6 kg
Carton Dimension	27" x 20.5" x 9.7" (68 cm x 52.1 cm x 24.13 cm)
Low Flow Rate	1.5 gpm (5.1 Lpm)
High Flow Rate	4.0 gpm (15.0 Lpm)
Water In-Let Hose	4' (1.22 m)
Remote Bucket Fill Hose	8' (2.44 m)
Drip Tray Drainage Hose	8' (2.44 m)
Operating Range Requirements - Concentrate	**J-Fill® QuattroSelect®**
Water Pressure	30–85 psi (170–580 KPA)
Water Flow	> 2.0 gpm
Water Temperature	40–120° F (5–48° C)

ASSE 1055-B backflow prevention requirements.

Product	Description	Product code
J-Fill® QuattroSelect®	Air Gap Dispenser / 1 Unit	D3764735
J-Fill® QuattroSelect®	Safe Gap Dispenser / 1 Unit	D3754220
J-Fill® QuattroSelect®	Safe Gap dispenser - Solid Door Unit / 1 Unit	D5913247

Safe handling

Please make sure your employees read and understand the product label and Safety Data Sheet before using this product. The label contains directions for use; and both the label and SDS contain hazard warnings, precautionary statements and first aid procedures. SDS are available online at www.diversey.com or by calling 888.352.2249. Improper use or dilution may result in damage to surfaces and may result in health and physical hazards that match those of the concentrate. Please refer to the Diversey HazMat Library, only available through Internet Explorer, http://naextranet.diversey.com/dot/, for up-to-date shipping information.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Dispenser, Disinfectant Wipes, Wall Mount

Manufacturer: Medline Industries Inc. ((847) 643-3318)

Vendor: Medline Industries Inc. ((847) 643-3318)

Model: MSC351128

Alt ID: DSP-DWP

Mfr #: MSC351128

Vendor #: MSC351128

Item ID:

Wall-mount disinfectant wipes dispenser wire bracket for 1.5 L wipes. White. List Price reflects per unit. 12 Each / Case.
**Dimensions provided by the Supplier. Contact the Supplier for more information.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	5.60 in (142 mm)	**Left:**	N/A
Depth:	8.60 in (218 mm)	**Right:**	N/A
Height:	5.50 in (140 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.3 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions provided by the Supplier. Contact the Supplier for more information.

Ships 12/case.
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Generated 04/07/2022

Documents/SDS

No SDS content is available for this product.

Wipes Canister Wall-Mount Brackets

Wall-Mount Wire Bracket for Wipes, Large for 1.5 L Canisters

- Securely mounts to wall
- Designed for easy installation
- These wire brackets conveniently hold Micro-Kill and Micro-Kill+ canisters

Report Incorrect Product Informatic

No disinfectant, cleaning, or sanitizing product should be administered into the human body (through injection, ingestion, etc.) under any circumstances. All products should only be used as intended and consistent with the product labeling.

Packaging	**12 Each / Case**
Manufacturer	**Medline**
Manufacturer #	**MSC351128**

SKU **MSC351128**

Specifications

COLOR	White
DISPENSER TYPE	Micro-kill+/epi-clenz+ Holder
HANDS FREE	No
HOLDING QTY	1
LABELS INCLUDED	No
LATEX FREE	Yes
LOCKING	No
MATERIAL	Wire
MOUNT TYPE	Wall-mount
PRODUCT FUNCTION	Holds Wipes Canisters
PRODUCT TYPE	Wall-mount Bracket - Canisters
SIZE IN INCHES	5.5 "
UNSPSC	47131702
UNIT COMPATIBILITY	Msc351231, Msc351230, MSC351231/MSC351230

Unit of Measure	Conversion	Net/Gross Weight (lbs)	Volume (cubic ft)	Shipping Dimensions (inch) L x W x H	GTIN
Each **(EA)**	1.0 Each	0.0 / 0.666	0.153	8.6 x 5.6 x 5.5	10080196290444
Case (CS)	**12.0 Each**	**0.0 / 9.25**	**1.17**	**18.504 x 5.906 x 18.504**	**40080196290445**
Carton **(CT)**	300.0 Each	0.0 / 0.0	0.0	0.0 x 0.0 x 0.0	30080196290448

HCPCS Information

HCPCS Code: NO CODE - PRODUCT DOES NOT MEET HCPCS SPECIFICATIONS

HCPCS Disclaimer: HCPCS codes and Home Health Consolidated Billing codes provided by Medline are intended as general guidelines only. Medline does not guarantee coverage or reimbursement of any products. You must address all coverage and reimbursement issues (including the correctness and accuracy of codes) with your individual payers. It is your responsibility to ensure the accuracy and appropriateness of each claim you submit, in accordance with all applicable payer requirements.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Emesis Bag, Wall Mount**
Manufacturer: Medline Industries Inc. ((847) 643-3318)
Vendor: Medline Industries Inc. ((847) 643-3318)
Model: NONEMBGDISP

Alt ID: DSP-EMS
Mfr #: NONEMBGDISP
Vendor #: NONEMBGDISP

Wall mounted dispensers for emesis bags. Dispenser holds folded containment bags and facilitates individual dispensing when needed. Holds up to 24 bags. Bags not included. List price reflects per unit. Ships 6/case.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	6.00 in (152 mm)	**Left:**	N/A
Depth:	6.00 in (152 mm)	**Right:**	N/A
Height:	6.50 in (165 mm)	**Front:**	N/A
Max Weight:	9 lbs (4.0 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Ships 6/case.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Medline Emesis Bags
Clean Sack Emesis Bag Dispenser, Blue

- Handy wall mounted design
- Can hold up to 24 bags
- Compatible with emesis bags NON80327, NON80328, NON80329, EMEBAG, and EMEBAGCL (bags not included)

Packaging	**6 Each / Case**	Report Incorrect Product Informatic
Manufacturer	**Medline**	
Manufacturer #	**NONEMBGDISP**	

SKU **NONEMBGDISP**

Documents/SDS

No SDS content is available for this product.

Specifications

COLOR	Clear
HEIGHT INCHES	6.5 "
LATEX FREE	Yes
LENGTH INCHES	6 "
MATERIAL	ABS
UNSPSC	42141603
UNIT COMPATIBILITY	Medline & Centurion Emesis Bag
WIDTH INCHES	6 "

Unit of Measure	Conversion	Net/Gross Weight (lbs)	Volume (cubic ft)	Shipping Dimensions (inch) L x W x H	GTIN
Each **(EA)**	1.0 Each	0.0 / 2.0	0.171	6.5 x 6.5 x 7.0	10888277410930
Case (CS)	**6.0 Each**	**0.0 / 8.9**	**1.334**	**20.25 x 13.8 x 8.25**	**20888277410937**

HCPCS Information

HCPCS Code: NO CODE - PRODUCT DOES NOT MEET HCPCS SPECIFICATIONS

HCPCS Disclaimer: HCPCS codes and Home Health Consolidated Billing codes provided by Medline are intended as general guidelines only. Medline does not guarantee coverage or reimbursement of any products. You must address all coverage and reimbursement issues (including the correctness and accuracy of codes) with your individual payers. It is your responsibility to ensure the accuracy and appropriateness of each claim you submit, in accordance with all applicable payer requirements.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Dispenser, Glove, Triple Box
Manufacturer: Omnimed, Inc ((866) 282-2006)
Vendor: Omnimed, Inc ((866) 282-2006)
Model: 305362 Clear PETG

Alt ID: DSP-GV3
Mfr #: 305362
Vendor #: 305362

Clear PETG glove box holder. Holds 3 glove boxes. Mounts horizontally or vertically. Recyclable.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	11.25 in (286 mm)	**Left:**	N/A
Depth:	3.75 in (95 mm)	**Right:**	N/A
Height:	15.50 in (394 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.5 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

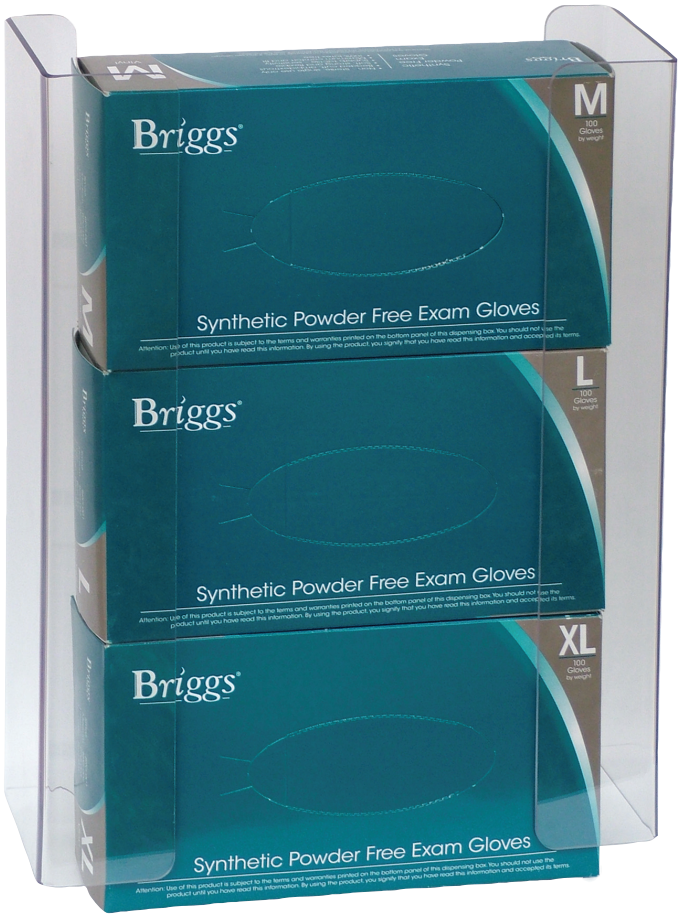
Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**31**	

Glove Box Holder

Improve business efficiency • Improve employee workplace safety • Improve patient care & management



Clear PETG Glove Box Holder - Triple - #305362

Omnimed plastic glove box holders are made of ECO friendly PETG plastic that is both durable and easy to clean. These holders will withstand years of use and still look new. They are ideal for use in medical, lab and food prep functions or any area where cross contamination up to three different glove sizes to meet staff needs. These holders are simple to load and can be mounted vertically or horizontally on a variety of surfaces. All glove boxes fit this model. This model includes a limited 1 year warranty.

- ECO friendly PETG plastic
- Easy to clean, load and mount
- Vertical or horizontal holder for three glove boxes
- measures 15 1/2"H by 11 1/4"W by 3 3/4"D
- Recyclable material
- 1 Year Warranty

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Hand Sanitizer, Wall Mount**

Manufacturer: GOJO Industries (800.321.9647)

Vendor: GOJO Industries (800.321.9647)

Model: Purell ES8 Touch-Free (7724-01)

Alt ID: DSP-HSZ

Mfr #: 7724-01

Vendor #: 7724-01

Wall-mounted hand sanitizer dispenser, White. Features: touch-free, 1200 mL in size, made of ABS plastic, coin cell battery integrated into the refill. Mounts to wall with included adhesive tape or hardware. ADA compliant.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	5.51 in (140 mm)	**Left:**	N/A
Depth:	3.88 in (99 mm)	**Right:**	N/A
Height:	9.06 in (230 mm)	**Front:**	N/A
Max Weight:	2 lbs (0.9 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Mounts to wall with included adhesive tape or hardware.

Install with at least 8" free space from bottom of dispenser to counter top.

ADA compliant if mounted according to requirements.

Powered via coin cell battery integrated into the refills.

Structural:

Electrical:

Plumbing:

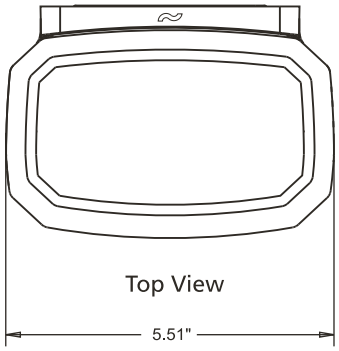
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	1	
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
ED/1st Flr	C019	Clean Supply	Project	Draft (New)	1	
ED/1st Flr	C041	EVS	Project	Draft (New)	1	
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	

ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1
ED/1st Flr	C329	Waiting Rm	Project	Draft (New)	1
ED/1st Flr	C466	Waiting Rm/Public	Project	Draft (New)	1
				Total:	**39**

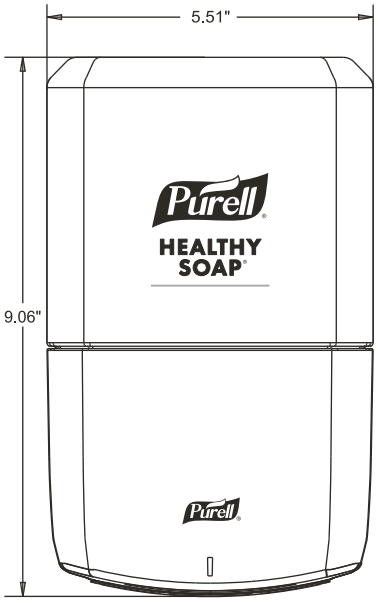
PURELL® ES8 TOUCH-FREE SOAP DISPENSER DIMENSIONS



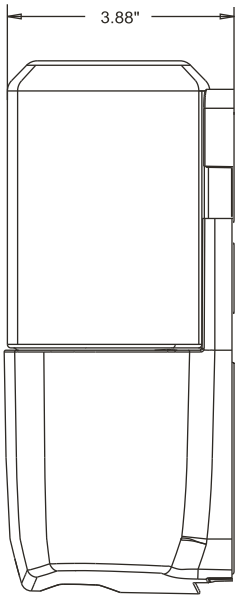
Top View

Use the dimensions provided to ensure adequate wall spacing and clearance for the unit.

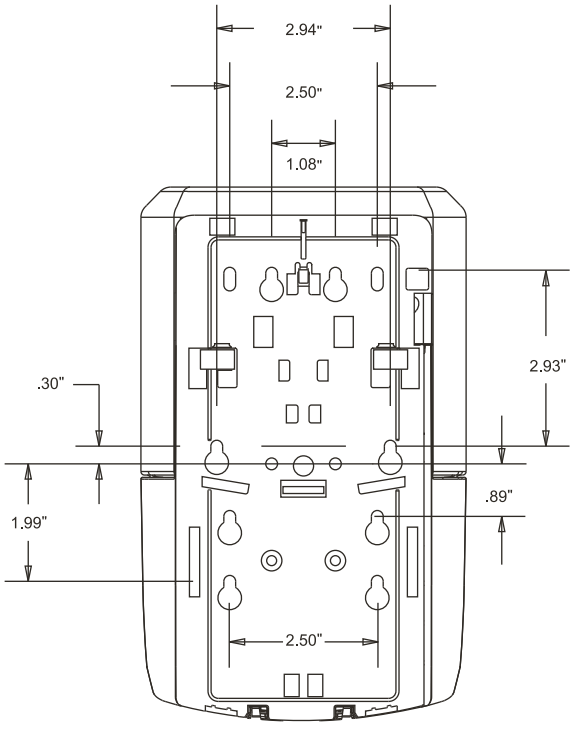
Refill sold separately.



Front View



Side View



Back View

GOJO Industries, Inc.
One GOJO Plaza, Suite 500
P.O. Box 991 • Akron, OH 44309-0991
Tel: 1-330-255-6000 • Toll-free: 1-800-321-9647
Fax: 1-800-FAX-GOJO

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Medication, Auxiliary**
Manufacturer: BD - Becton, Dickinson and Company (844-823-5433)
Vendor: BD - Becton, Dickinson and Company (844-823-5433)
Model: Pyxis MedStation 4000 (7-Drwr, 7 Cubie)

Alt ID: DSP-MAU
Mfr #: M4A7DRW7
Vendor #: M4A7DRW7

Auxiliary medication supply dispenser. 7 drawers, 7 Cubie/Mini drawers.
**Customizable per site, actual list price will vary depending on final configuration.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Medical	**Green:** No

Physical Requirements

Width:	23.00 in (584 mm)	**Left:**	N/A
Depth:	27.00 in (686 mm)	**Right:**	N/A
Height:	47.00 in (1194 mm)	**Front:**	N/A
Max Weight:	133 lbs (60.3 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	0	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	Yes	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Final weight of unit varies per drawer configuration.

Per Manufacturer, requires seismic anchoring kit 122596-01.

Requires power and data connection to Medstation Main console (adds 21 BTU).
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

Pyxis MedStation 4000 auxiliary cabinets

Seven-drawer cabinet

Pyxis MedStation 4000 system-seven-drawer auxiliary cabinets are fabricated from 18-guage sheet metal. Each cabinet structure consists of a top panel, bottom panel, right panel, left panel, and middle shelf. A removable, locking rear panel covers the back of the cabinet. Each seven-drawer auxiliary cabinet includes a plastic top cover that fastens to the cabinet structural top panel.

All seven-drawer auxiliary cabinets have two drawer slide brackets for each cabinet drawer position. A drawer release lever at the rear of each bracket allows removal of an entire drawer from the front of the cabinet. The cabinet locking rear panel must be removed to access these release levers.

Each Pyxis MedStation 4000 system seven-drawer auxiliary cabinet includes casters that allow the cabinet to be easily moved and levelers for leveling the cabinet on an uneven floor. For Pyxis MedStation 4000 system seven-drawer auxiliary cabinet specifications, see *Seven-drawer auxiliary cabinet* on page *10*.

Double-column eight-door and single-column four-door cabinets

Pyxis MedStation 4000 system four- and eight-door tower auxiliary cabinets are fabricated primarily from 18-guage sheet metal. The cabinets have four or eight doors respectively that are fabricated primarily from latex-free, clear Lexan.

Cabinet door latches are unlocked by way of the Pyxis MedStation 4000 system application. Adjacent pairs of doors at the top and bottom halves of the cabinets can be coupled together, with each set of coupled doors functioning as one Pyxis MedStation 4000 system device. Each door secures a cabinet storage shelf area with configurable wire shelves. A manual door latch release is located under a locking top grill at the top front of each cabinet.

The top of each cabinet houses an AC power panel with a cabinet light switch. The interior of each cabinet is illuminated by a fluorescent bulb that provides light through diffusing panels inside the cabinet. The light is accessible through a center back panel on each cabinet.

Each of these auxiliary cabinets includes casters which allow the cabinet to be moved and levelers for leveling the cabinet on an uneven floor. Lower the casters to keep the cabinet from moving.

For Pyxis MedStation 4000 system eight- and four-door auxiliary cabinet specifications, see *Double-column, single-column, and half-height tower auxiliary cabinets* on page *11*.

Half-height tower cabinet

Each Pyxis MedStation 4000 system half-height tower auxiliary cabinet is fabricated primarily from 18-guage sheet metal. Each cabinet has two doors fabricated primarily from latex-free, clear Lexan.

The door latches are unlocked by using the Pyxis MedStation 4000 system application. The doors secure cabinet storage shelf areas with configurable wire shelves. A manual door latch release is located under a locking grill at the top left side of the cabinet.

Each of these auxiliary cabinets includes casters which allow the cabinet to be moved and levelers for leveling the cabinet on an uneven floor. Lower the casters to keep the cabinet from moving.

For Pyxis MedStation 4000 system half-height tower cabinet specifications, see *Double-column, single-column, and half-height tower auxiliary cabinets* on page *11*.

Pyxis MedStation 4000 system auxiliary cabinet specifications

Seven-drawer auxiliary cabinet

The following table provides specifications for Pyxis MedStation 4000 system seven-drawer auxiliary cabinets.

Graphic	Equipment	Imperial dimensions	Metric dimensions	BTUs	Steady power (Watts)	Peak power (Watts)
	Seven-drawer	27" (L) 23" (W) 47" (H)	68.6 cm (L) 58.4 cm (W) 119.4 cm (H)	N/A	N/A	N/A

Additional cabinet components

The following table provides information about additional Pyxis MedStation 4000 system cabinet components.

Graphic	Equipment	Description
	Locking rear panel • Main cabinet, six-drawer • Main cabinet, two-drawer • Auxiliary cabinet, seven-drawer	Secures access to drawer manual release levers.
	Locking top grill • Auxiliary cabinet, double-column, eight-door • Auxiliary cabinet, single-column, four-door	Secures access to door manual release lever.
	Locking top grill • Auxiliary cabinet, half-height tower	Secures access to door manual release lever.
	Casters and levelers • Main cabinet, six-drawer • Auxiliary cabinet, seven-drawer	Casters—make cabinet mobile. Levelers—adjust to level cabinet.
	Casters and levelers • Auxiliary cabinet, double-column, eight-door • Auxiliary cabinet, single-column, four-door • Auxiliary cabinet, half-height tower	Casters—make cabinet mobile. Levelers—adjust to level cabinet.
	Levelers • Main cabinet, two-drawer • Main cabinet, zero-drawer	Adjust to level main unit.

Weight specifications

The following table provides weight specifications for Pyxis MedStation 4000 system components.

Equipment	Imperial weight	Metric weight
Drawer main cabinet (without drawers, unless specified)		
Six-drawer	165.5 lb	75.1 kg
Four-drawer +bin	165.5 lb	75.1 kg
Two-drawer	100.7 lb	45.7 kg
Zero-drawer	48.0 lb	21.8 kg
Integrated main cabinet		
Single column	350 lb	159.1 kg
Double column	750 lb	340.9 kg
Auxiliary (without drawers, unless specified)		
Seven-drawer	133 lb	60.3 kg
Two-drawer	100.7 lb	45.7 kg
Double-column eight-door	470.5 lb	213.4 kg
Single-column four-door	314 lb	142.4 kg
Half-height tower auxiliary	260 lb	118.0kg
Pyxis MedStation 4000 system consoles		
Pyxis MedStation 4000 system console (including consoel rack and workstation)	154.4 lb	70 kg
Pyxis MedStation 4000 system workstation (including Dell OptiPlex tower, monitor, keyboard, and mouse)	26.4 lb	12 kg
Pyxis MedStation 4000 system console rack	128 lb	58.1 kg
Drawers/pockets		
Matrix drawer	26 lb	11.6 kg
Matrix drawer (return bin)	30 lb	13.6 kg
Half-Height CUBIE drawer set (no pockets)	52.2 lb	23.7 kg
Half-Height CUBIE drawer set (with pockets)	63 lb	28.6 kg
Half-Height CUBIE Pocket 1x 1	0.2 oz	0.1 kg
Half-Height CUBIE Pocket 1x 2	0.3 oz	0.1 kg
Half-Height CUBIE Pocket 1x 3	0.5 oz	0.2 kg
Full-Height CUBIE drawer (no pockets)	38.6 lb	17.5 kg
Full-Height CUBIE pocket 1X	5.4 oz	.15 kg

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Medication, Host (Main)**
Manufacturer: BD - Becton, Dickinson and Company (844-823-5433)
Vendor: BD - Becton, Dickinson and Company (844-823-5433)
Model: MedStation 4000 (6-Drwr, 3 Cubie)

Alt ID: DSP-MDM
Mfr #: M4MB6DR7W3
Vendor #: M4MB6DR7W3
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Medical	**Green:** No

Physical Requirements

Width:	23.00 in (584 mm)	**Left:**	N/A
Depth:	27.00 in (686 mm)	**Right:**	N/A
Height:	55.00 in (1397 mm)	**Front:**	N/A
Max Weight:	166 lbs (75.3 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	120
Hz:	60	**Amps:**	1
Phase:	Single	**BTU/hr:**	409
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	Yes	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Final weight of unit varies based on drawer configuration and addition of supplies.
Electrical requirements are for main only. Each component requires independent outlet, see cutsheet for details.
Dedicated circuit breaker recommended for all equipment.
Per Manufacturer, requires seismic anchoring kit 122596-01.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

Pyxis MedStation 4000 main cabinets

There are two types of system main cabinets:

- Pyxis MedStation 4000 system drawer main cabinet—see *Pyxis MedStation 4000 system drawer main cabinet* below.
- Pyxis MedStation 4000 Integrated Main cabinet—see *Pyxis MedStation 4000 Integrated Main cabinet specifications* on page *7*.

Pyxis MedStation 4000 system drawer main cabinet

Each Pyxis MedStation 4000 drawer main cabinet (shown here) includes an electronics drawer (E-drawer) assembly that fastens to the cabinet structural top panel, and a top cover assembly that is hinged to the rear of the E-drawer. The top cover assembly locks to the E-drawer in the closed position and is supported by two struts in the open position.

The E-drawer assembly includes the following main components:

- Computer motherboard
- Peripheral circuit boards
- Hard drive
- DC power supply
- Backup battery

The top cover assembly includes the following main components:

- Monitor/touchscreen assembly
- Keyboard
- Thermal printer
- BioID fingerprint identification system
- 2D barcode scanner with hands-free mounting bracket

Pyxis MedStation 4000 drawer main cabinets are fabricated from 18-guage sheet metal. Each cabinet structure consists of a top panel, bottom panel, right panel, left panel, and middle shelf. A removable, locking rear panel covers the back of the cabinet.

Each Pyxis MedStation 4000 drawer main cabinet and seven-drawer auxiliary cabinet includes casters that allow the cabinet to be easily moved and levelers for leveling the cabinet on an uneven floor.

All cabinets (with the exception of the zero-drawer main cabinet) have two drawer slide brackets for each cabinet drawer position. A drawer release lever at the rear of each bracket allows removal of an entire

Pyxis MedStation 4000 system drawer main cabinet specifications

The following table provides specifications for Pyxis MedStation 4000 main cabinets.

Graphic	Equipment	Imperial dimensions	Metric dimensions	BTUs	Steady power (Watts)	Peak power (Watts)
	Six-drawer, Four-drawer	27" (L) 23" (W) 55" (H)	68.6 cm (L) 58.4 cm (W) 139.7 cm (H)	409	80	120
	Two-drawer	27" (L) 23" (W) 28" (H)	68.6 cm (L) 58.4 cm (W) 71.1cm (H)	409	80	120
	Zero-drawer (connected to auxiliary cabinets)	27" (L) 23" (W) 16" (H)	68.6 cm (L) 58.4 cm (W) 40.6 cm (H)	273	65	80

Weight specifications

The following table provides weight specifications for Pyxis MedStation 4000 system components.

Equipment	Imperial weight	Metric weight
Drawer main cabinet (without drawers, unless specified)		
Six-drawer	165.5 lb	75.1 kg
Four-drawer +bin	165.5 lb	75.1 kg
Two-drawer	100.7 lb	45.7 kg
Zero-drawer	48.0 lb	21.8 kg
Integrated main cabinet		
Single column	350 lb	159.1 kg
Double column	750 lb	340.9 kg
Auxiliary (without drawers, unless specified)		
Seven-drawer	133 lb	60.3 kg
Two-drawer	100.7 lb	45.7 kg
Double-column eight-door	470.5 lb	213.4 kg
Single-column four-door	314 lb	142.4 kg
Half-height tower auxiliary	260 lb	118.0kg
Pyxis MedStation 4000 system consoles		
Pyxis MedStation 4000 system console (including consoel rack and workstation)	154.4 lb	70 kg
Pyxis MedStation 4000 system workstation (including Dell OptiPlex tower, monitor, keyboard, and mouse)	26.4 lb	12 kg
Pyxis MedStation 4000 system console rack	128 lb	58.1 kg
Drawers/pockets		
Matrix drawer	26 lb	11.6 kg
Matrix drawer (return bin)	30 lb	13.6 kg
Half-Height CUBIE drawer set (no pockets)	52.2 lb	23.7 kg
Half-Height CUBIE drawer set (with pockets)	63 lb	28.6 kg
Half-Height CUBIE Pocket 1x 1	0.2 oz	0.1 kg
Half-Height CUBIE Pocket 1x 2	0.3 oz	0.1 kg
Half-Height CUBIE Pocket 1x 3	0.5 oz	0.2 kg
Full-Height CUBIE drawer (no pockets)	38.6 lb	17.5 kg
Full-Height CUBIE pocket 1X	5.4 oz	.15 kg

CPU and power specifications

The following table provides CPU and power specifications for Pyxis MedStation 4000 system components.

Description	Equipment	Specification
AC power (line Voltage)	Main (6, 4, 2, 0)	100-240V, 50–60 Hz
	Column	100-240V, 50–60 Hz
Load current (Amps)	Main (6, 4, 2, 0)	1 Amp NOM, 3 Amp MAX
	Column	1 Amp NOM, 3 Amp MAX
Circuit breakers	All	One for the system
Heat evolved	Main	2-, 4- and 6-drawer Main approx. 409 BTU/hr.
	Aux	Add 21 BTU for each auxiliary.
	Column	Add 21 BTU for each auxiliary.
Battery	Main	Five-year life span
Console server	AC Input	100-240V, 50–60 Hz
	Power Supply	Second power supply for redundancy
	Output Power	600 Watts MAX
Console server	Power Management	ACPI 1.0, APM 1.2 Compliant
	AC Input	100-240V, 50–60 Hz
	Output Power	250 Watts MAX

Lock loop systems

In addition to the cabinet keyed locks, lock loop systems provide an additional level of cabinet security by allowing customers to install their own padlocks on cabinets.

The lock loops on newer cabinets include rear panel lock hasps, to which the customer can install padlocks. Lock loop kits are orderable for installing lock hasps on older cabinets.

Recommended lock loop system procedures

CareFusion recommends the following security procedures for lock loop systems installed on Pyxis MedStation 4000 system equipment:

1. Install two padlocks per Pyxis MedStation 4000 system cabinet, if double-lock-and-key requirements exist.
2. Ensure that each padlock is keyed differently and labeled as "Lock A" and "Lock B."
3. Ensure that all "A" and "B" type padlocks, respectively, are keyed the same throughout the customer site.
4. Develop a secure key control system for both standard Pyxis keys and hospital-owned padlock keys.
5. Restrict access to Pyxis keys and padlock keys to hospital employees only.

Seismic anchoring

In California, certain equipment cabinets must be seismically anchored according to California Building Code Section 1632A. Installation of these anchoring devices is the responsibility of the customer and requires the use of power tools and the careful positioning of heavy objects. It is recommended that these installations be accomplished by a licensed contractor or other hospital-approved, qualified individuals. CareFusion Corporation shall not be liable for damage to equipment or personnel during the installation of these devices. For more information, including seismic anchor kit part numbers, see the *CareFusion Seismic Anchor Kits Install Guide*.

The following Pyxis MedStation 4000 system cabinets require seismic anchoring:

- Pyxis MedStation 4000 system six-drawer main cabinet
- Pyxis MedStation 4000 Integrated Main three and seven door cabinets
- Seven-drawer auxiliary cabinet
- Double-column 8-door auxiliary cabinet
- Single-column 4-door auxiliary cabinet
- Console rack

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Medication, Lock Module**

Manufacturer: BD - Becton, Dickinson and Company (844-823-5433)

Vendor: BD - Becton, Dickinson and Company (844-823-5433)

Model: SMART Remote Manager

Alt ID: DSP-MLK

Mfr #: MSRM

Vendor #: MSRM

Lock/monitor module for refrigerated medication dispensing. Includes a software module, electronic locking latch and temperature sensor with display. Integrates with Pyxis MedStation to provide controlled point-of-use access and monitor internal temperatures of storage devices. Electronically archives transaction and temperature data and generates reports necessary for regulatory compliance, inventory management and billing. Refrigerator not included.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Medical	**Green:** No

Physical Requirements

Width:	2.50 in (64 mm)	**Left:**	4.00 in (102 mm)
Depth:	4.75 in (121 mm)	**Right:**	N/A
Height:	7.00 in (178 mm)	**Front:**	N/A
Max Weight:	4 lbs (1.8 kg)	**Back:**	N/A
Mounting:	Special	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Mounts on refrigerator door (refrigerator not included).
Ensure that overall width required includes space for unit to attach to the refrigerator.

Connects to Pyxis Main dispenser for power.

If undercounter refrigerator located in casework, provide grommet. Or, electrical can be installed in wall at each location and remote manager and medication dispenser can be tied together.

Requires 4" clearance on non-hinge side of refrigerator.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

Pyxis MedStation 4000 auxiliaries

Pyxis MedStation 4000
7-drawer auxiliary

22.8″ W x 27″ D x 47″ H

Pyxis MedStation 4000
half-height column auxiliary
(2 doors)

31″ W x 28″ D x 43″ H

Pyxis MedStation 4000
single column auxiliary
(4 doors)

31″ W x 28″ D x 79.5″ H

Pyxis MedStation 4000
double column auxiliary
(8 doors)

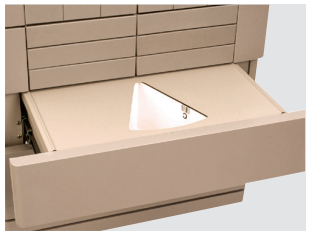
52″ W x 28″ D x 79.5″ H

Related products

Pyxis SMART Remote Manager
Pyxis Remote Manager
(refrigerator not included)

Pyxis MedStation 4000 drawers

CUBIE® pockets



Carousel drawer

Matrix drawer with optional
return bin

MiniDrawer *(I-6)*

MiniDrawer *(I-18)*

2D barcode scanner included

Pyxis MedStation 4000 consoles

Pyxis MedStation 4000
console and cabinet

30″ W x 24″ D x 49″ H

Pyxis MedStation 4000
workstation

16.25″ W x 8.25″ D x 17.5″ H

Pyxis Remote Manager and Pyxis SMART Remote Manager

For Pyxis Remote Manager and Pyxis SMART Remoted Manager specifications, see *Pyxis Remote Manager and Pyxis SMART Remote Manager specifications* on page *27*.

Pyxis Remote Manager

Pyxis Remote Manager is an automated medication management system for temperature-sensitive medication. It provides controlled point-of-use access, electronically tracks and records transaction data, and generates reports necessary for inventory management, billing, and regulatory compliance. Pyxis Remote Manager includes an electronic locking latch that can be installed on many commercially available refrigerators or warmers.

Pyxis SMART Remote Manager

The Pyxis Secure Monitor Alarm Record Temperature (SMART) Remote Manager is an automated medication management system for temperature-sensitive medication dispensing and for storage device temperature management. Pyxis SMART Remote Manager provides controlled access, monitors internal storage temperatures of refrigerators or warming devices, provides a warning when temperatures fall outside of user-defined limits, electronically archives transaction and temperature data, and generates reports necessary for regulatory compliance, inventory management, and billing. Like Pyxis Remote Manager, Pyxis SMART Remote Manager includes an electronic locking latch that can be installed on many commercially available refrigerators or warmers. Pyxis SMART Remote Manager also includes a digital temperature readout on top of the unit.

Pyxis SMART Remote Manager units are available for refrigerator doors that open from either the left or from the right.

Pyxis Remote Manager and Pyxis SMART Remote Manager specifications

The following table provides specifications for Pyxis Remote Manager and Pyxis SMART Remote Manager units.

CAUTION

Do not position a Pyxis Remote Manager or Pyxis SMART Remote Manager refrigerator on top of a Pyxis MedStation 4000 system auxiliary cabinet. Doing so can exceed the load limit of the cabinet. For more information, see the *Pyxis MedStation® System Safety Manual*.

Graphic	Equipment	Imperial dimensions (excluding door latch plate)	Metric dimensions (excluding door latch plate)
	Pyxis Remote Manager	2.16" (W) 4.75" (L) 6.76" (H)	5.49 cm (W) 12.07 cm (L) 17.170 cm (H)
	Pyxis SMART Remote Manager	2.16" (W) 4.75" (L) 6.76" (H)	5.49 cm (W) 12.07 cm (L) 17.170 cm (H)

For more detailed information about refrigerators that can be used with Pyxis Remote Manager and Pyxis SMART Remote Manager, see the *CareFusion Guide to selecting compatible refrigerators, Pyxis® SMART Remote Manager and Pyxis® Remote Manager.*

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Medication, Auxiliary**
Manufacturer: BD - Becton, Dickinson and Company (844-823-5433)
Vendor: BD - Becton, Dickinson and Company (844-823-5433)
Model: Pyxis MedStation ES Single Column

Auxiliary medication supply dispenser. Single column/tower with 4 doors.

Alt ID: DSP-MTS
Mfr #:
Vendor #:
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Medical	**Green:** No

Physical Requirements

Width:	29.75 in (756 mm)	**Left:**	N/A
Depth:	27.50 in (699 mm)	**Right:**	N/A
Height:	79.00 in (2007 mm)	**Front:**	N/A
Max Weight:	314 lbs (142.4 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	65
Hz:	60	**Amps:**	<1
Phase:	Single	**BTU/hr:**	21
KVA:		**Ded. Circuit:**	No
Emer. Power:	Yes	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Requires data connection to MedStation Main.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

Pyxis MedStation ES system specifications

The introduction of the Pyxis MedStation system in 1989 revolutionized the way health care facilities manage their medication distribution process. Pyxis MedStation is the most widely used point-of-use automated medication dispensing system in the world today. The system brings value to a facility by supporting its efforts to reduce chances of medication errors, enhance quality of care, maintain compliance with regulatory and Joint Commission requirements, control costs, and increase revenue.

The Pyxis MedStation ES system is the newest generation of the Pyxis MedStation system product legacy. It builds upon our industry-leading technology and advances new medication safety, workflow, security, operational, and IT functionality.

The Pyxis MedStation ES system is a cabinet-based storage system used by hospitals and similar institutions to store and safeguard medications and floor stock items. Using a computer in the Pyxis MedStation ES system main cabinet, users can unlock and open drawers in the cabinets and access the contents of the medications stored in the cabinets.

A single configuration of Pyxis MedStation ES system cabinets is called a station. A station consists of a main cabinet, or a main cabinet and one or more auxiliary cabinets. A facility can have one Pyxis MedStation ES system or several Pyxis MedStation ES systems connected together in a network.

Using the Pyxis MedStation ES system, a pharmacy can store and track a range of medications and floor-stock items. Depending on your needs, the Pyxis MedStation ES system can manage:

- Narcotics
- Floor stock
- Pro re natas (PRNs) (profile mode recommended)
- First doses (profile mode recommended)
- Some IV solutions and sets
- Up to 95% of all medications (profile mode only)

The actual amount of medication storage depends on your station configurations and other factors. The Pyxis MedStation ES system is flexible and has many configuration options to accommodate customer needs and requirements.

Pyxis MedStation ES system auxiliary cabinets

Seven-drawer cabinet

Pyxis MedStation ES system-seven-drawer auxiliary cabinets are fabricated from 18-gauge sheet metal. Each cabinet structure consists of a top panel, bottom panel, right panel, left panel, and middle shelf. A removable, locking rear panel covers the back of the cabinet. Each seven-drawer auxiliary cabinet includes a plastic top cover that fastens to the cabinet structural top panel.

All seven-drawer auxiliary cabinets have two drawer slide brackets for each cabinet drawer position. A drawer release lever at the rear of each bracket allows removal of an entire drawer from the front of the cabinet. The cabinet locking rear panel must be removed to access these release levers.

Each Pyxis MedStation ES system seven-drawer auxiliary cabinet includes casters that allow the cabinet to be easily moved and levelers for leveling the cabinet on an uneven floor. For Pyxis MedStation ES system seven-drawer auxiliary cabinet specifications, see *Seven-drawer auxiliary cabinet* on page *12*.

Double-column eight-door and single-column four-door cabinets

Pyxis MedStation ES system eight-door and four-door tower auxiliary cabinets are fabricated primarily from 18-gauge sheet metal. The cabinets have four or eight doors respectively that are fabricated primarily from clear acrylic. Cabinets with solid, 16-gauge steel doors are also available.

Cabinet door latches are unlocked using the Pyxis MedStation ES system application. Adjacent pairs of doors at the top and bottom halves of the cabinets can be coupled together, with each set of coupled doors functioning as one Pyxis MedStation ES system device. Each door secures a cabinet storage shelf area with configurable wire shelves. A manual door latch release is located under a locking top grill at the top front of each cabinet.

The top of each cabinet houses an AC power panel with a cabinet light switch. The interior of each cabinet is illuminated by a fluorescent bulb that provides light through diffusing panels inside the cabinet. The light is accessible through a center back panel on each cabinet.

Each of these auxiliary cabinets includes casters, which allow the cabinet to be moved, and levelers for leveling the cabinet on an uneven floor. Lower the levelers to keep the cabinet from moving.

For Pyxis MedStation ES system eight-door and four-door auxiliary cabinet specifications, see *Double-column, single-column, and half-height tower auxiliary cabinets* on page *14*.

Double-column, single-column, and half-height tower auxiliary cabinets

The following table provides specifications for Pyxis MedStation ES system double-column, single-column, and half-height tower auxiliary cabinets.

Photo	Equipment	Imperial dimensions	Metric dimensions	BTUs	Steady power (Watts)	Peak power (Watts)
	Double-column, eight-door	27.5" (L) 51.8" (W) 78.9" (H)	69.9 cm (L) 131.6 cm (W) 200.4 cm (H)	222	65	65
	Single-column, four-door	27.5" (L) 29.7" (W) 78.9" (H)	69.9 cm (L) 75.4 cm (W) 200.4 cm (H)	222	65	65
	Half-height tower	27.5" (L) 29.7” (W) 42.6” (H)	69.9 cm (L) 75.4 cm (W) 108.2 cm (H)	N/A	N/A	N/A

Additional cabinet components

The following table provides information about additional Pyxis MedStation ES system cabinet components.

Photo	Equipment	Description
	Locking rear panel • Main cabinet, six-drawer • Main cabinet, two-drawer • Auxiliary cabinet, seven-drawer	Secures access to drawer manual release levers.
	Locking top grill • Auxiliary cabinet, double-column, eight-door • Auxiliary cabinet, single-column, four-door	Secures access to door manual release lever.
	Locking top grill • Auxiliary cabinet, half-height tower	Secures access to door manual release lever.
	Casters and levelers • Main cabinet, six-drawer • Auxiliary cabinet, seven-drawer	Casters—make cabinet mobile. Levelers—adjust to level cabinet.
	Casters and levelers • Auxiliary cabinet, double-column, eight-door • Auxiliary cabinet, single-column, four-door • Auxiliary cabinet, half-height tower	Casters—make cabinet mobile. Levelers—adjust to level cabinet.
	Levelers • Main cabinet, two-drawer • Main cabinet, zero-drawer	Adjust to level main unit.

Weight specifications

The following table provides approximate weight specifications for Pyxis MedStation ES system components.

Equipment	Imperial weight	Metric weight
Main cabinet (without drawers, unless specified)		
Six-drawer	165.5 lb	75.1 kg
Four-drawer bin	165.5 lb	75.1 kg
Two-drawer	100.7 lb	45.7 kg
Zero-drawer	48.0 lb	21.8 kg
Auxiliary (without drawers, unless specified)		
Seven-drawer	133 lb	60.3 kg
Two-drawer	100.7 lb	45.7 kg
Double-column eight-door	470.5 lb	213.4 kg
Single-column four-door	314 lb	142.4 kg
Half-height tower auxiliary	260 lb	118.0 kg
Pyxis MedStation ES system consoles		
Dell PowerEdge T310 tower server	51.8 lb	23.5 kg
Dell PowerEdge T410 tower server	62.6 lb	28.4 kg
Dell PowerEdge R310 rack server	35.0 lb	15.9 kg
Dell PowerEdge R410 rack server	35.0 lb	15.9 kg
Drawers/pockets		
Matrix drawer	26 lb	11.6 kg
Matrix drawer (return bin)	30 lb	13.6 kg
CUBIE drawer set (no pockets)	52.2 lb	23.7 kg
CUBIE drawer set (with pockets)	63 lb	28.6 kg
CUBIE Pocket 1x1	2.6 oz	0.07 kg
CUBIE Pocket 1x2	4.7 oz	0.13 kg
CUBIE Pocket 1x3	7.9 oz	0.22 kg
Full-height CUBIE drawer (no pockets)	38.6 lb	17.5 kg
Full-height CUBIE pocket 1X	5.4 oz	.15 kg
Full-height CUBIE pocket 2X	9.0 oz	.26 kg
Full-height CUBIE pocket 3X	12.2 oz	.35 kg
Full-height CUBIE pocket 5X	19.7 oz	.56 kg

Cabinet security features

Main cabinets, seven-drawer auxiliary cabinets

Keyed rear panel locks

The cabinet's removable rear panel is secured to the cabinet with two tubular keyed locks that are keyed differently. These locks are located on the top left and right sides of the rear panel. Customers retain control of the keys to these locks at all times, and CareFusion field personnel are prohibited from having these keys in their possession.

The bottom of the rear panel is retained with two sheet metal tabs that insert into holes in the bottom of the cabinet. If the locked rear panel is pried off of the cabinet, substantial visible structural damage will be evident.

Cabinet security anchor cable

A one-inch hole located at the bottom rear of each cabinet allows the attachment of a cabinet security anchor cable that prevents removal of the entire cabinet.

Additional security features

If the locked cabinet rear panel is removed and a drawer is removed by manually pivoting the drawer latch arm, a speaker in the Pyxis MedStation ES system E-drawer will sounds an alarm, and an illegal access message is logged in the system for the drawer. This message contains the drawer number, and the date and time of access.

If a Pyxis MedStation ES system main cabinet is unplugged from its wall power outlet, the station goes into backup power mode and continue running on the 12-Volt backup battery in the main cabinet E-drawer. A message is logged into the system indicating that power was lost at the station at the date and time of the incident. Any unsaved data is saved, and the station then shuts down.

Double-column eight-door and single-column four-door auxiliary cabinets

Each Pyxis MedStation ES system eight-door and four-door tower auxiliary cabinet includes a top grill with two tubular locks that are keyed differently. Customers retain control of the keys to these locks at all times, and CareFusion field personnel are prohibited from having these keys in their possession.

Unlocking and opening the cabinet top grill provides access to the cabinet manual door latch release.

CPU and power specifications

Description	Equipment	Specification
AC power (line voltage)	Main (6, 4, 2, 0)	100–240 V, 50–60 Hz
	Column	100–240 V, 50–60 Hz
Load current (amps)	Main (6, 4, 2, 0)	1 amp NOM, 3 amp MAX
	Column	1 amp NOM, 3 amp MAX
Circuit breakers	All	One for the system
Heat evolved	Main	2-, 4- and 6-drawer main approx. 409 BTU/hr.
	Aux	Add 21 BTU for each auxiliary.
	Column	Add 21 BTU for each auxiliary.
Battery	Main	Five-year life span
Console server	Dell PowerEdge T310 tower server	Power supply: Single cabled power supply (375 W) / optional redundant power supply (400 W) UPS (uninterruptible power supply): 500 W–2700 W Extended Battery Module (EBM) Network Management Card
	Dell PowerEdge T410 tower server	Power supply: Non redundant, 525 W (80+) Optional redundant, 580 W (80+ GOLD—80 PLUS energy efficiency rating) Auto ranging (100 V~240 V) UPS: 500 W–2700 W EBM Network Management Card
	Dell PowerEdge R310 rack server	Power supply: One non redundant 350 W power supply Two hot-pluggable redundant 400 W hot-plug power supplies UPS: 1000 W–5600 W 2700 W–5600 W High Efficiency Online EBM Network Management Card
	Dell PowerEdge R410 rack server	Power supply: Non redundant, 480 W (80+ BRONZE) Optional redundant, 500 W (80+ SILVER) Auto ranging (100 V~240 V) UPS: 1000 W-5600 W 2700 W-5600 W High Efficiency Online EBM Network Management Card

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Personal Protection, Wall Mount, Recessed**
Manufacturer: Bowman Dispensers ((360) 435-5005)
Vendor: Bowman Dispensers ((360) 435-5005)
Model: RE101-0012 Semi-Recessed

Alt ID: DSP-PPE
Mfr #: RE101-0012
Vendor #: RE101-0012

Semi-recessed, wall mount personal protection dispensing system. Holds a variety of gowns, three boxes of gloves, one box of earloop masks, one box of shield masks, and built-in storage area (for a variety of medical supplies, fourth box of gloves, or N-95 masks). Features keyless locking mechanism, quartz beige powder coated steel construction, low profile design, and screw holes in sides to mount to stud framing in wall.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	24.36 in (619 mm)	**Left:**	N/A
Depth:	4.77 in (121 mm)	**Right:**	N/A
Height:	27.65 in (702 mm)	**Front:**	N/A
Max Weight:	22 lbs (10.2 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Installation should be performed only by a licensed contractor.

Screw holes in sides to mount to stud framing in wall.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

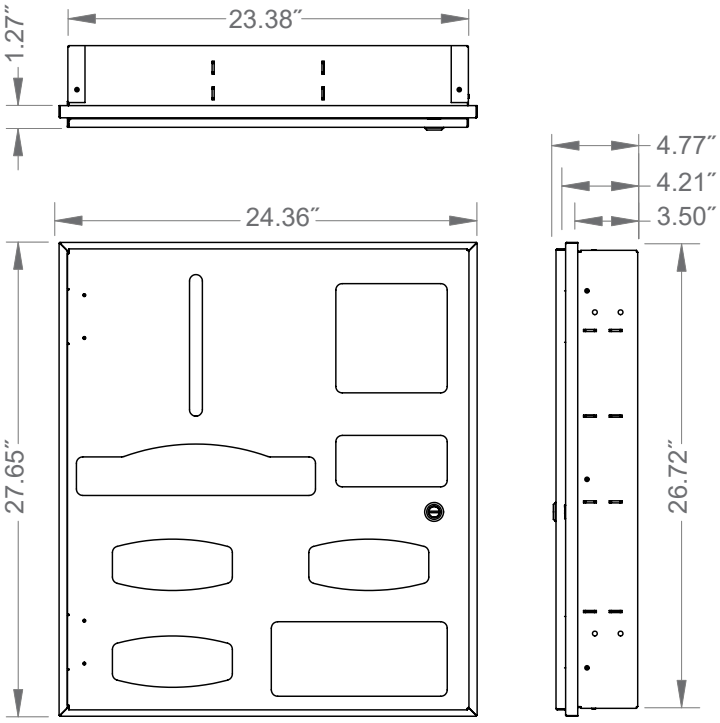
Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C026A; C043A	Alcove/PPE	Project	Draft (New)	2	
				Total:	**2**	

BOWMAN®
Dispensers
Organize • Contain • Comply

RE101-0012
Semi-Recessed PPE Dispensing System

Mounting Specifications:

- Installation should be performed only by a licensed contractor.



Product Description:

- Semi-Recessed PPE Dispensing System
- Holds a variety of gowns, three boxes of gloves, one box of earloop-style face masks, one box of shield-style face masks, and built-in storage area (for a variety of medical supplies, fourth box of gloves, or one box of N-95 face masks)
- Low profile
- Slotted keyless cam lock (one key included, extras sold separately)
- Screw holes in sides to mount to stud framing in wall
- Made of Quartz Beige Powder-Coated Steel

Primary Area for Product Usage:

- All patient care areas requiring personal protective equipment and isolation supplies

Dispenses:

- Top left section: Gowns (up to 15 flat pack, 15 launderable, or 2 blue boxes) folded up to 14.94″W x 14.50″H x 4.06″D (37.8 cm x 36.8 cm x 10.9 cm)
- Top right section: One box shield-style face masks up to 8.38″W x 9.50″H x 4.06″D (21.1 cm x 23.9 cm x 10.4 cm)
- Middle right section: One box earloop-style face masks up to 8.38″W x 4.75″H x 4.06″D (20.6 cm x 12.2 cm x 10.4 cm)
- Two top glove sections: Two boxes of gloves up to 11.63″W x 6.25″H x 4.06″D (29.5 cm x 15.9 cm x 10.4 cm)
- Two bottom sections: Two boxes of gloves up to 11.63″W x 5.50″H x 4.06″D (29.5 cm x 14.0 cm x 10.4 cm), or one box of gloves and miscellaneous medical supplies in bottom right

Package Specifications:

- Package Quantity: 1 per case
- 27″L x 8″W x 32″H (68.6 cm x 20.3 cm x 81.3 cm)
- 26.0 lbs (11.8 kg) - approximated

Product Specifications (overall external dimensions):

- 24.36″W x 27.65″H x 4.77″D (61.9 cm x 70.2 cm x 12.1 cm)
- 22.4 lbs (10.1 kg) - approximated

Accessories (each sold separately):

- MP-047: Clip-On Sign Holder (shown attached below)
- REK01-0320: Recessed Key

Product Videos:
BowmanDispensers.com/Product-Videos

BOWMAN Dispensers
20325 71st Ave NE, Suite D, Arlington, WA 98223
800.962.4660 • www.BowmanDispensers.com

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Dispensers

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RE101-0012

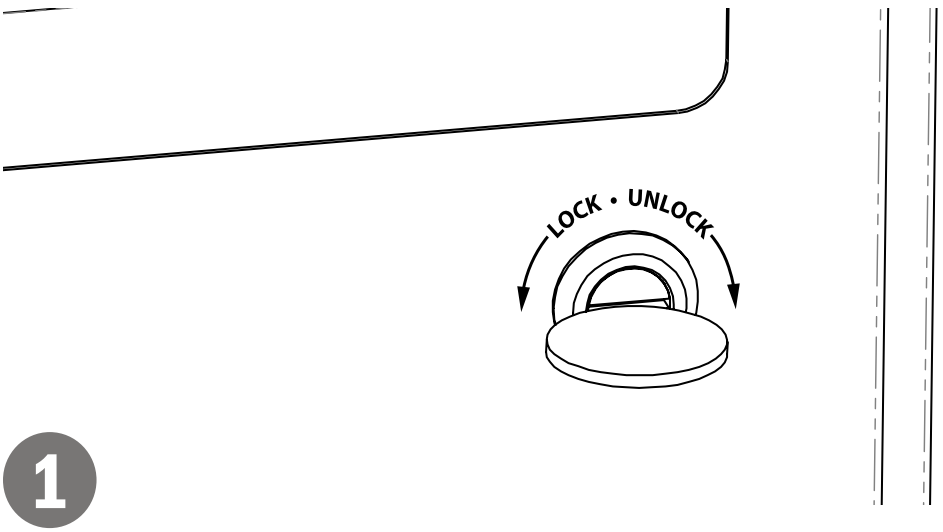
Semi-Recessed PPE Dispensing System

Installation Instructions/Characteristics & Care

Installation

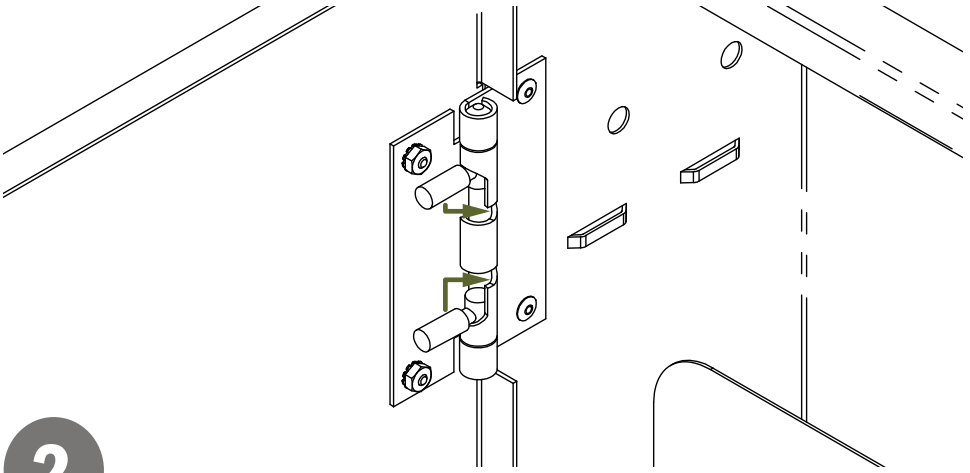
Always mount dispensers securely *prior* to loading with product.

- Door can be locked or unlocked using a small flat object, such as a coin, or similar rounded edge.



1

- Door can be removed by squeezing and turning posts on hinges as shown.



2

Parts included:

- Dispenser

Tools Required:

- No tools required to assemble dispenser

Characteristics & Care

Powder-Coated Steel

Material Characteristics

Designed for Long-Term Use

Our steel dispensers and stands are coated with polyester powders which makes them highly resistant to corrosion.

Powder-coated steel is ideal for dispensers used in a healthcare or an industrial setting because it is impact resistant and is not effected by extremes in temperature.

Dispensers and stands made of powder-coated steel are both attractive and functional, providing years of service.

Care and Cleaning

For best results, clean by washing the surface with a diluted solution of a mild, non-abrasive detergent in cold or warm water and a non-abrasive cloth. Standard hospital cleaning supplies can be used.

Dry with a soft cloth. Do not use any solvent-based materials, abrasives (e.g. Scotch-brite, steel wool), or apply excessive force during cleaning.

BOWMAN Dispensers
20325 71st Ave NE, Suite D, Arlington, WA 98223
800.962.4660 • www.BowmanDispensers.com

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Paper Towel, Surface Mount, Stainless Steel** **Alt ID:** DSP-PSS

Manufacturer: Kimberly-Clark Professional (888-346-4652) **Mfr #:** 09216

Vendor: Kimberly-Clark Professional (888-346-4652) **Vendor #:** 09216

Model: SCOTTFOLD Compact [09216]

Surface mount paper towel dispenser. Stainless steel. View windows, key-activated spring lock or push button, hinged front cover. When installed properly, this dispenser meets the ADA Standards for Accessible Design. **Item ID:** TA-09

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	10.75 in (273 mm)	**Left:**	N/A
Depth:	4.75 in (121 mm)	**Right:**	N/A
Height:	9.00 in (229 mm)	**Front:**	N/A
Max Weight:	3 lbs (1.4 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Suggested mounting height = 44 inches.

When installed properly, this dispenser meets the ADA Standards for Accessible Design.

Structural:

Electrical:

Plumbing:

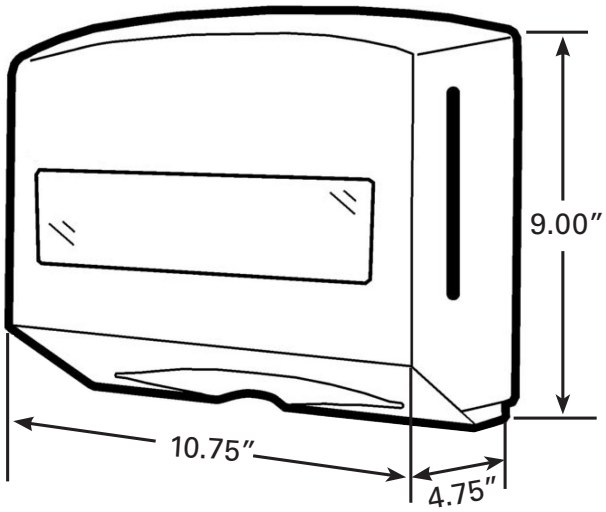
Mechanical:

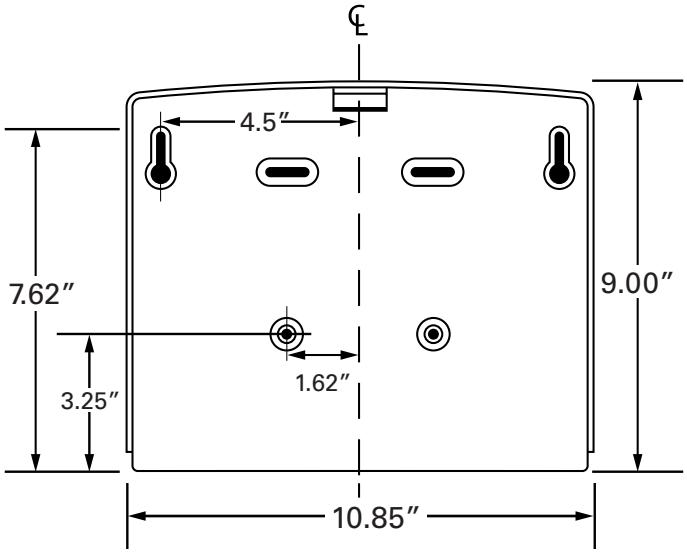
Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	1	
ED/1st Flr	C049A; C049B	Alcove/Sink-Handwash	Project	Draft (New)	2	
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	

ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1
				Total:	**44**

Scott® and Universal Folded Towel Dispenser





- Choice of ABS plastic or Stainless Steel with view windows located on both sides to allow for easy checking of towel level
- Accommodates multiple clips of towels to help reduce maintenance
- Features include compact size to fit in tight spaces, key-activated spring lock or push-button operation and a hinged front cover
- Overfill mechanism to minimize tears and tabs from dispenser being overfilled
- Hardware included for mounting
- One per case

Product Codes:

09214	**09215**	**09216**	**09217**
White Fits 7.8″ or 8.0″ width towel	Black Fits 7.8″ or 8.0″ width towel	Stainless Steel, Fits 7.8″ or 8.0″ width towel	Universal, White, Fits 7.8″-9.4″ width towel

Suggested mounting height is 48″ from the floor or 12″ above a counter to the bottom of the dispenser.

When installed properly and used with the corresponding product, this dispenser meets ADA Standard 28 CFR Part 36, local rules may vary.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Dispenser, Soap, Wall Mount

Manufacturer: GOJO Industries (800.321.9647)

Vendor: GOJO Industries (800.321.9647)

Model: PURELL CS4 Soap Dispenser Push-Style (Graphite)

1250 mL wall mounted soap dispenser. Push style with large sight window to check refill level. Collapsible, SANITARY SEALED™ PET refill bottle with removable collar for easy recycling. LOCK OR NOT technology - can convert to a locking system. Fully ADA compliant. Uses PURELL CS4 1250 mL HEALTHY SOAP refills.

Alt ID: DSP-SPG

Mfr #: 5134-01

Vendor #: 5134-01

Item ID: TA-10

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	5.81 in (148 mm)	**Left:**	N/A
Depth:	4.48 in (114 mm)	**Right:**	N/A
Height:	10.56 in (268 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.6 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	8.00 in (203 mm)

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Mounts to wall with adhesive tape (included) or optional mounting screws (not included). Multiple hole pattern allows use of existing wall holes.

Requires 8" (20.32 cm) clearance from bottom of dispenser to surface.

Structural:

Electrical:

Plumbing:

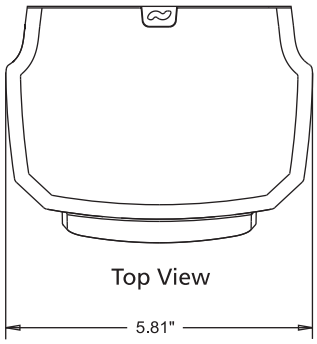
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	1	
ED/1st Flr	C049A; C049B	Alcove/Sink-Handwash	Project	Draft (New)	2	
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	

ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1
				Total:	**44**

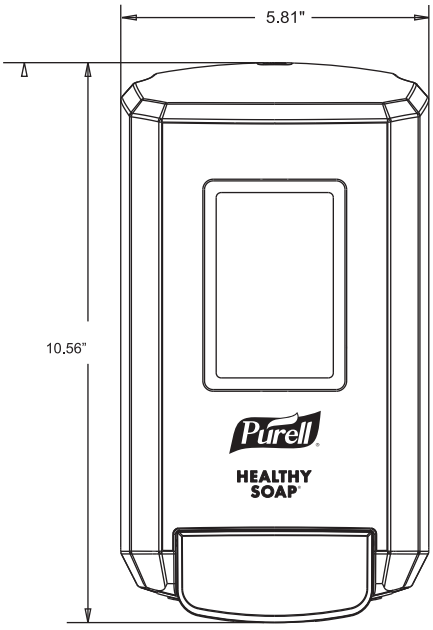
PURELL® CS4 PUSH-STYLE HAND SOAP DISPENSER DIMENSIONS



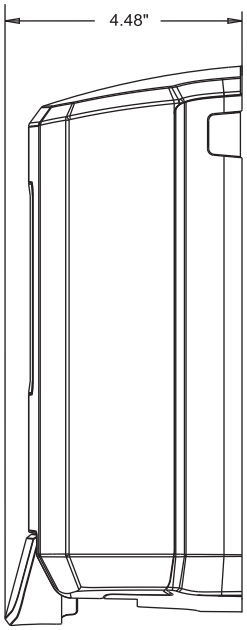
Top View

Use the dimensions provided to ensure adequate wall spacing and clearance for the unit.

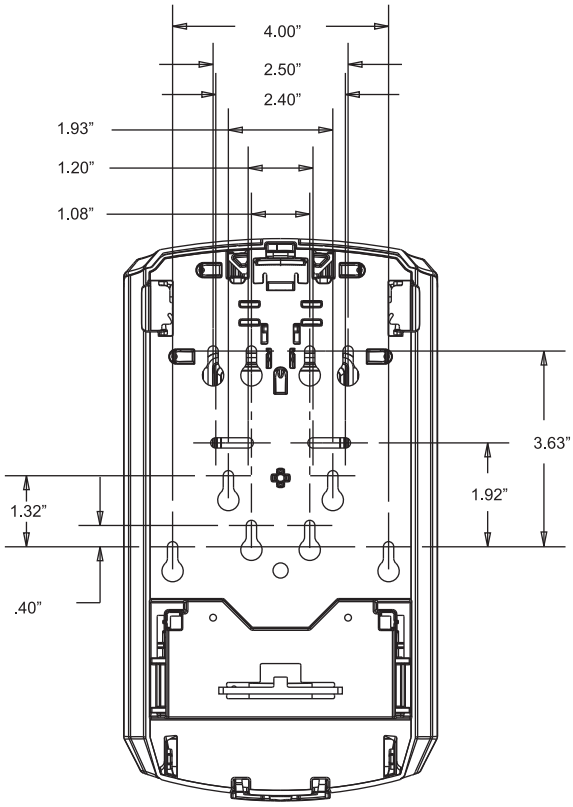
Refill sold separately.



Front View



Side View



Back View

GOJO Industries, Inc.
One GOJO Plaza, Suite 500
P.O. Box 991 • Akron, OH 44309-0991
Tel: 1-330-255-6000 • Toll-free: 1-800-321-9647
Fax: 1-800-FAX-GOJO

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Dispenser, Sanitary Napkin, Stainless Steel**

Alt ID: DSP-STN

Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Mfr #: B-35139

Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600)

Vendor #: B-35139

Model: B-35139 TrimLine Series Surface-Mounted

Sanitary Napkin Dispenser. Features: Provides a low-profile, sanitary way to dispose of feminine products. Wall-mounted with a removable skirt for optional recessed mounting. Durable 304 stainless steel construction with a satin finish. Includes a 0.6 gallon removable waste bin for simple emptying. Hinged door with a magnet catch and a cable limiter to prevent swinging.

Item ID: TA-03

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	8.06 in (205 mm)	**Left:**	N/A
Depth:	4.50 in (114 mm)	**Right:**	N/A
Height:	14.13 in (359 mm)	**Front:**	N/A
Max Weight:	30 lbs (13.6 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	
				Total:	**1**	

BOBRICK

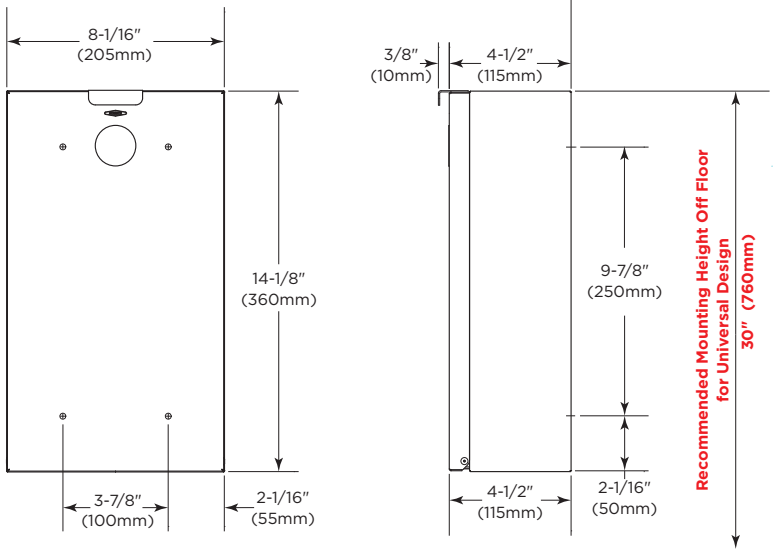
Technical Data

TrimLineSeries™ SURFACE-MOUNTED SANITARY NAPKIN DISPOSAL

B-35139

Specify Finish Required

☐ Stainless Steel, Satin Finish
☐ Matte Black Finish, please use model no. B-35139.MBLK



MATERIALS:

Cabinet — 18-8, Type-304, heavy-gauge stainless steel. All-welded construction. Exposed surfaces have satin finish or matte black, as specified.

Skirt — 18-8, Type-304, stainless steel with satin finish or matte black, as specified.

Door — 18-8, Type-304, 20-gauge (0.9mm) stainless steel with satin finish or matte black, as specified. Secured to cabinet with two rivets and equipped with a magnet catch.

Waste Receptacle — 18-8, Type-304, heavy-gauge stainless steel. All-welded construction. Removable for servicing. Capacity: 0.6-gal. (2.3-L).

OPERATION:

To service waste receptacle, unlatch door and remove waste container. Cable door-swing limiter prevents damage to washroom accessories and walls.

INSTALLATION:

For partitions with particleboard or other solid core, secure with four #10 x 5/8" (4.8 x 16mm) sheet-metal screws (not furnished) at points indicated by an S, or provide through-bolts, nuts, and washers.

For hollow-core metal partitions, provide solid backing into which sheet-metal screws can be secured. If two units are installed back-to-back, then provide threaded sleeves and machine screws for the full thickness of partition.

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with sheet-metal screws.

For other wall surfaces, provide fiber plugs or expansion shields for use with sheet-metal screws, or provide 3/16" (5mm) toggle bolts or expansion bolts.

Replacement Parts:

Skirt Replacement Kit	35139-53
Waste Receptacle Replacement	35139-78

SPECIFICATION:

Surface-mounted sanitary napkin disposal shall be Type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish or matte black, as specified. Door shall be Type-304, 20-gauge (0.9mm) stainless steel with satin finish or matte black, as specified. Secured to cabinet with two rivets and equipped with a magnet catch and cable door-swing limiter. Waste receptacle shall be Type-304, heavy-gauge stainless steel. All-welded construction with a capacity of 0.6-gal. (2.3-L).

Surface-Mounted Sanitary Napkin Disposal shall be Model B-35139 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Revised 6/28/23

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Dispenser, Toilet Paper, Surface Mount, Stainless Steel

Alt ID: DSP-TLP

Manufacturer: Kimberly-Clark Professional (888-346-4652)

Mfr #: 09606

Vendor: Kimberly-Clark Professional (888-346-4652)

Vendor #: 09606

Model: Coreless Double Roll [09606]

Wall mounted, cordless standard roll bath tissue dispenser. 24-gauge brushed stainless steel cover and sliding door with folded edges. Back and arms are made of molded plastic and the brushed stainless steel cover with slid- ing door is attached to the plastic housing by the hinge pins. Features a key-activated spring lock or push button operation and a hinged front cover.

Item ID: TA-02

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	10.13 in (257 mm)	**Left:**	N/A
Depth:	6.38 in (162 mm)	**Right:**	N/A
Height:	7.00 in (178 mm)	**Front:**	N/A
Max Weight:	3 lbs (1.4 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

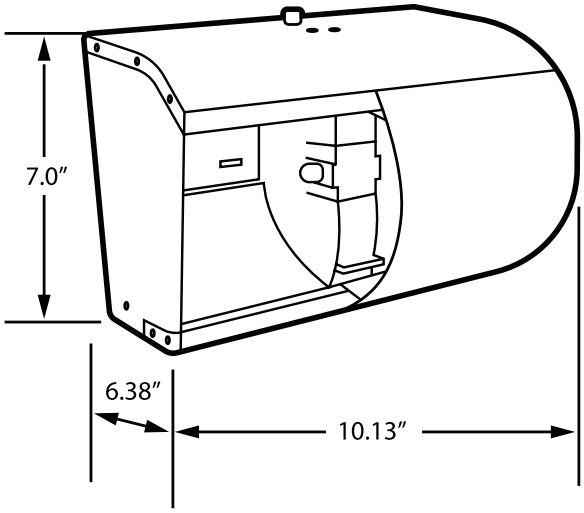
Plumbing:

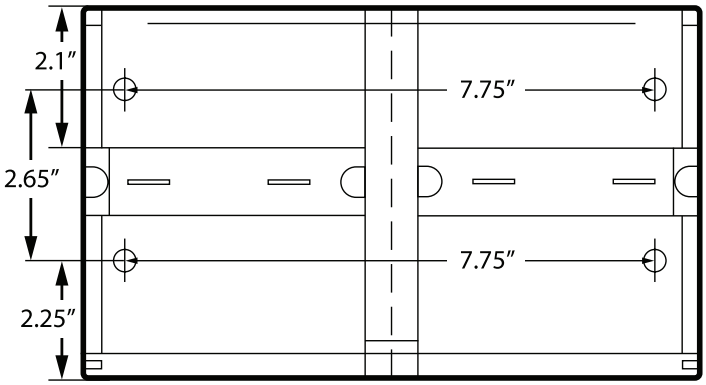
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	
				Total:	**8**	

Scott® Pro Coreless Standard Roll Bathroom Tissue Dispenser





- 304 brushed stainless steel cover and sliding door with folded edges
- Back and arms made of ABS plastic
- Designed to dispense two full standard rolls
- Cover with sliding door is attached to plastic housing by hinge pins
- Choice of key-activated spring lock or push-button operation
- Hardware included for mounting
- One per case

Product Code:

09606	51917
Stainless Steel	Onvation, Stainless Steel

Suggested mounting height for the outlet of the dispenser is 15″ minimum and 48″ maximum above the floor. Distance from the midline of the dispenser to the front of the toilet is 7-9″. In the presence of a grab bar rail, mount dispenser so that the outlet is no greater than 12″ above the bar, or so that the top of the dispenser is no less than 1.5″ below the bar.

When installed properly and used with corresponding product, this dispenser meets ADA Standard 28 CFR Part 36, local rules may vary.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Dispenser, Toilet Seat Cover

Alt ID: DSP-TSC

Manufacturer: Kimberly-Clark Professional (888-346-4652)

Mfr #: 09512

Vendor: Kimberly-Clark Professional (888-346-4652)

Vendor #: 09512

Model: Scott Personal Seat Cover Dispenser

Toilet seat cover dispenser. Stainless steel. Manually dispenses via a center-located lever. Built-in lock. Seat covers are fully enclosed. ADA compliant.

Item ID: TA-04

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	16.75 in (425 mm)	**Left:**	N/A
Depth:	2.50 in (64 mm)	**Right:**	N/A
Height:	12.25 in (311 mm)	**Front:**	N/A
Max Weight:	6 lbs (2.7 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Suggested Mounting Height from floor: 49 inch to 54 inch.

Structural:

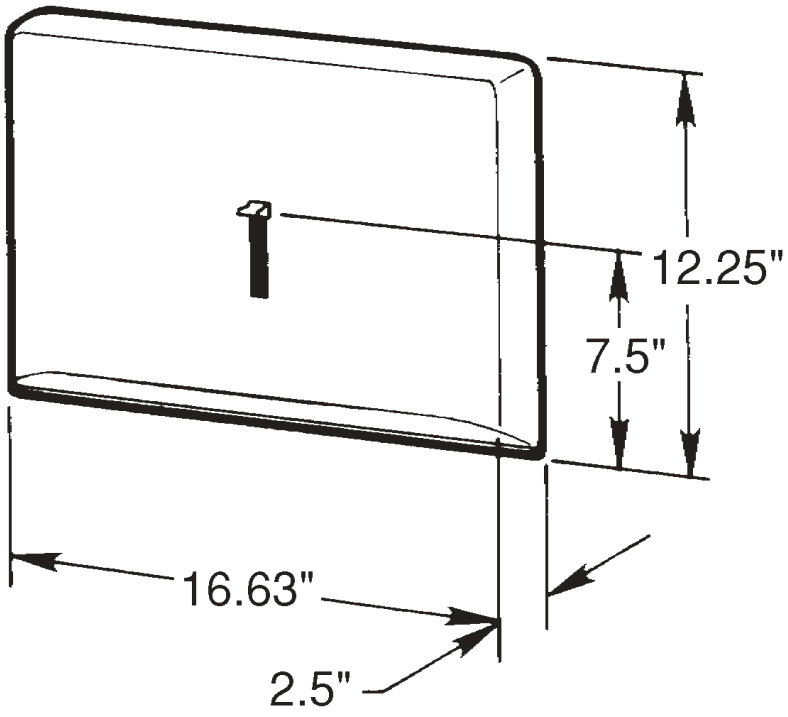
Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	
				Total:	**1**	



09512

PERSONAL SEATS Dispenser

22-gauge brushed stainless steel front cover and 20-gauge steel back with baked enamel finish. Dispenses 1.5 pads of tissue seat covers. Features a key-activated spring lock and center-located dispensing lever. 10 per case.

Suggested Mounting Height: 49" to 54"

NOTE: Unless otherwise noted, suggested mounting height is the distance from the floor to the bottom of the dispenser.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Dispenser, Water, Filtered

Manufacturer: Waterlogic Commercial Products, LLC (800-288-1891)

Vendor: Waterlogic Commercial Products, LLC (800-288-1891)

Model: Innowave Chiller 3

Alt ID: DSP-WCT

Mfr #: Innowave Chiller 3

Vendor #: Innowave Chiller 3

Item ID:

Countertop filtered water dispenser. 3.5 Liters (1 gallon) storage capacity. 3-stage filtration technology process, 5-micron Sediment filter reduces sediment and solid particle matter, 1-micron Carbon Block filter reducing chlorine, lead, cysts and turbidity, type T304 stainless steel hot and cold tanks, adjustable cold temperature, mechanical float water shut-off system, power switches for hot/cold tanks and equipped with ITS (In-Tank Sanitization). Energy Star certified. Complies with UL Standard 399.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	13.50 in (343 mm)	**Left:**	N/A
Depth:	14.45 in (367 mm)	**Right:**	N/A
Height:	17.75 in (451 mm)	**Front:**	N/A
Max Weight:	42 lbs (19.1 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	912
Hz:	60	**Amps:**	7.6
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	Yes	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Drain the water out of the storage tanks after long periods of non-usage.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	1	
				Total:	**1**	

Chiller3™ COUNTER-TOP

The Highest Standards…
The **SAFEST** Drinking Water

innowave® A WATERLOGIC GROUP COMPANY

THE LATEST IN **BOTTLE-LESS TECHNOLOGY**

BioCote®

A Fresh Approach and New Look

The innowave Chiller 3™ Counter-Top brings a unique, fresh approach, and a new look, to point-of-use systems in the marketplace. Unlike a bottled water cooler, incoming tap water is treated as it's needed, so the water is always fresh and great tasting. The innowave Chiller 3™ Counter-Top has a cooling capacity that surpasses that of the ordinary bottled water cooler, so you are sure to get a cold, refreshing serving of drinking water every time.

Water - Drink 8 a Day

Health care professionals recommend that the average person drink at least 8 - eight ounce servings of water every day. Unfortunately, over 2,100 contaminants have been identified as potential threats to the drinking water supply. They fall into four groups: Organic, Inorganic, Biological and Radioactive. A point-of-use water treatment system is ideal for consumers concerned about their local water quality, or who are simply looking to have better tasting water.

Modular Treatment Package

Knowing that water conditions vary between locations, innowave developed this system so it can be tailored to suit a variety of water conditions and meet customers' needs. Trained innowave® Dealers are customer-focused and will discuss the treatment technology available to combat local water conditions. In addition to a customized treatment package, this system is equipped with leak detection for added peace of mind. Once the system is installed, an innowave® Dealer provides periodic maintenance to ensure the system performs as intended.

innowave Chiller3™ Counter-Top Specifications

Width: 13.5 in. (34 cm)
Depth: 14.5 in. (37 cm)
Height: 17.75 in. (45 cm)
Water Connection: 1/4" tubing

Weight: 42 lbs. (dry)
Power Supply: 120V/60Hz
Amps: 7.6 Amps (Hot/Cold)
All figures are approximate and subject to change

The innowave Chiller 3™ Counter-Top has been tested and complies with UL Standard 399

ITS™ In-Tank Sanitization

ITS™ Controls Bacteria

The innowave Chiller 3™ Counter-Top is also equipped with ITS™ (In-Tank Sanitization). This feature utilizes ultraviolet light as an effective method to prevent the potential for biofilm (slime) buildup in the storage tank after chlorine has been reduced through carbon filtration. Ultraviolet technology also helps reduce any heterotrophic bacteria that may occur in drinking water. This reduces the need for preventative maintenance and improves drinking water quality.

Tested and Certified Treatment Technology

The innowave Chiller 3™ Counter-Top has been tested and certified by WQA according to NSF/ANSI Standard 61: Drinking Water System Components - Health Effects.

800-SAFE-H2O

innowave® **www.innowave.com**

Chiller3™ COUNTER-TOP

The Highest Standards…
The **SAFEST** Drinking Water

innowave®
A WATERLOGIC GROUP COMPANY

THE LATEST IN **BOTTLE-LESS TECHNOLOGY**

No More Bottles
Bottle-less drinking water technology means no more deliveries of bottles, and no more lifting and storing of heavy 5-gallon bottles. innowave systems are designed to plumb into existing water lines and use modern technology to treat water, on site, at the point-of-use.

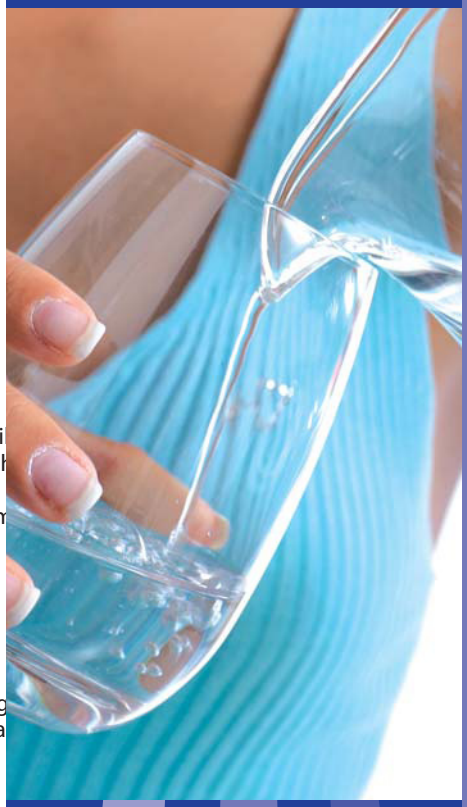
Minimal Manpower
With innowave systems, there are never any bottles to lift, store or replace. This reduces the risk of lifting injuries and workers' compensation claims associated with heavy bottles. To save you time and money, periodic preventative maintenance is performed according to innowave's strict protocols, by a qualified service technician.

Increase Security by Reducing Deliveries
Many companies today are focusing on building security. By decreasing the number of unauthorized personnel on your premises, you are contributing to the safety and well-being of all associates. Additionally, you're not blocking entries with delivery trucks, nor using up valuable space by storing water bottles!

Decrease Bacteria
Bottled water coolers have exposed reservoirs that can become contaminated if not sanitized on a routine basis. Someone's hands may be dirty when they are handling and changing bottles. Offer your employees better protection from bacteria with a self-contained, point-of-use system.

Support a Better Environment by Reducing Waste
Bottle-less technology is environmentally friendly. According to the World Wildlife Federation, the conservation organization, bottled water puts 1.5 mi tons of plastic into the environment, worldwide, each year. By changing to a point-of-use system, your company is doing something better for the environm by reducing waste.

Less Paperwork and Hassles
An economical innowave system can save money and reduce billing-related hassles. With an innowave system, there's a level payment plan every month, regardless of usage. If you're charged with managing budgets while being accountable for quality, innowa water systems are right for you.



The Highest Standards
innowave's goal is to provide water treatment systems that meet the highest standards and provide the safest drinking water. By utilizing a combination of modern water treatment technologies, innowave water treatment systems consistently provide high quality drinking water.

crystal mountain®

www.crystalmtnwater.com

CALL 1-888-881-8945 (IN NORTH ALABAMA, SIMPLY DIAL 256-922-1114)

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Diagnostic System, Integrated

Manufacturer: Hillrom - Welch Allyn, Inc. ((800) 535-6663)

Vendor: Hillrom - Welch Allyn, Inc. ((800) 535-6663)

Model: Green Series 777 [77791-2MPX]

Alt ID: DSY-OTO

Mfr #: 77791-2MPX

Vendor #: 77791-2MPX

Integrated Diagnostic System. Includes Wall Aneroid Sphygmomanometer (#7670-01), SureTemp Plus 690 Electronic Thermometer (#01690-300), PanOptic Ophthalmoscope with Cobalt-Blue Filter and Corneal Viewing Lens (#11820), MacroView Otoscope (#23810), KleenSpec Disposable Specula Dispenser, Wall-Mount Panel (30 x 12 in). Wall Transformer handles automatically turn on/off. 12 ft. cord length. Energy Star Qualified.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Medical	**Green:** Yes

Physical Requirements

Width:	30.00 in (762 mm)	**Left:**	N/A
Depth:	9.50 in (241 mm)	**Right:**	N/A
Height:	11.75 in (298 mm)	**Front:**	N/A
Max Weight:	25 lbs (11.3 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	22
Hz:	60	**Amps:**	0.2
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimension reflects wall board

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Welch Allyn **Green Series 777 Integrated Wall System**

Allows for reliable diagnostic patient data in a standardized and energy efficient solution to improve your bottom line.

Welch Allyn Green Series 777 Wall Transformer—configured to each facility's needs.

- Help reduce facility cost with a more energy efficient product than the 767 Wall Transformer
- Help improve workflow and save energy with handles that automatically turn on/off
- Quickly and easily upgrade from the Welch Allyn 767 Wall Transformer to the Green Series 777 Wall Transformer
- No on/off switch reduces contact, to help reduce the risk of cross-contamination

Welch Allyn Otoscopes & Ophthalmoscopes

- Standardize or choose the technology you need for each facility
- Upgrade to the Welch Allyn LED lamp for greater energy efficiency and lower cost of ownership

Welch Allyn MacroView™ Otoscope

- Almost twice the field of view and 30% greater magnification than traditional otoscopes
- Allows for simplified diagnosis of otitis media through superior visualization of the tympanic membrane

Welch Allyn Pneumatic Otoscope

- Rotating lens with ultraseal enables easy pneumatic otoscopy
- Easier instrumentation to allow a faster and more comfortable exam for the patient

Welch Allyn PanOptic™ Ophthalmoscope

- Fast, easy entry into undilated pupils with 5X larger view of the fundus for a streamlined exam
- 25º field of view vs. the standard 5º field of view provides optimal visualization

Welch Allyn Coaxial Ophthalmoscope

- 18 unique aperture/filter combinations for greater versatility
- 28 focusing lenses with a range of -25 to +40 diopters

Welch Allyn industry-leading blood pressure and thermometry devices provide you with fast, accurate and reliable patient data you can trust—to help improve patient care and clinical decisions.

Welch Allyn Wall Aneroid

- Recessed, laser-engraved dial face with high-contrast pointer provides certified accuracy to reduce errors and improve patient care
- Lifetime calibration warranty reduces cost of ownership

Welch Allyn Connex® ProBP™ Digital Blood Pressure Device

- Connectivity to most leading EHR systems, to improve patient documentation accuracy and efficiency
- Improve patient comfort and increase throughput with fast, 15-second NIBP readings
- Portable, so you can take BP readings just about anywhere

Welch Allyn Spot Vital Signs® Device

- Improve workflow by using a device that includes NIBP, pulse rate and MAP
- Optional SureTemp® thermometry and Masimo® or Nellcor® pulse oximetry

Welch Allyn Connex® Spot Monitor

- Improve patient comfort and increase throughput with 15-second NIBP readings taken as the cuff inflates
- Automated blood pressure averaging helps improve hypertension diagnosis accuracy
- Connectivity to most leading EHR systems, to improve patient vitals documentation accuracy and efficiency
- Improve workflow by using a device that includes NIBP, pulse rate, MAP, thermometry and SpO_2

Welch Allyn SureTemp® Plus Electronic Thermometer

- Provides accurate oral temperatures in 4 to 6 seconds, axillary and rectal temperatures in 10 to 13 seconds and adult axillary temperatures in 12 to 15 seconds
- Reduce risk of cross-contamination with single-use probe covers
- Improve efficiency with convenient storage for 75 probe covers
- Takes approximately 6,000 readings on 3 AA batteries and provides last temperature recall

WelchAllyn®

Standardize *across facilities for greater efficiency and consistent data capture or* ***customize*** *for your facility's needs.*

	WALL BOARD	GS 777 WALL TRANSFORMER	COAXIAL OPHTHALMOSCOPES	PANOPTIC™ OPHTHALMOSCOPES		DIAGNOSTIC MACROVIEW™ OTOSCOPES		PNEUMATIC OTOSCOPE	KLEENSPEC® DISPENSERS		WALL ANEROID	CONNEX® PROBP™ DEVICE	SURETEMP® PLUS THERMOMETER
Part #		77710	11720	11810	11820	23810	23820	20200	52400-PF	52100-PF	7670-01	34XFWT-B	01690-300
GS 777 Integrated Wall Systems													
77798	●	●	●					●		●	●		
77791-1MPX	●	●		●		●			●		●		●
77791-2MPX	●	●			●	●			●		●		●
77791-MX	●	●	●			●			●		●		●
77792-1MP	●	●		●		●			●		●		
77792-2MP	●	●			●	●			●		●		
77792-M	●	●	●			●			●		●		
77795-2MPX	●	●			●		●		●		●		●
77795-MX	●	●	●				●		●		●		●
77796-M	●	●	●				●		●		●		
77797-2PX	●	●			●			●		●	●		●
77797-X	●	●	●					●		●	●		●
77791-MXNOBP	●	●	●			●			●				●
77792-MNOBP	●	●	●			●			●				
GS 777 Integrated Wall Systems with Connex® ProBP™ Digital Blood Pressure Device (includes wall mounting bracket and device)													
77791-MXPROBP	●	●	●			●			●			●	●
77791-2MPXPROBP	●	●			●	●			●			●	●
GS 777 Integrated Wall Systems with Connex® Spot Monitor, Spot Vital Signs® or Spot Vital Signs® LXi Devices (includes wall mounting bracket only, devices must be ordered separately)													
77794-MCSM	●	●	●			●			●				
77794-2MCSM	●	●			●	●			●				
77794-MSPOT	●	●	●			●			●				
77794-MLXI	●	●	●			●			●				
77794-2MPSPOT	●	●			●	●			●				
77794-2MPLXI	●	●			●	●			●				
GS 777 Wall Transformer Sets													
77510		●							●				
77910		●							●		●		
77710-71M		●	●			●							
77710-81M		●		●		●							

The United States Green Building Council's Leadership in Energy and Environmental Design (LEED) is an internationally recognized green building certification system providing benchmarks for the design, construction and operation of high-performance green buildings.

Welch Allyn is proud to have earned a Gold rating in the LEED certification program.

To place an order, call our Customer Service Department at: 1.800.535.6663
or contact your local Welch Allyn representative.

 www.welchallyn.com

ENERGY STAR PARTNER

Welch Allyn®

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project
Specification Coversheet

Description: **Electrocardiograph (ECG), Interpretive**
Manufacturer: GE Healthcare - Cardiology (800.814.9389)
Vendor: GE Healthcare - Cardiology (800.814.9389)
Model: MAC VU360 Resting ECG Workstation w/ Basic Trolley

Alt ID: ECG-CRT
Mfr #: MAC VU360
Vendor #: MAC VU360

Item ID:

Electrocardiograph system with cart. Features: Marquette 12SL ECG Analysis Program for adults and pediatrics. 360 degree all around view, Smart Lead technology that automatically detects when a new patient is connected and Smart Auto-ECG that immediately captures and displays the first clean, high quality waveform. 1,000 records storage, AC differential ± 5mV, DC offset ±300 mV dynamic range, Up to 5 minutes of continuous digital rhythm storage (exportable as a PDF) and 15-lead analysis includes measurements of user-selectable additional 3 leads. Microprocessor augmented automatic electrocardiograph; 14-leadwire acquisition with programmable lead configuration.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	20.50 in (521 mm)	**Left:**	N/A
Depth:	23.50 in (597 mm)	**Right:**	N/A
Height:	57.00 in (1448 mm)	**Front:**	N/A
Max Weight:	76 lbs (34.5 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	180
Hz:	60	**Amps:**	1.5
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflects Basic Trolley only.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	2	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	2	
				Total:	**4**	

MAC VU360™

Resting ECG Workstation

General

Instrument type	Microprocessor augmented automatic electrocardiograph; 14-leadwire acquisition with programmable lead configuration
ECG Interpretation	Marquette™ 12SL™ ECG Analysis Program for Adults and Pediatrics
Computerized measurements	15-lead analysis includes measurements of user-selectable additional 3 leads
Digital Rhythm	Up to 5 minutes of continuous rhythm storage (exportable as a PDF)
Storage	1,000 records
Dynamic Range	AC Differential ± 5mV, DC offset ±300 mV
Common Mode Rejection	>130 dB (>100 dB with AC filter disabled)
Input Impedance	>10MΩ @ 10 Hz
Defibrillation protection	Per IEC 60601-2-25:2011
Patient Leakage	<10 µA

Acquisition and analysis

Analog to Digital Conversion	2,000 samples/second (0.1192 µV; DC to 500 Hz)
Additional report filters	20 Hz, 40 Hz, 100 Hz, or 150 Hz

Stored and transmitted waveforms

Digital Rhythm waveform	1,000 samples/second (4.88 µV; 0.04, 0.56 ZPD to 150 Hz)
12-lead ECG waveform	500 & 1,000 samples/second
Representative (median) complex	500 & 1,000 samples/second

Pace detection

Pacemaker waveform	75,000 samples/second/channel
Pace Annotation	Dedicated pace channel on display and printed reports

Display

Display & Resolution	15.6” LED Full HD 1080P (1920 x 1080 pixels)
Touch Screen Type	Capacitive touch screen. Works while wearing medical exam gloves
Sensors	Accelerometer for putting unit in standby when display is closed

Writer

Type	Integrated thermal dot array
Number of Traces	3, 6, 12, or 15 user selectable
Writer Speeds	5, 12.5, 25, & 50 mm/s
Paper Type	Thermal, Z-fold, perforated, fan fold, 300 sheets/pack
Paper Size:	Letter: 8.5 in x 11 in (215 mm x 280 mm) A4: 8.27 in x 11.7 in (210 mm x 297.5 mm)

Electrical

Power Supply	AC mains or battery operation
Input Voltage	100-240 VAC ±10%
Battery Type	Replaceable and rechargeable internal battery (hot swappable)

Communications

ECG Management Systems Connectivity	MUSE™ (v8 or later) with bi-directional orders and ADT support
DICOM℠	Bi-directional modality worklist/orders via GE MUSE (v9 or higher) and GE DICOM Gateway Pro
Web	HTML/web capable for access to MUSE CV Web (optional)
Wireless LAN Connectivity	Wireless 802.11 a/b/g/n wireless
Certificate Hashing Algorithms	SHA1 and SHA2 support
Wired LAN Connectivity	Compatible to 10Base-T, 100Base-T and 1000Base-T LAN
Network Clock	Network time synchronization (NTP)

Security & Privacy

Encryption	All files containing PHI, local users and passwords
Login Authentication	Network: LDAP/Active Directory Local: User database
User Management	Customizable roles for limiting system access by user groups for Admin, Clinical, Service, Biomed, and user defined customized roles
Audit Trail	All user logins, logouts and login failures, file deletions, file changes, file views, file acquisitions, file transmissions, file printouts, system configuration changes
Protected Health Information (PHI) Access	Controlled by customizable roles with configurable advanced strict PHI access rules
PHI Access Logs	Detailed and exportable logs of all PHI viewing by users
Emergency access (STAT mode)	Provides access to the device without providing login credentials to perform emergency tasks such as acquiring an ECG or rhythm while preventing access to any stored patient data, orders, ADT, or 3rd party applications
USB Lockout	Software controls to disable USB ports/ connections

Vectorcardiography

Report Formats	Vector loops of main vector (QRS-STT)
Sensitivity	20, 40, 80, or 160 mm/mV
Time Resolution	2 ms

Physical Specifications

Weight	75.3 lbs max with adjustable height premium trolley and one battery
Basic trolley	20.5 x 23.5 x 57 in (52 x 60 x 145 cm)
Easy Clean trolley	19 x 28 x 56-58 in (48 x 71 x 142-147 cm)
Easy Clean trolley with adjustable height	19 x 28 x 56-62 in (48 x 71 x 142-158 cm) 6 in (16 cm) of height adjustability

Input Devices

Keyboard	Sealed elastomer membrane keyboard with tactile feedback
Touchscreen	Full HD (1080p) projected Capacitive (PCAP) multipoint touch input that works while wearing medical exam gloves
Barcode	Supported (optional)
Mouse	Supported (not included)

Barcode Support

Types	Fixed and variable length
Symbologies	Code-128, PDF417, Code 39, Interleaved Code 2 of 5, and Data Matrix symbology for characters A-Z (upper case), a-z (lower case), and 0-9 for all supported languages

Acquisition Unit

Quality Indicators	Real-time Hookup Advisor with LED lead quality indicators
Remote control	ECG acquisition button, rhythm acquisition button, stop button
Ingress Protection Level	IPx4

Cleaning

Approved cleaning agents	Soap and water solution Sodium Hypochlorite (NaOCl) 5% solution Ethanol (ethyl alcohol) 96% (v/v) Isopropyl alcohol 70% (m/m) Hydrogen Peroxide 20% (v/v) Phenol 2% (V/V) Super Sani-Cloth®

JB55395XX(1)

Distributed by:
GE Medical Systems Information Technologies, Inc.
GE Healthcare
8200 West Tower Avenue
Milwaukee, WI 53223
U.S.A.

0459

Table 54: Electrical Specifications

Item	*Description*
Power supply	AC mains or battery operation
Input voltage	100–240 VAC ±10%
Input current range	1.5A @100V to 625mA @240V
Input frequency	50-60 Hz ± 3 Hz

Table 55: Battery Specifications

Item	*Description*
Type	Replaceable and rechargeable internal battery
Charge time	Approximately 240 minutes from total discharge when device is off (standby).
Battery capacity	The system shall be able to continuously display scrolling waveforms without printing for a minimum of six hours when the maximum total battery capacity is installed and the batteries are fully charged.

Table 56: Other Input Device Specifications

Item	*Description*
External USB barcode reader	Fixed and variable length types Symbologies: Code-128, PDF417, Code 39, Interleaved Code 2 of 5, and Data Matrix symbology for characters A-Z (upper case), a-z (lower case), and 0-9 for all supported languages.
Acquisition Module	Real-time Hookup Advisor with LED lead quality indicators Ingress protection level: IPx4 Optional integrated barcode reader

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Hamper, Linen
Manufacturer: Filmop USA LLC (888-741-0707)
Vendor: Filmop USA LLC (888-741-0707)
Model: Delta 32 Gallon Linen Hamper

Alt ID: HMP-32G
Mfr #: 0000C0412xx
Vendor #: 0000C0412xx

Item ID:

32 gallon linen hamper. Compatible with any bag with 18 inch diameter opening. Features co-polymer construction, front foot pedal mechanism, carry-all basket. Tuck-n-Snap bag holding system. Four swivel wheels, also includes two stationary front feet for optional use. Specify lid color when ordering.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	19.75 in (502 mm)	**Left:**	N/A
Depth:	25.25 in (641 mm)	**Right:**	N/A
Height:	39.00 in (991 mm)	**Front:**	N/A
Max Weight:	15 lbs (6.8 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	2	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	2	
				Total:	**4**	

Delta

32 Gallon Linen Collection Hamper

SILENT, HANDS-FREE CLOSURE

Hydraulic pistons enable silent closing of container cover; foot pedal provides hands-free opening.

HEAVY LOAD SUPPORT

Solid co-polymer base provides full support for heavy loads; eliminates bag dragging.

COLOR-CODING OPTIONS

Cover available in various colors to indicate different types of soiled linen, area-specific collection or other color-coding needs.

CO-POLYMER CONSTRUCTION

Easy to clean, sturdy, light-weight and won't rust. Polymer wheels swivel silently and provide maximum manueverability.

FILMOP®
Engineered Cleaning Systems

ABOUT DELTA LINEN COLLECTION SYSTEM

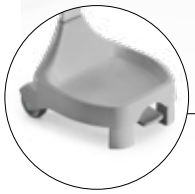
Hydraulic pistons inside cover = silent closure

Ergonomic push bar

Use any bag with 18"diameter opening

Carry-All Basket: Removable basket for gloves, extra bags, spray bottles, cloths, etc.

Front foot pedal mechanism = Hands-free opening of cover



Rounded, smooth co-polymer = Easy cleaning, disinfecting

Solid co-polymer base provides support for heavy loads

Tuck-n-Snap Bag Holding System

Lift Tuck-n-Snap brackets and wrap bag edges around them.

Lower brackets and snap into outer frame.

The Tuck-n-Snap system automatically conforms to the bag's thickness to securely hold the bag.

Lift Tuck-n-Snap brackets to remove bag.

DELTA Components & Accessories

DELTA COLLECTION FRAME KIT:
Gray co-polymer frame with 4 swivel wheels, foot pedal, hydraulic pistons and colored cover of choice. Two stationary front feet included for optional use.

Item# **0000C04120U** gray
Item# **0000C04121U** blue
Item# **0000C04122U** red
Item# **0000C04123U** yellow
Item# **0000C04124U** green

Kits include two stationary feet for a semi-mobile version

Co-polymer cover

Item# **P290976U** gray
Item# **P290976A** blue
Item# **P290976B** red
Item# **P290976C** yellow
Item# **P290976F** green

Carry-All basket (co-polymer) for holding extra bags, cleaning supplies, etc.

Item# **P190975N**

Hydraulic, shock absorbing piston for silent cover closing

Item# **P190908U**

DELTA COLLECTION COMPLETE KIT:
Gray co-polymer frame with carry-all basket (co-polymer), 4 swivel wheels, foot pedal and colored cover of choice. Two stationary front feet included for optional use.

Item# **0000C04140U** gray
Item# **0000C04141U** blue
Item# **0000C04142U** red
Item# **0000C04143U** yellow
Item# **0000C04144U** green

Coated, washable, reusable 32 gallon bag. Gray. Can be lined with secondary bag (disposable or linen)

Item# **0000AT0190E** gray

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13410 Highway 105 West
Conroe, Texas 77304
Toll-Free: 888 741 0707
e-mail: info@filmopusa.com
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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Hook, Coat/Robe, Wall Mount**
Alt ID: HOK-COT
Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600)
Mfr #: B-9542
Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600)
Vendor #: B-9542
Model: B-9542 Surface-Mounted Coat Hook

Wall mounted coat/robe hook. Features: 150 lb. capacity, Silver, Satin finish, and Type 303 Stainless steel material. ADA compliant.

Item ID: TA-11

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	1.31 in (33 mm)	**Left:**	N/A
Depth:	2.97 in (75 mm)	**Right:**	N/A
Height:	1.31 in (33 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.2 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	Provide blocking as required.
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	Provide blocking as required.
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	Provide blocking as required.
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	Provide blocking as required.
				Total:	**8**	

BOBRICK

Technical Data

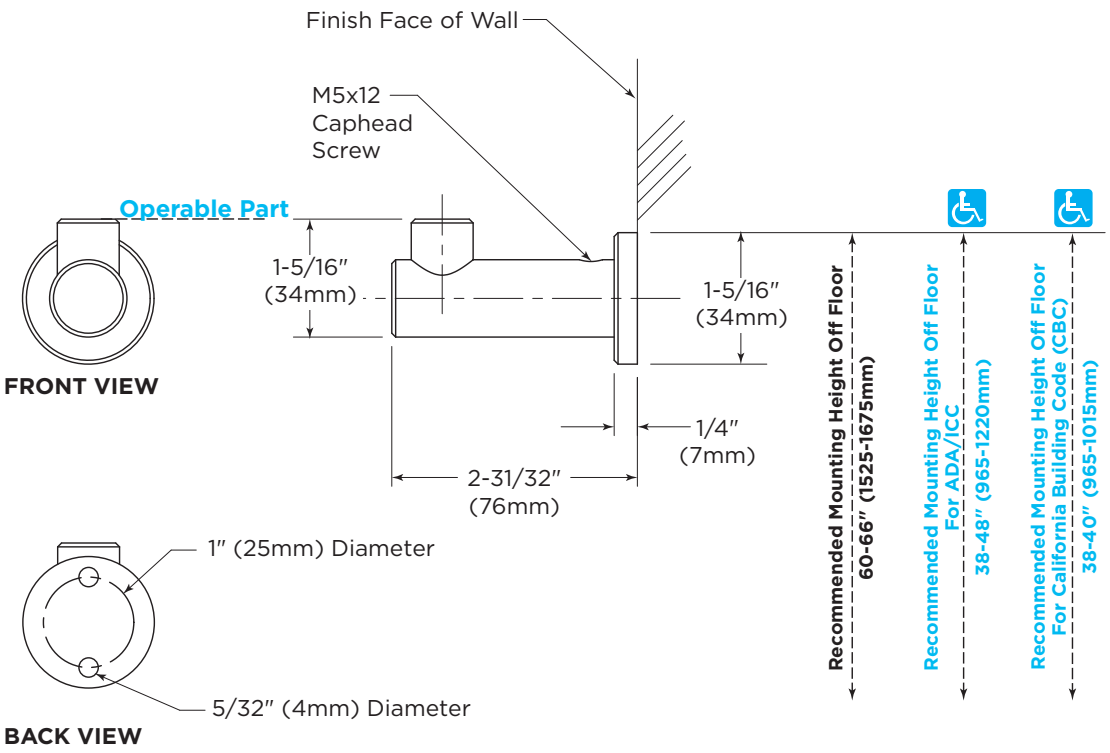
fino collection

COAT HOOK

B-9542

Specify Finish Required

- ☐ Stainless Steel, Satin Finish
- ☐ Matte Black Finish, please use model no. B-9542.MBLK



ADA/CBC Installation Guidance

***Operable Part:** Top of hook pin.

Maximum mounting height of Operable Part:
ADA/ICC: 48" above finished floor (AFF)
CBC: 40" above finished floor (AFF)

*For more information regarding operable parts, please refer to Bobrick Planning Guide for Accessible Restrooms, page 9.

MATERIAL:

Post — Type 303, solid machined stainless steel in satin finish, 3/4" (20mm) diameter, 2-31/32" (76mm) long. Post is fastened to the flange via set screw, securing the flange cover.

Hook Pin — Type 303, solid machined stainless steel in satin finish, 5/8" (16mm) diameter integrated into the post.

Flange Cover — Type 303, solid machined stainless steel in satin finish, 1/16" (2mm) thick, 1-5/16" (34mm) diameter.

Concealed Mounting Flange — Type 303, solid machined stainless steel, 5/32" (4mm) thick, 1-5/16" (34mm) diameter, equipped with two mounting holes for attachment to wall.

STRENGTH:

Bobrick coat hook B-9542 can support loads of up to 150lbs. (68kg.) if properly installed.

continued . . .

5-Year Limited Warranty — In addition to Bobrick's one-year guarantee, Bobrick extends a limited 5-year warranty from the date of purchase on all parts for model B-9542. This warranty is limited to the repair or exchange of defective parts at the option of Bobrick and is only extended to the original owner of the installed unit against defects in factory workmanship or material under normal use and service.

SAFETY WARNING:

COAT HOOK IS NO STRONGER THAN THE ANCHORS AND WALLS TO WHICH THEY ARE ATTACHED AND, THEREFORE, MUST BE FIRMLY SECURED IN ORDER TO SUPPORT THE LOADS FOR WHICH THEY ARE INTENDED. TO AVOID POTENTIAL INJURY, THE BUILDING OWNER OR MAINTENANCE PERSONNEL SHOULD REMOVE THE COAT HOOK FROM SERVICE IF THE COAT HOOK IS NOT ADEQUATELY SECURED TO WALL.

INSTALLATION:

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with sheet-metal screws (not furnished). For other wall surfaces, provide fiber plugs or expansion shields for use with sheet-metal screws (not furnished), or provide 1/8″ (3mm) toggle bolts or expansion bolts.

For partitions with particle-board or other solid core, secure with sheet-metal screws (not furnished), or provide through-bolts, nuts, and washers. For hollow-core metal partitions, provide solid backing into which the sheet-metal screws (not furnished) can be secured.

SPECIFICATION:

Coat Hook shall be type 303 machined solid stainless steel in satin finish or matte black, as specified. Coat Hook shall have 3/4″ (20mm) diameter post with integrated 16mm diameter Hook Pin. Concealed mounting flange shall be 5/32″ (4mm) thick machined solid stainless steel plate, 1-5/16″ (34mm) diameter and equipped with two screw holes for attachment. Machined solid flange cover shall be 1/16″ (2mm) thick stainless steel in satin finish or matte black, as specified, 1-5/16″ (34mm) diameter. Set screw shall fasten the post to the flange and secures the flange cover.

Coat Hook shall be Model B-9542 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Hypo-Hyperthermia Unit, General**

Alt ID: HYP-GEN

Manufacturer: Medivance, Inc. - Subsidiary of Bard Medical ((303) 926-1917)

Mfr #: 5000-00-00e

Vendor: Medivance, Inc. - Subsidiary of Bard Medical ((303) 926-1917)

Vendor #: 5000-00-00e

Model: Arctic Sun 5000e

Item ID:

Hypo-hyperthermia unit with touch screen interface. Temperature Management System for monitoring and controlling patient temperature. Consists of the Arctic Sun, TIM (Transmission Interface Module) Unit, and EMR capability. Features four hospital defined protocols, offers visibility and duration tracking during therapy, new timer starts for normothermia phase, and hardware accessory kit. A series of hardware and software provides direct data streaming to the hospital IT system, continuous live data output, and fully tracks all four phases of therapy. Patient temperature control range: 32°C to 38.5°C (89.6°F to 101.3°F). Reservoir capacity: 3.5 liters; water flow rate: 5 liters per minute. Patient probe type: YSI 400 Series compatible.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	14.00 in (356 mm)	**Left:**	N/A
Depth:	18.50 in (470 mm)	**Right:**	N/A
Height:	35.00 in (889 mm)	**Front:**	N/A
Max Weight:	103 lbs (46.7 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	1265
Hz:	60	**Amps:**	11
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Empty weight: 95 lbs.

Do not use in the presence of flammable agents.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	2	
				Total:	**2**	

SIMPLY ADVANCED.™ | ARCTIC SUN® 5000
TEMPERATURE MANAGEMENT SYSTEM

Leading the market isn't enough

INTRODUCING THE ARCTIC SUN® 5000e Temperature Management System

The future of medicine is less invasive and more effective. ARCTIC SUN® 5000e Temperature Management System is non-invasive **and** effective. It elevates the science of core body temperature management, delivering precision cooling... without cutting.

Useful real-time data

The ARCTIC SUN® 5000e Temperature Management System is the only advanced TTM delivery device that features data output capabilities. The Transmission Interface Module (TIM) enables communication from the device to data aggregation systems.

Four hospital defined protocols

Customization of treatment profile: The ARCTIC SUN® 5000e Temperature Management System can now store up to four pre-set protocols to precisely deliver core body temperature management.

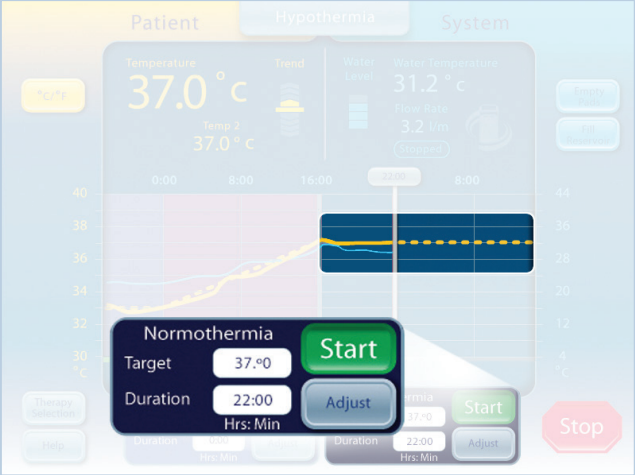
BARD | MEDICAL

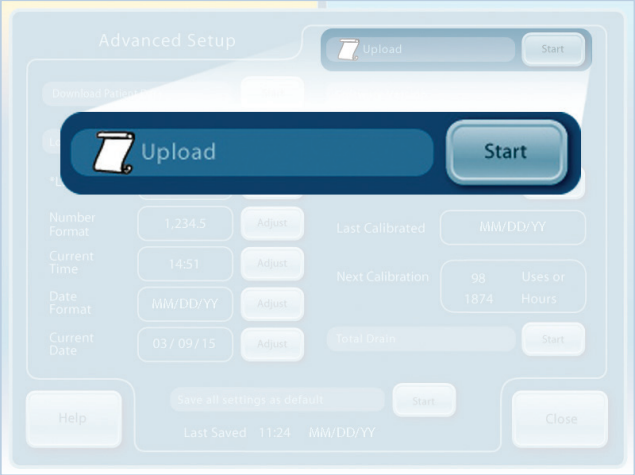
Window into the patient

Visibility and duration tracking during all phases of therapy (induction, maintenance, rewarming, and normothermia). The ARCTIC SUN® 5000e Temperature Management System Therapy Screen illustrates maintained normothermia and tracks the phase duration for you.

Quick access to your procedure

Administering Targeted Temperature Management requires a high level of expertise with a multidisciplinary approach. With the ARCTIC SUN® 5000e Temperature Management System, you can upload your procedure for quick reference. This image can include your order set, checklist, or step-by-step guide.





Indications for Use:

The ARCTIC SUN® Temperature Management System is a thermal regulating system, indicated for monitoring and controlling patient temperature.

Contraindications
- There are no known contraindications for the use of a thermoregulatory system.
- Do not place ARCTICGEL™ Pads on skin that has signs of ulcerations, burns, hives or rash.
- While there are no known allergies to hydrogel materials, caution should be exercised with any patient with a history of skin allergies or sensitivities.

Warnings
- When using the ARCTIC SUN® Temperature Management System, note that all other thermal conductive systems, in use while warming or cooling with this device may interfere with patient temperature control.

Cautions
- Due to underlying medical or physiological conditions, some patients are more susceptible to skin damage from pressure and heat or cold. Patients at risk include those with poor tissue perfusion or poor skin integrity due to diabetes, peripheral vascular disease, poor nutritional status, steroid use or high dose vasopressor therapy. Examine the patient's skin under the ARCTICGEL™ Pads.
- Skin injury may occur as a cumulative result of pressure, time and temperature.
- Carefully remove ArcticGel™ Pads from the patient's skin at the completion of use. Aggressive removal or removal of cold pads from the patient's skin may result in skin tears.
- The rate of temperature change and potentially the final achievable patient temperature is affected by many factors. Treatment application, monitoring and results are the responsibility of the attending physician. If the patient does not reach target temperature in a reasonable time or the patient is not able to be maintained at the target temperature, the skin may be exposed to low or high water temperatures for an extended period of time which may increase the risk for skin injury.

Please consult package insert for more detailed safety information and instructions for use.

BARD | MEDICAL

Manufacturer:
Medivance, Inc.
321 South Taylor Ave., Suite 200
Louisville, Colorado 80027 USA
medivance.com

Customer Service Phone: 800-526-4455
Customer Service Fax: 800-852-1339
Email: bmd.cs@crbard.com

1503-60 R 04/15 THP P04/15 5M

BARD

Medivance

ARCTIC SUN® 5000e

TEMPERATURE MANAGEMENT SYSTEM

TECHNICAL SPECIFICATIONS:

Therapy Modes
Normothermia: Control Patient
Hypothermia: Cool Patient
Rewarm Patient

Heater Capacity
2500 BTU/hr / 750 Watts

Circulating Fluid
Distilled or Sterile Water

Reservoir Capacity
3.5 liters

Water Flow Rate
5 liters per minute

Patient Probe Type
YSI 400 Series compatible

Patient Temperature Inputs
Patient Temp 1: control, monitor, alarm
Patient Temp 2: monitor, alarm

Patient Temperature Display Range
10°C to 44°C
50°F to 111.2°F
0.1°C / °F increments

Patient Temperature Measurement Accuracy
±0.4°C (10°C to 32°C)
±0.2°C (32°C to 38°C)
±0.4°C (38°C to 44°C)
Includes ±°0.1C external probe

Patient Temperature Control Range
32°C to 38.5°C
89.6°F to 101.3°F
0.1 °C/°F increments

Water Temperature Display Range
3°C to 45°C / 37.4°F to 113.0°F
1 °C/°F increments

Water Temperature Control Range (Manual)
4°C to 42°C / 39.2°F to 107.6°F
0.1 °C/°F increments

High Water Temperature Limit
36°C to 42°C / 96.8°F to 107.6°F
1 °C/°F increments

Low Water Temperature Limit
4°C to 25°C / 39.2°F to 77°F
1 °C/°F increments

Mains Input
115 VAC, 60 Hz, 11.0 Amp (nominal)
230 VAC, 50 Hz, 5.5 Amp

Leakage Current
<300 µA

Operating Relative Humidity Range
10°C to 27°C / 50°F to 80°F

Storage Temperature Range
-30°C to 50°C / -20°F to 120°F

Dimensions
Height: 35 inches (89 cm)
Width: 14 inches (36 cm)
Depth: 18.5 inches (47 cm)

Weight
Empty: 43 kg / 95 lbs ;
Filled: 47 kg / 103 lbs

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Ice Machine, Dispenser, Nugget, Countertop

Manufacturer: Follett LLC (800-523-9361)

Vendor: Follett LLC (800-523-9361)

Model: 7 Series 7CI100A-IW-CF-ST-00

Alt ID: ICE-7CT

Mfr #: 7CI100A-IW-CF-ST-00

Vendor #: 7CI100A-IW-CF-ST-00

Countertop ice and water dispenser with integral air-cooled ice machine and internal filter. Push button actuation. Produces up to 125 lbs of compressed nugget ice/24 hrs. Storage capacity 7 lbs. Stainless steel exterior with accent trim. Agion silver-based antimicrobial product protection of key ice contact components.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	Yes
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	C/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	14.62 in (371 mm)	**Left:**	3.00 in (76 mm)
Depth:	22.12 in (562 mm)	**Right:**	3.00 in (76 mm)
Height:	17.62 in (448 mm)	**Front:**	N/A
Max Weight:	81 lbs (36.7 kg)	**Back:**	3.00 in (76 mm)
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	575
Hz:	60	**Amps:**	5
Phase:	Single	**BTU/hr:**	1700
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	Yes	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Requires 15 amp dedicated circuit.

Max Weight reflects bin at max capacity.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	1	
ED/1st Flr	C466	Waiting Rm/Public	Project	Draft (New)	1	
				Total:	**2**	

7 Series ice and water dispenser

Chewblet® ice machine

Shown with optional base stand

NOTE: For use in applications with greater than 5 mg/l but less than 400 mg/l total dissolved solids in water and less than 200 mg/l hardness (either naturally occurring or treated with reverse osmosis or other TDS reducing technology).

Not recommended for use with softened water.

Model configurations			
Ice storage capacity	Configuration	Filter[1]	**Item number**
7 lb (3.2 kg)	countertop ice and water	no filter	**7CI100A-IW-NF-ST-00**
		internal	**7CI100A-IW-CF-ST-00**
	countertop ice-only	no filter	**7CI100A-NW-NF-ST-00**
		internal	**7CI100A-NW-CF-ST-00**
For freestanding models			
Optional base stand to convert countertop models to freestanding			**00956292**

[1] Internal filter is a 5 micron particle and carbon filter.

Features

Compact size, only 17.62" (44.8 cm) tall to fit on counters under standard cabinets

7 lb (3.2 kg) ice storage capacity

Integral air-cooled ice machine with up to 125 lb (56.7 kg) daily production of popular Chewblet ice

- designed to serve up to 50 people (201 servings per 9 hr day[1])
- soft, chewable, compressed nugget ice is preferred over cubes[2]
- environmentally responsible R134a refrigerant with zero ozone depletion potential
- energy saving sleep mode
- quiet production without noisy harvest cycles
- meets the Consortium for Energy Efficiency (CEE) Tier 2 specifications for highly efficient ice machines

Durable, attractive dispenser

- modern styling, stainless steel exterior with accent trim
- dispense-activated soft blue light illuminates point-of-use
- easy-to-clean, removable 20 oz (591 ml) drip tray

Designed with sanitation in mind

- Agion® silver-based antimicrobial product protection of key ice and water contact components[3]
- capacitive touch controls eliminate direct contact with ice

Installation

- comes fully assembled
- two easy connections – electric and water
- drainless design allows dispenser to be placed anywhere a water line can be run and eliminates the cost of a drain installation

Warranty

- 2 years parts and labor, 5 years compressor parts
- optional extended third year warranty (item# 00960732)

Accessories

Touchless SensorSAFE™ dispensing kit, user installed on new and existing models, refer to form# 8815 for additional details.

SafeCLEAN Plus™ ice machine cleaner, refer to form# 8295

4.00" (10.16 cm) leg kit for CI - countertop models (item# 00956300)

6.00" (15.24 cm) leg kit for base stand (item# 00956318)

Drip tray drain kit for countertop models (includes 4.00" (10.16 cm) legs) (item# 00981977)

Drip tray drain kit for countertop models used with base stand accessory (does not include 4.00" (10.16 cm) legs) (item# 00956375)

Filter cartridge, replacement 5 micron particle/carbon (item# 00968107)

For additional water treatment and other accessories, refer to form# 4025

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FOLLETT®

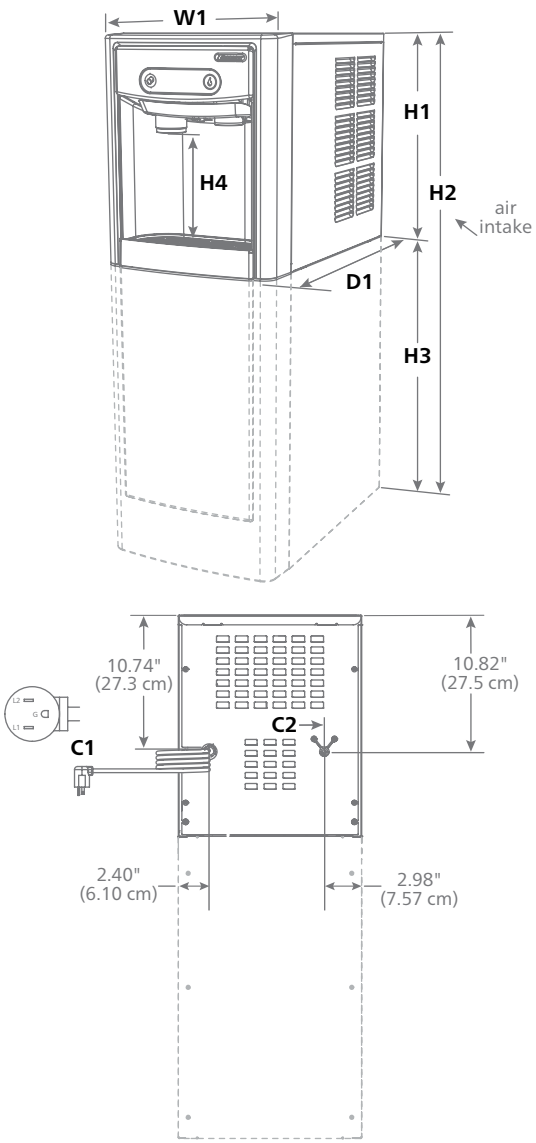
Specification

Ice storage capacity	7 lb (3.2 kg)
W1 Width	14.62" (37.1 cm)
D1 Depth	22.12" (56.2 cm)
H1 Height, countertop models	17.62" (44.8 cm)
H2 Height, with optional base stand	42.00" (106.7 cm)
H3 Height, optional base stand	24.50" (62.2 cm)
H4 Dispense height clearance	8.50" (21.59 cm)
Ventilation clearance	3.00" (7.62 cm) on each side
Service clearance	3.00" (7.62 cm) behind and on each side
C1 115 V/60/1 electrical	5 amps, 0.26 kW Connect to dedicated 15 amp circuit, fuse or breaker. 8' (2.4 m) cord w/ NEMA 5-15 90º plug.
C2 Water inlet	1/4" push-in
Air temperature	50 -100 F (10 - 38 C)
Water temperature	40 - 90 F (4 - 32 C)
Water pressure	10 - 70 psi (69 - 482 kpa)
Ice production at 70 F (21 C) air and 50 F (10 C) water	125 lb (56.7 kg)
Ice production at 90 F (32 C) air and 70 F (21 C) water	100 lb (45.4 kg)
Energy consumption 90 F (32 C) air and 70 F (21 C) water	6.9 kWh per 100 lb (45.4 kg) ice
Heat rejection	1700 BTU/hr
Water consumption	12 gal (45.4 L) of potable water per 100 lb (45.4 kg) of ice
Approximate net weight – countertop models	74 lb (34 kg)
Approximate shipping weight – countertop models	87 lb (40 kg)
Approximate net weight – optional base stand	24 lb (11 kg)
Approximate shipping weight – optional base stand	42 lb (19 kg)

NOTE: Intended for commercial use only. Follett can't guarantee freight carrier's ability to deliver to residential locations. Follett service providers may not be bonded to perform on-site warranty repairs in certain areas.

SHORT FORM SPECIFICATION: (Choose one) ____ Ice and water or ____ ice-only dispenser to be Follett automatic load in countertop configuration, with 7 lb (3.2 kg) of storage. Environmentally responsible R134a ice machine to be air-cooled. Ice machine to produce approximately 125 lb (56.7 kg) of Chewblet compressed nugget ice at air temperature of 70 F (21 C) and water temperature of 50 F (10 C). Ice machine to be equipped with printed circuit board and diagnostics to allow simplified servicing and with capacitive touch user interface. Storage area to be insulated with CARB compliant non-HFC foam. 8' (2.4 m) cord and NEMA 5-15 90º plug provided. 115 V/60/1. NSF and ETL listed. For use in applications with greater than 5 mg/l but less than 400 mg/l total dissolved solids in water and less than 200 mg/l hardness (either naturally occurring or treated with reverse osmosis or other TDS reducing technology).

Dimensional drawing



[1] 4 oz (118 ml) of ice per cup in a 12 oz (355 ml) cup.
[2] Independent third party studies. Contact Follett for details.
[3] Disclaimer: Antimicrobial protection is limited to the treated components and does not treat water or ice.

3725-202209 | © Follett Products, LLC

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Ice Machine, Dispenser, Nugget, Countertop

Manufacturer: Follett LLC (800-523-9361)

Vendor: Follett LLC (800-523-9361)

Model: Symphony Plus 12CI425A-S

Alt ID: ICE-C12

Mfr #: 12CI425A-S

Vendor #: 12CI425A-S

Item ID:

Countertop ice and water dispenser with integral, air-cooled ice machine. SensorSAFE infrared dispensing. Produces up to 425 lbs of compressed nugget ice/24 hrs. Storage capacity 12 lbs. Stainless steel cabinet with accent trim, corrosion-resistant poly drain pan, grille and dispenser lid. Agion silver-based antimicrobial product protection of key ice and water contact components. Quiet Night sleep mode turns off ice machine when idle. NSF and ETL listed.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	Yes
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	C/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	16.12 in (409 mm)	**Left:**	N/A
Depth:	23.50 in (597 mm)	**Right:**	6.00 in (152 mm)
Height:	32.50 in (826 mm)	**Front:**	N/A
Max Weight:	156 lbs (70.8 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	12.00 in (305 mm)
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	1265
Hz:	60	**Amps:**	11
Phase:	Single	**BTU/hr:**	5000
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	Yes	**Gasses:**	No
Water - Hot:	No	**Drain:**	Yes
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
15 amp dedicated circuit.

Max Weight reflects bin at max capacity.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
				Total:	**2**	

Symphony Plus™ ice and water dispenser

12 CI series countertop with Chewblet® ice machine

Shown with SensorSAFE™

agion® ANTIMICROBIAL PRODUCT PROTECTION

SensorSAFE infrared dispense (optional)

SensorSAFE not recommended for use with clear containers or for applications in direct sunlight

Model configurations			
Ice storage capacity	Dispense	Ice machine cooling	**Item number**
12 lb (5.4 kg)	Lever	air	**12CI425A-L**
	SensorSAFE	air	**12CI425A-S**

Ice-only available, add -I
Example: 12CI425A-LI

Ice production		
Temperatures air/water	**70/50 F (21/10 C)**	**90/70 F (32/21 C)**
Air-cooled	425 lb (193.0 kg)	325 lb (147.6 kg)
Energy consumption per 100 lb (45.4 kg) ice	N/A	6.0 kWh air-cooled
Water consumption	12.0 gal (45.4 L) of potable water per 100 lb (45.4 kg) of ice	

Features

Narrow, 16.12" (40.9 cm) width

12 lb (5.4 kg) ice storage capacity

Integral air-cooled ice machine with up to 425 lb (193.0 kg) daily production of Chewblet ice

- soft, chewable, compressed nugget ice is preferred over cubes[1] and is ideal for patient care
- Quiet Night™ sleep mode turns off ice machine when idle

Designed with sanitation in mind

- automatic self-flushing of ice machine removes impurities
- drain cup provides internal air gap for added protection of food zone components from drain line contaminants
- Agion® silver-based antimicrobial provides protection of key ice and water contact components[2]
- one-hand lever or SensorSAFE infrared ice dispense

Dependable design, easy to service and clean

- cleaning and sanitizing of entire machine takes only 1 hour
- LED control board provides at-a-glance machine status
- panels are easily removed for accessibility to all components
- ice machine parts are common across all Symphony Plus dispensers
- stainless steel evaporator and auger deliver long life

Environmentally responsible

- meets Consortium for Energy Efficiency Tier 2 specifications
- R404a refrigerant has zero ozone depletion potential
- continuous ice making process uses less electricity and water

Durable, attractive dispenser

- stainless steel cabinet with accent trim
- poly drain pan, grille and dispenser lid are corrosion-resistant

Easy installation

- comes fully assembled and installs with three easy connections – electric, water and drain

Warranty

- 3 years parts and labor, 5 years compressor parts

Accessories

Base stand with or without factory installed filter (refer to form# 7010)

4.00" (10.16 cm) leg kit (item# AF10LBLEGS)

Pressurized water sanitizing kits (refer to form# 6830)

SafeCLEAN Plus™ ice machine cleaner
6 x 8 oz (237 ml) bottles (item# 01149954)
Carton of 24 x 8 oz (237 ml) bottles (item# 01149962)

Nu-Calgon® IMS-III sanitizer, 16 oz (0.5 L) bottle (item# 00979674)

Additional filters (refer to form# 9905 and 8320)

Additional Symphony Plus accessories (refer to price list)

Job

Item

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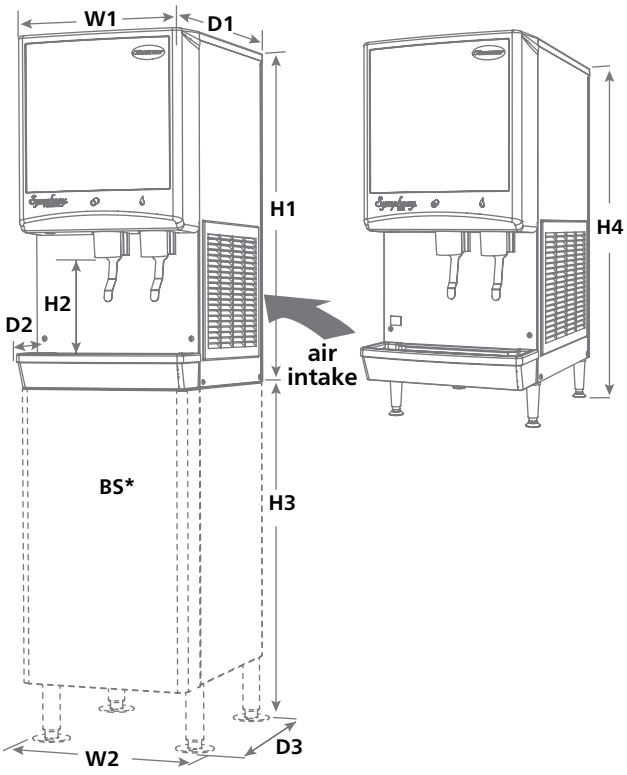
Specification

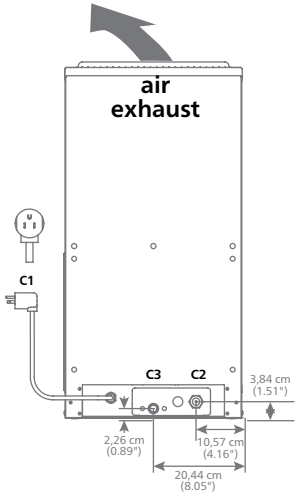
Ice storage capacity	12 lb (5.4 kg)
W1 Width	16.12" (40.9 cm)
W2 Width, base stand accessory	17.50" (44.4 cm)
D1 Depth, entire dispenser	23.50" (59.7 cm)
D2 Depth, drain pan	5.50" (13.97 cm)
D3 Depth, base stand accessory	22.00" (55.9 cm)
H1 Height, dispenser	32.50" (82.6 cm)
H2 Dispense height clearance	9.38" (23.83 cm)
H3 Height, base stand accessory	33.00" (83.8 cm)
H4 Height, leg kit accessory	36.64" (93.1 cm)
Ventilation clearance	6.00" (15.24 cm) top and right side
Service clearance	12.00" (30.5 cm) top
Utility connection location	through back or bottom
C1 115 V/60/1 electrical	11 amps, 0.8 kW 8.5' (2.6 m) cord w/ NEMA 5-15 90º hospital-grade plug
C2 Potable water inlet	3/8" FPT
C3 Drain	3/4" MPT
Air temperature	50 -100 F (10 - 38 C)
Water temperature	45 - 90 F (7 - 32 C)
Water pressure	10 - 70 psi (69 - 483 kpa)
Heat rejection	5000 BTU/hr
Approximate net weight	144 lb (65 kg)
Approximate ship weight	199 lb (90 kg)
Approximate ship weight, base stand accessory	80 lb (36 kg)

NOTE: For indoor use only

SHORT FORM SPECIFICATION: (Choose one) ___ Ice and water or ___ ice-only dispenser to be Follett® automatic load in countertop configuration, with 12 lb (5.4 kg) of storage and separate ice and water chutes. Environmentally responsible R404a air-cooled ice machine to have 24 hour production capacity of approximately 425 lb (193.0 kg) of Chewblet compressed nugget ice at water temp. of 70 F (21 C); air temp. of 50 F (10 C). Ice machine equipped with automatic self-flushing and Quiet Night sleep mode. Dispenser to have automatic bin level control to start and stop ice machine. Storage area insulated with CARB compliant non-HFC foam. 8.5' (2.6 m) cord and NEMA 5-15 90º hospital grade plug provided. NSF and ETL listed.

Dimensional drawing





BS*– Base stand sold separately; measurements shown are with base stand legs at lowest position.

See dispenser detail sheet, form# 6675, for counter cutouts.

[1] Independent third party studies. Contact Follett for details.
[2] Disclaimer: Antimicrobial protection is limited to the treated components and does not treat water or ice.

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Water Treatment System, Ice Maker, Wall Mount
Alt ID: ICE-FLT
Manufacturer: Follett LLC (800-523-9361)
Mfr #: 00130229
Vendor: Follett LLC (800-523-9361)
Vendor #: 00130229
Model: Standard Capacity Filter System 00130229

Water filter system for use with all Follett Symphony Plus ice and water dispensers and Maestro Plus flake and Chewblet ice machines. Standard capacity, provides 3,000 gallons of filtration. Includes Agion silver-based antimicrobial product protection of key water contact components. Includes pre-filter, primary filter, pressure gauge and wall mounting bracket. Price reflects NET Price.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	C/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	14.25 in (362 mm)	**Left:**	N/A
Depth:	6.00 in (152 mm)	**Right:**	N/A
Height:	18.50 in (470 mm)	**Front:**	N/A
Max Weight:	15 lbs (6.8 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	2.50 in (64 mm)

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	Yes	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	1	
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
ED/1st Flr	C466	Waiting Rm/Public	Project	Draft (New)	1	
				Total:	**4**	

Water filter systems

carbon and carbonless accessories

Filter system compatibility	Filter system	Capacity – gal (l)	Item number
Symphony™ and Symphony Plus™ ice and water dispensers, Maestro™ and Maestro Plus™ ice machines	Carbon	Standard – 3,000 (11,340)	**00130229**
Symphony and Symphony Plus ice and water dispensers, Maestro and Maestro Plus ice machines, Horizon and Horizon Elite ice machines	Carbon	High capacity – 15,000 (56,700)	**00978957**
Symphony and Symphony Plus ice and water dispensers, Maestro and Maestro Plus ice machines, Horizon and Horizon Elite ice machines	Carbonless	High capacity – 15,000 (56,700)	**01050442**

Replacement cartridge description	Filter system	Unit	Item number
Primary filter, standard capacity	Carbon	Carton of 6	**00954297**
		Single	**00130245**
Primary filter, high capacity	Carbon	Carton of 6	**00978973**
		Single	**00978965**
Primary filter, high capacity	Carbonless	Carton of 6	**01050434**
		Single	**01050426**
Pre-filter	Carbon and Carbonless	Carton of 12	**00954305**
		Single	**00130211**

Features

Two systems to choose – carbon or carbonless

Capacities to choose – 3,000 or 15,000 gal (11,340 or 56,700 l) for carbon or 15,000 gal (56,700 l) for carbonless

All systems includes pre-filter, primary filter, pressure gauge and wall mounting bracket

Carbon filters

- includes silver-based antimicrobial product protection of key water contact components[1]
- removes chlorine, off-tastes and odors

Cleaner ice and water with all filters

- includes Micro-pure® II media (item# 00130229) or Fibredyne™ media (item# 00978957), both featuring antimicrobial product protection to inhibit the growth of biofilm and enhance filter performance[1]
- traps dirt as small as 0.5 micron in size
- advanced filtration system filters out parasitic cysts
- certified to ANSI/NSF standards 42 and 53

Improve ice machine performance

- dramatically reduces the most common water-related ice machine problems to keep ice machines functioning at full capacity
- reduces scale build-up from dirt and minerals in the water
- removes dirt and abrasive particles that can damage ice machine
- saves energy and reduces downtime

Space-saving design

- all systems can be mounted in areas as small as 14.75" (45.0 cm) wide by 21.00" (53.3 cm) high or out of the way below standard 34.00" - 36.00"(86.4 cm - 91.4 cm) counters

Pre-filter system saves money

- economical pre-filter filters out large particles and extends life of primary filter

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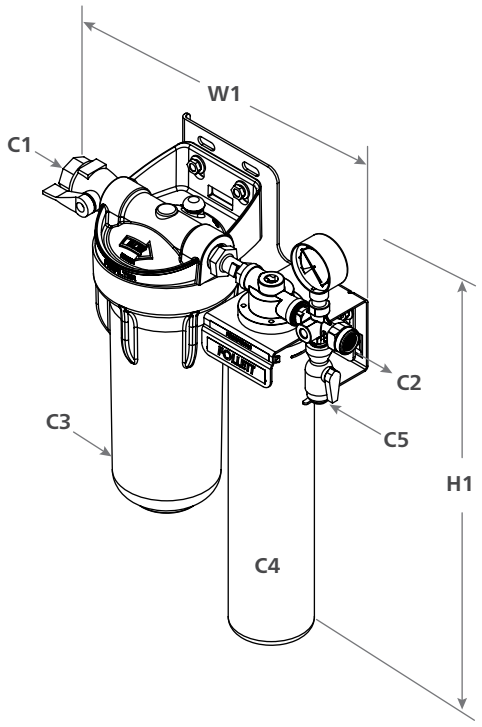
FOLLETT®

Specification

W1 Width	14.25" (36.2 cm)
Depth	6.00" (15.24 cm)
H1 Height	18.50" (47.0 cm)
Service clearance	2.50" (6.35 cm) at bottom for cartridge removal
C1 Water inlet	3/4" FNPT (3/8" reducer bushing included with system)
C2 Water outlet	3/8" FNPT
C3 Pre-filter	10 micron capable
C4 Primary filter	0.5 micron capable
C5 Flushing valve	
Capacity	**Carbon** Standard – 3,000 gal (11,340 l) High capacity – 15,000 gal (56,700 l) **Carbonless** High capacity – 15,000 gal (56,700 l)
Flow rate	**Carbon** Standard – 0.5 gpm (1.89 lpm) High capacity – 2.5 gpm (9.46 lpm) **Carbonless** High capacity – 2.0 gpm (7.57 lpm)
Water temperature	40 - 90 F (5 - 32 C)
Water pressure	10 - 125 psi (69 - 860 kpa)
Carbon NSF International ISS capable standard no. 42	Aesthetic effects – Chemical reduction: taste and odor and chlorine reduction, Mechanical filtration: particulate reduction, class 1: 99.9% reduction of particles 0.5 micron and larger in size
Carbonless NSF International standard no. 42	Mechanical filtration: nominal particulate reduction, class I
Carbon NSF International standard no. 53	Health effects – Mechanical filtration: Cyst reduction, Turbidity reduction (high capacity, item# 00978957, only)
Carbonless NSF International standard no. 53	Health effects – Mechanical filtration: Cyst reduction
Approximate ship weight	15 lb (7 kg)

NOTE: For indoor use only. Check for compliance with state and local laws and regulations. Do not use any filtration system where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit. May be used with disinfected water where filterable cysts may be present.

Dimensional drawing



[1] Disclaimer: Antimicrobial protection is limited to the treated components and does not treat water.

Water filter system accessories

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Ultrasound, Imaging, Urology

Manufacturer: Verathon ((425) 867-1348)

Vendor: Verathon ((425) 867-1348)

Model: BladderScan Prime w/Mobile Cart

Alt ID: IMG-BLD

Mfr #: 0270-0870 / 0800-0532

Vendor #: 0270-0870 / 0800-0532

Item ID:

Bladder ultrasound with mobile cart. 3D unit that noninvasively measures bladder volume. Scanning is available in a variety of modes for male, female, and small child, as well as functions for recall, print, or to transfer saved exams. Features an on-board tutorial and integrated help screens. System consists of the console with touch-screen display, probe that contains the ultrasound transducer, battery charger and 2 rechargeable lithium-ion batteries. The cart features a tray (10.5 x 18 inches) that holds accessories, 5 casters, and 21 inch diameter base. The ultrasound mounts to the pole above the tray. Does not include optional printer or on-site calibration.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	21.00 in (533 mm)	**Left:**	N/A
Depth:	21.00 in (533 mm)	**Right:**	N/A
Height:	52.00 in (1321 mm)	**Front:**	N/A
Max Weight:	15 lbs (6.8 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	875
Hz:	60	**Amps:**	2.7
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions are with ultrasound mounted to cart.
Cart height adjusts from 40H to 52H inches overall.
Weight shown is for ultrasound and cart together..

Electrical is for power adapter.

Battery charger: 24V DC, 2.5A input current; output 18V DC max, 4A max.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

VERATHON®

BLADDERSCAN PRIME

OPERATIONS & MAINTENANCE MANUAL

BLADDERSCAN®

IMPORTANT INFORMATION

OVERVIEW

PRODUCT DESCRIPTION

The BladderScan Prime instrument provides noninvasive measurement of urinary bladder volume. The instrument calculates the bladder volume using patented NeuralHarmonics® technology. Volume measurements made with NeuralHarmonics technology are based on a more complex, multifaceted image of the bladder.

Bladder volume, mode (male, female, and small child), directional aiming with real-time feedback, battery status and usage rate indicators are displayed on the LCD.

The system also includes a battery charger for the custom, user-replaceable lithium-ion batteries included with the system.

Stored exams can be accessed at any time using the console display.

STATEMENT OF INTENDED USE

The BladderScan Prime system is an ultrasound device intended to be used for measuring the urine volume in the bladder noninvasively.

NOTICE TO ALL USERS

The BladderScan Prime system should be used only by individuals who have been trained and authorized by a physician or the institution providing patient care. Users should read this entire manual prior to using the system. Do not attempt to operate this instrument until you thoroughly understand all instructions and procedures in this manual.

STATEMENT OF PRESCRIPTION

Caution: Federal (United States) law restricts this device to sale by or on the order of a physician.

ESSENTIAL PERFORMANCE

Essential performance is the system performance necessary to achieve freedom from unacceptable risk. The essential performance of the BladderScan Prime system is to produce ultrasonic output energy, display ultrasonic images, and display numerical values for bladder volume. The instrument shall not produce unintended or excessive probe surface temperature.

INTRODUCTION

SYSTEM OVERVIEW

BladderScan Prime is a 3D ultrasound system that noninvasively measures bladder volume. The core components of the system are a console with a touch-screen display, an ergonomic probe containing the ultrasound transducer, and a battery charger with rechargeable lithium-ion batteries. There are several accessories and configuration options available for the system, including a mobile cart, a printer, and external memory solutions. For more information, see Components & Accessories on page 8.

Figure 1. BladderScan Prime System

The BladderScan Prime system includes an onboard tutorial as well as integrated help screens. Scanning is available in a variety of modes that are suited for different patient anatomies: male, female, and small child. In addition, the console features a variety of customizable settings and a saved scans function that allows you to recall, print, or transfer saved exams.

The Prime console also features an optional live imaging pre-scan mode that enables you to locate the bladder by displaying a B-mode view of the abdomen in real time, prior to completing the volume measurement scan. This option is disabled by default. For more information about enabling this mode, see Configure Exam Settings on page 28.

COMPONENTS & ACCESSORIES

Table 1. Included System Components & Accessories

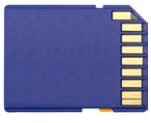
INCLUDED SYSTEM COMPONENTS & ACCESSORIES	
 Console	 Probe
 Battery	 Console base
 Battery charger	
 Power adapter	 In-service USB flash drive
 Media storage USB flash drive	
 Power cord *Note: Plug may vary by region*	 Port cover
 Media storage SD card	

Table 2. Optional System Components & Accessories

OPTIONAL SYSTEM COMPONENTS & ACCESSORIES		
 Mobile Cart	 Printer	 Thermal Paper

Additionally, quick reference materials and ultrasound gel may be available for order in your region. For more information, contact Verathon® Customer Care or your local representative or visit verathon.com/support.

SYSTEM FEATURES

CONSOLE FEATURES

The BladderScan Prime console's primary feature is a touch-screen display that allows you to perform scans, manage scan results, and customize settings. The console also provides controls for adjusting brightness and volume and activating the system or putting it in standby mode. A rechargeable battery is inserted into one side of the console, and the other side features a selection of ports for connecting system components and accessories such as external, removable media storage devices. You may also customize your console by adding an optional printer, attaching the console base, or mounting the console on a mobile cart.

Figure 2. Console Features

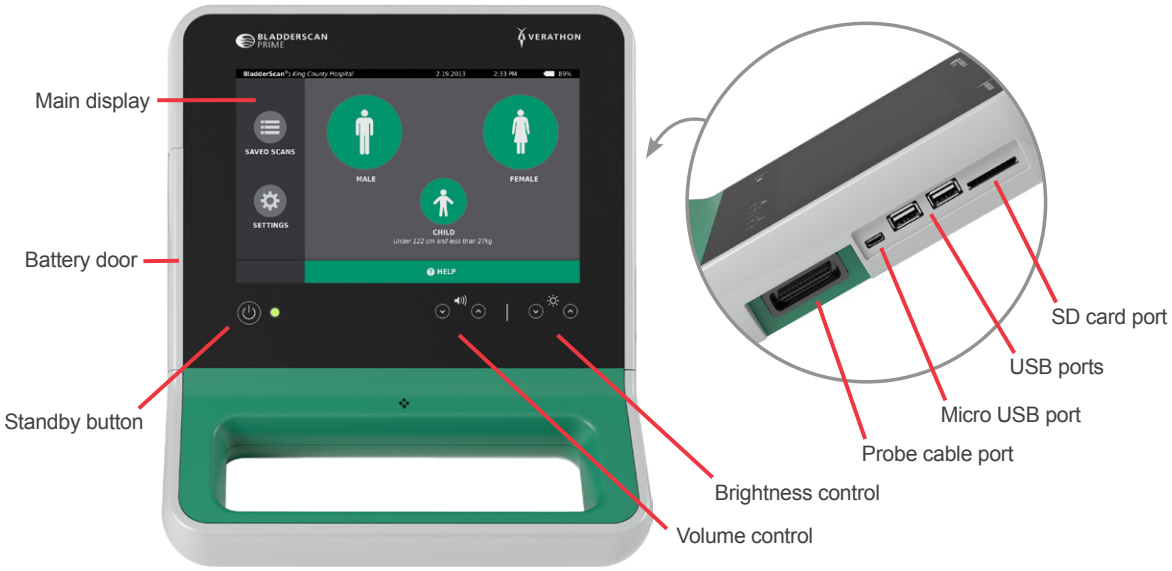


Table 3. Console Features

PART NAME	PURPOSE
Main display	Features touch-screen controls of the system user interface.
Battery door	Opens to access and replace the rechargeable battery.
Standby button	Activates the unit or puts it in standby mode. When the unit is active, an LED next to the Standby button is illuminated.
Volume control	Adjusts volume up or down.
Brightness control	Adjusts the main display to be brighter or dimmer.
Probe cable port	Connects the system probe and console.
USB ports	Provides connection for external, removable storage media.
Micro USB port	Not functional in this version of BladderScan Prime.
SD card port	Provides connection for external, removable storage media.

Note: The console USB and SD ports are designed to support removable storage media. Use these ports with USB flash drives and SD cards only. Do not attempt to use the ports with other devices.

PRODUCT SPECIFICATIONS

SYSTEM SPECIFICATIONS

OVERALL SYSTEM SPECIFICATIONS

Table 11. General System Specifications

ITEM	SPECIFICATION	
General Specifications		
Classification	Internally powered, Type BF	
Expected product life	Console	7 years
	Probe	7 years
	Printer	7 years
	Battery charger	7 years
Ingress protection (IP) against water	Console	IPX0
	Probe	IPX4
	Printer	IPX0
	Battery charger	IPX0
	Battery	IPX0
Operating Conditions		
Use	Indoor	
Temperature	+10 to +40°C (50 to 104°F)	
Relative humidity	20 to 75%	
Ambient air pressure	+700 hPa to 1060 hPa	
Storage Conditions		
Use	Indoor	
Temperature	-10 to +60°C (14 to 140°F)	
Relative humidity	20 to 80%	
Ambient air pressure	+600 hPa to 1060 hPa	

Table 12. Ultrasound Acoustic Output Parameters

Values in this table are the maximum readings obtained from three test results.

ACOUSTIC OUTPUT			MI	$I_{SPTA.3}$ (mW/cm²)	$I_{SPPA.3}$ (W/cm²)
Global Maximum Value			0.424	0.253	11.3
Associated Acoustic Parameter	$p_{r.3}$	(MPa)	0.705		
	W_o	(mW)		1.027	0.635
	f_c	(MHz)	2.70	2.83	2.83
	z_{sp}	(cm)	3.00		3.20
	Beam dimensions	x_{-6} (cm)			0.325
		y_{-6} (cm)			0.346
	PD	(µsec)	0.839		0.728
	PRF	(Hz)	408		408
	EDS	Az. (cm)		5.40	
		Ele. (cm)		1.50	
TIS/TIB/TIC range			0.0-1.0*		

* *Both MI and TI values are below 1.0.*

ACCURACY SPECIFICATIONS

Table 13. Accuracy Specifications

SPECIFICATION	DESCRIPTION
Bladder volume range	0 to 999 mL
Volume accuracy	± (15% ± 15 mL)

The accuracy specifications assume the instrument is being used according to the instructions provided by Verathon® while scanning a tissue-equivalent phantom.

To maintain accuracy within the sensitivity threshold, the instrument displays a 0 mL measurement when the detected volume is less than 30 mL in male or female scanning modes or below 15 mL in pediatric mode.

COMPONENT SPECIFICATIONS

CONSOLE SPECIFICATIONS

Table 14. Console Specifications

ITEM	SPECIFICATION
General Specifications	
Height	125 mm (4.92 in)
Width	227 mm (8.94 in)
Depth	259 mm (10.20 in)
Weight	1770 g (3.90 lbs)
Display	1280 x 800 pixels
Electrical Specifications	
Input	Verathon Supplied Battery, 11.7 V DC
Output	USB Ports, 5 V DC at 100 mA maximum from each port
Insulation	Type BF

PROBE SPECIFICATIONS

Table 15. Probe Specifications

ITEM	SPECIFICATION
General Specifications	
Height	196 mm (7.70 in)
Width	62 mm (2.43 in)
Depth	62 mm (2.43 in)
Weight	580 g (1.28 lbs)
Display	144 x 168 pixels
Cable	1.8 m (6.0 ft)

PRINTER SPECIFICATIONS

Table 16. Printer Specifications

SPECIFICATION	DESCRIPTION
General Specifications	
Height	70 mm (2.76 in)
Width	164 mm (6.45 in)
Depth	90 mm (3.54 in)
Weight (without paper)	352 g (0.78 lbs)
Resolution	8 dots/mm (203 dots/in)
Dot size	0.125 mm by 0.12 mm (0.005 in by 0.005 in)
Printing width	48 mm (1.89 in), or 384 dots/line

BATTERY SPECIFICATIONS

The BladderScan Prime system is provided with two lithium-ion batteries. A battery symbol on the instrument LCD is always present, indicating how much power remains and when the battery needs to be changed. You can change the battery whenever necessary.

Adhere to the following recommendations and guidance:

- Use only the battery charger provided with the system. Any other battery charger may damage the batteries.
- It is recommended that you replace the batteries every 2 years. Contact Verathon® Customer Care or your local representative to order replacement batteries.

Table 17. Battery Specifications

CONDITION	DESCRIPTION
General Specifications	
Battery type	Lithium Ion (Li-Ion)
Height	23 mm (0.89 in)
Width	151 mm (5.94 in)
Depth	59 mm (2.32 in)
Weight	326 g (0.72 lbs)
Electrical Specifications	
Battery life	A fully charged battery will typically provide over 24 hours of normal operating use between charges
Charging time	2.5 hours (typical)
Rated capacity	4.6 Ah, 51 Wh
Nominal voltage	11.1 V
Max charging voltage	12.6 V

BATTERY CHARGER SPECIFICATIONS

Table 18. Battery Charger Specifications

SPECIFICATION	DESCRIPTION
General Specifications	
Height	58 mm (2.30 in)
Width	124 mm (4.89 in)
Depth	175 mm (6.89 in)
Weight	385 g (0.85 lbs)
Electrical Specifications	
Input voltage	24 V DC
Input frequency	DC
Input current	2.5 A
Input connection	2.5 mm (0.1 in), center positive
Output	18 V DC max, 4 A max
Insulation	Protection Class III
Fuses	No user replaceable fuses

POWER ADAPTER SPECIFICATIONS

Table 19. Charger Power Adapter Specifications

SPECIFICATION	DESCRIPTION
Electrical Specifications	
Input voltage	100–240 V AC, single phase
Input frequency	50–60 Hz
Input current	1.4 A max
Input connection	IEC C13 connection, line cord plug NEMA 5-15 (North America), AS 3112 (Australia), CEE 7/4 (Europe), BS 1363 (United Kingdom)
Output	24 V DC / 0–2.71 A
Insulation	10 Megaohm for 500 V DC
Fuses	Automatic Over Voltage Protection (OVP), Short Circuit Protection (SCP), Over Current Protection (OCP)

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Ultrasound, Imaging, Multipurpose
Manufacturer: GE Healthcare - Imaging Systems (800-886-0815)
Vendor: GE Healthcare - Imaging Systems (800-886-0815)
Model: LOGIQ E10

Alt ID: IMG-UMP
Mfr #: H4918U
Vendor #: H4918U
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	23.00 in (584 mm)	**Left:**	N/A
Depth:	39.00 in (991 mm)	**Right:**	N/A
Height:	51.00 in (1295 mm)	**Front:**	N/A
Max Weight:	278 lbs (126.1 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	110	**Watts:**	1210
Hz:	60	**Amps:**	11
Phase:	Single	**BTU/hr:**	3070
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Requires dedicated single branch circuit.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

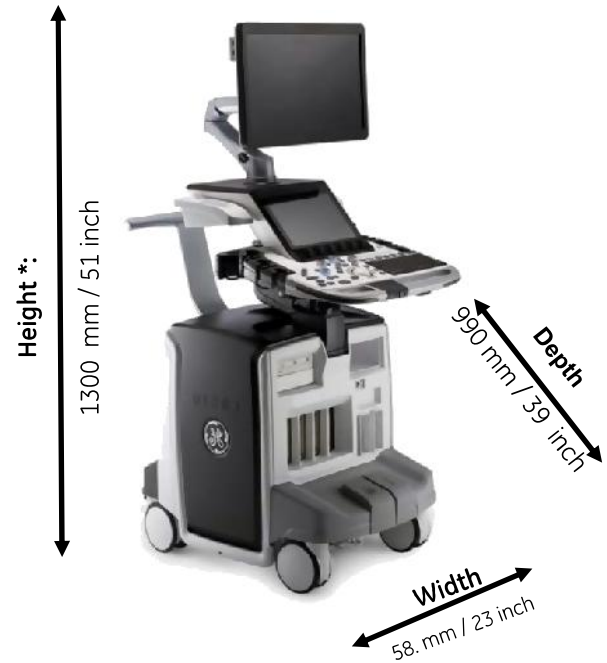
Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

LOGIQ E10

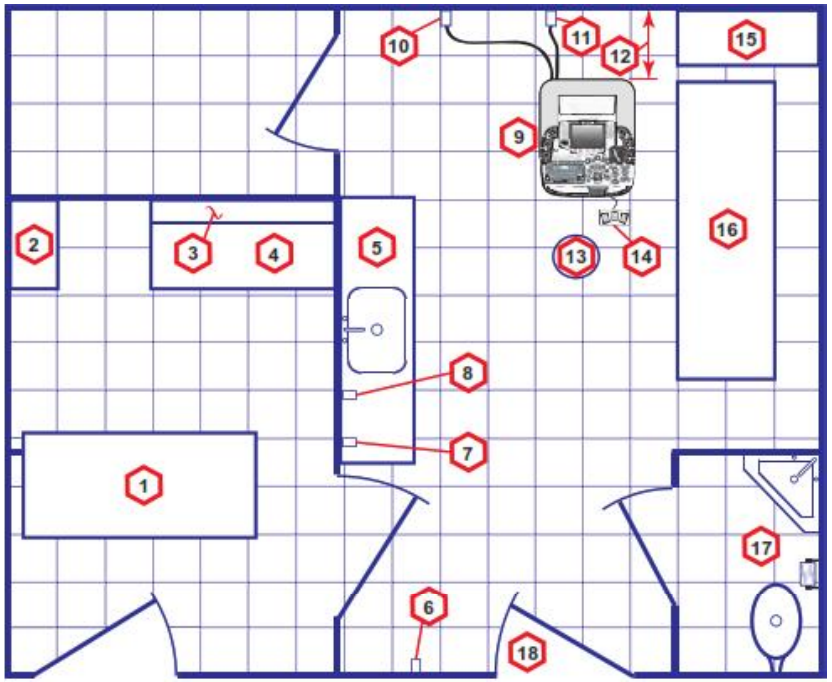
Site Preparation

Physical Dimensions and Weight (mm) :

Please Note: The picture may vary according to order configuration.



Recommended Ultrasound Room Layout 4.27 x 5.18 m (14 x 17 foot)



1. Secretaries or Doctors Desk
2. File Cabinet
3. Film Viewer
4. Counter Top
5. Counter Top and Sink with hot and cold water
6. Overhead Lights Dimmer - Dual Level Lighting (bright and dim)
7. Emergency Oxygen
8. Suction Line
9. LOGIQ E10
10. Dedicated Power Outlet - Circuit Breaker protected and easily accessible
11. Network Interface
12. 457 mm (18 inches) distance of LOGIQ E10 from wall or objects
13. Stool
14. Footswitch
15. Storage for Linens and Equipment
16. Examination Table – 1930 x 610 mm (76 x 24 inches)
17. Lavatory and Dressing Room
18. Door – at least 762 mm (30 inches)

* Dimensions given with floating keyboard stowed for transport and the Main Monitor down.

External Inputs and Outputs :

Environmental Requirements

Operating Temperature	10 to 35 C (50 to 96F)
Operating Humidity	30 to 80 % rH, non-condensing , Pressure : 70 –106 kPa
Heat Dissipation	3070 BTU/hour + 300 Btu for each person. Without lights, other equipment etc.
Storage Temperature	-10 to 50 C (-14 to 122 F) ,
Storage Humidity	30% - 80 % rH, non-condensing , Pressure : 70 –106 kPa
Lighting	Combination lighting system (dim/bright) is recommended. Keep in mind that lighting controls and dimmers can be a source of EMI which could degrade image quality.

Electrical Specifications

Voltage	100 –240 VAC +- %10 / 50, 60 Hz (+-2%) At 230 VAC -> up to 8A , at 100 VAC—> up to 10A
Power Consumption	1 KVA
Site Power Outlets	A dedicated AC power outlet must be within reach of the unit without extension cords
Inrush current (These values are estimations)	264 VAC, 50 Hz -> 6A, 60 Hz -> 5A 220 VAC, 50 Hz -> 5.5A , 60 Hz -> 6A 110 VAC, 50 Hz -> 9A, 60 Hz -> 11A 90 VAC, 50 Hz -> 13A, 60 Hz -> 12A
Power outage may occur	Requires a dedicated single branch circuit. To avoid circuit overload and possible loss of critical care equipment, make sure you DO NOT have any other equipment operating on the same circuit.
Acoustic Noise output	Less than 48 dB(A)

Please Note: For more information please refer to the product's service & user manuals.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

AESCULAP®

Description: Instruments, Surgical

Manufacturer: Aesculap, Inc. ((800) 258-1946)

Vendor: Aesculap, Inc. ((800) 258-1946)

Model: TBD

Alt ID: INS-SRG

Mfr #:

Vendor #:

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	4-Instruments	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	N/A	**Left:**	N/A
Depth:	N/A	**Right:**	N/A
Height:	N/A	**Front:**	N/A
Max Weight:	N/A	**Back:**	N/A
Mounting:	N/A	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Lift, Patient, Ceiling, 1-Bed
Manufacturer: Arjo Inc ((800) 323 1245)
Vendor: Arjo Inc ((800) 323 1245)
Model: MS 1000 4F ECS w/ Scale

Alt ID: LFT-O1B
Mfr #: LF21409 w/ 700-5441 w/ 700-05401-BOX w/ 700.00525
Vendor #: LF21409 w/ 700-5441 w/ 700-05401-BOX w/ 700.00525

Item ID: EXISTING

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Existing (Reuse)	Draft (Existing)	1	
				Total:	**1**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Locator, Vein
Manufacturer: AccuVein (816 997-9400)
Vendor: AccuVein (816 997-9400)
Model: AV500 Vein Viewing System

Alt ID: LOC-VEN
Mfr #: AV500
Vendor #: AV500

Vein locator. Intended use: Infrared light detection, digitally displays a map of the vasculature on the surface of the skin for medical procedures. Features: single button point and click technology, handheld assessment, no vents, chemical resistance, timeout choices, class 1 laser rating, standard viewing mode, inverse mode and 3 brightness levels. Green projection color, 4 to 12 inch working range and purple screen surround color. Includes charging cradle.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	2.00 in (51 mm)	**Left:**	N/A
Depth:	2.50 in (64 mm)	**Right:**	N/A
Height:	8.00 in (203 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.5 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	48
Hz:	60	**Amps:**	0.4
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Electrical reflects charging cradle.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	2	
				Total:	**2**	

AccuVein®

AccuVein AV500

Description

Weight	275 grams (9.7 oz.)
Size	5 x 6 x 20 cm (2" x 2.4" x 7.9")
Integrated Battery, BA500	Product contains integrated Li-Ion battery. 3.6V, 3,100 mAh
Continuous (vein light on) run time on full charge:	Typically, 120 minutes
Maximum charging time	Charging battery from 5% charged to 100% 3 hours 45 minutes
CC500 desktop charging cradle + PS510 power supply	5V 2.0A 100V-240V 50Hz-60Hz 0.4A
Product sealing	Dust / liquid IPx0

Environment

Operating	Temperature	4°C to 33°C (39°F to 90°F)
	Humidity	5% to 85% RH non-condensing
	Pressure	75kPa to 106kPa
Transport	Temperature	-20°C to 50°C (-4°F to 122°F)
	Humidity	5% to 85% RH non-condensing
Storage	Temperature	-20°C to 50°C (-4°F to 122°F)
	Humidity	5% to 85% RH non-condensing

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project
Specification Coversheet

Description: Laryngoscope Set, Video
Manufacturer: Verathon ((425) 867-1348)
Vendor: Verathon ((425) 867-1348)
Model: GlideScope Core Single-Use Premium WS + BFlex

Alt ID: LRY-SMB
Mfr #: 0270-0991
Vendor #: 0270-0991

Video laryngoscope. Features: Single-use bronchoscope, 10-inch touchscreen monitor, dual connection ports, picture-in-picture views-simultaneously, image and video capture Video playback and image gallery. Patient notes annotation, SpO2 and pulse rate reading on screen. On captured video, 180 degrees image rotation and HDMI output for external video display.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	20.98 in (533 mm)	**Left:**	N/A
Depth:	20.98 in (533 mm)	**Right:**	N/A
Height:	52.01 in (1321 mm)	**Front:**	N/A
Max Weight:	19 lbs (8.4 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	399.6
Hz:	60	**Amps:**	3.33
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height adjustable from 40 to 52.0078 inches.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

PRODUCT SPECIFICATIONS

SYSTEM SPECIFICATIONS, STANDARDS, & APPROVALS

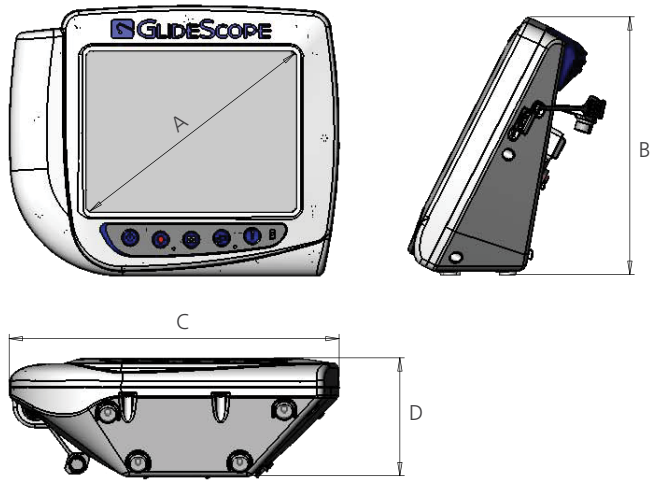
Table 9. System Specifications

GENERAL SPECIFICATIONS			
Classification:	Electrical Class II, Applied Part BF		
Line voltage:	Range: 100–240 V AC, 50 and 60 Hz. Connect to a medical-grade power supply. (If the provided power cord has a third prong, it is used as a functional ground.)		
DC power supply:	12 V DC, 3.33 A max		
Fuse:	Internal 2.5 A hold / 5 A trip, 15 V max		
Ingress protection against water:	Video monitor		IP54
	Single-use bronchoscope		IPX0
	GlideScope Video Monitor QuickConnect Cable		IPX7
Expected product life:	Single-use bronchoscope	BFlex 5.0	Refer to the "use by" date indicated by the ⌛ symbol on the package label.
		BFlex 5.8	
OPERATING & STORAGE SPECIFICATIONS			
Operating Conditions			
Temperature:	GlideScope BFlex Single-Use Bronchoscopes		10–35°C (50–95°F)
	QuickConnect Cables		
	Other system components		
Relative humidity:	GlideScope BFlex Single-Use Bronchoscopes		10–95%
	QuickConnect Cables		
	Other system components		0–95%
Atmospheric pressure:	GlideScope BFlex Single-Use Bronchoscopes		700–1060 hPa
	QuickConnect Cables		
	Other system components		
Shipping & Storage Conditions			
Temperature:	GlideScope BFlex Single-Use Bronchoscopes		-20–45°C (-4–113°F)
	QuickConnect Cables		
	Other system components		
Relative humidity:	GlideScope BFlex Single-Use Bronchoscopes		10–95%
	QuickConnect Cables		
	Other system components		0–95%
Atmospheric pressure:	GlideScope BFlex Single-Use Bronchoscopes		440–1060 hPa
	QuickConnect Cables		
	Other system components		

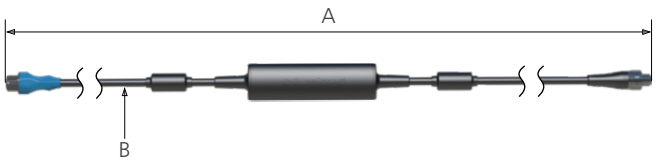
COMPONENT SPECIFICATIONS

Table 10. System Component Specifications

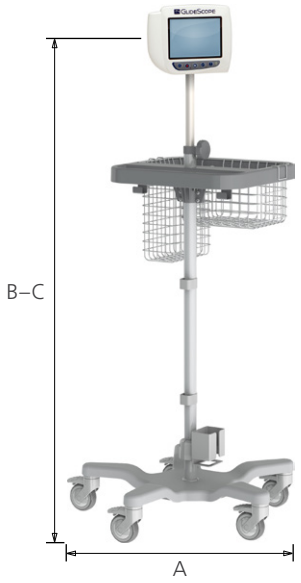
GLIDESCOPE VIDEO MONITOR (0570-0338)	
Specification	**Value**
Screen type and resolution	TFT Color VGA 640 x 480 px
Screen size (diagonal; A)	16.3 cm (6.4 in)
Height (B)	174 mm
Width (C)	223 mm
Depth (D)	80 mm
Weight	1.0 kg



GLIDESCOPE VIDEO MONITOR QUICKCONNECT CABLE (0600-0781)	
Specification	**Value**
Length (A)	1931 mm
Diameter (B)	6.8 mm

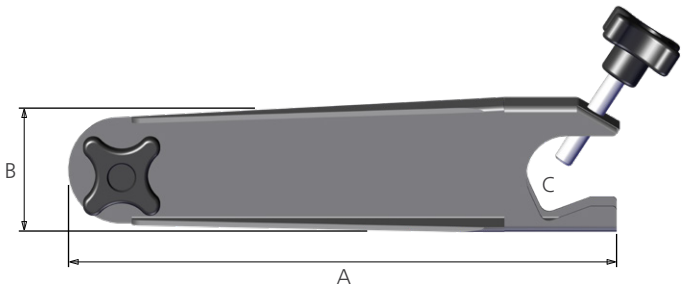


PREMIUM CART (0800-0537)	
Specification	Value
Wheelbase diameter (A)	53.3 cm
Minimum height (B)	101.6 cm
Maximum height (C)	132.1 cm
Weight	8.0–8.4 kg

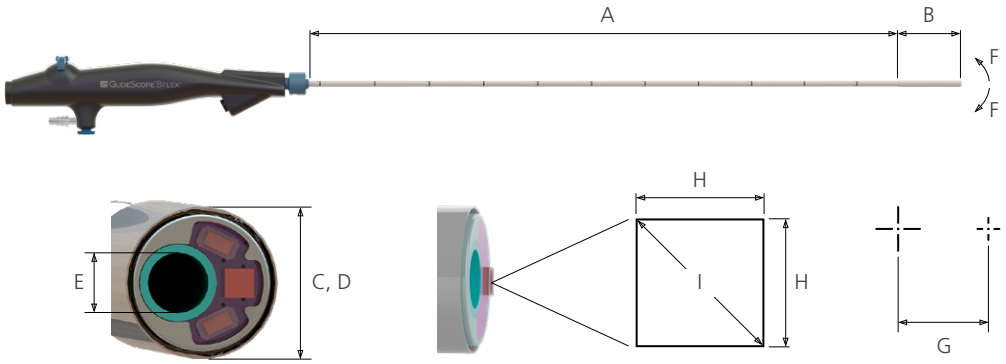


MOBILE STAND (0800-0410)	
Specification	Value
Wheelbase diameter (A)	61 cm
Minimum height (B)	76 cm
Maximum height (C)	122 cm

IV POLE MOUNT (0810-0200)	
Specification	Value
Weight	0.9 kg
Arm length (A)	27 cm
Width (B)	6.2 cm
Pole width range (C)	6.4–33 mm

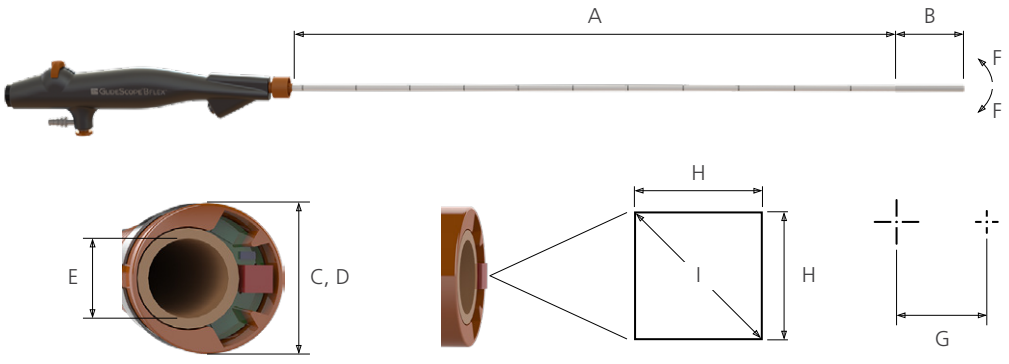


BFLEX 5.0 (0570-0374; SINGLE-USE SYSTEM)	
Specification	Value
Length of flexible insertion tube (A)	566 mm*
Length of distal tip (B)	44 mm
Outside diameter of flexible insertion tube (C)	5.0 mm
Maximum outside diameter of flexible insertion tube and distal tip (D)	5.5 mm
Minimum internal diameter of endotracheal tube	6.0 mm
Minimum inside diameter of working channel (E)	2.1 mm†
Maximum accessory width	2.0 mm
Length of working channel	696 mm‡
Volume of working channel	2.77 cc (2.77 mL)
Range of movement of distal tip (F)	130° up, 130° down
Depth of field (G)	5–50 mm
Direction of view, relative to center line of distal tip	0°
Field of view, horizontal/vertical (H)	85°
Field of view, diagonal (I)	120°



* *The protective sheathing of the distal tip extends 6 mm over the insertion tube.*
† *There is no guarantee that accessories selected solely using this minimum instrument channel width will be compatible in combination.*
‡ *There is no guarantee that accessories selected solely using maximum insertion portion width and working length will be compatible in combination.*

BFLEX 5.8 (0570-0381; SINGLE-USE SYSTEM)	
Specification	Value
Length of flexible insertion tube (A)	566 mm*
Length of distal tip (B)	44 mm
Outside diameter of flexible insertion tube (C)	5.8 mm
Maximum outside diameter of flexible insertion tube and distal tip (D)	6.35 mm
Minimum internal diameter of endotracheal tube	7.0 mm
Minimum inside diameter of working channel (E)	3.0 mm†
Maximum accessory width	2.6 mm
Length of working channel	696 mm‡
Volume of working channel	5.2 cc (5.2 mL)
Range of movement of distal tip (F)	115° up, 120° down
Depth of field (G)	5–50 mm
Direction of view, relative to center line of distal tip	0°
Field of view, horizontal/vertical (H)	85°
Field of view, diagonal (I)	120°



* *The protective sheathing of the distal tip extends 6 mm over the insertion tube.*

† *There is no guarantee that accessories selected solely using this minimum instrument channel width will be compatible in combination.*

‡ *There is no guarantee that accessories selected solely using maximum insertion portion width and working length will be compatible in combination.*

BATTERY SPECIFICATIONS

Table 11. Monitor Battery Specifications

CONDITION	DESCRIPTION
Battery type	Lithium-ion
Battery life	Under normal operating conditions, a fully charged battery lasts approximately 90 minutes
Charging time	Charging time off line will take no more than 6 hours from an empty battery to a full charge
Rated capacity	2150 mAh
Nominal voltage	7.2 V
Max charging voltage	8.4 V
Nominal weight	90 g (0.2 lbs)
Width	23 mm (0.9 in)
Length	391 mm (5.4 in)
Thickness	23 mm (0.9 in)

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Flowmeter, Air**

Manufacturer: Precision Medical ((610) 262-6090)

Vendor: Precision Medical ((610) 262-6090)

Model: Chrome (0-15 lpm, Ohmeda, Power Take Off)

Alt ID: MDG-AIR

Mfr #: 1MFA2005PTO

Vendor #: 1MFA2005PTO

Chrome air flowmeter. Features: With power take off, glass flow tube and front control knob. 0-15 lpm and Ohmeda connection.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	1.25 in (32 mm)	**Left:**	N/A
Depth:	2.50 in (64 mm)	**Right:**	N/A
Height:	6.50 in (165 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.5 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	Yes
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	3	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**32**	

PRECISION MEDICAL®

CHROME FLOWMETERS

The hospital standard in flowmeters

They're Durable...

The polycarbonate housings are extremely durable. They are impervious to chemical solutions normally used in a clinical setting preventing clouding and spidering. The polycarbonate flow tubes insure durability.

They're Accurate...

Our flowmeters use black glass flow indicator balls. Their exceptional sphericity and uniform weight contribute to a more accurate flowmeter than those using plastic floats.

They're Precise...

Highly accurate needle valves insure precise flow-settings the first time....every time.

They're Easy to Use...

The flow control knob is on the front of the flowmeter in clear sight of the operator unlike side mount knobs which are susceptible to damage during installation of additional equipment. Our black glass float makes the flow setting easy to read.

They're Dependable...

The housings and flow tubes carry a lifetime warranty and the needle valves carry a five (5) year warranty.

SPECIFICATIONS

Model	Gas	Scale	Increments	Accuracy
0-5 lpm	Oxygen	0-5 lpm	.25 lpm (starts at .5 lpm)	±.20 lpm
0-8 lpm	Oxygen	0-8 lpm	.5 lpm (starts at .5 lpm)	±.25 lpm
0-15 lpm	Oxygen	0-15 lpm	.5 lpm from .5 to 5 lpm 1 lpm from 5 to 15 lpm	±.25 lpm from .5 to 5 lpm ±.5 lpm above 6 to 15 lpm
0-15 lpm	Air	0-15 lpm	.5 lpm from .5 to 5 lpm 1 lpm from 5 to 15 lpm	±.25 lpm from .5 to 5 lpm ±.5 lpm above 6 to 15 lpm
0-70 lpm	Oxygen	0-70 lpm	5 lpm (starts at 10 lpm)	±3 lpm with Flush
0-70 lpm	Air	0-70 lpm	5 lpm (starts at 10 lpm)	±3 lpm with Flush

Flowmeters calibrated at 50 PSI, 70°F, standard atmospheric pressure. Specifications are subject to change without prior notice.

ORDERING INFORMATION

	O2 0-5 LPM	O2 0-8 LPM	O2 0-15 LPM	Air 0-15 LPM	O2 0-70 LPM	Air 0-70 LPM
No Adaptor (1/8 NPTF)	1MFA3501	1MFA4001	1MFA1001	1MFA2001	1MFA8001	1MFA9001
 **DISS Female Hex Nut**	1MFA3502	1MFA4002	1MFA1002	1MFA2002	1MFA8002	1MFA9001
 **DISS Female Hand Tight**	1MFA3503	1MFA4003	1MFA1003	1MFA2003	1MFA8003	1MFA9003
 **DISS Male**	1MFA3504	1MFA4004	1MFA1004	1MFA2004	1MFA8004	1MFA9004
 **Ohmeda**	1MFA3505	1MFA4005	1MFA1005	1MFA2005	1MFA8005	1MFA9005
 **Chemetron**	1MFA3506	1MFA4006	1MFA1006	1MFA2006	1MFA8006	1MFA9006
 **Oxequip**	1MFA3507	1MFA4007	1MFA1007	1MFA2007	1MFA8007	1MFA9007
 **Puritan-Bennett**	1MFA3508	1MFA4008	1MFA1008	1MFA2008	1MFA8008	1MFA9008
 **Schrader**	1MFA3509	1MFA4009	1MFA1009	1MFA2009	1MFA8009	1MFA9009

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Flowmeter, Oxygen
Manufacturer: Precision Medical ((610) 262-6090)
Vendor: Precision Medical ((610) 262-6090)
Model: Chrome (0-15 lpm, Ohmeda, Power Take Off)

Alt ID: MDG-OXF
Mfr #: 1MFA1005PTO
Vendor #: 1MFA1005PTO

Chrome body oxygen flowmeter. Features: With power take off, glass flow tube and front control knob. 0-15 lpm flow range, Ohmeda inlet connection.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	1.25 in (32 mm)	**Left:**	N/A
Depth:	2.50 in (64 mm)	**Right:**	N/A
Height:	6.50 in (165 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.5 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	Yes
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	6	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	18	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	34	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	4	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	2	
				Total:	**64**	

PRECISION MEDICAL®

CHROME FLOWMETERS

The hospital standard in flowmeters

They're Durable...

The polycarbonate housings are extremely durable. They are impervious to chemical solutions normally used in a clinical setting preventing clouding and spidering. The polycarbonate flow tubes insure durability.

They're Accurate...

Our flowmeters use black glass flow indicator balls. Their exceptional sphericity and uniform weight contribute to a more accurate flowmeter than those using plastic floats.

They're Precise...

Highly accurate needle valves insure precise flow-settings the first time....every time.

They're Easy to Use...

The flow control knob is on the front of the flowmeter in clear sight of the operator unlike side mount knobs which are susceptible to damage during installation of additional equipment. Our black glass float makes the flow setting easy to read.

They're Dependable...

The housings and flow tubes carry a lifetime warranty and the needle valves carry a five (5) year warranty.

SPECIFICATIONS

Model	Gas	Scale	Increments	Accuracy
0-5 lpm	Oxygen	0-5 lpm	.25 lpm (starts at .5 lpm)	±.20 lpm
0-8 lpm	Oxygen	0-8 lpm	.5 lpm (starts at .5 lpm)	±.25 lpm
0-15 lpm	Oxygen	0-15 lpm	.5 lpm from .5 to 5 lpm 1 lpm from 5 to 15 lpm	±.25 lpm from .5 to 5 lpm ±.5 lpm above 6 to 15 lpm
0-15 lpm	Air	0-15 lpm	.5 lpm from .5 to 5 lpm 1 lpm from 5 to 15 lpm	±.25 lpm from .5 to 5 lpm ±.5 lpm above 6 to 15 lpm
0-70 lpm	Oxygen	0-70 lpm	5 lpm (starts at 10 lpm)	±3 lpm with Flush
0-70 lpm	Air	0-70 lpm	5 lpm (starts at 10 lpm)	±3 lpm with Flush

Flowmeters calibrated at 50 PSI, 70°F, standard atmospheric pressure. Specifications are subject to change without prior notice.

ORDERING INFORMATION

	O2 0-5 LPM	O2 0-8 LPM	O2 0-15 LPM	Air 0-15 LPM	O2 0-70 LPM	Air 0-70 LPM
No Adaptor (1/8 NPTF)	1MFA3501	1MFA4001	1MFA1001	1MFA2001	1MFA8001	1MFA9001
 **DISS Female Hex Nut**	1MFA3502	1MFA4002	1MFA1002	1MFA2002	1MFA8002	1MFA9001
 **DISS Female Hand Tight**	1MFA3503	1MFA4003	1MFA1003	1MFA2003	1MFA8003	1MFA9003
 **DISS Male**	1MFA3504	1MFA4004	1MFA1004	1MFA2004	1MFA8004	1MFA9004
 **Ohmeda**	1MFA3505	1MFA4005	1MFA1005	1MFA2005	1MFA8005	1MFA9005
 **Chemetron**	1MFA3506	1MFA4006	1MFA1006	1MFA2006	1MFA8006	1MFA9006
 **Oxequip**	1MFA3507	1MFA4007	1MFA1007	1MFA2007	1MFA8007	1MFA9007
 **Puritan-Bennett**	1MFA3508	1MFA4008	1MFA1008	1MFA2008	1MFA8008	1MFA9008
 **Schrader**	1MFA3509	1MFA4009	1MFA1009	1MFA2009	1MFA8009	1MFA9009

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Regulator, Suction, Intermittent/Continuous**

Manufacturer: Precision Medical ((610) 262-6090)

Vendor: Precision Medical ((610) 262-6090)

Model: PM3303 (DISS HT/Tubing Npl)

Alt ID: MDG-SCI

Mfr #: PM3303

Vendor #: PM3303

Intermittent/Continuous suction regulator. Features: DISS male bottom connection, DISS Hand Tight vacuum source connection (female). 3 modes: INT, OFF and REG. Gauge readings: 0-200 mmHg and full vacuum indication, vacuum operating range: 0-200 mmHg. Specify label color when ordering.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	2.80 in (71 mm)	**Left:**	N/A
Depth:	4.40 in (112 mm)	**Right:**	N/A
Height:	5.30 in (135 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.5 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / Yes
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	6	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	18	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	34	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	4	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	2	
				Total:	**64**	

Vacuum Regulators

Continuous

PM3000, PM3100, PM3500 & PM3600

Continuous-Intermittent

PM3300 & PM3400

It's Field Serviceable...

The unique modular design makes service a breeze for any biomed or central supply department. Continuous VacRegs are made up of six (6) easy-to-replace modular components. Continuous-Intermittent VacRegs are made up of eight (8) easy-to-replace modular components.

It's Durable...

Unlike the plastic inlet and outlet connections on most competitor's units, the cast metal backplate connections are extremely durable, saving down time and unnecessary repair costs.

It's Compact...

As a result of its modular design, the unit is 25-50% smaller than other suction regulators making it the product of choice for crowded wall and rail areas.

It's Sturdy...

The case is made of strong ABS plastic and houses the gauge for extra protection.

It's Infection Control Friendly...

The smooth surface and rounded corners of the housing make cleaning and disinfection wipe down easier.

It's User-Friendly...

The large control knob and easy-to-read settings make vacuum adjustments simple, even in emergency situations. The optional colors are convenient for product locations.

It's Safe...

The **Pediatric** vacuum regulator is restricted to 170mmHg (±10mmHg) to prevent dangerous high vacuum situations. The gauge face is imprinted with the Precision Medical's "Stork Symbol" to indentify the unit for pediatric applications.

It's Unique...

A digital/analog gauge allows for the accuracy of digital and dependability of analog. Analog gauges on current models can be replaced with new digital/analog gauge.

Vacuum Regulator Specifications

Continuous Models

Gauge Range:

PM3000 & PM3100	0-200 mmHg and "Full Vacuum"
PM3000HV & PM3100HV	0-300 mmHg and "Max Vacuum"
PM3500	0-150 mmHg
PM3600	0-760 mmHg

Gauge Accuracy:

Analog:	± 5 % of Max	
Digital/Analog:	Digital Display:	± 1% of Full Scale
	Analog Gauge:	± 5% of MAX within ref. Indicator

Modes:

PM3000 & PM3500	OFF - REG.
PM3100 & 3600	LINE - OFF - REG

Maximum Vacuum:

PM3000 & PM3100	REG. Mode @ Full Vac - 396 mmHg
PM3500	Restricted to 170 mmHg (± 10 mmHg max.)
PM3600	REG. Mode A Full Vac - 760 mmHg

Weight:

1.1 lbs. (.50 kg)

Dimensions:

Length:	3.7 in. (9.4 cm)
Width:	2.8 in. (7.1 cm)
Height:	5.2 in. (13.2 cm)

Continuous-Intermittent Models

Gauge Range:

PM3300	0-200 mmHg and "Full Vacuum"
PM3300HV	0-300mmHg and "Max Vacuum"
PM3400	0-150 mmHg

Gauge Accuracy:

Analog:	± 5 % of Max	
Digital/Analog:	Digital Display:	± 1% of Full Scale
	Analog Gauge:	± 5% of MAX within ref. Indicator

Modes:

PM3300 & PM3400	REG - OFF - INT

Maximum Vacuum:

PM3300	REG. Mode @ Full Vac- 396 mmHg
PM3400	Restricted to 170 mmHg (± 10 mmHg max.)

Weight:

1.2 lbs. (.54 kg)

Dimensions:

Length:	4.4 in. (11.2 cm)
Width:	2.8 in. (7.1 cm)
Height:	5.3 in. (13.4 cm)

Specifications are subject to change without prior notice.

Continuous Subglottic Suction Regulator Specifications

Model Series PM9100

Scaled Suction Range:	20 - 70 mmHg (2.7 – 9.3 kPa)
Scale Accuracy:	+/- 3 mmHg (.4 kPa)
Maximum Regulator Vacuum Setting:	85 mmHg (11.3 kPa)
Flow:	37 lpm @ 20 inHg @ Max of 85 mmHg (54 lpm in "Push to Clear" mode)
Weight (without fittings):	.38 lb (.17 kg)
Dimensions (without fittigs):	
Length:	3.50 in. (88.9 mm)
Width:	2.19 in. (55.6 mm)
Height:	3.75 in. (95.3 mm)

All specifications obtained using a vacuum source of 21 inHg (71.1 kPa).
Specifications are subject to change without prior notice.
Vacuum scale & flows are for reference only.
(Verify vacuum pressure setting with PM760 Digital VacCheck)

Ordering Information

Vacuum Regulator or Vacuum Regulator with Subglottic Suction Regulator

Part numbers for Vacuum Regulators are defined by the basic model number and option suffixes:

PM3XXX

Base Model Number

see chart below

D E HV

Suffixes:

D	Digital Model
HV	High Range Vacuum Gauge (0-300mmHg)
MR	MRI Safe (Continuous only)
C	Canadian Color Coding of Fittings
T	includes VacTrap (DISS Male and Ohmeda Style Trap Bottle connections only)
VL	with Left mounted PM9100
VR	with Right mounted PM9100 (as viewed from front of device)

– DB

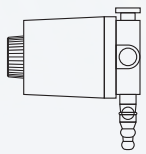
Labeling Color

-DB	Dark Blue
-Y	Yellow
-MG	Mint Green
-P	Purple
-G	Gray
-R	Red
-LB	Light Blue

Vacuum Regulator only

BOTTOM CONNECTION (inlet)	VACUUM SOURCE CONNECTION (on back of unit)										
	1/8" N.P.T.F.	DISS HEX	DISS H.T.	OHMEDA	CHEMETRON	OXEQUIP (Old Style)	OXEQUIP (Medstar)	PURITAN-BENNETT	SCHRADER	TUBING NIPPLE	90° TUBING NIPPLE
TUBING NIPPLE	PM3001 PM3101 PM3501 PM3601	PM3002 PM3102 PM3502 PM3602	PM3003 PM3103 PM3503 PM3603	PM3004 PM3104 PM3504 PM3604	PM3005 PM3105 PM3505 PM3605	PM3006 PM3106 PM3506 PM3606	PM3007 PM3107 PM3507 PM3607	PM3008 PM3108 PM3508 PM3608	PM3009 PM3109 PM3509 PM3609	PM3010 PM3110 PM3510 PM3610	PM3011 PM3111 PM3511 PM3611
	PM3301 PM3401	PM3302 PM3402	PM3303 PM3403	PM3304 PM3404	PM3305 PM3405	PM3306 PM3406	PM3307 PM3407	PM3308 PM3408	PM3309 PM3409	PM3310 PM3410	PM3311 PM3411
DISS MALE	PM3012 PM3112 PM3512 PM3612	PM3013 PM3113 PM3513 PM3613	PM3014 PM3114 PM3514 PM3614	PM3015 PM3115 PM3515 PM3615	PM3016 PM3116 PM3516 PM3616	PM3017 PM3117 PM3517 PM3617	PM3018 PM3118 PM3518 PM3618	PM3019 PM3119 PM3519 PM3619	PM3020 PM3120 PM3520 PM3620	PM3021 PM3121 PM3521 PM3621	PM3022 PM3122 PM3522 PM3622
	PM3312 PM3412	PM3313 PM3413	PM3314 PM3414	PM3315 PM3415	PM3316 PM3416	PM3317 PM3417	PM3318 PM3418	PM3319 PM3419	PM3320 PM3420	PM3321 PM3421	PM3322 PM3422
OHMEDA STYLE TRAP BOTTLE CONNECTION	PM3023 PM3123 PM3523 PM3623	PM3024 PM3124 PM3524 PM3624	PM3025 PM3125 PM3525 PM3625	PM3026 PM3126 PM3526 PM3626	PM3027 PM3127 PM3527 PM3627	PM3028 PM3128 PM3528 PM3628	PM3029 PM3129 PM3529 PM3629	PM3030 PM3130 PM3530 PM3630	PM3031 PM3131 PM3531 PM3631	PM3032 PM3132 PM3532 PM3632	PM3033 PM3133 PM3533 PM3633
	PM3323 PM3423	PM3324 PM3424	PM3325 PM3425	PM3326 PM3426	PM3327 PM3427	PM3328 PM3428	PM3329 PM3429	PM3330 PM3430	PM3331 PM3431	PM3332 PM3432	PM3333 PM3433
45 TRAP BOTTLE CONNECTION	PM3034 PM3134 PM3534 PM3634	PM3035 PM3135 PM3535 PM3635	PM3036 PM3136 PM3536 PM3636	PM3037 PM3137 PM3537 PM3637	PM3038 PM3138 PM3538 PM3638	PM3039 PM3139 PM3539 PM3639	PM3040 PM3140 PM3540 PM3640	PM3041 PM3141 PM3541 PM3641	PM3042 PM3142 PM3542 PM3642	PM3043 PM3143 PM3543 PM3643	PM3044 PM3144 PM3544 PM3644
	PM3334 PM3434	PM3335 PM3435	PM3336 PM3436	PM3337 PM3437	PM3338 PM3438	PM3339 PM3439	PM3340 PM3440	PM3341 PM3441	PM3342 PM3442	PM3343 PM3443	PM3344 PM3444
1/8" N.P.T.F	PM3000 PM3100 PM3500 PM3600	PM3046 PM3146 PM3546 PM3646	PM3047 PM3147 PM3547 PM3647	PM3048 PM3148 PM3548 PM3648	PM3049 PM3149 PM3549 PM3649	PM3050 PM3150 PM3550 PM3650	PM3051 PM3151 PM3551 PM3651	PM3052 PM3152 PM3552 PM3652	PM3053 PM3153 PM3553 PM3653	PM3054 PM3154 PM3554 PM3654	PM3055 PM3155 PM3555 PM3655
	PM3300 PM3400	PM3346 PM3446	PM3347 PM3447	PM3348 PM3448	PM3349 PM3449	PM3350 PM3450	PM3351 PM3451	PM3352 PM3452	PM3353 PM3453	PM3354 PM3454	PM3355 PM3455

Continuous Subglottic Suction Regulator-PM9100 only



BOTTOM CONNECTION (inlet)	VACUUM SOURCE CONNECTION (on back of unit)								
	1/8" N.P.T.F.	DISS HEX	DISS H.T.	OHMEDA	CHEMETRON	OXEQUIP (Old Style)	OXEQUIP (Medstar)	PURITAN-BENNETT	Street T
TUBING NIPPLE	PM9101	PM9102	PM9103	PM9104	PM9105	PM9106	PM9107	PM9108	PM9109

MUST add "L" or "R" suffix to all part numbers listed above for Right or Left Source Connection (as viewed from front of device).

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Mirror, Vanity
Alt ID: MIR-V24
Manufacturer: Bobrick Washroom Equipment, Inc. ((818) 982-9600)
Mfr #:
Vendor: Bobrick Washroom Equipment, Inc. ((818) 982-9600)
Vendor #:
Model: B-166 - 2448
Item ID: TA-12

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	Provide blocking as required.
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	Provide blocking as required.
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	Provide blocking as required.
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	Provide blocking as required.
				Total:	**8**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Monitor, Physiologic, Bedside, With Mobile Stand**
Alt ID: MON-BSM
Manufacturer: Philips Healthcare - Monitoring Systems ((978) 687-1501)
Mfr #: M8105A/A04/B41/989803002531
Vendor: Philips Healthcare - Monitoring Systems ((978) 687-1501)
Vendor #: M8105A/A04/B41/989803002531
Model: Intellivue MP5 (4 wave w/stand)

Portable patient monitor with mobile floor stand. 4 wave capability. Configured for ECG, RESP, NBP, SpO2, 1BP AND 1 continuous Temp, and predictive Suretemp. Integrated recorder.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	21.00 in (533 mm)	**Left:**	N/A
Depth:	21.00 in (533 mm)	**Right:**	N/A
Height:	56.00 in (1422 mm)	**Front:**	N/A
Max Weight:	29 lbs (13.2 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	65
Hz:	60	**Amps:**	1.3
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

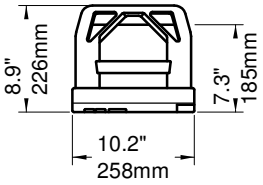
Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	2	
				Total:	**2**	

PHILIPS
sense and simplicity

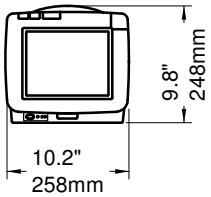
IntelliVue Patient Monitor - MP5

Standard Equipment

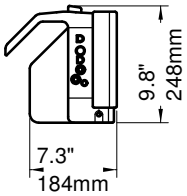
Top



Front



Side



Philips IntelliVue MP5 (M8105A)

Dimensions: 10.2" W x 9.8" H x 7.3" D
Weight: 8.8 lbs. (with ECG/Resp, NBP, SpO_2, and battery)
Heat Dissipation: < 137 Btu/hr. average, < 222 Btu/hr. peak
Power: < 40 Watts average, < 65 Watts peak

Environmental Requirements for General Equipment Locations

Heating, ventilation, air conditioning requirement for general equipment locations must maintain temperature at 32 to 95 degrees Fahrenheit and non-condensing relative humidity at 15% to 95%.

Power Requirements

15 Amp dedicated duplex outlet within 3' of the rear of unit(s).
1.3A @ 115 VAC

Network Requirements

Ethernet 10 base T outlet within 3' of the rear of the unit. All network drops are to be category 5 or higher certified.

Installation Guide

Philips MP5 Roll Stand Kit with Fixed Tilt Mount

The purpose of this guide is to:

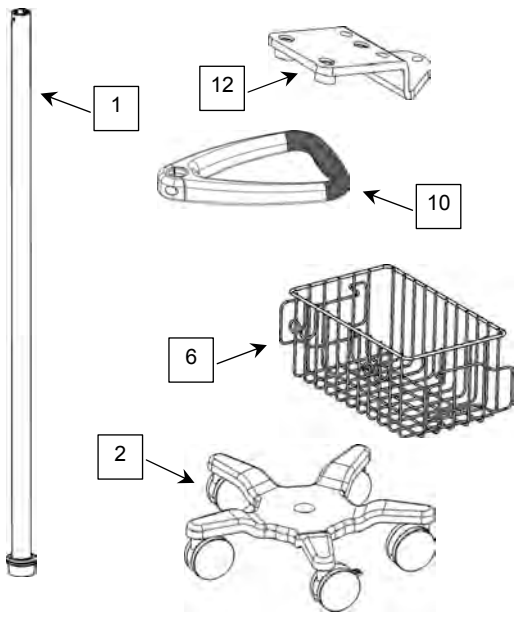
1. *Describe assembly of Roll Stand (pages 2 – 4).*
2. *Describe mounting of monitor on Roll Stand (pages 4 – 5).*

WARNING: USE OF THIS ROLL STAND FOR INSTRUMENTS OTHER THAN THOSE DESCRIBED IN THIS DOCUMENT MAY RESULT IN INJURY DUE TO TIPPING OF THE ROLL STAND. THE CUSTOMER SHOULD VERIFY THE STABILITY OF ANY DEVIATION FROM THE CONFIGURATIONS SHOWN.

Parts Reference

The following parts and hardware are included with this installation kit (hardware not shown):

Item #	Description	Qty
1	Post, 40"	1
2	Base, 21"	1
3	5/16-18 x 1" Hex Head Cap Screw (HHCS)	1
4	5/16 Flat Washer	1
5	5/16 Split Lock Washer	1
6	Utility Basket	1
7	Basket Clip	2
8	#8-32 x 7/8" Pan Head Machine Screw (PHMS)	2
9	#8-32 Hex Nut	2
10	Handle	1
11	#10-32 x 9/16" PHMS	4
12	Fixed Tilt Mount	1
13	M6 x 10mm Flat Head Machine Screw (FHMS)	3
14	M6 x 8mm PHMS	2



Tools Required: Phillips screwdriver (not provided), 1/2" [13mm] wrench (not provided).

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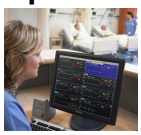
Specification Coversheet



Description: **Monitor, Central Station, 9 - 15 Patient**
Alt ID: MON-CNS
Manufacturer: Philips Healthcare - Monitoring Systems ((978) 687-1501)
Mfr #:
Vendor: Philips Healthcare - Monitoring Systems ((978) 687-1501)
Vendor #:
Model: IntelliVue

12 patient central monitoring station. System consists of multiple components and will vary per project. Contact Philips for customized specification package.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	REM	**Left:**	N/A
Depth:	REM	**Right:**	N/A
Height:	REM	**Front:**	N/A
Max Weight:	REM	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	110	**Watts:**	*
Hz:	60	**Amps:**	15
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	Yes	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
15 amp dedicated circuit required.
System consists of multiple components and will vary per project. Contact Philips for customized specification package.
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

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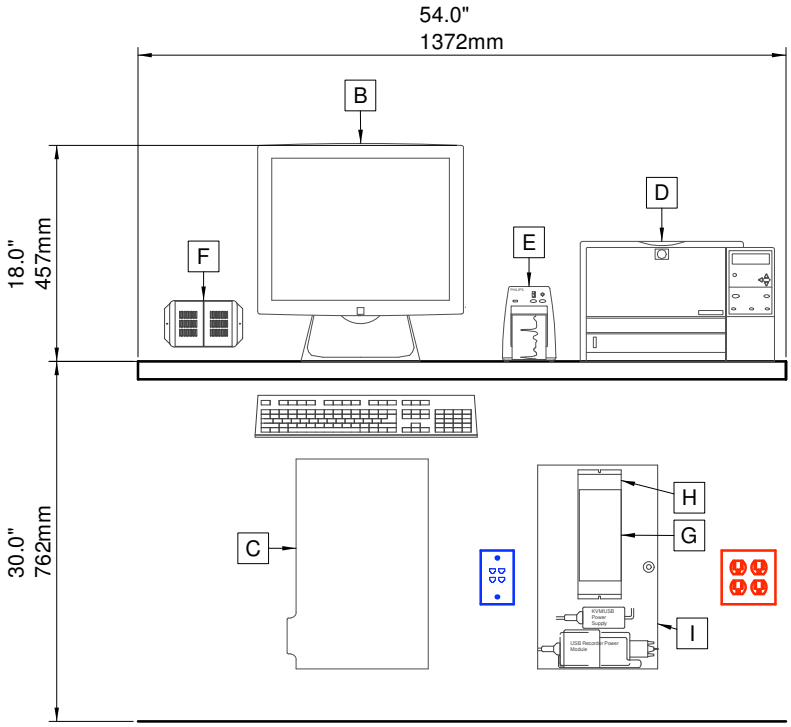
IntelliVue Information Center with LCD Display - Remote PC Configuration

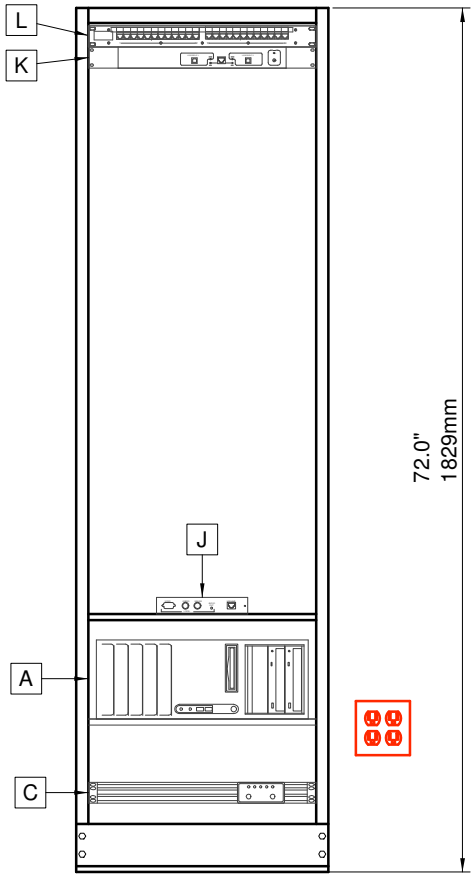
(Typical layout - not site specific)

Remote PC



Rack Components

(typical layout, not site specific)



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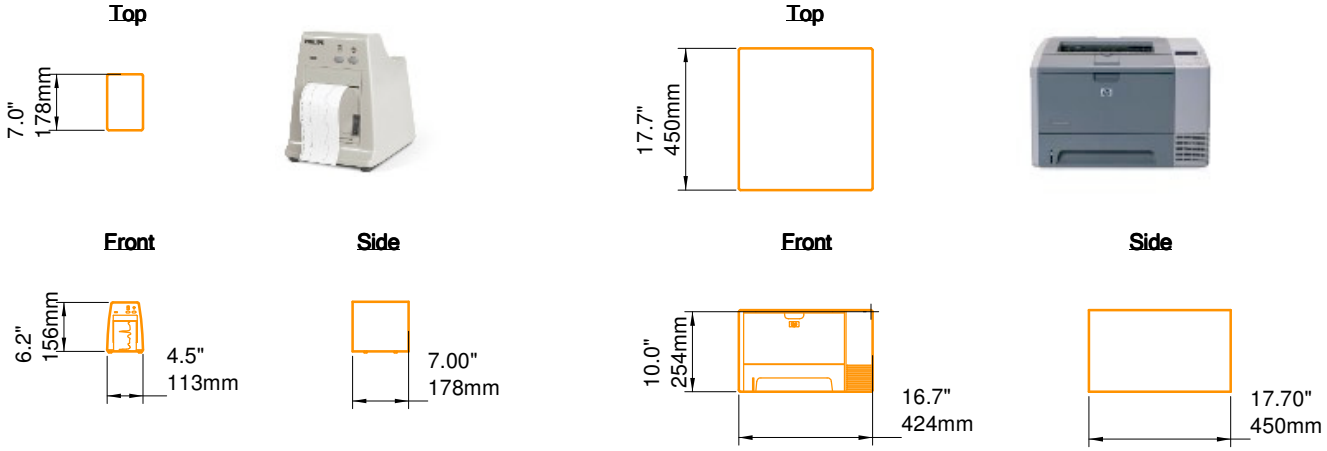
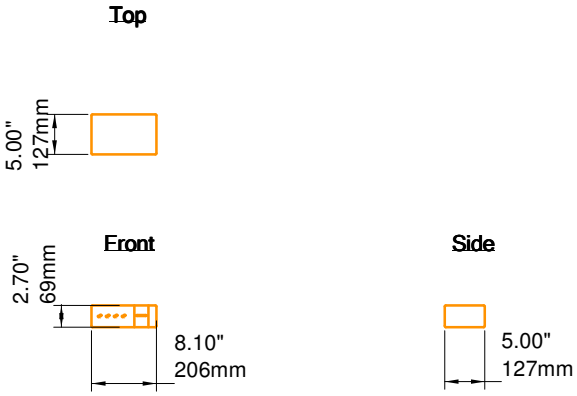
Infomation Center Peripherals

(Typical layout - not site specific)



M3176C USB Recorder Module
Dimensions: 4.5" W x 6.25" H x 7.0" D
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: ---

HP LaserJet 2400
Dimensions: 15.7" W x 10.2" H x 17.7" D
Weight: 36 lbs.
Heat Dissipation: --- Btu/hr.
Power: 5.3A @ 117VAC



KVM Keyboard Switch
Dimensions: 8.1" W x 1.9" H x 5.0" D
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: ---

Environmental Requirements for General Equipment Locations

Heating, ventilation, air conditioning requirement for general equipment locations must maintain temperature at 62 to 82 degrees Fahrenheit and non-condensing relative humidity at 30 to 60%.

Power Requirements

110 Volt, 15 Amp dedicated duplex outlet within 3' of the rear of unit(s).

Network Requirements

N/A

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IntelliVue Information Center with LCD Display - Remote PC Configuration

(Typical layout - not site specific)

A **Information Center PC**

Dimensions: 6.6" W x 17.7" H x 17.8" D
Weight: 32.5 lbs.
Heat Dissipation: 1595 Btu/hr. (max)
Power: 5.2A @ 115VAC

B **LCD Display**

Dimensions: 18" H x 17.2" W x 9.49" D
Weight: 22.0 lbs
Heat Dissipation: N/A
Power: 0.5A @ 115 VAC, 40W typ

C **Watchdog UPS (862123)**

Dimensions: 17.5" W x 1.75" H x 11.75" D
Weight: 19 lbs.
Heat Dissipation: 65 Btu/hr. (nominal)
437Btu/hr (Max)
Power: 5.6A @ 115VAC
Rackmount option available

D **HP LaserJet 2400 (865037)**

Dimensions: 15.7" W x 10.2" H x 17.7" D
Weight: 36 lbs.
Heat Dissipation: --- Btu/hr.
Power: 5.3A @ 115VAC

E **USB Recorder Module (M3176C)**

Dimensions: 4.5" W x 6.25" H x 7.0" D
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: ---

F **Alarm Speaker**

Dimensions: 4.5" W x 6.25" H x 7.0" D
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: ---

G **KVM Extender (Receiver)**

Dimensions: 7.56" W x 1.4" H x 3.5" D
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: ---

H **USB Extender (Receiver)**

Dimensions: 10.8" W x 1.4" H x 3.4" D
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: 100mA @ 5VDC

I **Utility Box for Remote PC Devices**

Dimensions: 10.0" W x 17.0" H x 4.0" D
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: ---

J **Single Video KVM Extender (Sender)**
Shown on 1U rack shelf

Dimensions: 7.6" W x 1.4" H x 3.5" D
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: ---

K **USB Extender (Sender)**
For (1) USB Recorder and up to (2) Touch Screen Displays

Dimensions: 14.0" W x 1.8" H x 4.2" D
Rack Space: 1U
Weight: --- lbs.
Heat Dissipation: --- Btu/hr.
Power: 100mA @ 5VDC

L **Patch Panel**

Note:

Equipment shown is a nominal configuration for a Philips IntelliVue Information Center installation with the computer remote from the Nurses/Monitoring Station. The actual equipment may vary from that shown.
Depending on other monitoring equpment purchased, there may be additional equipment present.
Cable requirements shown are for the Remote PC only. Additional cable may be required based on the monitoring equipment purchased.

Environmental Requirements for General Equipment Locations

Heating, ventilation, air conditioning requirement for general equipment locations must maintain temperature at 62 to 82 degrees Fahrenheit and non-condensing relative humidity at 30 to 60%.

Power Requirements

15 Amp dedicated quad outlet within 3' of the rear of unit(s).

Network /Cable Requirements

Ethernet 10/100 base T outlet within 3' of the rear of the computer(s). All network drops are to be category 5e or higher certified.
Minimum cable requirements: (2) Cat-5e UTP, (2) Cat-5e STP.

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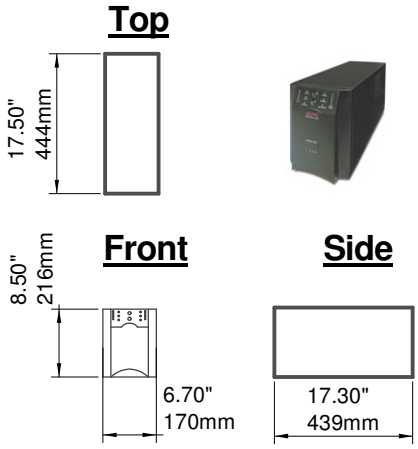
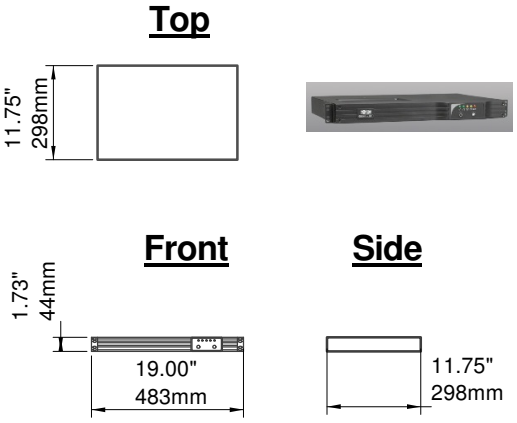
Uninterrupted Power Supply (UPS)

(Typical layout - not site specific)



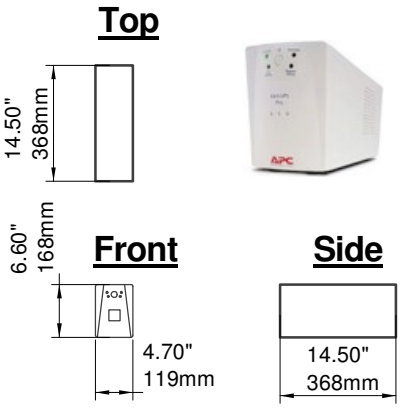
1000VA APC Smart UPS

Dimensions: 8.5" H x 6.7" W x 17.3" D
Weight: 60.0 lbs
Heat Dissipation: 30 Btu/hr
Power: 6.0A @ 110 VAC



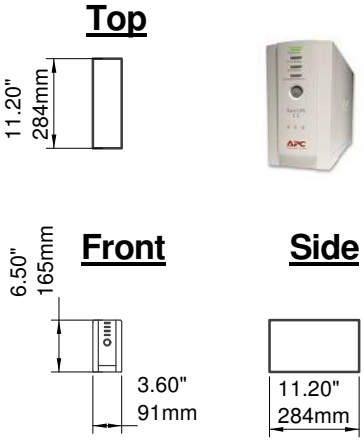
Watchdog UPS
Tripplite 500VA Rackmount UPS

Dimensions: 1.7" H x 19.0" W x 11.75" D
Weight: 19.0 lbs
Heat Dissipation: 65 Btu/hr
Power: 5.6A @ 110 VAC



650VA APC UPS

Dimensions: 6.6" H x 4.7" W x 14.5" D
Weight: 25.1 lbs
Heat Dissipation: 70 Btu/hr
Power: 6.0A @ 110 VAC



350VA CS APC UPS

Dimensions: 6.5" H x 3.6" W x 11.2" D
Weight: 12.5 lbs
Heat Dissipation: 20 Btu/hr
Power: 2.5A @ 110 VAC

Environmental Requirements for General Equipment Locations

Heating, ventilation, air conditioning requirement for general equipment locations must maintain temperature at 62 to 82 degrees Fahrenheit and non-condensing relative humidity at 30 to 60%.

Power Requirements

110 Volt, 15 Amp dedicated duplex outlet within 3' of the rear of unit(s).

Network Requirements

N/A

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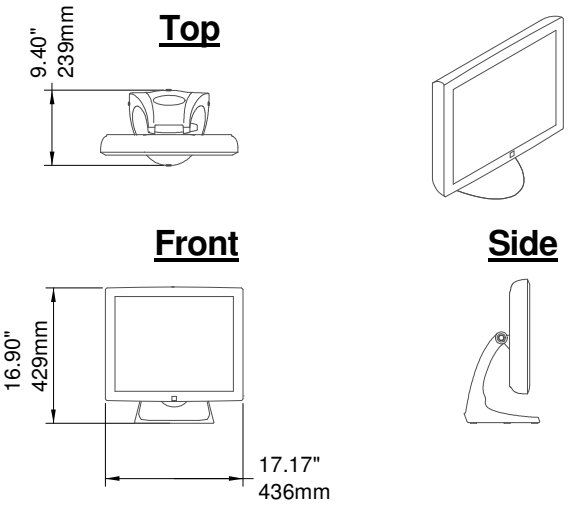
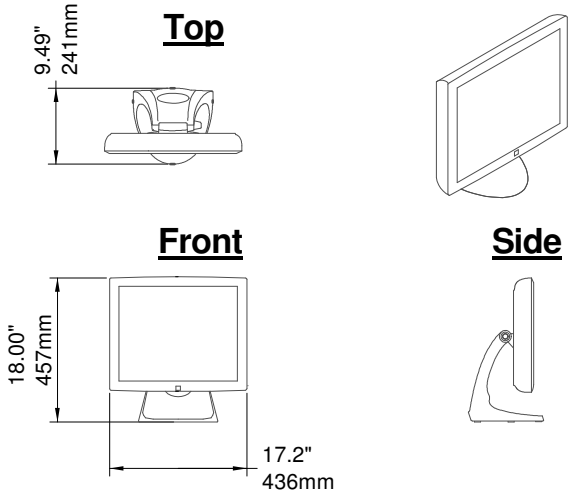
LCD Displays

(Typical layout - not site specific)



17" LCD Touchscreen Display

Dimensions: 16.90" H x 17.17" W x 9.40" D
Weight: 22.0 lbs
Heat Dissipation: N/A
Power: 0.5A @ 117 VAC



19" LCD Touchscreen Display

Dimensions: 18" H x 17.2" W x 9.49" D
Weight: 22.0 lbs
Heat Dissipation: N/A
Power: 0.5A @ 117 VAC, 40W typ

Environmental Requirements for General Equipment Locations

Heating, ventilation, air conditioning requirement for general equipment locations must maintain temperature at 62 to 82 degrees Fahrenheit and non-condensing relative humidity at 30 to 60%.

Power Requirements

110 Volt, 15 Amp dedicated duplex outlet within 3' of the rear of unit(s).

Network Requirements

N/A

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Monitor, Blood Glucose, Point-of-Care**
Alt ID: MON-GLC
Manufacturer: Roche Diagnostics Corporation (800-428-5076)
Mfr #: 05060311001/05060290001
Vendor: Roche Diagnostics Corporation (800-428-5076)
Vendor #: 05060311001/05060290001
Model: ACCU-CHEK Inform II Meter & Base Unit

Hand held monitor for Point of Care blood glucose testing. Uses test strips. Results in 5 seconds from 0.6 µ sample. Configured with base unit for charging and connectivity.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	4.75 in (121 mm)	**Left:**	N/A
Depth:	4.00 in (102 mm)	**Right:**	N/A
Height:	7.75 in (197 mm)	**Front:**	N/A
Max Weight:	2 lbs (0.9 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	204
Hz:	60	**Amps:**	1.7
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
				Total:	**1**	

Accu-Chek® Inform II meter

The first wireless hospital glucose meter

Integral barcode scanner
Advanced bar code scanning for accurate patient ID confirmation

Test strip port
Allows easy dosing of the Accu-Chek Inform II test strip

Cover
Meter cover withstands robust cleaning and disinfection

Touch screen
Allows for easy entry of information including patient ID and operator ID

Flexible connectivity
Hardwire base unit or base unit hub to network or WLAN enabled for immediate transfer of patient results to the hospital medical record

Battery
50 tests after 4 hour recharge

Code key reader
Centralized entry of strip information into meter enables central control ensuring only approved test strip lots are used for testing

Roche

cobas®
Life needs answers

Accu-Chek® Inform II meter

Technical specifications

Specification	Meter
Height	44 mm / 1.73 in
Width	95 mm / 3.74 in
Length	193 mm / 7.60 in
Weight	347 g (with rechargeable battery)
User interface	Touchscreen and barcode scanner
Result memory	At least 1,000 results
Operating temperature (review functions only)	3 to 50 °C (37 to 122 °F)
Storage temperature	5 to 40 °C / 41 to 104 °F at 10 to 85% RH (non-condensing)
Humidity (operating)	10 to 90% RH (non-condensing)
Air pressure	0.7 to 1.06 bar / 70 to 106 kPa
Input voltage	+ 7.5 V DC
Input frequency	DC
Input current	1.7 A (max)
Battery	Lithium-ion rechargeable (8 hr to full charge)
Tests	50 tests after 4 hours recharge

Key technical features

First truly wireless hospital glucose meter with optional in-built WiFi card	No need to dock the meter to transmit results
	Helps to enable faster therapeutic decision making to improve patient care
	Real-time updates to patient information for continuity of care
	Real-time control of both meters and operators
Flexible bi-directional connectivity options to LIS/HIS	Enhances patient ID confirmation, reduces potential errors
Designed to easy to clean	Withstands new aggressive cleaners
Graphically driven menus	Easy to use, easy to train
Rechargeable batteries	50 tests after 4 hour recharge
Software updates may be made centrally to all meters from cobas IT 1000 application	Synchronized software and functionality
Central control of active test strip lots	Helps to streamline nursing workflow
Other test entry (OTE) captures and stores results for multiple POC tests	Captures manual tests to the electronic patient record

Roche Diagnostics International Ltd
CH-6343 Rotkreuz
Switzerland
www.cobas.com

Accu-Chek® Inform II test strip

Technical specifications

Specification	Test strip
Measurement principle	Modified glucose dehydrogenase (Mut. Q-GDH) - electrochemical detection technique
Range of measurement	10 to 600 mg/dL (0.56 to 33.31 mmol/L)
Measurement time	5 seconds
Operating temperature	8 to 44 °C (46 to 111 °F)
Sample volume	0.6 µL
Hematocrit range	10 to 65%
Altitude	< 3,094 meters above sea level (10,150 feet)
Sample types	Capillary, venous, neonatal, arterial
Calibration	IFCC plasma

Accu-Chek Inform II system components

Accessory box
Convenient storage and transport of meter and consumables

Lancets
"Pain free" single-use lancing device offering three adjustable depth settings

Code key reader
Entry of strip information into device. Ensures only approved test strips are used for testing

cobas IT 1000 application

Test strips
0.6 µL sample size
5 second test time
End dosing for easier testing

Test strip vial
Flip top vial to maintain integrity of test strips
18 months open vial stability

Control and linearity solutions
Ensures function and accuracy
2 levels of controls/
6 levels of linearity

Base Unit
Recharges meter battery. Allows for the transfer of data to and from the data management system

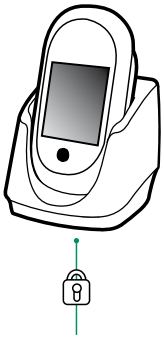
Roche Diagnostics International Ltd
CH-6343 Rotkreuz
Switzerland
www.cobas.com

Accu-Chek® Inform II Base Unit

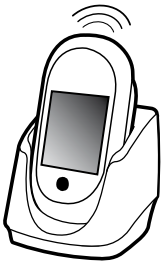
Technical specifications

Specification	Base Unit	Base Unit Light	Base Unit Hub
Height	110 mm / 4.33 in	110 mm / 4.33 in	35 mm / 1.38 in
Width	118 mm / 4.65 in	118 mm / 4.65 in	169 mm / 6.65 in
Length	103mm / 4.06 in	103 mm / 4.06 in	127 mm / 5.00 in
Weight	615 g (with wallmount)	615 g (with wallmount)	470 g
User interface	LED (red, green, blue)	LED (red, green, blue)	LED (red, green, blue)
Operating temperature	3 to 50 °C / 37 to 122 °F	3 to 50 °C / 37 to 122 °F	3 to 50 °C / 37 to 122 °F
Input voltage / current	+ 7.5 V DC / 1.7 Amp (max)	+ 7.5 V DC / 1.7 Amp (max)	+ 7.5 V DC / 1.7 Amp (max)

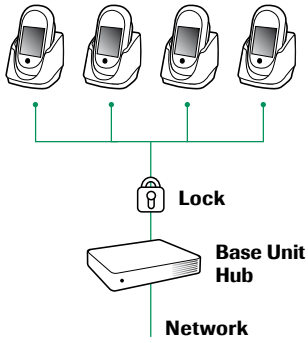
Wireless to network
Supports 802.11.g/b wireless network communications
- WEP encryption is supported using 64 or 128 bit encryption
- Wi-Fi Alliance® certified for WPA™ and WPA2™ using TKIP or AES



Base Unit to network
Base unit acts as physical docking and charging station and hardwire connection to the hospital network



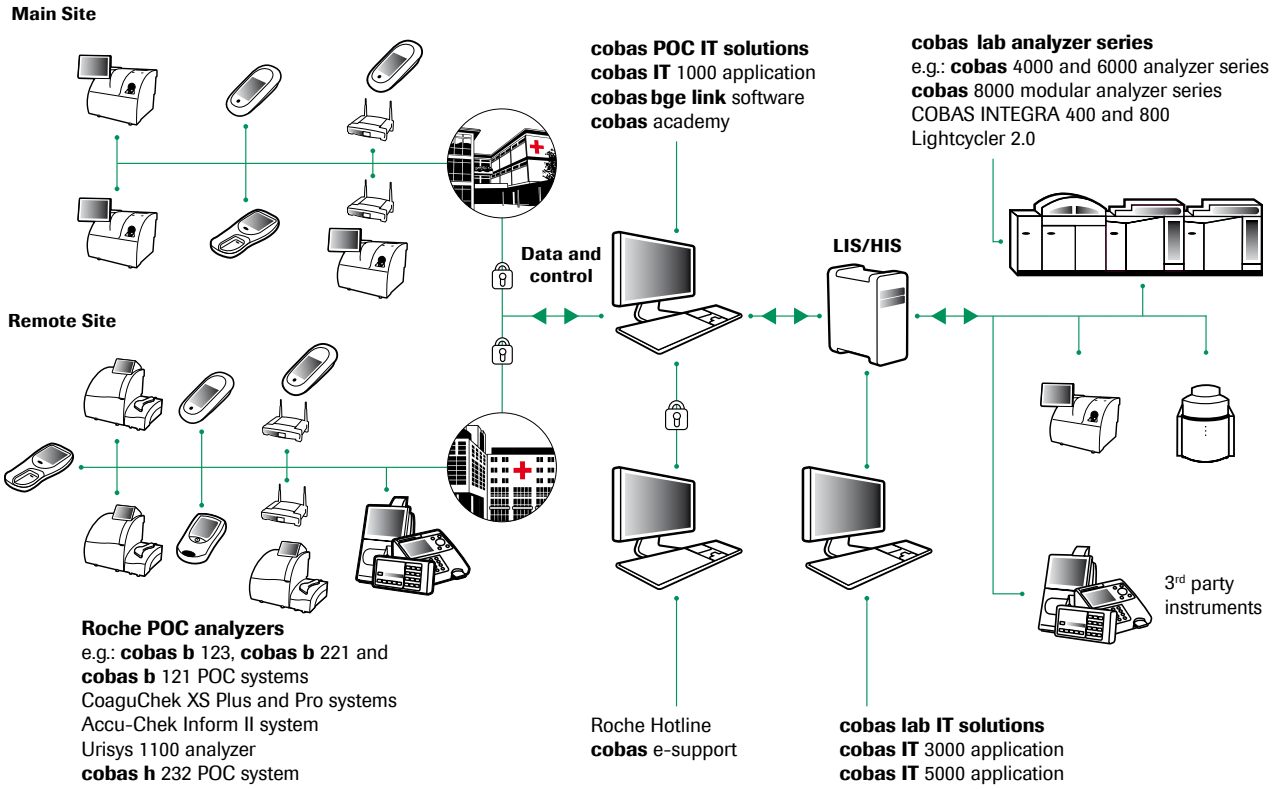
Base Unit Light
Intended to be used with wirelessly enabled Accu-Chek Inform II devices if used solely as a charging station or together with base unit hub



Base Unit Hub
Intended to be used in conjunction with multiple Base Unit Lights, in order to:
Provide connectivity where there are limited network drop points available

Roche Diagnostics International Ltd
CH-6343 Rotkreuz
Switzerland
www.cobas.com

cobas academy: a module of the cobas POC IT solution



Confidence

- in the usage and condition of all analyzers
- in the reliability of results
- from a single point of control which connects all areas of the hospital
- that only trained users can run test on known instruments that have passed their quality control
- from the seamless integration of results into the LIS/HIS
- from the help in meeting regulatory and ISO standards
- from the reduced risk of transcription errors
- from the increased security through password protection

Roche Diagnostics International Ltd
CH-6343 Rotkreuz
Switzerland
www.cobas.com

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Monitor, Physiologic, Bedside** **Alt ID:** MON-PHS

Manufacturer: Philips Healthcare - Monitoring Systems ((978) 687-1501) **Mfr #:** M8002A

Vendor: Philips Healthcare - Monitoring Systems ((978) 687-1501) **Vendor #:** M8002A

Model: IntelliVue MP30

Portable patient monitor with recorder. 3 waveforms, one integrated (10.4 inch) color SVGA, touchscreen and navigation point, up to five hours battery operation, neonatal event review and OxyCRG, drug calculator. Wired and wireless connectivity.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	13.75 in (349 mm)	**Left:**	N/A
Depth:	8.75 in (222 mm)	**Right:**	N/A
Height:	11.00 in (279 mm)	**Front:**	N/A
Max Weight:	13 lbs (5.9 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	100
Hz:	60	**Amps:**	1.3
Phase:	Single	**BTU/hr:**	495
KVA:		**Ded. Circuit:**	No
Emer. Power:	Yes	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Electrical requirements are for battery charging.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Product specifications

	MP20	MP30
Waveforms	Three (four, six,[3] optional)	Three (four, six,[3] optional)
Monitor screen display	One integrated 26cm (10.4″) color SVGA	One integrated 26cm (10.4″) color SVGA
Screen navigation	Navigation Point	• Touchscreen • Navigation Point
Multi-Measurement Server (MMS)	Compatible	Compatible
Battery operation	Optional	Optional
Networking capability	Optional	Standard
Patient population	Adult, pediatric, and neonates	Adult, pediatric, and neonates

The Multi-Measurement Server includes a collection of the most consistently required parameters in a single unit, which saves valuable space.

- Lightweight and compact
- Stores up to 8 hours of data
- For patient transport and transfer, the Multi-Measurement Server detaches and inserts into any other Philips IntelliVue monitor or Philips M3 and M4 transport monitors
- Upon return to the patient's bed, reconnects to IntelliVue and uploads stored transfer data without recabling or reconfiguring
- Can remain with a patient throughout the hospital stay

Standard Multi-Measurement Server includes SpO_2, ECG and arrhythmia, non-invasive blood pressure, and an optional invasive blood pressure/temperature port.

M8002A MP30
M8001A MP20
M3001A Multi-Measurement Server

3. 6 waves not available in the US.
4. Continuous cardiac output and PiCCO technology not available in the US.

Microstream CO_2 Extension also includes an optional invasive blood pressure/temperature port.

Capnography Extension with a choice of mainstream or sidestream CO_2 measurement is available in a variety of configurations and can include additional pressures, temperature, cardiac output, or continuous cardiac output using PiCCO® technology.[4]

Hemodynamic Extension includes cardiac output, continuous cardiac output using PiCCO technology,[4] invasive blood pressure, and temperature. An additional invasive blood pressure/temperature port is optional.

The Essential Gas Module can be integrated with the MP20 and MP30 via the IntelliVue quick mount.

Ideal for ambulatory surgery or conscious sedation with optional integrated BIS measurement.

Please visit www.philips.com/IntelliVueMP30

Philips Healthcare is part of Royal Philips Electronics

www.philips.com/healthcare
healthcare@philips.com

Printed in The Netherlands
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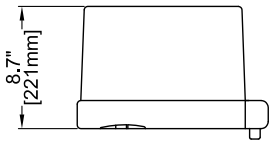
PHILIPS

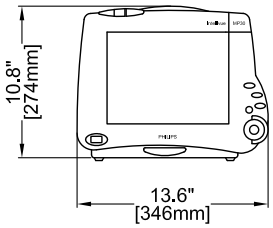
Intellivue Patient Monitor - MP20/30

Standard Equipment

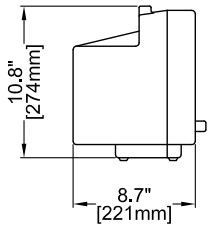


Top

Front



Side



Phillps Intelllvue MP20/MP30 (M8001A/M8002A):

Dimensions: 13.6" W x 10.8" H x 8.7" D
Weight: 13.2 lbs. (with MMS)
Heat Dissipation: 495 Btu/hr.
Power: 100 Watts

Environmental Requirements for Equipment Locations:
Heating, ventilation, air conditioning requirement for general equipment locations must maintain temperature at 62 to 82 degrees Fahrenheit and non-condensing relative humidity at 30 to 60%.

Power Requirements:
15 Amp dedicated duplex outlet within 3' of the rear of unit(s).
1.3A @ 115 VAC

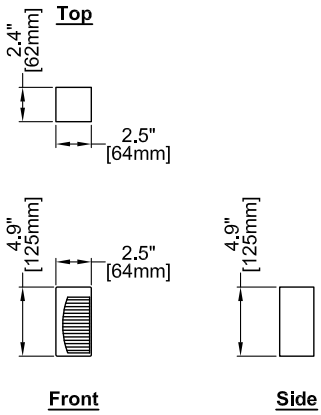
Network Requirements:
Ethernet 10 base T outlet within 3' of the rear of the unit. All network drops are to be category 5 or higher certified.

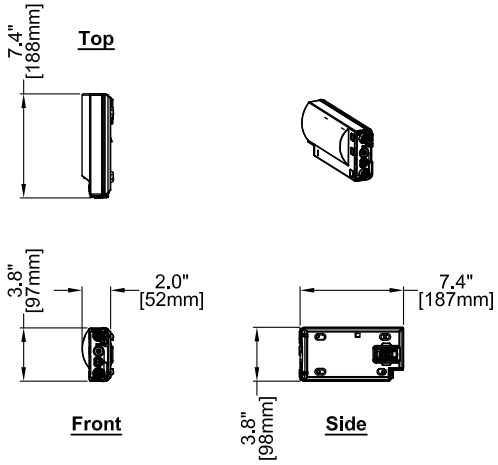
(2009.6)

PHILIPS

Intellivue Patient Monitor - MP20/30

Additional Equipment





Remote Alert Device (M8025A):

Dimensions: 2.5" W x 4.9" H x 2.4" D
Weight: 0.7 lbs.
Ships with Universal Mounting Clamp

Multi Measurement Server (M3001A):

Dimensions: 2.0" W x 3.8" H x 7.4" D
Weight: 1.4 lbs.

Environmental Requirements for Equipment Locations:
Heating, ventilation, air conditioning requirement for general equipment locations must maintain temperature at 62 to 82 degrees Fahrenheit and non-condensing relative humidity at 30 to 60%.

Power Requirements:
N/A

Network Requirements:
N/A

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Monitor, Physiologic, Vital Signs, w/Stand

Manufacturer: Hillrom - Welch Allyn, Inc. ((800) 535-6663)

Vendor: Hillrom - Welch Allyn, Inc. ((800) 535-6663)

Model: Connex Spot 7500 Wireless (BP, Covidien SpO2, SureTemp)

Vital signs monitor with SureBP Non-invasive Blood Pressure, Covidien SpO2 and SureTemp Plus Thermometer. Color touchscreen display. WiFi Connectivity. Configured with standard basket roll stand.

Alt ID: MON-VSS

Mfr #: 75CT-B/7000-MS3

Vendor #: 75CT-B/7000-MS3

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	23.00 in (584 mm)	**Left:**	N/A
Depth:	23.00 in (584 mm)	**Right:**	N/A
Height:	49.00 in (1245 mm)	**Front:**	N/A
Max Weight:	50 lbs (22.7 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	180
Hz:	60	**Amps:**	1.5
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Can be powered via AC power or battery.

Dimensions include mobile stand.

Weight includes battery and mobile stand.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

Connex® Spot Monitor Mounting and Mobility Options

Vital signs data within your reach—across care settings and workflows

Mobile stands support clinical workflows that require a shared device across multiple rooms.

	Standard Basket Stand Simple portability with a small footprint	**Work Surface and Accessory Management Stand** Organized storage and cable management, plus a compact mobile work surface footprint	**Accessory Power Management Stand** Mobile work surface and integrated battery to power through a busy day
Part Number*	7000-MS3	7000-MWS	7000-APM
Height	49” (124.46 cm) total 38” (96.52 cm) to top of basket handle	47” (119.38 cm) total 39.25” (99.7 cm) to work surface	47” (119.38 cm) total 41” (104.14 cm) to work surface
Base Diameter	23” (58.42 cm)	23” (58.42 cm)	23” (58.42 cm)
Work Surface Area	N/A	11.62” (29.51 cm) wide 11.25” (28.56 cm) deep	11.5” (29.21 cm) wide 10” (25.4 cm) deep
Accessory Basket	12.5” (31.75 cm) wide 8.25” (20.96 cm) deep 7.25” (18.42 cm) high	11.75” (29.85 cm) wide 8.25” (20.96 cm) deep 7.5” high (19.05 cm) 4 accessory bays	11.75” (29.85 cm) wide 8.25” (20.96 cm) deep 7.5” high (19.05 cm) 4 accessory bays
Weight	13.8 kg / 30.5 lb (fully loaded with device and accessories)	15.4 kg / 34 lb (fully loaded with device and accessories)	18.4 kg / 40 lb (fully loaded with device and accessories)
Power Accessory Functionality	N/A	N/A	9 cell Lithium Ion Battery (Field replaceable, integrated power supply, integrated work light, battery life indicator display, two USB ports)

*Connex Spot Monitor sold separately.

Welch Allyn®

Technical Specifications:

Connex® Spot Monitor

Item Description: Monitor, Vitals Signs

Model Number: 7400 / 7500

Noninvasive Blood Pressure (NIBP)

Cuff Inflation Target	Adult: 160 mmHg Pediatric: 140 mmHg Neonate: 90 mmHg
Systolic Range	Adult/Pediatric: 30 – 260 mmHg Neonate: 20 – 120 mmHg
Diastolic Range	Adult/Pediatric: 20 – 220 mmHg Neonate: 10 – 110 mmHg
MAP Range	Adult/Pediatric: 23 – 230 mmHg Neonate: 13 – 110 mmHg
Blood Pressure Accuracy	Meets the ANSI/AAMI SP10:2002 and ISO/ANSI/AAMI 81060-2:2013 standards for noninvasive blood pressure accuracy (±5 mmHg mean error, 8 mmHg SD)
BP Determination Time	15 seconds typical, 150 seconds max
Overpressure Cutoff	Adult/Pediatric: 300 mmHg ± 15 mmHg Neonate: 150 mmHg maximum
Pulse Rate Range	Adult/Pediatric: 30 – 200 bpm Neonate: 35 – 220 bpm
Pulse Rate Accuracy	± 5.0% (±3 bpm)

Temperature

Measurement Range	SureTemp Plus: 80 - 110°F (26.7 – 43.3°C) Braun: 68 - 108°F (20 – 42.2°C)
Calibration Accuracy	SureTemp Plus: ±0.2°F (±0.1°C) Braun: ±0.4°F (for temps up to 107.6°F), ±0.5°F (for temps higher than 107.6°F)
Determination Time	Oral: Approximately 4 seconds Axillary: Approximately 4 seconds Rectal: Approximately 4 seconds Tympanic: Approximately 4 seconds

Electrical

AC Power Supply	15V at 2.33A
Operating Time (Integrated 2-Cell Battery)	Up to 12 hours with fully charged battery (6 patients per device, vitals every 4 hours with NIPB, SpO2, temp, WiFi and barcode scan)
Battery Recharge Time	4 hours
Operating Time (APM with 9-Cell Battery)	Up to 17 hours

Wireless Radio

Wireless Network Inter-face	IEEE 802.11 a/b/g/n
Frequency	2.4 GHz – 2.483 GHz (2.4 GHz bands) 5.15 GHz to 5.35 GHz, 5.725 GHz to 5.825 GHz (5 GHz bands)
Authentication/Encryption	Wireless Equivalent Privacy (WEP, RC4 Algorithm); Wi-Fi Protected Access (WPA); IEEE 802.11i (WPA2); TKIP, RC4 Algorithm; AES, Rijndael Algorithm; Encryption Key Provisioning; Static (40-bit and 128-bit lengths); PSK; Dynamic; EAP-FAST; EAP-TLS; EAP-TTLS; PEAP-GTC 1 PEAPMSCHAPv2; PEAP-TLS
FIPS 140-2	Yes

Mechanical

Dimensions	Height: 10in (25.4cm) Width: 11in (27.9cm) Depth: 6in (15.3cm)
Weight	9.5 lbs (4.3 kg)

SpO_2

Measurement Range	1 – 100%
Pulse Rate Range	Masimo: 25 – 240 bpm Nellcor: 25 – 240 bpm Nonin: 40 – 240 bpm
SpO_2 Accuracy	Masimo: ± 2 digits Nellcor: ± 3 digits Nonin: ± 3 digits
Pulse Rate Accuracy	Masimo: ± 3 digits Nellcor: ± 3 digits Nonin: ± 3 digits

Environmental

Operating Temperature	50 – 104°F (10 – 40°C)
Storage Temperature	-4 – 122°F (-20 – 50°C)
Operating Altitude	-1250 – 10,000 ft. (-381 – 3,048 m)
Operating Humidity	15% to 90% noncondensing
Storage Humidity	15% to 95% noncondensing
EMC Standard	IEC/EN 60601-1, 2nd and 3rd Edition Standards

For further information about this product or service, please contact your local Welch Allyn representative or visit www.welchallyn.com.

Welch Allyn, Inc.
4341 State Street Road
Skaneateles Falls, NY 13153 USA
(p) 800.535.6663 (f) 315.685.3361

Welch Allyn reserves the right to make changes without notice in design, specifications and models.

Specifications

Physical specifications

Protection classifications, all monitor configurations

Characteristic	Specification
Electrical rating	100 – 240 V AC, 50 – 60 Hz, 0.8X– 1.5 A
Duty cycle	Continuous operation
Type of protection against electric shock	Class I internally powered
Degree of protection against electric shock, for parts applied to patients	Type BF defibrillator proof IEC EN 60601-1, 2nd and 3rd Editions
Recovery time following defibrillator discharge	Less than or equal to 15 seconds
Flammable anesthetics	**WARNING** Not suitable for use with flammable anesthetics.
Degree of protection provided by the enclosure with respect to harmful ingress of liquids	IPX1 Protection against vertically falling drops of water
Height	Standard chassis: 6.3 in. (16.1 cm) Extended chassis: 6.5 in. (16.6 cm) with Braun Extended chassis: 6.4 in. (16.6 cm) with SureTemp
Width	Standard chassis: 9.2 in. (23.4 cm) Extended chassis: 11.7 in. (29.8 cm) with Braun Extended chassis: 11.7 in. (29.8 cm) with SureTemp
Depth	Standard chassis: 2.3 in. (5.8 cm) Extended chassis: 4.4 in. (11.0 cm) with Braun Extended chassis: 4.2 in. (10.6 cm) with SureTemp
Weight (including battery)	Standard chassis: 2.9 lb (1.3 kg) Extended chassis: 3.7 lb (1.7 kg) with Braun Extended chassis: 3.5 lb in. (1.6 kg) with SureTemp

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Monitor, Temperature, Refrigerator/Freezer**
Alt ID: MTP-RFZ

Manufacturer: Fisher Scientific Company ((800) 766-7000)
Mfr #: 15078215

Vendor: Fisher Scientific Company ((800) 766-7000)
Vendor #: 15078215

Model: Traceable Hi-Accuracy Refrigerator Thermometer

Refrigerator/Freezer temperature monitor. Features triple display, programmable in 0.01° increments, 10 feet micro-cable, -50 to +70°C (-58 to +158°F) temperature range, 0.01°, accuracy: ±0.3°C resolution, programmable two-channel alarm in in 0.1° increments, high-impact. Includes ABS plastic case, stand, Velcro and magnetic strips, wall mount, and two AA batteries (allow continuous, 1-year always-on monitoring), probe(s).

Item ID:

General Product Detail

Arch Sig: No
Spatially Sig: No
Arch Code: 3-Movable, Non-Elect
ADA: No
Custom Code: Unassigned
Antimicrobial: No
Furnish Install: O/O
Type: Medical
Green: No

Physical Requirements

Width: 2.75 in (70 mm)
Depth: 0.75 in (19 mm)
Height: 4.25 in (108 mm)
Max Weight: 0 lbs (0.1 kg)
Mounting: Counter/Cart/Table/Pole

Left: N/A
Right: N/A
Front: N/A
Back: N/A
Top: N/A
Bottom: N/A

Electrical Requirements

Volts: N/A
Watts: N/A
Hz: N/A
Amps: N/A
Phase: N/A
BTU/hr: N/A
KVA: N/A
Ded. Circuit: No
Emer. Power: No
Plug Type: N/A

Utility and Technology Requirements

Water - Cold: No
Gasses: No
Water - Hot: No
Drain: No
Water - Treated: No
Steam: No
Vent: No
Vacuum - Dental / Medical: No / No
Tech Connect: No

Structural Requirements

Seismic: No
Pre-approval:

Product and Project Item Notes

Specification:
Powered by AA batteries.

Can be wall mounted.

Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	2	
				Total:	**2**	

Fisherbrand™ Traceable™ Hi-Accuracy Refrigerator Thermometer

Refrigerator thermometer can monitor two different areas simultaneously. Has the ability to monitor temperatures in refrigerator and freezer simultaneously or two refrigerator locations.

Catalog No. 15078215

$142.20 / Each of 1

Qty Check Availability

Includes: ABS plastic case, stand, Velcro™ and magnetic strips, wall mount, and two AA batteries (allow continuous, 1-year always-on monitoring), probe(s)

Customers who viewed this item also viewed ⓘ

Viewing 1-4 of 4

Catalog No. 06-664-11

Fisherbrand™ Traceable™ Vaccine Refrigerator/Fr

$82.30
/ Each

Catalog No. 15-077-8D

Fisherbrand™ Traceable™ Digital Thermometers wi

$99.80
/ Each

Catalog

Fisherbrand™ Tracea

Description

Refrigerator thermometer can monitor two different areas simultaneously. Has the ability to monitor temperatures in refrigerator and freezer simultaneously or two refrigerator locations. Fisher Scientific™ Traceable™ Hi-Accuracy Refrigerator Thermometer has an alarm which provides two visual LEDs and two audio alerts, displays exact time/date of dual thermometer alarms.

- Triple display shows minimum/maximum, current temperatures
- Min/max monitors readings for any period; displays exact time/date temperature occurred
- Programmable in 0.01° increments
- m signals continuously even if temperature returns to nonalarm range
  . micro-cable permits refrigerator doors to close on it
- emperature range: -50 to +70°C (-58 to +158°F)

- Resolution: 0.01°, accuracy: ±0.3°C
- Displays exact time/date when MIN/MAX reading occurred and time/date when alarm triggered
- Two-channel alarm is programmable in 0.1° increments and sounds continuously when temperature rises above/falls below set points
- High-impact, chemical resistant ABS plastic case is 2.75 × 4.25 × 0.75 in.
- Weight: 5 oz. (141.74g)

This product(s) resides on a Fisher Scientific GSA or VA contract. If you are viewing this page as a nonregistered user, the price(s) displayed is List Price. To view your GSA or VA contract pricing, log in using your account number, or become a registered user by contacting one of our Customer Service teams. You can also view your contract price by searching for this item(s) on GSA Advantage. To place an order, contact Fisher Scientific Customer Service.

Order Info

Available with bottle probe or regular probe. Bottle probed sealed in a 1 dia. x 2.5 in. bottle with nontoxic glycol. Regular probe is chemical resistant and waterproof; measures 0.18 dia. x 0.75 in. .

Certifications

Individually serial-numbered Traceable Certificate is provided from an ISO 17025 calibration laboratory accredited by A2LA™; indicates traceability to standards provided by NIST™.

Specifications

Certifications/Compliance	ISO 17025, A2LA, NIST
Dimensions (L x W x H)	4.5 x 2.75 x 4.25 in. (11.4 x 7 x 10.79 cm)
Height (English)	4.25 in.
Includes	High-impact, chemical-resistant ABS Plastic case, bench stand, Velcro and Magnetic strips, wall mount and two batteries, one bottle probe
Length (English) Probe	0.7 in.
Length (Metric) Cable	304.8 cm
Material	ABS Plastic
Resolution	0.01°C
ight (Metric)	140 g

Diameter (English) Probe	0.18 in.
For Use With (Application)	Monitoring temperature in refrigerator and freezer simultaneously or two refrigerator locations
Height (Metric)	10.79 cm
Length (English) Cable	120 in.
Length (Metric)	114 mm
Length (Metric) Probe	1.9 cm
Probe Type	1 Bottle Probe
Weight (English)	5 oz.
Width (English)	2.75 in.
Max. Temperature (English)	158°F

Length (English)	4.5 in.
Max. Temperature (Metric)	70°C
Min. Temperature (Metric)	-50°C
Accuracy	±0.3°C
Width (Metric)	6.9 cm

Min. Temperature (English)	−58°F
Temperature Range (English)	-58°F to +158°F
Display	LED

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Oven, Domestic, Microwave, Countertop**
Manufacturer: Summit Appliance ((800) 932-4267)
Vendor: Summit Appliance ((800) 932-4267)
Model: SCM853

Alt ID: OVM-CTS
Mfr #: SCM853
Vendor #: SCM853

Domestic microwave countertop oven ideal for small kitchens. Featuring 0.9 cubic feet capacity. Brushed stainless steel cabinet, Polished stainless steel interior, Multiple power levels, Glass turntable, End of cycle buzzer, Digital clock display of time, Digital touchpad with options for popcorn, reheating, defrosting, melting, and softening butter.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	Yes
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	18.88 in (480 mm)	**Left:**	2.00 in (51 mm)
Depth:	14.25 in (362 mm)	**Right:**	2.00 in (51 mm)
Height:	11.00 in (279 mm)	**Front:**	N/A
Max Weight:	30 lbs (13.6 kg)	**Back:**	4.00 in (102 mm)
Mounting:	Counter/Cart/Table/Pole	**Top:**	8.00 in (203 mm)
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	1380
Hz:	60	**Amps:**	12
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Separate circuit recommended. 20 amp circuit required.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	2	
				Total:	**2**	

SCM853

11" x 18.88" x 14.25" (H x W x D)

Stainless steel microwave oven with digital touch controls; replaces SCM852

Highlights:

Perfectly sized for compact applications

Brushed stainless steel exterior offers unique style

Easy-to-clean interior made of polished stainless steel

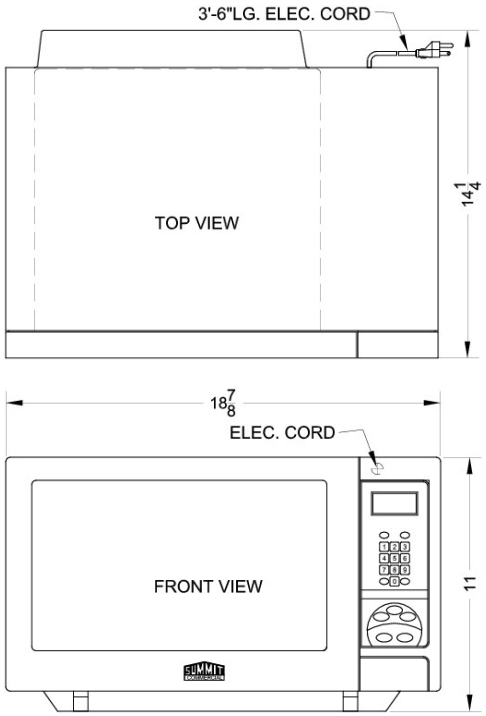
Product Features:

Brushed stainless steel cabinet	Subtle shade with all the durability of stainless steel
Polished stainless steel interior	Elegant interior is simple to clean
Multiple power levels	Variable power options let you get the right heat for each dish
Glass turntable	Included with unit for optimum rotation
End of cycle buzzer	An audible signal lets you know when the time is up
Clock	Digital display of time
Digital touchpad	Includes automatic settings for popcorn, butter, defrosting and more

SUMMIT APPLIANCE DIVISION, FELIX STORCH, INC. | ISO 9001:2015 Certified
770 Garrison Avenue Bronx, NY 10474 USA **TEL** 718-893-3900 **FAX** 844-478-8799 info@summitappliance.com **www.summitappliance.com**

SCM853 Specifications:

Overview	
Height of Cabinet	11.0" (28 cm)
Width	18.88" (48 cm)
Depth	14.25" (36 cm)
Capacity	0.9 cu.ft. (25 L)
Cabinet	Stainless Steel
US Electrical Safety	UL
Canadian Electrical Safety	ULC
Amps	12.0
Voltage/Frequency	115 V AC/60 Hz
Weight	30.0 lbs. (14 kg)
Shipping Weight	32.0 lbs. (15 kg)
Estimated Time to Ship	Next day shipping
Parts & Labor Warranty	90 Days
Microwave	
Type	Countertop
Wattage	900.0
Controls	Digital
Digital Display	Yes
Turntable Diameter	10.5" (27 cm)
Specialized Cooking Buttons	Yes
Interior Height	7.75" (20 cm)
Interior Width	12.5" (32 cm)
Interior Depth	11.38" (29 cm)



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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Computer, Desktop, All-in-One
Manufacturer: Lenovo (855-253-6686)
Vendor: Lenovo (855-253-6686)
Model: M810Z

Alt ID: PCD-AL1
Mfr #: M700z
Vendor #: M700z
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329	Alcove/WOW-Registration	Project	Draft (New)	1	
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**2**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project
Specification Coversheet

Description: Pump, Infusion, Single
Manufacturer: Fresenius Kabi USA (800-333-6925)
Vendor: Fresenius Kabi USA (800-333-6925)
Model: Ivenix Large Volume Infusion Pump (LVP)

Alt ID: PMP-IF1
Mfr #: Ivenix Large Volume Infusion Pump (LVP)
Vendor #: Ivenix Large Volume Infusion Pump (LVP)
Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	10	
				Total:	**10**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Pump, Infusion, Rapid
Alt ID: PMP-IFR
Manufacturer: Belmont Medical Technologies (866-663-0212)
Mfr #: 903-00039
Vendor: Belmont Medical Technologies (866-663-0212)
Vendor #: 903-00039
Model: Rapid Infuser RI-2 (750ml)

Rapid Warm Blood and Fluid Infuser System. Provides instant heat, no water baths or hot plates. Features: automatic air removal, touch screen with step-by-step on screen instructions, automatic priming, control of infusion with settings from 2.5 ml/min to 750 ml/min, operator controlled bolus infusion, automatic alarms when the line becomes obstructed, fluids deplete or when other conditions requiring attention arise, recirculation mode, automatic line pressure monitoring, 15 ft. power cord with lock (USA only), optional large reservoir. RoHs compliant. CE mark.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	7.50 in (191 mm)	**Left:**	N/A
Depth:	13.50 in (343 mm)	**Right:**	N/A
Height:	12.00 in (305 mm)	**Front:**	N/A
Max Weight:	28 lbs (12.7 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	1440
Hz:	60	**Amps:**	12.5
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
IV pole mountable or freestanding. IV pole diameter range of pole mount: 1" - 1-1/4".

Fuse: 1.25A, 250V, Fast Acting, 5x20mm

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Technical Specifications of the Belmont RI-2

DIMENSION	
Size	13.5" x 12" x 7.5" (34.29cm x 30.48cm x 19.05cm)
Weight	28 lbs (12.7 Kg)

PORTABILITY	
Hand Carry	Handle on top of unit for easy transport
IV Pole Mount	IV pole mountable or free standing. I.V pole diameter range of pole mount: 1" - 1 1/4"

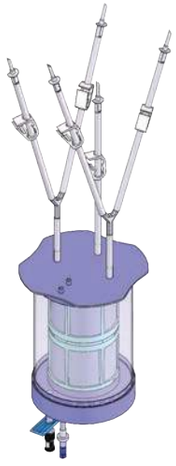
POWER	
AC Input Voltage	115-120 V ~ or 230 V ~
Fuse	1.25A, 250V, Fast Acting, 5x20mm
Operating Frequency	50/60 Hz
Maximum Power	1440 VA
Line Isolation	1500 V to ground
Earth Leakage Current	< 300 µA (For Domestic unit) < 500 µA (For 230 V ~ unit)
Electrical Compliance	EN 60601-1, CSA/C22.2 - No. 601.1-M90
Circuit Breaker	15Amp, 125VAC/250VAC, 50/60 Hz
Power Cord	U.S.: 3 conductors, 14 AWG type SJT Cord with Hospital grade plug
	Outside U.S.: 3 x 1.5 mm^2 International Harmonized Cordage with Hospital grade plug
Battery Type	Rechargeable lead acid
Running Time	> 30 minutes at 50ml/min. without heat
Recharge Time	8 hours

Belmont INSTRUMENT CORPORATION
780 Boston Road
Billerica, MA 01821 USA
T: 866.663.0212
F: 978.663.0214
www.belmontinstrument.com

Technical Assistance Hotline
1.855.397.4547

Worldwide
978.663.0212

120 ml Reservoir



3.0 Liter Reservoir

Order Information

Rapid Infuser RI-2, 1000 ml/min
Infusion rate: 2.5-1000 ml/min

US: Part #903-00037 (120V)
International: Part #903-00037A (230V)

Rapid Infuser RI-2, 750 ml/min
Infusion rate: 2.5-750 ml/min

US: Part #903-00039 (120V)
International: Part #903-00039A (230V)

3-Spike Disposable Set
Part #903-00006

3.0 Liter Reservoir
Part #903-00018

Patient Line Extension
Part #903-00022

Dual Patient Line
Part #903-00004

Belmont Instrument Corporation
Registered to ISO 13485
File Number: A18173

UL 60601-1
CAN/CSA-C22.2 No. 601.1
ANSI/AAMI/ES60601-1 (2005)
CAN/CSA-C22.2 No. 60601-1 (2008)

The Belmont® Rapid Infuser, RI-2, has been evaluated with respect to electrical shock, fire and mechanical hazards in accordance with UL 60601-1, CAN/CSA-C22.2 No. 601.1, ANSI/AAMI/ES60601-1 (2005, 3rd ed.), CAN/CSA-C22.2 No. 60601-1 (2008), Electromagnetic Compatibility [EN60601-1-2 (2007) and IEC 60601-1-2 (2007)].

Hardware Specifications

Dimensions
13.5 in. x 7.5 in. x 12 in.
342.9 mm. x 190.5 mm. x 304.8 mm.

Weight
28 lb.
12.7 kg

Portability
Quick-on IV pole mount/handle at top of unit

Power
115 volt or 220/240 volt AC input

Battery
Internal, rechargable for transport
Operates all functions without heating

Fluid Pump
Roller type peristaltic pump
Flow rate 2.5-1000 ml/min

Heater
Maximum applied power, 1440 watts

Sensors
2 air detectors, pressure transducer, 2 temperature probes (infrared sensing), pump infusion rate sensor, open door detector, and valve activation sensors

Control Computer
Built-in, controls all functions
Redundant hardware override protection in case of computer failure

Display
LCD type with waterproof touch pad

External Dimensions
5.85 in. x 4.12 in.
148.1 mm. x 104.7 mm

Active Area
4.53 in. x 3.40 in.
115.1 mm. x 86.3 mm

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Pump, Suction/Aspirator, General, Portable

Manufacturer: SSCOR, Inc. ((818) 504-4054)

Vendor: SSCOR, Inc. ((818) 504-4054)

Model: SSCOR VX-2

Alt ID: PMP-SAG

Mfr #: 2310V

Vendor #: 2310V

Battery powered aspirator/suction pump. Features 30+lpm clinical airflow, variable regulator: -50 mmHg to -525 mmHg+ vacuum, 2 position regulator: -125 mmHg +/- 15% or -525 mmHg+. Battery care system keeps battery charged to optimal level. Includes DC power cord, AC/DC converter, 1200cc Bemis canister, patient tubing and HI-D suction tip. EMS use only.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	17.00 in (432 mm)	**Left:**	N/A
Depth:	5.25 in (133 mm)	**Right:**	N/A
Height:	9.00 in (229 mm)	**Front:**	N/A
Max Weight:	9 lbs (4.1 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	N/A
Hz:	60	**Amps:**	N/A
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Electrical requirements are for land-based battery charging. DC power cord (included) charges battery within vehicle.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	Sits on Crash Cart;Sits on Crash Cart
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	Sits on Crash Cart;Sits on Crash Cart
				Total:	**2**	

SSCOR VX-2

Complies with SAE J3043 Standard!

SSCOR VX-2

The SSCOR VX-2® is a portable, powerful battery powered suction unit that can be mounted in the action area of an ambulance and used as onboard suction. The optional charging/retention bracket connects the VX-2 to vehicle power at all times. With its variable regulator and gauge, outward facing controls, and drawing its power from the vehicle, the VX-2 is setup for on-board suction. If portable suction is required at the scene, the VX-2 can easily be removed from the retention bracket and used as portable suction, drawing power from its battery.

The VX-2 comes equipped with a battery care system which insures the battery is charged to an optimal level, prevents deep discharge and indicates battery condition.

Complete information at www.sscor.com.

Use the SSCOR Onboard Canister Clip #230-00003 (sold separately) and a Bemis 1200cc canister as shown above for SAE J3043 compliance.

SAE J3043 and EN1789 compliant Charging/Retention Bracket. Holds to a force of 25 G and conducts vehicle power to run and charge the unit.

OPTIONS!

Different solutions for different needs.

SSCOR

	VX-2 Model #2310BV	VX-2 Model #2310V
Size	17" L x 9" H x 5.25" W 43.2cm L x 22.9cm H x 13.3cm W	
Weight	8.6 lbs. or 3.9 kg	
Vacuum Pump	12V DC oil-less diaphram. Clinical Airflow >=30LPM	
Regulator	Variable Regulator and Gauge	
Canister	Bemis canister. For canister options, see http://www.sscor.com/S-SCORT_VX2_canister_battery.html	
Run Time (full capacity)	45 minutes (+/- 10%)	
Battery Condition Indication	3 LED, 5 stage, battery condition indicator system	
Charging	Charge constantly from vehicle via the charging retention bracket or an optional AC/DC converter Part # 80521-100 for land based AC/DC charging	Charge constantly from vehicle power using DC power cord (included) or an AC/DC converter Part # 80521-100 for land based AC/DC charging
Charging/Retention Bracket	Part # 8310 Included SAE J3043 Compliant, EN1789 Compliant	No
DC Power Cord	Optional	Part # 80665
230 Setup International Customers	Optional AC/DC charger Part # 80529	DC Power Cord Part # 80965; AC/DC charger Part # 80529
Items Included	Suction Unit, Charging/Retention Bracket, 1200cc Bemis® Canister, patient tubing and HI-D® suction tip	Suction Unit, DC Power Cord, AC/DC Converter, 1200cc Bemis Canister, patient tubing and HI-D suction tip
Onboard Canister Clip	Optional Part #230-00003	N/A

The NEW Onboard Canister Clip

Use the SSCOR Onboard Canister Clip with the VX-2 Model 2310BV and the Model 23002 Canister Holder to comply with SAE J3043. The Onboard Canister Clip will hold the Bemis 1200cc canister in place on the VX-2 Model 2310BV and 23002 plastic canister holder to a force of 25G.

Part # 230-00003

SSCOR, Inc.
11064 Randall St. Sun Valley, CA 91352
Phone: (800) 434 5211 Domestic +1 818 504 4054 International
LIT-2310 Rev. B

CE 0413

e-mail: marketing@sscor.com www.sscor.com

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Pneumatic Tube System, Station**
Manufacturer: Swisslog Healthcare Solutions ((800) 525-1841)
Vendor: Swisslog Healthcare Solutions ((800) 525-1841)
Model: 6' Recessed Station w/ IQ Panel

Alt ID: PNU-STR
Mfr #: 56488101 + 56575103
Vendor #: 56488101 + 56575103

Recessed pneumatic tube station for receiving and dispatching carriers. IQ control panel. 6 inch system accommodates 5 carriers.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	32.25 in (819 mm)	**Left:**	N/A
Depth:	17.50 in (445 mm)	**Right:**	N/A
Height:	44.50 in (1130 mm)	**Front:**	N/A
Max Weight:	N/A	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	N/A
Hz:	60	**Amps:**	N/A
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

PTS Pneumatic Tube System

Recessed Station

The Recessed Station is designed for optimal receiving and dispatching of carriers. The station's large receiving bin accommodates several carriers at a time. When the receiving bin is full, an audible alert at the station informs users of the excess carriers in the bin and a sensor notifies the system control center. A carrier can be queued in the dispatcher while another carrier is destined for the station. The queued carrier is automatically dispatched after the inbound carrier has arrived.

The Recessed Station provides a clean installation, allowing tubes to be concealed behind walls, laminate enclosures and above ceilings. Stations can be installed with minimal disruption to the work area either during the construction phase of a project or in built-out areas in existing facilities.

The Recessed Station is available with either a standard or a full-capacity dispatcher. Integrated racks provide convenient storage of empty carriers until they are needed.

The Recessed Stations are supplied with either a Standard or an optional IQ control panel (shown). The Standard control panel has drop-down operating instructions, a station directory, a numeric keypad to address the destination station, and a two-line display that alerts users of the system's status. Special function keys increase priority, track transactions, control who receives items at the destination station, etc.

Features & Benefits

- Available with Standard or IQ control panel
- Ability to queue carrier for dispatch
- Available with Standard or Full Capacity Dispatcher
- Flush mounting provides a clean, professional look
- The station is UL approved
- Can be roughed-in during new construction and remodeling

swisslog

Recessed Station **Specifications**

The Recessed Station is available for both four-inch and six-inch systems, and is compatible with all control panels.

Received Carrier Capacity:*

4-inch	5
6-inch	5

*Station is considered “full”

Empty Carrier Storage: (In Station)

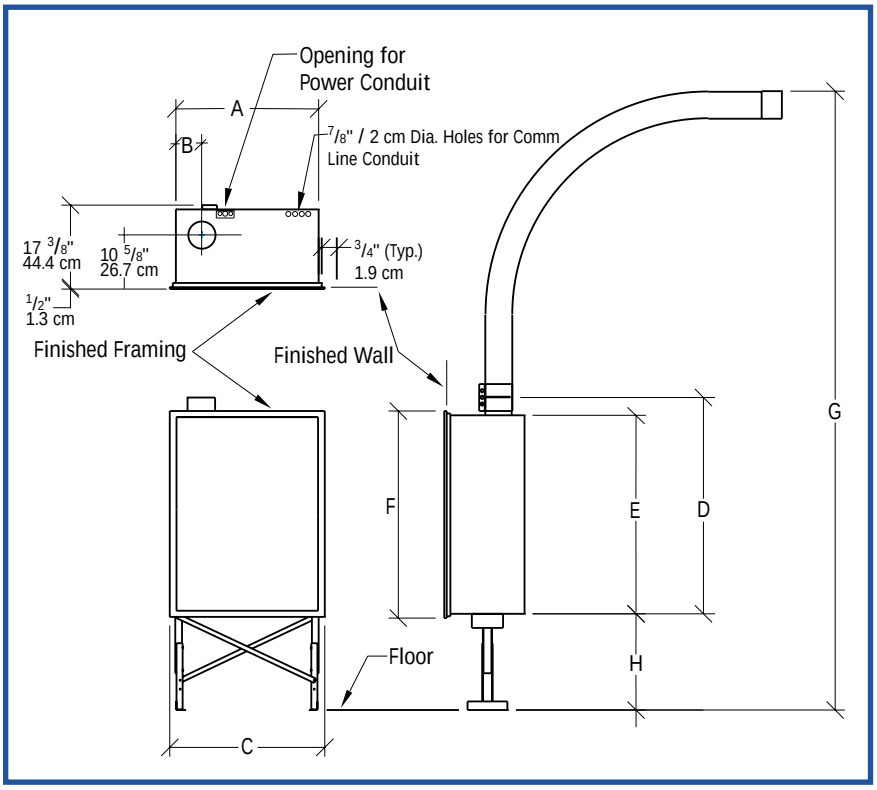
4-inch	4
6-inch	4

Power Requirements:

105 to 125 VAC, 60 Hz, single phase, 3A, unswitched, terminated at in-station Swisslog-supplied duplex outlet.

Control Requirements:

Four conductor Plenum-rated cable, #22 AWG stranded, 5 VDC maximum open circuit voltage, 200 mA maximum short circuit current.



Size	Weight	A	B	C	D	E	F	G *(see Note 1)*	H *(see Note 1)*
4-inch	200 lbs.	26 1/8"	4 7/8"	28 3/4"	48"	44 1/2"	46 3/4"	11' 10 1/8"	21 5/8"
	90.7 kg	66.2 cm	12.2 cm	73 cm	122 cm	113 cm	118.8 cm	3.6 m	55 cm
6-inch	240 lbs.	32 1/8"	5 7/8"	34 3/4"	48"	44 1/2"	46 3/4"	11' 8 1/8"	21 5/8"
	108.9 kg	81.5 cm	14.7 cm	88.3 cm	122 cm	113 cm	118.8 cm	3.6 m	55 cm

Note 1: Standard height may be reduced.

Swisslog Healthcare Solutions provides many solutions for various needs.

The Wall-Mount Station

Designed to maximize space utilization and minimize construction costs while providing the reliability and convenience of a full-size Swisslog station.

The Ultra Station

Designed to function as four separate stations with up to four dispatch/receive ports in one compact unit. Ultra Stations allow mixing of 4" and 6" tube systems.

For More Information:

Swisslog
Healthcare Solutions
USA: 10825 East 47th Ave
Denver, CO 80239-2913

www.swisslog.com; contact@swisslog.com

Sales Inquiries: 800-764-0300; 303-373-7883
Customer Service: 800-396-9666; Fax: 303-373-7871
International: Canada Office
Phone: 877-294-2831; 905-629-2400
Fax: 905-629-2799

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Printer, Label, Barcode

Manufacturer: Zebra Technologies Corp ((847) 634-6700)

Vendor: Zebra Technologies Corp ((847) 634-6700)

Model: GK420t (Thermal Transfer)

Alt ID: PRT-LBL

Mfr #: GK42-102510-000

Vendor #: GK42-102510-000

Item ID:

Barcode label printer. Thermal transfer. 5 inch or 127 millimetre per second print speed, 4.09 inch or 104 millimetre print width, 39 inch or 991 millimetre length, 203 dpi or 8 dots per mm resolution. EPL2 & ZPL II programming language, Dual-wall frame, USB, Parallel and Serial connectivity, Certified Microsoft Windows drivers. Energy Star Qualified.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	7.60 in (193 mm)	**Left:**	N/A
Depth:	10.00 in (254 mm)	**Right:**	N/A
Height:	7.50 in (191 mm)	**Front:**	N/A
Max Weight:	5 lbs (2.1 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	70
Hz:	60	**Amps:**	.58
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Requires data connection to either PC port or network cable/interface.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	2	
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	5	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	5	
				Total:	**13**	

GK420 Advanced Desktop Printers

Boost productivity with quality, reliable printing and advanced features—priced to fit your budget

Zebra's GK420™ advanced desktop printers deliver professional-quality, dependable performance and advanced features, all at a competitive price. Available in both direct thermal and thermal transfer models, these printers offer fast print speeds, network manageability and easy-load designs to help you improve operational efficiencies, boost profitability and reduce downtime. Also available in a healthcare-specific model, the printers are ideal for a wide range of environments.

GK420t

GK420d

GK420d Healthcare

GK420t Healthcare

Zebra OneCare Services

Increase printer uptime and reduce lost productivity and unbudgeted repair costs by selecting a Zebra OneCare™ service agreement. A cost-effective means of planning and budgeting for your annual maintenance expenditures, your agreement ensures that trained Zebra technicians will bring your printer back to factory specifications. Zebra offers a variety of plans to fit your budget and business needs.

Genuine Zebra Supplies

Ensure consistent print quality, reduce downtime and increase productivity in your printing process with Genuine Zebra™ supplies. We manufacture each supplies product with the exact same materials every time so you always get crisp, readable and scannable output without needing to adjust the printer darkness setting between rolls.

Advanced Features You Need— In a Dependable, Compact Printer

Available with direct thermal or thermal transfer, the GK420 combines an intuitive user interface, advanced features and the quality you expect from a Zebra® printer.

Flexible and Easy to Use

Zebra's GK420 advanced desktop printers are flexible, making them a top choice for a variety of mid-volume and distributed-printing applications. Whether you're printing transportation and logistics shipping labels, healthcare patient identification or pharmacy labels, retail coupons or receipts, or hospitality boarding passes or bag tags, GK420 printers make it easy. Fast print speeds help you get the job done quicker. And, loading media is a snap with the OpenACCESS™ clamshell design. Avoid wasted time and media with the standard auto-calibration feature.

Connectivity + Quality

Offering three connectivity interfaces and optional 10/100 Ethernet—along with standard EPL™ and ZPL® programming languages—these printers are quick and easy to integrate. Consistently producing quality text, barcodes and graphics, they ensure your print output is always professional-looking and barcodes are reliably scannable. ENERGY STAR® qualified, GK420 printers help protect your budget and reduce your total cost of ownership.

GK420 Healthcare

For healthcare-specific environments, Zebra offers the GK420 Healthcare printer—available with thermal transfer or direct thermal. These printers are constructed using durable materials in the healthcare color palette for frequent, easy cleaning with harsh disinfectant chemicals over their lifetime. Engineered to protect patient safety and ensure compliance, they also contain a medical-grade power supply that meets IEC 60601-1 standards to reduce the risk of electrical shock. With GK420 Healthcare printers, healthcare professionals can print labels and wristbands anywhere in a healthcare facility.

Cleaning Made Simple for Healthcare Models

For a complete, approved list of cleaning agent ingredients compatible with GK420 Healthcare printers, see the separate "Guide to Disinfecting and Cleaning Zebra Healthcare Printers".

ENERGY STAR

For more information about the GK420 Advanced Desktop Printers, visit www.zebra.com/gk420 or access our global contact directory at www.zebra.com/contact

GK420 Specifications

STANDARD FEATURES

- Programming language: EPL and ZPL are standard
- Construction: Dual-wall frame
- Tool-less printhead and platen replacement
- OpenACCESS for easy media loading
- Quick and easy ribbon loading
- Auto-calibration of media
- Triple connectivity: USB, Parallel, Serial
- Certified Microsoft® Windows® drivers
- ENERGY STAR qualified

PRINTER SPECIFICATIONS

Resolution	203 dpi/8 dots per mm
Memory	Standard: 4 MB Flash; 8 MB SDRAM
Maximum Print Width	4.09"/104 mm
Maximum Print Speed	5"/127 mm per second
Media Sensors	Standard: Fixed reflective and transmissive sensors
Maximum Print Length	39"/991 mm

MEDIA CHARACTERISTICS

Media Width	0.75"/19 mm - 4.25"/108 mm
Maximum Media Roll Size	5"/127 mm O.D.
Thickness	0.003"/0.08 mm to 0.0075"/0.19 mm
Media Types	Roll-fed or fan-fed, die-cut or ccontinuous direct thermal or thermal transfer labels with or without black line, tag stock, continuous receipt paper, wristbands

RIBBON CHARACTERISTICS (Thermal-transfer option only)

Standard Length	244'/74 M
Width	1.33"/33.8 mm to 4.3"/109.2 mm
Core I.D.	0.5"/12.7 mm

OPERATING CHARACTERISTICS

Environmental	Operating Temperature: 40°F to 105°F/4.4°C to 41°C Operating Humidity: 10% to 90% non-condensing Storage/Transportation Temperature: -40°F to 140°F/ -40°C to 60°C Storage Humidity: 5% to 95% non-condensing
Electrical	Auto-ranging external power supply with C14 type connector Output: 24 VDC, 2.5A Input: 100-240 VAC, 50-60 Hz ENERGY STAR qualified IEC 60601-1 Certified, Output: 24 VDC, 3.125A (GK420 Healthcare Models only)
Agency Approvals	Emissions: FCC Part 15, Subpart B (Class B), ICES 003, VCCI, C-Tick, CQC, EAC, KCC, BSMI, ICES-003 Emissions and Susceptibility: EN55022 (Class B), EN55024, EN61000-3-2, EN61000-3-3 Safety: CB Scheme IEC 60950-1, TUV NRTL, C-Tick, CCC, NOM, EAC, KCC, BSMI, BIS (GK420t only)

PHYSICAL CHARACTERISTICS

	GK420d	GK420t
Length	8.25"/210 mm	10.0"/254 mm
Width	6.75"/171 mm	7.6"/193 mm
Height	6.0"/152 mm	7.5"/191 mm
Weight	3 lbs./1.4 kg	4.6 lbs./2.1 kg

COMMUNICATION AND INTERFACE CAPABILITIES

RS-232 auto-sensing Serial interface, DB-9

USB V1.1, bi-directional

Centronics® Parallel

Ethernet — 10/100 internal (optional, replaces Serial and Parallel ports)

SOFTWARE TOOLS

ZebraLink Solutions

Zebra Setup Utilities — A Windows application to quickly set up and configure your Zebra printer.

ZebraDesigner™ — Simple Windows WYSIWYG label design application with basic features.

ZebraDesigner Pro — Simple Windows WYSIWYG label design application offering more advanced features for more complex label designs.

ZebraDesigner Windows Driver — Microsoft certified for Windows Vista®, Windows 7, Windows 8, Windows 8.1, Windows 2008, and Windows 2012.

ZBI-Developer™ — Programming utility makes it dramatically easier for programmers to create and test complex ZBI 2.0™ programs and distribute them to the printer (standard with ZBI 2.0).

ZebraNet™ Bridge Enterprise — Centrally manage Zebra printers from a single PC screen anywhere on your global network.

ZebraNet Utilities v7.0 — Provides enhanced printing, conversion and administration capabilities; message management; and more.

POS Driver

Web View

Connect and control Zebra barcode printers using ZPL II via the printer's web interface using common web browsers.

Alert

Printers equipped with ZebraNet print servers will notify you via any email-enabled, wired, or wireless device to minimize downtime.

FIRMWARE

ZBI 2.0 — Optional powerful programming language that lets printers run stand-alone applications, connect to peripherals, and much more.

ZPL and ZPL II® — Zebra Programming Language provides sophisticated label formatting and printer control and is compatible with all Zebra printers.

EPL and EPL2™ — Eltron Programming Language with Line Mode simplifies label formatting and enables format compatibility with legacy applications. (EPL with Line Mode available on direct thermal models only.)

BARCODE SYMBOLOGIES

Barcode Ratios: 2:1 (non-rotated) and 3:1

Linear Barcodes: Codabar, Code 11 (ZPL), Code 128, Code 39, Code 93, Code 93, EAN-13, EAN-8, EAN-14 (ZPL), German Post Code (EPL), Industrial 2-of-5 (ZPL), Interleaved 2-of-5, Japanese Postnet (EPL), ISBT-128 (ZPL), Logmars (ZPL), MSI, Plessey, Postnet, GS1 DataBar (RSS-14), Standard 2-of-5 (ZPL), UCC/EAN-128 (EPL), UPC and EAN 2 or 5 digit extensions (ZPL), UPC-A, UPC-A and UPC-E with EAN 2 or 5 digit extensions, UPC-E, and GS1 Databar (formerly RSS)

2D Barcodes: Codablock (ZPL), Code 49 (ZPL), Data Matrix, MaxiCode, QR Code, PDF417, MicroPDF417, Aztec (For EPL and ZPL except where noted)

Ideal for These Applications

Transportation and Logistics
- Shipping labels

Healthcare
- Patient identification
- Pharmacy and product labeling

Retail
- Price marking
- Coupon and receipt printing
- Inventory and product labeling

Hospitality and Leisure
- Boarding passes
- Bag tags

Security
- Visitor ID
- Evidence tracking
- Parking passes

Manufacturing
- Light-industrial
- Work-in-process and product labeling

GK420 Specifications

FONTS AND GRAPHICS

- 16 resident expandable ZPL fonts
- One resident scalable ZPL font
- Five resident expandable EPL2 fonts
- Supports user-defined fonts and graphics — including custom logos
- Native open type font support
- Unicode™ compliant for multi-language, on-demand thermal printing
- ZPL II drawing commands — for boxes and lines
- 1.5 MB user available non-volatile memory storage for downloadable objects
- 3 MB user-available SDRAM

OPTIONS AND ACCESSORIES

- Dispenser — Label peel and present with label present sensor
- ZebraNet® 10/100 Print Server — Internal or external Ethernet for network communication and printing
- Font Packs — Asian and other international font kits
- ZKDU™ keyboard display units for stand-alone printing applications

For optimum print quality and printer performance, use Genuine Zebra supplies.
Specifications subject to change without notice.

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10/15/2018

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Printer, Laser, Network
Manufacturer: Hewlett-Packard (650-857-1501)
Vendor: Hewlett-Packard (650-857-1501)
Model: LaserJet Enterprise M605dn

Alt ID: PRT-LSN
Mfr #: E6B70A#BGJ
Vendor #: E6B70A#BGJ

Network laser printer. Features 58 ppm print speed, LCD control panel with keypad, 100-sheet multipurpose tray and 500-sheet tray 2, automatic duplexer, support for high-capacity toner cartridge. Energy Star certified. Purchase USB cable separately.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	16.75 in (425 mm)	**Left:**	N/A
Depth:	21.25 in (540 mm)	**Right:**	N/A
Height:	15.75 in (400 mm)	**Front:**	N/A
Max Weight:	57 lbs (25.9 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	840
Hz:	60	**Amps:**	7
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	1	
				Total:	**1**	

Data sheet

HP LaserJet Enterprise M605 series

A powerhouse printer loaded with manageability, energy savings, and mobile printing features.[2]

Accelerate business results with outstanding print quality. Tackle large jobs and equip workgroups for success wherever business leads.[2] Easily manage and expand this impressively fast, versatile printer—and help reduce environmental impact.

HP LaserJet Enterprise M605n

HP LaserJet Enterprise M605dn

HP LaserJet Enterprise M605x

Take productivity to the next level

- Equip users to fly through tasks with the intuitive 4.3-inch (10.9 cm) color touchscreen and PIN printing.
- Meet high-volume demands with automatic two-sided printing and versatile paper trays—up to 3600 sheets.[4]
- Improve efficiency. Add paper-handling accessories to presort jobs, print on different media, and more.[5]
- Print uninterrupted for longer periods of time with high-yield Original HP LaserJet cartridges.[6]

Meet business needs in the office and beyond

- Enable wireless direct printing in the office—from mobile devices—without accessing the network.[7]
- Print with just a touch of your NFC-enabled mobile device to this printer—no network needed.[8]
- Easily print from a variety of smartphones and tablets—generally no setup or apps required.[2]
- Easily print from virtually anywhere in the office with Ethernet and optional wireless connectivity.[9]

Advanced capabilities, easy management

- Easily expand this printer as solutions advance and workgroup needs grow, with add-on, updatable features.
- Protect sensitive data—at rest or in transit—with a variety of embedded and optional security solutions.[10]
- Easily take command of your printing environment from one central location—with HP Web Jetadmin.[11]
- Quickly troubleshoot problems using cloud-based help services that are relevant and up to date.[12]

Less energy, more efficiency and savings

- Save energy—HP Auto-On/Auto-Off Technology turns your printer on when you need it and off when you don't.[13]
- Conserve resources—this printer has lower typical electricity consumption than any device in its class.[14]
- Help save time and money with lightweight HP EcoFFICIENT paper—engineered for clean, trouble-free printing.
- Help reduce your impact. Count on easy, free cartridge recycling through HP Planet Partners.[1]

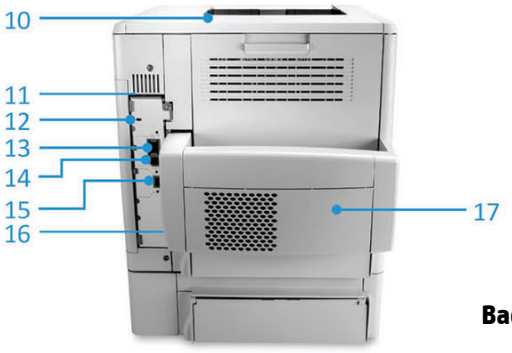
[1] Program availability varies. Original HP cartridge return and recycling is currently available in more than 49 countries, territories, and regions in Asia, Europe, and North and South America through the HP Planet Partners program. For more information, visit hp.com/recycle [2] Local printing requires mobile device and printer be on the same network or have a direct wireless connection. Wireless performance is dependent on physical environment and distance from access point. Wireless operations are compatible with 2.4 GHz operations only. Remote printing requires an Internet connection to an HP Web-connected printer. App or software and HP ePrint account registration may also be required. Wireless broadband use requires separately purchased service contract for mobile devices. Check with service provider for coverage and availability in your area. See hp.com/go/mobileprinting for more details. Some features require purchase of an optional accessory, available Fall 2015.[3] Printing speed measured using ISO/IEC 24734 and excludes first set of test documents. For more information, see hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity.[4] 3600-sheet input capacity requires purchase of additional accessories. [5] Optional paper-handling accessories must be purchased separately. [6] The optional high-yield Original HP LaserJet cartridge must be purchased separately. [7] Wireless direct printing is standard on the HP LaserJet Enterprise M605x only. Requires purchase of optional module, available Fall 2015, for the LaserJet Enterprise M605n and M605dn. Mobile device needs to be connected directly to the Wi-Fi network of a wireless direct–capable multi-function printer (MFP) or printer prior to printing. Depending on mobile device, an app or driver may also be required. Wireless performance is dependent on physical environment and distance from the access point in the MFP or printer. For details, see hp.comgobusinessmobileprinting [8] Touch-to-print capability is standard on the HP LaserJet Enterprise M605x only. Requires purchase of optional HP Jetdirect 3000w near-field communications (NFC)/Wireless Accessory, available Fall 2015, for the LaserJet Enterprise M605n and M605dn. Mobile device must support NFC-enabled printing. For more information, see hp.com/go/mobileprinting [9] Wireless Internet connectivity requires purchase of an optional accessory, available Fall 2015, for the M605n and M605dn. Wireless performance is dependent on physical environment and distance from access point. Wireless operations are compatible with 2.4 GHz routers only. [10] Some solutions require download or additional purchase. Learn more at hp.com/go/printingsolutions. The encrypted hard disk drive (HDD) requires an additional purchase. [11] Universal device plug-in is offered with HP Web Jetadmin 10.3 SR4 and higher. HP Web Jetadmin is free and available for download at hp.com/go/webjetadmin [12] Online help must be enabled on the printer or MFP. Mobile device must have an Internet connection to access online services. [13] HP Auto-On/Auto-Off Technology capabilities are subject to printer and settings. [14] Based on HP testing using the ENERGY STAR® program's Typical Electricity Consumption (TEC) method or as reported in energystar.gov vs. competitive single-function black-and-white laser printers with print speeds between 56 and 70 pages per minute (ppm) as of November 2014. Actual results may vary.

Product walkaround

1. Intuitive 4.3-inch (10.9 cm) color touchscreen tilts up for easier viewing (Available on the X bundle only)
2. 600-sheet output bin
3. Top cover (access to the toner cartridge)
4. 100-sheet multipurpose tray 1
5. 500-sheet input tray 2
6. 500-sheet input tray 3
7. Hardware Integration Pocket (HIP)
8. Easy-access USB port
9. Convenient front on/off button
10. Output accessory cover
11. 512 MB standard memory (upgradeable to 1.5 GB) and a 1.2 GHz processor
12. Access port for optional Kensington style lock
13. Local area network (LAN) Ethernet (RJ 45) network port
14. Hi-speed USB 2.0 printing port
15. Hi-speed USB 2.0 port for connecting external USB devices
16. Power connection
17. Built-in automatic two-sided printing

HP LaserJet Enterprise M605x

Front view



Back view

Series at a glance

Model	HP LaserJet Enterprise M605n	HP LaserJet Enterprise M605dn	HP LaserJet Enterprise M605x
Product number	E6B69A	E6B70A	E6B71A
Print speed in ppm, letter/A4[3]	58/55	58/55	58/55
Control panel	4-line LCD with keypad	4-line LCD with keypad	4.3-inch (10.9 cm) color touchscreen
100-sheet multipurpose tray and 500-sheet tray 2	√	√	√
500-sheet tray 3	Optional	Optional	√
Up to three 1 x 500-sheet input trays and 1,500 sheet high-capacity input tray[4]	Optional (up to a maximum of 6 trays total)	Optional (up to a maximum of 6 trays total)	Optional (up to a maximum of 6 trays total)
Touch-to-print[8] **and wireless direct mobile Printing**[7]	Optional	Optional	√
High-Performance Secure Hard Disk	Optional	Optional	Optional
Automatic duplexer	Optional	√	√
Support for high-capacity toner cartridge[6]	√	√	√
ENERGY STAR certified	Not available	√	√

For footnotes please see page 1

HP Services

Downtime can have serious consequences, so HP provides support beyond the standard warranty. You benefit from reduced risk, maximized uptime, predictable service delivery and no unbudgeted repair costs. HP Care Pack Services provide a comprehensive suite of protection services designed to keep HP hardware and software up and running so employees can stay productive.

Next Business Day with Defective Media Retention:
Customers can retain their hard disk drive and keep control of sensitive data.

Same Day – 4 hour 9x5 and 13x5:
Sends an HP technician to customers' site the same business day for repair, within 4 hours, if the issue cannot be resolved through remote support. Various support window times are available, for different requirements.

Next Business Day Exchange:
Exchange of hardware at customers' premise the next business day, if the issue cannot be resolved remotely.

Installation Service with Network Setup:
Installation services that include onsite installation and network setup of printing product.

For carepack availability visit: hp.com/go/cpc

Top features

Stay ahead of schedule with this swift and versatile printer—up to 58 pages per minute (ppm).[3] Easily meet high-volume demands and provide flexible options for multiple users and paper sizes.

Business is mobile, and so is your workforce. Keep them covered—at their desk, on the way to the office, or stepping off a plane for an important meeting—with easy printing from mobile devices.[2]

Streamline fleet management—while giving workgroups the tools to support larger business initiatives. Extend print capabilities as business evolves, enhance security, and customize new solutions seamlessly.

Shrink your energy use while helping your company save money. This HP LaserJet Enterprise printer is designed for low energy consumption. Keep the printing process efficient and produce less waste.

Accessories
F2G68A - HP LaserJet 500-Sheet Input Tray Feeder
F2G69A - HP LaserJet Auto Duplexer Two Side Print
F2G70A - HP LaserJet Printer Stand
F2G72A - HP LaserJet 500-Sheet Stacker Stapler
F2G73A - HP LaserJet 1500-Sheet Input Tray
F2G74A - HP LaserJet 75-Sheet Envelope Feeder
F2G75A - HP LaserJet Custom Media Cassette Accessory
F2G81A - HP LaserJet 500-Sheet 5-Bin Mailbox
B5L28A - HP Two Internal USB Ports
B5L29A - HP Secure High Performance Hard Disk Drive
G6W84A - HP 1GB 90-Pin DDR3 Slim DIMM
F5S62A - HP Trusted Platform Module
Q3216A - HP 1000-staple Cartridge

Supplies
F2G76A - HP LaserJet Printer 110V Maintenance Kit (225K yield)
F2G77A - HP LaserJet Printer 220V Maintenance Kit (225K yield)
CF281A - HP 81A Black Original LaserJet Toner Cartridge (~10,500 pages)
CF281X - HP 81X High Yield Black Original LaserJet Toner Cartridge (~25,000 pages)

Services

HP LaserJet Enterprise M605 Series

U8CR0E - HP 3 year Next Business Day + Defective Media Retention LaserJet M605 Hardware Support
U8CR2E - HP 3 year 4 hour 13x5 + Defective Media Retention LaserJet M605 Hardware Support
U8CR3E - HP 3 year Next Business Day Exchange + Defective Media Retention LaserJet M605 Service
U8CR1E - HP 3 year 4 hour 9x5 + Defective Media Retention LaserJet M605 Hardware Support
U8CR4E - HP 3 year Return + Defective Media Retention LaserJet M605 Service
UC742E - Installation for 1 Network Configuration for Personal or Workgroup printer

[2] Local printing requires mobile device and printer be on the same network or have a direct wireless connection. Wireless performance is dependent on physical environment and distance from access point. Wireless operations are compatible with 2.4 GHz operations only. Remote printing requires an Internet connection to an HP Web-connected printer. App or software and HP ePrint account registration may also be required. Wireless broadband use requires separately purchased service contract for mobile devices. Check with service provider for coverage and availability in your area. See hp.com/go/mobileprinting for more details. Some features require purchase of an optional accessory, available Fall 2015. [3] Printing speed measured using ISO/IEC 24734 and excludes first set of test documents. For more information, see hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity.

HP LaserJet Enterprise M605 series

Technical Specifications	HP LaserJet Enterprise M605n(E6B69A)	HP LaserJet Enterprise M605dn(E6B70A)	HP LaserJet Enterprise M605x(E6B71A)
AIO functions	Print		
Print speed	**Letter:** Up to 58 ppm black; [5]; **First Page Out Black:** As fast as 7 sec; [6]		
Print resolution	**Black (best):** Up to 1200 x 1200 dpi		
Print Technology	Laser; **Print Resolution Technologies:** HP ImageREt 3600 (600 x 600 dpi), HP ProRes 1200 (1200 x 1200 dpi)		
Print Cartridges Number	2 (black)		
Standard Print Languages	HP PCL 6, HP PCL 5e , HP Postscript Level 3 emulation, native PDF printing (v 1.7)		
Printer Smart Software Features	HP ePrint, Apple AirPrint, HP Auto-On/Auto-Off Technology, HP FutureSmart Firmware, Easy Access USB, Hardware Integration Pocket, Open Extensibility Platform, HP Web Jetadmin, HP Universal Print Driver, 4-line color display control panel		HP ePrint, Apple AirPrint, HP Auto-On/Auto-Off Technology, HP FutureSmart Firmware, Easy Access USB, Hardware Integration Pocket, Open Extensibility Platform, HP Web Jetadmin, HP Universal Print Driver, 4.3" color touchscreen control panel
Printer Management	Printer Administrator Resource Kit (Driver Configuration Utility, Driver Deployment Utility, Managed Printing Administrator); HP Web JetAdmin Software; HP Proxy Agent Software; HP Imaging and Printing Security Center; HP Utility (Mac)		
Standard Connectivity	Hi-Speed USB 2.0 ports (Host and Device); built-in Gigabit Ethernet 10/100/1000T network port; Hardware Integration Pocket (HIP)		
Network Capabilities	Via HP Jetdirect Ethernet embedded print server (standard) supports: 10Base-T, 100Base-Tx, 1000Base-T; 802.3az (EEE) support on Fast Ethernet and Gigabit Ethernet; IPsec (standard)		Embedded NFC/HP Wireless Direct support
Network Ready	Standard (built-in Gigabit Ethernet)		
Wireless Capability	Optional, enabled with purchase of a pending hardware accessory		Yes, embedded NFC/HP Wireless Direct support
Mobile Printing Capability	HP ePrint, Apple AirPrint™		HP ePrint, Apple AirPrint™, Touch-to-Print, Wireless Direct Printing
Memory	**Standard:** 512 MB; **Maximum:** 1.5 GB		
Mass Storage	4GB non-volatile storage, Firmware encryption (AES 128 or AES 256) of customer/job data; Secure Cryptographic Erase – Job Data, Secure Erase		
Processor Speed	1.2 GHz / **Hard disk:** Optional, 500 GB HP Secure High Performance Hard Disk Drive		
Duty Cycle	**Monthly, letter:** Up to 225,000 pages[7]; **Recommended Monthly Page Volume:** 5000 to 16,000[8]		
Paper Handling	**Input Capacities:** 100-sheet multipurpose tray 1, 500-sheet input tray 2; 500-sheet input tray 3 (M605x), Automatic duplexer for two-sided printing (M605dn, M605x); Up to 600 sheets standard labels legal; Up to 1100 standard labels legal(M605x); **Output Capacities:** 500-sheet output bin; 100-sheet rear output bin; Up to 600 sheets (500 in the face down bin, 100 in rear face up door) standard labels legal; **Duplex Options:** No (M605n); Yes (M605dn, M605x); **Envelope Feeder:** Yes, 75; **Standard Paper Trays:** 2; 3 (M605x); **Media Types Supported:** Paper (bond, color, letterhead, plain, preprinted, prepunched, recycled, rough, light), envelopes, labels, cardstock, transparencies, shelf edge labels, user-defined; **Media Weight Supported:** Multipurpose tray 1: 16 to 53 lb; Tray 2, optional 500-sheet input tray, optional Custom media cassette, optional 1500-sheet High-capacity input tray: 16 to 32 lb; Optional Envelope feeder: 20 to 28 lb; Optional Duplexer: 16 to 32 lb; **Media Sizes Supported:** Multipurpose tray 1: letter, legal, executive, statement, 8.5 x 13 in, 3 x 5 in, 4 x 6 in, 5 x 7 in, 5 x 8 in, envelope (commercial No. 9, No. 10, Monarch), US postcard; Tray 2, optional 500-sheet input tray: letter, legal, executive, 8.5 x 13 in; optional 1500-sheet High-capacity Input tray: letter, legal; **Media Sizes Custom:** Multipurpose tray 1: 3 x 5 to 8.5 x 14 in; Tray 2, optional 500-sheet input tray: 5.83 x 8.27 to 8.5 x 14 in; Optional Custom media cassette: 4.02 x 5.83 to 6.69 x 11.10 in		
Product Dimensions	**W x D x H:** 16.7 x 17.8 x 15.7 in; **Maximum:** 16.7 x 33 x 22.5 in	**W x D x H:** 16.7 x 21.1 x 15.7 in; **Maximum:** 16.7 x 33 x 22.5 in	**W x D x H:** 16.7 x 21.1 x 20.5 in; **Maximum:** 16.7 x 33 x 27.4 in
Product Weight	49.7 lb[1]	57 lb[1]	71.5 lb[1]
What's in the box	HP LaserJet M605; Pre-installed HP Black LaserJet Toner Cartridge; Installation guide, Support flyer; Printer documentation and software on CD-ROM; Power cord; Pre-installed HP Duplexer (dn, x models only)		
Warranty Features	One-year return to bench		
Energy Efficiency Compliance	CECP	Energy Star® certified; Blue Angel; CECP; EPEAT® Silver	
Control Panel	4-line color LCD display, 3 LED lights (Ready, Data, Attention), buttons (Information, Stop/Cancel, Return, Home, Folder, Clear), 10-key numeric keypad		4.3-in touch screen, LCD (color graphics); 1 Home button
Display Description	4-line LCD (color text and graphics)		4.3-in (10.9-cm) touchscreen LCD (color graphics)
Software Included	Windows OS: HP Software Installer/Uninstaller, HP PCL 6 Printer Driver, HP Device Experience (DXP), HP Update, Product Registration Assist, HP Web Services Assist (HP Connected), Online user manuals; Mac OS: Welcome Screen, (Directs users to HP.com or OS App Source for LaserJet Software), Setup Scan To Folder and Email		
Fonts and Typefaces	105 internal TrueType fonts scalable in HP PCL, 92 internal scalable fonts in HP postscript Level 3 emulation (Euro symbol built-in); 1 internal Unicode Fonts (Andale Mono WorldType); 2 Internal Windows Vista 8 Fonts (Calibri, Cambria); additional font solutions available via third-party flash memory cards; HP LaserJet Fonts and IPDS Emulation available at hp.com/go/laserjetfonts		
Compatible Operating Systems	Windows OS compatible with In-Box Driver: Windows XP SP3 all 32-bit editions (XP Home, XP Pro, etc.), Windows Vista all (32-bit) editions (Home Basic, Premium, Professional, etc.), Windows 7 all (32-bit, 64-bit) editions; Windows 8/8.1 all (32-bit, 64-bit) editions (excluding RT OS for Tablets), Windows 10 all (32-bit, 64-bit) editions (excluding RT OS for Tablets); Windows OS compatible with Universal Print Driver (From HP.com): Windows XP (SP3) (32-bit, 64-bit) editions (XP Home, XP Pro, etc.), Windows Vista all (32-bit, 64-bit) editions (Home Basic, Premium, Professional, etc.), Windows 7 all (32-bit, 64-bit) editions, Windows 8/8.1 all (32-bit, 64-bit) editions (excluding RT OS for Tablets), Windows 10 all (32-bit, 64-bit) editions (excluding RT OS for Tablets); Mac OS (HP Print Drivers available from HP.com and Apple Store): OS X 10.7 Lion, OS X 10.8 Mountain Lion, OS X 10.9 Mavericks, OS X 10.10 Yosemite; Mobile OS (In-OS drivers): iOS, Android, Windows 8/8.1/10 RT; Linux OS (In-OS HPLIP): SUSE Linux (12.2, 12.3, 13.1), Fedora (17, 18, 19, 20), Linux Mint (13, 14, 15, 16, 17), Boss (3.0, 5.0), Ubuntu (10.04, 11.10, 12.04, 12.10, 13.04, 13.10, 14.04, 14.10), Debian (6.0.x, 7.x); Other OS: UNIX[11]		
Compatible Network Operating Systems	Windows Server 2012 R2 (64-bit only), Windows Server 2012 Cluster Support (64-bit only), Windows Server 2012 (64-bit only), Windows Server 2008 Standard Edition Enterprise Edition (32-bit), Windows Server 2008 (SP2) (64-bit), Windows Server 2008 SP2 (32-bit),Windows Server 2008 Server Terminal Services (64-bit), Windows Server 2008 Server Terminal Services (32-bit), Windows Server 2008 R2 Standard Edition Enterprise Edition (64-bit only), Windows Server 2008 R2 (SP1) (64-bit only), Windows Server 2008 Enterprise Edition (64-bit), Windows Server 2003 Standard Edition (64-bit), Windows Server 2003 Standard Edition (32-bit), Windows Server 2003 R2 Standard Edition Enterprise Edition (64-bit), Windows Server 2003 R2 Standard Edition Enterprise Edition (32-bit), Windows Server 2003 Enterprise Edition (64-bit), Windows Server 2003 Enterprise Edition (32-bit), Windows Server 2003 2008 R2 - Cluster Support (64-bit), Windows Server 2003 2008 R2 - Cluster Support (32-bit), Windows Server 2003 2008 - Cluster Support (64-bit), Windows Server 2003 2008 - Cluster Support (32-bit), Citrix MetaFrame XP, Presentation Server Feature Release 1, 2, and 3 (32-bit, 64-bit), Citrix MetaFrame® Presentation Server 3.0, Citrix Microsoft Windows Server 2008 Terminal Services, Citrix MS Windows Server 2003 Terminal Services (32-bit, 64-bit), Citrix MS Windows Server 2008 R2 Terminal Services, Citrix MS Windows Server 2008 Terminal Services (32-bit, 64-bit), Citrix Presentation Server 4.0, Citrix Presentation Server 4.0 (32-bit, 64-bit), Citrix Presentation Server 4.5, Citrix Presentation Server™ 4.5, Citrix XenApp 5.0, Citrix XenApp 5.0, Citrix XenApp 5.0 Feature Pack 2 & 3 (32-bit, 64-bit), Citrix XenApp 5.0 Feature Pack 2 & 3 (32-bit, 64-bit), Citrix XenApp 6.0, Citrix XenApp 6.5, Citrix XenDesktop 5.6 (32-bit, 64-bit), HP-UX 10.20, 11.x, 11.i, IBM AIX 3.2.5 or higher, Linux Red Hat 7.x or higher, Linux SuSe 8.x or higher, Novell NetWare 6.5 (SP8) minimum for full Vista, Novell NetWare 6.5 (SP8) minimum for full Win7, Novell NetWare 6.5 SP8 minimum for full XP (SP7 if only XP), Novell iPrint Client v5.4 for Vista (x86 and x64), Novell iPrint Client v5.4 for Win7 (x86 and x64), Novell iPrint Client v5.4 for Win XP (x86 and x64), Novell Open Enterprise Server 2 (Linux), Solaris 2.5 or higher (SPARC systems only)		
Minimum System Requirements	**PC:** Windows XP (SP3) all 32-bit editions (XP Home, XP Pro, etc.), Windows Vista all 32-bit editions (Home Basic, Premium, Professional, etc.), Windows 7 all 32-bit and 64-bit editions; Windows 8/8.1 all 32-bit and 64-bit editions (excluding RT OS for Tablets), Windows 10 all 32-bit and 64-bit editions (excluding RT OS for Tablets); Windows OS compatible with Universal Print Driver (From HP.com): Windows XP (SP3) 32-bit and 64-bit editions (XP Home, XP Pro, etc.), Windows Vista all 32-bit and 64-bit editions (Home Basic, Premium, Professional, etc.), Windows 7 all 32-bit and 64-bit editions, Windows 8/8.1 all 32-bit and 64-bit editions (excluding RT OS for Tablets), Windows 10 all 32-bit and 64-bit editions (excluding RT OS for Tablets); Mobile OS (In-OS drivers): Android, Windows 8/8.1/10 RT; Linux OS (In-OS HPLIP): SUSE Linux (12.2, 12.3, 13.1), Fedora (17, 18, 19, 20), Linux Mint (13, 14, 15, 16, 17), Boss (3.0, 5.0), Ubuntu (10.04, 11.10, 12.04, 12.10, 13.04, 13.10, 14.04, 14.10), Debian (6.0.x, 7.x); Other OS: UNIX; CD-ROM or DVD drive, or Internet connection; Dedicated USB or network connection or Wireless connection; 200 MB available hard disk space; OS compatible hardware (For OS hardware requirements see microsoft.com); **MAC:** Mac OS X 10.7 Lion, OS X 10.8 Mountain Lion, OS X 10.9 Mavericks, OS X 10.10 Yosemite; USB; 1 GB available hard disk space; OS compatible hardware (For OS hardware requirements see apple.com)		
Power	**Power Supply Type:** Internal (Built-in) power supply; **Power Requirements:** 110-volt input voltage: 100 to 127 VAC (+/- 10%), 50/60 Hz (+/- 3 Hz); 220-volt input voltage: 220 to 240 VAC (+/- 10%), 50/60 Hz (+/- 3 Hz) (Not dual voltage, product varies by part number with # Option code identifier); **Power Consumption:** 840 watts (Printing), 3.7 watts (Sleep), <0.1 watts (Manual Off), 0.7 watts (Auto-Off/Wake on LAN), <0.1 watts (Auto-Off/Manual On)[2]		
Acoustics	**Acoustic Power Emissions:** 7.1 B(A); **Acoustic Pressure Emissions:** 56 dB(A)[4]		
Operating Environment	**Operating Temperature Range:** 59 to 89.6ºF; **Recommended Operating Temperature:** 59 to 89.6ºF; **Storage Temperature Range:** -22 to 140ºF; **Non-Operating Humidity Range:** 10 to 90% RH; **Operating Humidity Range:** 10 to 80% RH; **Recommended Humidity Operating Range:** 10 to 80% RH		
Security Management	Identity management: Kerberos authentication, LDAP authentication, 1000 user PIN codes, optional HP and 3rd party advanced authentication solutions (e.g., badge readers); Network: IPsec/firewall with Certificate, Pre-Shared Key, and Kerberos authentication, Supports WJA-10 IPsec configuration Plug-in, 802.1X authentication (EAP-PEAP, EAP-TLS), SNMPv3, HTTPS, Certificates, Access Control List; Data: Storage Encryption, Encrypted PDF & Email (uses FIPS 140 validated cryptographic libraries from Microsoft), Secure Erase, SSL/TLS (HTTPS), Encrypted Credentials; Device: Security lock slot, USB port disablement, hardware integration pocket for security solutions; Security management: Compatible with HP Imaging and Printing Security Center		

[1] With cartridges [2] Power requirements are based on the country/region where the printer is sold. Do not convert operating voltages. This will damage the printer and void the product warranty. [3] Declared yield value in accordance with ISO/IEC 19752 and continuous printing. Actual yields vary considerably based on images printed and other factors. For details see hp.com/go/learnaboutsupplies. [4] Acoustic values are subject to change. For current information see hp.com/support. Configuration tested: M604dn, simplex printing, A4 paper at an average of 50 ppm. [5] Measured using ISO/IEC 24734, excludes first set of test documents. For more information, see hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity. [6] Measured using ISO/IEC 17629. For more information, see hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity. [7] Duty cycle is defined as the maximum number of pages per month of imaged output. This value provides a comparison of product robustness in relation to other HP LaserJet or HP Color LaserJet devices, and enables appropriate deployment of printers and MFPs to satisfy the demands of connected individuals or groups. [8] HP recommends that the number of printed pages per month be within the stated range for optimum device performance, based on factors including supplies replacement intervals and device life over an extended warranty period. [9] HP SureSupply alerts you when your print cartridge is running low and helps you purchase online or locally through HP or a participating retailer. Only available with Original HP supplies; Internet access required. To learn more, visit hp.com/go/SureSupply. [10] Paper handling accessories are offered separately and with an additional cost. To insure product stability, it is a requirement to purchase the HP LaserJet P4010/P4510/600 Series Printer Stand (F2G70A) when using M604/M605/M606 Printers with more than three HP LaserJet 500-sheet Input Tray Feeders (CE998A), or with one HP LaserJet 1500-sheet Input Tray (CE398A) and more than one HP LaserJet 500-sheet Input Tray Feeder (CE998A). [11] Not all Compatible Operating Systems are supported with In-box software. Full solution software available only for Windows 7 and newer. Legacy Windows Operation Systems (XP, Vista, and equivalent servers) get print and Scan drivers only. Windows RT OS for Tablets (32-bit, 64-bit) uses a simplified HP print driver built into the RT OS. UNIX modelscripts are available on hp.com (Modelscripts are printer drivers for UNIX operating systems). Linux systems use in-OS HPLIP software.

Learn more at hp.com

4AA5-6774ENUC, April 2015, Rev. 1

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Printer, Laser, Multifunction

Manufacturer: Hewlett-Packard (650-857-1501)

Vendor: Hewlett-Packard (650-857-1501)

Model: Color LaserJet Enterprise MFP M577f

Alt ID: PRT-MFC

Mfr #: B5L47A#BGJ

Vendor #: B5L47A#BGJ

Item ID:

Color Multifunction laser printer. Scan, print, copy, fax and mobile printing capability (HP ePrint; Apple AirPrint; Mopria-certified; Google Cloud Print 2.0). Features Print speed, color (normal) Up to 40 ppm. 100-sheet multipurpose tray 1, 550-sheet tray 2. Ports 2 Hi-Speed USB 2.0 Host, 1 Hi-Speed USB 2.0 Device, 1 Gigabit/Fast Ethernet 10/100/1000 Base-TX network, 1 Hardware Integration Pocket, 1 Fax. (8) inch color touchscreen. 1.2 GHz processor speed. Number of print cartridges 4 (1 each black, cyan, magenta, yellow). Energy Star qualified. FCC Class A emissions - for use in commercial environments, not residential environments.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	Yes
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	27.50 in (699 mm)	**Left:**	N/A
Depth:	19.84 in (504 mm)	**Right:**	N/A
Height:	22.95 in (583 mm)	**Front:**	N/A
Max Weight:	85 lbs (38.3 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	592
Hz:	60	**Amps:**	4.9333
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect maximum.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329	Alcove/WOW-Registration	Project	Draft (New)	1	
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	2	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	2	
				Total:	**6**	

Data sheet

HP Color LaserJet Enterprise MFP M577 series

Conserve energy and boost productivity with an MFP that delivers multi-level device security.[10]

Ideal for enterprises and medium businesses that need a secure, highly productive, energy-efficient color MFP.

HP Color LaserJet Enterprise MFP M577dn

HP Color LaserJet Enterprise MFP M577f

HP Color LaserJet Enterprise Flow MFP M577c

HP Color LaserJet Enterprise Flow MFP M577z

High-speed performance meets energy efficiency

- Don't wait for documents. Print your first page in as few as 9 seconds from energy-efficient sleep mode.[2]
- Speed through jobs. Print two sides as quickly as one—up to 40 ipm[9]—and scan both sides of the page at once.
- This MFP uses exceptionally low amounts of energy—thanks to its innovative design and toner technology.[3]
- Choose a maximum capacity of up to 2300 sheets.[8] Print up to 59 pages per minute on A5.[9]

Unparalleled fleet security and management

- Embedded features detect security threats and heal your MFP, protecting it from boot up to shutdown.[10]
- Protect sensitive data on the MFP and in transit, using embedded security features and 256-bit encryption.[10]
- Protect sensitive business data with embedded and optional HP JetAdvantage Security Solutions.[11]
- Centralize control of your printing environment with HP Web Jetadmin—and help build business efficiency.[12]

More. Pages, Performance, and Protection.

- Make an impression with leading color quality from HP. Get unparalleled printing for your office needs.
- Get more pages with each Original HP Toner cartridge with JetIntelligence and high-yield cartridges.[113]
- Help ensure the Original HP quality you paid for with anti-fraud and cartridge authentication technology.
- Print right away with preinstalled toner cartridges. Replace them with cartridges featuring auto seal removal.

Stay connected with secure mobile printing options

- Enable 128-bit encrypted wireless direct printing from mobile devices—without accessing the network.[5]
- Print with just a touch of your NFC-enabled mobile device to this printer—no network needed.[6]
- Easily print from a variety of smartphones and tablets—generally no setup or apps required.[7]
- Easily access, print, and share resources with Ethernet and optional wireless networking.[4]

[1] More pages versus predecessor cartridges claim based on page-yield comparison of HP 507A High Yield Original LaserJet Toner Cartridges with HP 508X High Yield Original LaserJet Toner Cartridges. For more information, see http://www.hp.com/go/learnaboutsupplies

[2] Based on HP internal testing of top three leading competitors' first page out from sleep mode and duplex print and copy speed completed 8/2015. Subject to device settings. Actual results may vary. For details, see http://www.hp.com/go/Ljclaims

[3] Based on HP testing using the ENERGY STAR® program's Typical Electricity Consumption (TEC) method or as reported in energystar.gov versus the top three leading competitors as of 8/2015. Actual results may vary. For details see http://www.hp.com/go/Ljclaims

[4] Wireless networking requires purchase of the HP Jetdirect 2900nw Print Server. Wireless performance is dependent on physical environment and distance from access point, and may be limited during active VPN connections.

[5] Wireless direct printing is standard on the HP Color LaserJet Enterprise MFP M577z only. Requires purchase of optional HP Jetdirect 3000w NFC/Wireless Direct Accessory for the HP Color LaserJet Enterprise MFP M577dn/f/c. Mobile device needs to be connected directly to the Wi-Fi network of a wireless direct–capable MFP or printer prior to printing. Depending on mobile device, an app or driver may also be required. Wireless performance is dependent on physical environment and distance from the access point in the MFP or printer. For details, see http://www.hp.com/go/businessmobileprinting

[6] Touch-to-print capability is standard on the HP Color LaserJet Enterprise MFP M577z only. Requires purchase of optional HP Jetdirect 3000w NFC/Wireless Direct Accessory for the HP Color LaserJet Enterprise MFP M577dn/f/c. Mobile device must support Near Field Communication (NFC)–enabled printing. For more information, see http://www.hp.com/go/businessmobileprinting

[7] Wireless operations are compatible with 2.4 GHz operations only. App or software and HP ePrint account registration may also be required. Some features require purchase of an optional accessory. Learn more at http://www.hp.com/go/mobileprinting

[8] Purchase of optional paper trays required to reach maximum input capacity.

[9] Measured using ISO/IEC 24734 and excludes first set of test documents. For more information, see http://www.hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity.

[10] Some features require additional purchase. A FutureSmart service pack update may be required to activate security features. Learn more at http://www.hp.com/go/printsecurity

[11] Some solutions require download or additional purchase. Learn more at http://www.hp.com/go/printingsolutions

[12] Universal device plug-in is offered with HP Web Jetadmin 10.3 SR4 and higher. HP Web Jetadmin is free and available for download at http://www.hp.com/go/webjetadmin

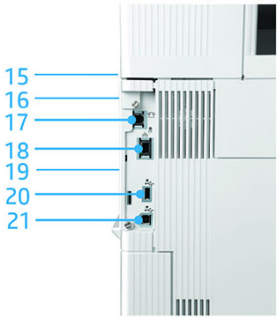
[13] HP 508X High Yield Original LaserJet Toner Cartridges not included; please purchase separately.

[14] An FCC Class A emissions compliant device meets the less stringent (higher) levels of emissions allowed by the FCC for a product operation in a commercial environment. An FCC class A device cannot be marketed for use in a residential environment and an FCC class A device should not be purchased for use in a residential environment due to the increased risk of interference to radio communications.

Product walkaround

1. Intuitive 8-inch (20.3 cm) color touchscreen tilts up for easier viewing
2. Convenience stapler
3. Pull-out keyboard for easy, accurate data entry
4. Convenient front on/off button
5. Right door (access to print path)
6. 100-sheet multipurpose tray
7. 550-sheet input tray 2
8. 100-sheet ADF with single-pass, two-sided scanning and HP EveryPage
9. Hardware Integration Pocket[1] (for connecting accessory and third-party devices)
10. Easy-access USB port to save and print files directly[2]
11. Built-in wireless direct Printing[3]/NFC touch-to-print[4]
12. 250-sheet output bin
13. Front door (access to HP JetIntelligence Toner cartridges)
14. Built-in automatic two-sided printing
15. 1.75 GB standard memory (upgradeable to 2.5 GB) and a 1.2 GHz processor
16. HP High-Performance Secure Hard Disk
17. Fax port
18. HP Jetdirect Gigabit Ethernet print server
19. Slot for optional cable-type security lock
20. Hi-Speed USB 2.0 port (for connecting third-party devices)
21. Hi-Speed USB 2.0 printing port

Front view



Series at a glance




Model	HP Color LaserJet Enterprise MFP M577dn	HP Color LaserJet Enterprise MFP M577f	HP Color LaserJet Enterprise Flow MFP M577c	HP Color LaserJet Enterprise Flow MFP M577z
Model	MFP M577dn	MFP M577f	Flow MFP M577c	Flow MFP M577z
Product number	B5L46A	B5L47A	B5L54A	B5L48A
HP High-Performance Secure Hard Disk	√			
100-page ADF with single-pass, two sided scanning	√		√ (Plus HP EveryPage)	
Fax capability	Optional	√		
Convenience stapler	Not available	√		
Advanced workflow features including pull-out keyboard	Not available		√	
Wireless direct printing[3]/NFC[4]	Optional			√

[1] Solutions deployed through the Hardware Integration Pocket may require additional purchase.
[2] An administrator must enable the easy-access USB port before use.
[3] Wireless direct printing is standard on the HP Color LaserJet Enterprise MFP M577z only. Requires purchase of optional HP Jetdirect 3000w NFC/Wireless Direct Accessory for the HP Color LaserJet Enterprise MFP M577dn/f/c. Mobile device needs to be connected directly to the Wi-Fi network of a wireless direct-capable MFP or printer prior to printing. Depending on mobile device, an app or driver may also be required. Wireless performance is dependent on physical environment and distance from the access point in the MFP or printer. For details, see hp.com/go/businessmobileprinting.
[4] Touch-to-print capability is standard on the HP Color LaserJet Enterprise MFP M577z only. Requires purchase of optional HP Jetdirect 3000w NFC/Wireless Direct Accessory for the HP Color LaserJet Enterprise MFP M577dn/f/c. Mobile device must support Near Field Communication (NFC)-enabled printing. For more information, see hp.com/go/businessmobileprinting.

HP Services

Downtime can have serious consequences, so HP provides support beyond the standard warranty. You benefit from reduced risk, maximized uptime, predictable service delivery and no unbudgeted repair costs. HP Care Pack Services provide a comprehensive suite of protection services designed to keep HP hardware and software up and running so employees can stay productive.

For carepack availability visit: hp.com/go/cpc:

Top features

This efficient MFP is designed to conserve energy without sacrificing productivity—so users can speed through tasks and move business forward. It also uses exceptionally low amounts of energy—thanks to its innovative design and toner technology.[3]

Trust your MFP is secure from power-up to power-down. Get strong protection for devices, data, and documents with embedded and optional security features while centrally managing your entire fleet.[10]

Bring out the best in your MFP. Print more high-quality pages than ever before,[1] using specially designed Original HP Toner cartridges with JetIntelligence. Count on the authentic HP quality you paid for—something the competition can't match.

Enable secure wireless printing in the office—with or without network access[5]—and keep users connected with Ethernet and optional wireless networking.[4] Print with just a touch from mobile devices.[6]

Accessories

H2MU47A	HP Accessibility Assistant
2NR09A	HP 2GB 144-Pin DDR3 TAA Version DIMM
2NR12A	HP Removable Hard Drive Enclosure
2TD64A	HP Accessibility Kit
3JN69A	HP Jetdirect 3100w BLE/NFC/Wireless Accessory
5EL03A	HP TAA Version Secure Hard Disk Drive
B5L28A	HP Internal USB Ports
B5L31A	HP Foreign Interface Harness
B5L34A	HP Color LaserJet 550-sheet Media Tray
B5L51A	HP Color LaserJet Printer Cabinet
B5L52A	HP 200 ADF Roller Replacement Kit
B5L53A	HP LaserJet MFP Analog Fax Accessory 600
CC543B	HP SmartCard NIPRNet Solution for US Government
E5K48A	HP 1 GB x32 144-pin (800 MHz)DDR3 SODIMM
E5K49A	HP 2 GB x32 144-pin (800 MHz) DDR3 SODIMM
F5S62A	HP Trusted Platform Module Accessory
F8B30A	HP SmartCard SIPRNet Solution for US Government
HG277TT	HP MICR Printing Solution - USB
J8030A	HP Jetdirect 3000w NFC/Wireless Accessory
J8031A	HP Jetdirect 2900nw Print Server
W5U23A	HP 200 ADF Roller Replacement Kit
Q7432A	HP Staple Cartridge Pack
A7W12A	HP LaserJet Keyboard Overlay Kit for Simplified Chinese & Traditional Chinese

Services

U8TH7E - HP 3 year Next Business Day + Defective Media Retention Color LaserJet M577 MultiFunction Hardware Support

U8TH8E - HP 4 year Next Business Day + Defective Media Retention Color LaserJet M577 MultiFunction Hardware Support

U8TH9E - HP 5 year Next Business Day + Defective Media Retention Color LaserJet M577 MultiFunction Hardware Support

U8TJ0E - HP 3 year 4 hour 9x5 + Defective Media Retention Color LaserJet M577 MultiFunction Hardware Support

U2010E - HP Network Installation mid-range LaserJet Multifunction printer Service

Solutions

HP Web Jetadmin: hp.com/go/wja

HP Universal Print Driver: hp.com/go/upd

HP Imaging and Printing Security Center: hp.com/go/ipsc

[1] More pages versus predecessor cartridges claim based on page-yield comparison of HP 507A High Yield Original LaserJet Toner Cartridges with HP 508X High Yield Original LaserJet Toner Cartridges. For more information, see http://www.hp.com/go/learnaboutsupplies
[2] Based on HP internal testing of top three leading competitors' first page out from sleep mode and duplex print and copy speed completed 8/2015. Subject to device settings. Actual results may vary. For details, see http://www.hp.com/go/Ljclaims
[3] Based on HP testing using the ENERGY STAR® program's Typical Electricity Consumption (TEC) method or as reported in energystar.gov versus the top three leading competitors as of 8/2015. Actual results may vary. For details see http://www.hp.com/go/Ljclaims
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[7] Wireless operations are compatible with 2.4 GHz operations only. App or software and HP ePrint account registration may also be required. Some features require purchase of an optional accessory. Learn more at http://www.hp.com/go/mobileprinting
[8] Purchase of optional paper trays required to reach maximum input capacity.
[9] Measured using ISO/IEC 24734 and excludes first set of test documents. For more information, see http://www.hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity.
[10] Some features require additional purchase. A FutureSmart service pack update may be required to activate security features. Learn more at http://www.hp.com/go/printsecurity
[11] Some solutions require download or additional purchase. Learn more at http://www.hp.com/go/printingsolutions
[12] Universal device plug-in is offered with HP Web Jetadmin 10.3 SR4 and higher. HP Web Jetadmin is free and available for download at http://www.hp.com/go/webjetadmin
[13] HP 508X High Yield Original LaserJet Toner Cartridges not included; please purchase separately.
[14] An FCC Class A emissions compliant device meets the less stringent (higher) levels of emissions allowed by the FCC for a product operation in a commercial environment. An FCC class A device cannot be marketed for use

HP Color LaserJet Enterprise MFP M577 series

Model	HP Color LaserJet Enterprise MFP M577dn	HP Color LaserJet Enterprise MFP M577f	HP Color LaserJet Enterprise Flow MFP M577c	HP Color LaserJet Enterprise Flow MFP M577z
Product number	B5L46A	B5L47A	B5L54A	B5L48A
AIO functions	Print, copy, scan; **AIO multitasking supported:** Yes	Print, copy, scan, fax; **AIO multitasking supported:** Yes		
Print				
Print speed[1 12 22 20]	**Letter:** Up to 40 ppm Black; Up to 40 ppm Color; **2-sided:** Up to 40 ipm Black; Up to 40 ipm Color; **First page out:** As fast as 5.5 sec Black; As fast as 6.9 sec Color; **Print speed (Landscape, A5):** Up to 59 ppm Black; Up to 59 ppm Color		**Letter:** Up to 40 ppm Black; Up to 40 ppm Color; **2-sided:** Up to 40 ipm Black; Up to 40 ipm Color; **First page out:** As fast as 5.7 sec Black; As fast as 6.9 sec Color; **Print speed (Landscape, A5):** Up to 59 ppm Black; Up to 59 ppm Color	
Print resolution	**Black (best)** HP ImageREt 3600; **Black (normal)** Up to 600 x 600 dpi; **Black (fine lines)** Up to 1200 x 1200 dpi **Color (best):** HP ImageREt 3600; **Color (normal):** Up to 600 x 600 dpi; **Color (fine lines):** Up to 1200 x 1200 dpi			
Print technology	Laser; **Print resolution technology:** HP ImageREt 3600, Pantone Calibrated			
Print cartridges number	4 (1 each black, cyan, magenta, yellow)			
Standard print languages	XPS, HP PCL 6; HP PCL 5c; HP postscript level 3 emulation, native PDF printing (v 1.7)			
Printer smart software features	Print preview, duplex printing, print multiple pages per sheet (2, 4, 6, 9, 16), collation, watermarks, store print jobs, easy-access USB, HP Easy Color			
Printer management	UPD Printer Administrator Resource Kit (Driver Configuration Utility, Driver Deployment Utility, Managed Printing Administrator); HP Web JetAdmin Software; HP Proxy Agent Software; HP JetAdvantage Security Manager			
Scan				
Scan type / Technology	**Type:** Flatbed, ADF (two-sided, single-pass); **Technology:** Contact Image Sensor (CIS)			
Scan resolution	**Hardware:** Up to 600 x 600 dpi; **Optical:** Up to 600 dpi			
Scan file format	PDF, JPEG, TIFF, MTIFF, XPS, PDF/A		Digital Send: PDF, JPEG, TIFF, MTIFF, XPS, PDF/A, TEXT (OCR), Unicode TEXT (OCR), RTF (OCR), Searchable PDF (OCR), Searchable PDF/A (OCR), HTML (OCR), CSV (OCR); Scan to easy access USB: PDF, JPEG, TIFF, MTIFF, XPS, PDF/A, TEXT (OCR), Unicode TEXT (OCR), RTF (OCR), Searchable PDF (OCR), Searchable PDF/A (OCR), HTML (OCR), CSV (OCR); Print from easy access USB: PDF, PS, Print Ready files (.prn, .pcl, .cht)	
Scan input modes	Front panel applications: Copy, E-mail, Save to Network Folder, Save to USB, Save to Device Memory, Open Extensibility Platform (OXP) applications	Front panel applications: Copy, E-mail, Fax, Save to Network Folder, Save to USB, Save to Device Memory, Open Extensibility Platform (OXP) applications	Front panel applications: Copy, E-mail, Fax, Save to Network Folder, Save to USB, Save to Device Memory, Save to SharePoint, Open Extensibility Platform (OXP) applications	
Scan Size	**ADF:** 8.5 x 14 in Maximum; 4.1 x 5 in Minimum; **Flatbed:** Up to 43 ppm/43 ipm (b&w), up to 38 ppm/38 ipm (color)		**ADF:** 8.5 x 14 in Maximum; 4.1 x 5 in Minimum; **Flatbed:** Up to 45 ppm/64 ipm (b&w), up to 45 ppm/58 ipm (color)	
Scan speed[2 3]	Up to 43 ppm/43 ipm (b&w), up to 38 ppm/38 ipm (color) **Duplex:** Up to 43 ipm (b&w), up to 38 ipm (color)		Up to 45 ppm/64 ipm (b&w), up to 45 ppm/58 ipm (color) **Duplex:** Up to 64 ipm (b&w), up to 58 ipm (color)	
Scanner advanced features	Optimize text/picture; Image adjustments; Job build; Output quality setting; Selectable scan resolution 75 to 600 dpi; Auto detect color; Edge Erase; Job notification; Blank page suppression; HP Quick Sets; %%Products.scanformatftnt*%% PDF, JPEG, TIFF, MTIFF, XPS, PDF/A		Optimize text/picture; Image adjustments; Job build; Output quality setting; Selectable scan resolution 75 to 600 dpi; Auto detect color; Edge Erase; Job notification; Blank page suppression; HP Quick Sets; HP EveryPage; Auto orientation; Embedded Optical Character Recognition (OCR), Auto crop to page; Auto-tone; %%Products.scanformatftnt*%% Digital Send: PDF, JPEG, TIFF, MTIFF, XPS, PDF/A, TEXT (OCR), Unicode TEXT (OCR), RTF (OCR), Searchable PDF (OCR), Searchable PDF/A (OCR), HTML (OCR), CSV (OCR); Scan to easy access USB: PDF, JPEG, TIFF, MTIFF, XPS, PDF/A, TEXT (OCR), Unicode TEXT (OCR), RTF (OCR), Searchable PDF (OCR), Searchable PDF/A (OCR), HTML (OCR), CSV (OCR); Print from easy access USB: PDF, PS, Print Ready files (.prn, .pcl, .cht)	
Bit depth / Grayscale levels	24-bit / 256			
Digital sending standard features	Scan to E-mail; Save-to-Network Folder; Save-to-USB drive; Send to FTP; Send to Internet Fax; Local Address Book; SMTP over SSL; Blank Page Removal; Edge Erase; Auto Color Sense; Auto Crop To Content; Compact PDF	Scan to E-mail; Save-to-Network Folder; Save-to-USB drive; Send to FTP; Send to LAN Fax; Send to Internet Fax; Local Address Book; SMTP over SSL; Blank Page Removal; Edge Erase; Auto Color Sense; Auto Crop To Content; Compact PDF	Scan to E-mail; Save-to-Network Folder; Save-to-USB drive; Send to Sharepoint; Send to FTP; Send to LAN Fax; Send to Internet Fax; OCR; Local Address Book; SMTP over SSL; Blank Page Removal; Edge Erase; Auto Color Sense; Auto Crop To Content; Compact PDF; Auto Tonescale; Auto Orientation; Multi-Pick Detect; Auto Straighten; Auto Crop To Page; OCR	
Copy				
Copy speed[2 1]	**Black (ISO):** Up to 38 cpm; **Color (ISO):** Up to 38 cpm; **First copy out:** As fast as 5.4 sec Black; As fast as 8.7 sec Color; **2-sided:** Up to 40 cpm Black; Up to 40 cpm Color		**Black (ISO):** Up to 38 cpm; **Color (ISO):** Up to 38 cpm; **First copy out:** As fast as 5.5 sec Black; As fast as 8.7 sec Color; **2-sided:** Up to 40 cpm Black; Up to 40 cpm Color	
Copy resolution	**Black (text and graphics):** Up to 600 x 600 dpi; **Color (text and graphics):** Up to 600 x 600 dpi			
Maximum Number of Copies	Up to 9999 copies			
Copier resize	25 to 400%			
Copier settings	Two-sided copying; Scalability; Image adjustments (darkness, contrast, background cleanup, sharpness); N-up; N or Z-ordering; Content orientation; Collation; Booklet; Job build; Edge-to-edge; Job storage; ID Copy; Book Copy; A-to-B Copy (different media sizes)			
Fax				
Fax speed		**Up to:** 33.6 kbps / **Letter:** 3 sec per page		
Fax resolution		**Black (best):** Up to 300 x 300 dpi (400 x 400 dpi for received faxes only); **Black (standard):** 204 x 98 dpi		
Fax smart software features		Stored faxes; Fax archiving; Fax forwarding; Scale to fit; Fax address book; LAN/Internet fax; Fax number confirmation; Holiday fax schedule		
Fax Features		**Auto fax reduction supported:** Yes; **Auto-redialing:** Yes; **Fax delayed sending:** No; **Distinctive ring detection supported:** No; **Fax forwarding supported:** Yes; **Fax phone TAM interface supported:** No; **Fax polling supported:** Yes (poll to receive only); **Fax telephone mode supported:** No; **Junk barrier supported:** Yes; **Maximum speed dialing numbers:** Up to 1000 numbers (each with 210 destinations); **PC interface supported:** Yes; **Remote retrieval capability supported:** No; **Telephone handset supported:** No		
Connectivity				
Standard connectivity	2 Hi-Speed USB 2.0 Host; 1 Hi-Speed USB 2.0 Device; 1 Gigabit/Fast Ethernet 10/100/1000Base-TX network; Hardware Integration Pocket	2 Hi-Speed USB 2.0 Host; 1 Hi-Speed USB 2.0 Device; 1 Gigabit/Fast Ethernet 10/100/1000Base-TX network; Hardware Integration Pocket; Fax		
Network capabilities	Yes, via HP Jetdirect Ethernet embedded print server (standard) supports: 10Base-T, 100Base-Tx, 1000Base-T; 802.3az (EEE) support on Fast Ethernet and Gigabit Ethernet; IPsec (standard)			
Wireless capability	Optional, enabled with purchase of hardware accessory.			Yes, built-in Gigabit Ethernet, Wi-Fi 802.11b/g/n
Mobile printing capability	HP ePrint; Apple AirPrint™; Mopria™-certified; Google Cloud Print 2.0			HP ePrint; Apple AirPrint™; Mopria™-certified; NFC Touch-to-print; Wireless Direct Printing; Google Cloud Print 2.0
Memory[8]	**Standard:** 1.25 GB (printer), 500 MB (scanner); **Maximum:** 2.0 GB (printer), 500 MB (scanner)			
Processor speed	1.2 GHz / **Hard disk:** Standard, embedded HP High-Performance Secure Hard Disk, minimum 320 GB; AES 256 hardware encryption or greater; Secure erase capabilities (Secure File Erase-Temporary Job Files, Secure Erase-Job Data, Secure ATA Erase-Disk); U.S. Government: Standard, FIPS 140-2 validated hard disk, minimum 500 GB			
Duty cycle (monthly)[9]	**Letter:** Up to 80,000 pages; **Recommended monthly page volume[10]:** 2000 to 7500			
Paper handling				
Input	100-sheet multipurpose tray, 550-sheet input tray 2; Up to 650 sheets Standard; Up to 10 envelopes			
Output	250-sheet output bin; Up to 250 sheets Standard; Up to 100 sheets	250-sheet output bin, convenience stapler; Up to 250 sheets Standard; Up to 100 sheets		
Duplex Options	Automatic (standard)			
Auto document feeder capacity	Standard, 100 sheets			
Envelope feeder	No			
Standard paper trays	2			
Media types	Paper (plain, light, bond, recycled, mid-weight, heavy, mid-weight glossy, heavy glossy, extra heavy, extra heavy glossy, cardstock, card glossy), color transparency, labels, letterhead, envelope, preprinted, prepunched, colored, rough, opaque film, user-defined			
Media weight	Tray 1: 16 to 58 lb (plain); 28 to 58 lb (glossy); Tray 2: 16 to 58 lb (plain paper); 28 to 58 lb (glossy paper); Optional Trays 3+: 16 to 58 lb (plain paper); 28 to 58 lb (glossy paper)			
Media sizes	Tray 1: letter, legal, oficio, executive, statement, 4 x 6, 3 x 5, 5 x 7, 5 x 8, postcard (JIS), double postcard (JIS), 8.5 x 13, envelope (commercial No. 9, No. 10, Monarch); Custom: 3 x 5 to 8.5 x 14 in; Tray 2: letter, executive, statement, 4 x 6, 5 x 7, 5 x 8, double postcard (JIS); Custom: 4.0 x 5.85 to 8.5 x 11.69 in; Optional Trays 3+: letter, legal, oficio, executive, 8.5 x 13; Custom: 4.0 x 5.85 to 8.5 x 14 in			
Media Sizes Custom	Tray 1: 3 x 5 to 8.5 x 14 in; Tray 2: 4.0 x 5.85 to 8.5 x 11.69 in; Optional Trays 3+: 4.0 x 5.85 to 8.5 x 14 in			
Dimensions (w x d x h)[2]	18.98 x 19.84 x 22.95 in; **Maximum:** 27.5 x 19.84 x 22.95 in			
Weight[3]	84 lb	84.5 lb	85 lb	
What's in the box[1]	Printer; Four preinstalled HP LaserJet toner cartridges (yield ~6000 pages black, ~5000 pages color); Toner collection unit; In-box documentation; Software CD; Power Cord	Printer; Four preinstalled HP LaserJet toner cartridges (Black: ~6000 pages, Color: ~5000 pages); Toner collection unit; In-box documentation; Software CD; Power Cord; fax cable		Printer; Four preinstalled HP LaserJet toner cartridges (Black: ~6000 pages , Color: ~5000 pages); Toner collection unit; In-box documentation; Software CD; Power Cord; fax cable
Warranty features	One-year, next-business day, onsite warranty. Warranty and support options vary by product, country and local legal requirements. Go to http://www.hp.com/support to learn about HP award winning service and support options in your region.			
Energy efficiency compliance	ENERGY STAR® qualified; EPEAT® Silver, CECP			ENERGY STAR® qualified; EPEAT® Silver; CECP
Control panel	8.0-in (20.3 cm) color touchscreen; adjustable angle display with gesturing; illuminated Home button (for quick return to the Home menu)		8.0-in (20.3 cm) color touchscreen; adjustable angle display with gesturing; illuminated Home button (for quick return to the Home menu) and integrated keyboard	
Display	8" color touchscreen			
Software included	For Windows OS; HP Software Installer/Uninstaller, HP PCL 6 Printer Driver, HP Device Experience (DXP), HP Send Fax, HP Update, Product Registration Assist, HP Web Services Assist (HP Connected), Online user manuals; For Mac OS; Welcome Screen, (Directs users to HP.com or OS App Source for LaserJet Software)			
Fonts and typefaces	105 internal TrueType fonts scalable in HP PCL, 92 internal scalable fonts in HP postscript Level 3 emulation (Euro symbol built-in); 1 internal Unicode Fonts (Andale Mono World Type); 2 Internal Windows Vista 8 Fonts (Calibri, Cambria); Additional font solutions available via third-party flash memory cards; HP LaserJet Fonts and IPDS Emulation available at http://www.hp.com/go/laserjetfonts			
Compatible operating systems[1 3]	Windows OS compatible with In-Box Driver; Windows XP SP3 all 32-bit editions (XP Home, XP Pro, etc.), Windows Vista all 32-bit editions (Home Basic, Premium, Professional, etc.), Windows 7 all 32- & 64-bit editions, Windows 8/8.1 all 32- & 64-bit editions (excluding RT OS for Tablets), Windows 10 all 32- & 64-bit editions (excluding RT OS for Tablets); Windows OS compatible with Universal Print Driver (From HP.com); Windows XP SP3 32- & 64-bit editions (XP Home, XP Pro, etc.), Windows Vista all 32- & 64-bit editions (Home Basic, Premium, Professional, etc.),Windows 7 all 32- & 64-bit editions, Windows 8/8.1 all 32- & 64-bit editions (excluding RT OS for Tablets), Windows 10 all 32- & 64-bit editions (excluding RT OS for Tablets); Mac OS (HP Print Drivers available from HP.com and Apple Store); OS X 10.8 Mountain Lion,OS X 10.9 Mavericks, OS X 10.10 Yosemite; Mobile OS (In-OS drivers); iOS, Android, Windows 8/8.1/10 RT; Linux OS (In-OS HPLIP; SUSE Linux (12.2, 12.3, 13.1), Fedora (17, 18, 19, 20), Linux Mint (13, 14, 15, 16, 17), Boss (3.0, 5.0), Ubuntu (10.04, 11.10, 12.04, 12.10, 13.04, 13.10, 14.04, 14.10), Debian (6.0.x, 7.x); Other OS; UNIX			
Compatible network operating systems	Windows OS compatible with In-Box Driver; Windows Server 2003/2003 R2 32-bit (SP1/SP2) Standard/Enterprise (+ Cluster & Terminal Services), Windows Server 2008 32-/64-bit (SP2) Standard/Enterprise (+ Cluster & Terminal Services), Windows Server 2008 R2 64-bit (SP1) Standard/Enterprise (+ Cluster & Terminal Services ;Windows OS compatible with Universal Print Driver (UPD) or Product-Specific drivers from HP.com; Windows Server 2003/2003 R2 32-/64-bit (SP1/SP2) Standard/Enterprise/Datacenter (+ Cluster & Terminal Services), Windows Server 2008/2008 R2 32-/64-bit (SP1/SP2) Standard/Enterprise/Datacenter (+ Cluster & Terminal Services), Windows Server 2012/2012 R2 64-bit Standard/Foundation/Essentials/Datacenter (+ Cluster & Terminal Services) ;Citrix (on Windows Server 2003/2003R2), Citrix MetaFrame Presentation Server, 3.0, Citrix MetaFrame XP Presentation Server (Feature Release 1, 2, and 3), Citrix Presentation Server 4.0/4.5, Citrix XenApp 5.0 (Plus Feature Pack 2 & 3), Citrix (on Windows Server 2008/2008R2, Citrix XenApp 5.0 (Plus Feature Pack 2 & 3), Citrix XenApp 6.0/6.5/7.5, Citrix XenDesktop 5.6/7.0/7.5 ,Citrix (on Windows Server 2012/2012R2, Citrix XenApp 7.5, Citrix XenDesktop 7.0/7.5 ;Novell Servers; www.novell.com/iprint), Novell iPrint Appliance v1.0, Novell Open Enterprise Server 11/SP1, Novell Open Enterprise Server 2 for Linux, NetWare 6.5/SP8, Novell Clients (www.novell.com/iprint; Windows 8 (32-bit / 64-bit) recommend v5.86+, 8.1 recommend v5.94+, Windows 7 (32-bit / 64-bit) recommend v5.82+, Windows Vista (32-bit / 64-bit) recommend v5.82+, Windows XP / SP3 (32-bit only) recommend v5.82+ ?			
Minimum system requirements	**PC:** Windows XP SP3 all 32-bit editions (XP Home, XP Pro, etc.), Windows Vista all 32-bit editions (Home Basic, Premium, Professional, etc.), Windows 7 all 32- & 64-bit editions, Windows 8/8.1 all 32- & 64-bit editions (excluding RT OS for Tablets), Windows 10 all 32- & 64-bit editions (excluding RT OS for Tablets); Windows OS compatible with Universal Print Driver (From HP.com); Windows XP SP3 32- & 64-bit editions (XP Home, XP Pro, etc.), Windows Vista all 32- & 64-bit editions (Home Basic, Premium, Professional, etc.),Windows 7 all 32- & 64-bit editions, Windows 8/8.1 all 32- & 64-bit editions (excluding RT OS for Tablets), Windows 10 all 32- & 64-bit editions (excluding RT OS for Tablets); CD-ROM or DVD drive, or Internet connection; Dedicated USB or network connection or Wireless connection; 200 MB available hard disk space; OS compatible hardware (For OS hardware requirements see http://www.microsoft.com); **Mac:** Mac OS (HP Print Drivers available from HP.com and Apple Store); OS X 10.8 Mountain Lion,OS X 10.9 Mavericks, OS X 10.10 Yosemite; Internet; USB; 1 GB HD; OS compatible hardware (For OS hardware requirements see http://www.apple.com)			
Power[5 19]	**Power supply type:** Internal (Built-in) power supply; **Power supply required:** Input voltage: 100 to 127 VAC, 60 Hz, Input voltage: 200 to 240 VAC, 50 Hz (Not dual voltage, product varies by part number with # Option code identifier); **Power consumption[4]:** 592 watts (Printing), 47.3 watts (Ready), 3.48 watts (Sleep), 0.08 watts (Auto-Off/Manual On), 0.49 watts (Auto-Off/Auto-On/Wake on LAN); **Typical electricity consumption (TEC) number:** 1.58 kWh/Week (Energy Star), 1.51 kWh/Week (Blue Angel); **Best technical electricity consumption (TEC):** 1.52 kWh/Week			
Acoustics	**Acoustic power emissions:** 6.5 B(A) (printing at 38 ppm)			
Operating environment	**Operating temperature range:** 59 to 86°F ; **Recommended operating temperature:** 62 to 77°F ; **Storage temperature range:** 32 to 95°F ; **Operating humidity range:** 10 to 80% RH ; **Recommended operating humidity range:** 30 to 70% RH			
Security management	Identity management: Kerberos authentication, LDAP authentication, 1000 user PIN codes, optional HP and 3rd party advanced authentication solutions (e.g., badge readers); Network: IPsec/firewall with Certificate, Pre-Shared Key, and Kerberos authentication, Supports WJA-10 IPsec configuration Plug-in, 802.1X authentication (EAP-PEAP, EAP-TLS), SNMPv3, HTTPS, Certificates, Access Control List; Data: Storage Encryption, Encrypted PDF & Email (uses FIPS 140-2 validated cryptographic libraries), Secure Erase, SSL/TLS (HTTPS), Encrypted Credentials; Device: Security lock slot, USB port disablement, hardware integration pocket for security solutions, optional Trusted Platform Module; Security management: Compatible with optional HP JetAdvantage Security Manager			

[1] Toner cartridge yields established using ISO/IEC test standards. Actual yields and costs vary considerably depending on images printed, number of color pages printed, and other factors.
[2] Without Tray 1 or Legal extension extended
[3] With printer cartridges
[4] Power requirements are based on the country/region where the printer is sold. Do not convert operating voltages. This will damage the printer and void the product warranty.
[5] Typical Electricity Consumption (TEC) rating represents the typical electricity consumed by a product during 1 week, measured in kilowatt-hours (kWh).
[6] Average color composite (C/M/Y) and black declared yields based on ISO/IEC 19798 and continuous printing. Actual yields vary considerably based on images printed and other factors. For details see http://www.hp.com/go/learnaboutSupportlies
[7] HP SureSupply alerts you when your print cartridge is running low and helps you purchase online or locally through HP or a participating retailer. Only available with Original HP supplies; Internet access required. To learn more, visit http://www.hp.com/go/SureSupply
[8] Max memory is with 1 GB DIMM installed. The maximum the Firmware can use is 2 GB so 250 MB is unused in this configuration.
[9] Duty cycle is defined as the maximum number of pages per month of imaged output. This value provides a comparison of product robustness in relation to other HP LaserJet or HP Color LaserJet devices, and enables appropriate deployment of printers and MFPs to satisfy the demands of connected individuals or groups.
[10] HP recommends that the number of pages per month of imaged output be within the stated range for optimum device performance, based on factors including supplies replacement intervals and device life over an extended warranty period.
[11] Measured using ISO/IEC 24734, excludes first set of test documents. For more information see http://www.hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity.
[12] HP recommends that the number of scanned pages per month be within the stated range for optimum device performance.
[13] Not all "Compatible Operating Systems" are supported with INBOX software; Full solution software available only for Windows 7 and newer; Legacy Windows Operating Systems (XP, Vista, and equivilant servers) get print and Scan drivers only; Windows RT OS for Tablets (32- & 64-bit) uses a simplified HP print driver built into the RT OS; UNIX modelscripts are available on HP.com (Modelscripts are printer drivers for UNIX operating systems); Linux systems use in-OS HPLIP software.

To learn more, visit hp.com

4AA6-1663ENUC, August 2019, R2

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Printer, Laser, Multifunction
Manufacturer: Konica Business Machines ((201) 825-4000)
Vendor: Konica Business Machines ((201) 825-4000)
Model: bizhub 558e

Alt ID: PRT-MFL
Mfr #:
Vendor #:
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	1	
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**4**	

KONICA MINOLTA

TECHNOLOGY

bizhub® 558e

MONOCHROME MID-VOLUME MULTIFUNCTION PRINTER

- Up to 55 ppm print/copy output to keep pace with rising demands
- Standard dual scanning up to 240 originals per minute
- High capacity 300-sheet document feeder
- Large 9" color display with quick tablet-like touchscreen interface
- 3rd-party software integration with standard web browser
- Built-in Emperon® print system, universal printer drivers
- Simitri® HD polymerized toner for high-resolution imaging
- Standard 250 GB HDD for on-board document storage
- Meets ISO 15408 and IEEE 2600.1 Security standards*
- Standard web browser, 4 GB of memory
- Power-saving design with quick recovery from sleep mode
- 6,650-sheet maximum capacity, tab printing support, carbon-copy printing
- Advanced authentication, secure print release, remote firmware updates
- Multiple bypass tray and detachable paper feed trays improve paper handling
- Finishing options for 80-page booklet-making, up to 100-sheet stapling
- Options for 2/3-hole punch, tri-fold, 2-fold, post-insertion and more
- Downloadable apps to help you work faster and smarter
- Multiple i-Options to suit the needs of your workflow
- EPEAT Gold-certified, low power consumption to cut costs
- Mobile printing support (AirPrint, Google Cloud Print Classic, NFC)

*May not be available at time of launch.

bizhub 558e

MONOCHROME MID-VOLUME MULTIFUNCTION PRINTER

The bizhub 558e presents the perfect solution for professional digitization of documents, thanks to the reliable high-capacity standard dual scan document feeder. Combined with the enhanced options for flexibility and security, it adapts precisely to customers' requirements and can easily be integrated into new working styles and any conceivable workflow.

SYSTEM OVERVIEW

System memory	4 GB
System hard disk	250 GB Standard
Interface	10-Base-T / 100-Base-TX / 1,000-Base-T Ethernet, USB 2.0
Network protocols	TCP/IP (IPv4/IPv6), FTP, SMB v2, SMTP, WebDAV
Frame types	Ethernet 802.2, Ethernet 802.3, Ethernet II, Ethernet SNAP
Document feeder	Up to 300 originals / 5.5" x 8.5" to 11" x 17" / 35–210 gsm Dual scan document feeder
Printable paper size	**Scanning/Copying:** up to 11" x 17" **Printing:** up to 11" x 17" full bleed on 12" x 18" paper Custom paper sizes Banner paper max.: 11.75" x 47.25"
Printable paper weight	52–300 gsm
Paper input capacity	**Standard:** 1,150 sheets / **Max.:** 6,650 sheets
Tray 1	500 sheets / 5.5" x 8.5" to 11" x 17" / 52–256 gsm
Tray 2	500 sheets / 5.5" x 8.5" to 12" x 18" / 52–256 gsm
Tray 3 (optional)	500 sheets / 5.5" x 8.5" to 11" x 17" / 52–256 gsm
Tray 4 (optional)	2 x 500 sheets / 5.5" x 8.5" to 8.5" x 11" / 52–256 gsm
Large capacity tray LU-207 (optional)	2,500 sheets / 8.5" x 11" to 12" x 18" / 52–256 gsm
Large capacity tray LU-302 (optional)	3,000 sheets / 8.5" x 11" / 52–256 gsm
Large capacity tray PC-415 (optional)	2,500 sheets / 8.5" x 11" / 52–256 gsm
Manual bypass	150 sheets / 4" x 6" to 12" x 18" / custom paper sizes / 50–300 gsm
Automatic duplexing	5.5" x 8.5" to 12" x 18" / 52–256 gsm
Finishing modes	Offset, group, staple, sort, punch, half-fold, z-fold, tri-fold, post-insertion, booklet
Output capacity	**Max. with finisher:** 3,200 sheets **Max. without finisher:** 250 sheets
Stapling (optional)	**Max.:** 100 sheets or 94 sheets + 2 cover sheets (up to 209 gsm)
Stapling output capacity	**Max.:** 1,000 sheets
Tri-fold (optional)	Up to 3 sheets
Tri-fold capacity	**Max.:** 30 sheets (tray)
Booklet (optional)	**Max.:** 20 sheets or 19 sheets + 1 cover sheet (up to 209 gsm)
Booklet output capacity	**Max.:** 100 sheets (tray)
Copy/print volume	**Max.:** 250,000 pages/month[1]
Toner lifetime	26,000 pages
Imaging unit lifetime	285,000 pages / 600,000 pages (Drum/Developer)
Power consumption	120 V / 60 Hz, less than 0.5 kW (system)
System dimensions	24.2" x 27" x 38" (W x D x H)
System weight	Approx. 211.64 lb

PRINTER SPECIFICATIONS

Print resolution	1,800 (equivalent) x 600 dpi, 1,200 x 1,200 dpi
PDL	PCL6 (XL 3.0), PCL5c, PostScript 3 (ver. 3016), XPS
Operating systems	Windows (x32/x64): Vista / 7 / 8.1 / 10 Windows Server (x32/x64): 2008 / 2008 R2[2] / 2012[3] Macintosh OS X 10.7 or later Red Hat Enterprise Linux
Printer fonts	80 PCL Latin, 137 PostScript 3
Print functions	Direct Print of PCL, PS, TIFF, XPS, PDF, encrypted PDF files and OOXML (DOCX, XLSX, PPTX), mixmedia and mixplex, "Easy Set" job programming, overlay, watermark, copy protection, carbon copy print

COPIER SPECIFICATIONS

Copying process	Electrostatic laser copy, tandem, indirect
Toner system	Simitri HD Polymerized Toner
Print speed (8.5" x 11")	Up to 55 ppm (portrait)
Print speed (11" x 17")	Up to 27 ppm (portrait)
Autoduplex speed (8.5" x 11")	Up to 55 ppm (portrait)
1st copy out time	3.5 sec.
Warm-up time	Approx. 22 sec.[2]
Copy resolution	600 x 600 dpi
Gradations	256 gradations
Multi-copy	1–9,999
Original format	Up to 11" x 17"
Magnification	25–400% in 0.1% steps, auto zooming
Copy functions	Electronic sorting, multi-job, adjustments (contrast, sharpness, image density), proof copy, interrupt mode, color mode, separate scan, sort/group, combination, original selection, ID card copy, 2-in-1, 4-in-1

SCANNER SPECIFICATIONS

Scan speed	**B&W / Color:** up to 240 ipm
Scan resolution	**Max.:** 600 x 600 dpi
Scan modes	Scan-to-Email, Scan-to-SMB, Scan-to-FTP, Scan-to-Box, Scan-to-USB, Scan-to-WebDAV, Scan-to-DPWS, Network TWAIN scan
File formats	JPEG, TIFF, PDF, PDF/A 1a and 1b (optional), compact PDF, encrypted PDF and searchable PDF (optional), XPS, compact XPS, PPTX and searchable PPTX (optional), searchable DOCX/XLSX (optional)
Scan destinations	2,100 (shared with fax), LDAP support
Scan functions	Annotation (text/time/date) for PDF, up to 400 job programs, real-time scan preview

FAX SPECIFICATIONS

Fax	Super G3 (optional)
Transmission	Analog, Internet Fax, Color i-Fax, IP-Fax
Resolution	**Max.:** 600 x 600 dpi (ultra-fine)
Compression	MH, MR, MMR, JBIG
Modem	Up to 33.6 Kbps
Destinations	2,100 (single + group)
Functions	Polling, time shift, PC-fax, receipt to confidential box, receipt to email/FTP/SMB, up to 400 job programs

USER BOX SPECIFICATIONS

Storable documents	**Max.:** 3,000 documents or 10,000 pages
Type of user boxes	Public Personal (with password or authentication) Group (with authentication)
Type of system boxes	Secure print, encrypted PDF, fax receipt, fax polling, annotation
User box functionality	Reprint, combination, download, sending (email/FTP/SMB and fax), copy box-to-box

SYSTEM FEATURES

Security	ISO 15408 EAL[4] IEEE 2600.1[4] IP filtering and port blocking SSL2, SSL3 and TSL1.0 network communication IPsec support IEEE 802.1x support FIPS 140-2 User authentication Authentication log Secure print Hard disk overwrite (8 standard types) Hard disk data encryption (AES 128) Memory data auto deletion Confidential fax receipt Print user data encryption Copy protection (Copy Guard, Password Copy) optional
Accounting	Up to 1,000 user accounts Active Directory support (user name + password + email + SMB folder) User function access definition Optional Biometric authentication (finger vein scanner) Optional ID card authentication (ID card reader)
Software	PageScope Net Care Device Manager PageScope Data Administrator PageScope Box Operator PageScope Direct Print Print Status Notifier Driver Packaging Utility Log Management Utility

[1] Maximum monthly duty cycle describes the maximum number of pages a device can output on a monthly basis. This specification is a guideline intended to offer a comparison of durability as it relates to the entire Konica Minolta MFP and printer product line so that the appropriate device can be placed in order to meet customer needs.

[2] Warm-up time may vary depending on the operating environment and usage.

[3] Supports x64 only.

[4] Certification pending.

COMPONENTS AND OPTIONS

AU-102 Biometric authentication	Finger vein scanner
Dynamag magnetic stripe card reader	Requires WT-506 Working Table
AU-205H Universal ID card reader*	Various ID card technologies
AU-211 CA/PIV solution	Requires WT-506 Working Table
EK-608 USB I/F kit	USB keyboard connection
EK-609 USB I/F kit	USB keyboard connection, Bluetooth
DK-510 Copier desk	Provides storage space for print media and other materials
FK-514 Fax board	Super G3 fax, digital fax functionality
FK-515 Fax board	Super G3 fax, digital fax functionality, lines 3 & 4 support (requires MK-742)
FS-533 Staple finisher	50-sheet stapling, 500 sheets max. output
FS-536 Staple finisher	50-sheet stapling, 3,200 sheets max. output (requires RU-513)
FS-536SD Booklet finisher	50-sheet staple finisher, 20-sheet booklet finisher, 2,200 sheets max. output (requires RU-513)
FS-537 Staple finisher	100-sheet stapling, 3,200 sheets max. output (requires RU-513)
FS-537SD Booklet finisher	100-sheet stapling, 20-sheet booklet finisher, 2,500 sheets max. output (requires RU-513)
HD-524 Hard disk	Hard disk mirroring, 250 GB
JS-506 Job separator	Separation for fax output, etc.
JS-602 Job separator for FS-537	Separation for fax output, etc.
KH-102 Keyboard holder	To place USB keyboard
KP-101 10-Key pad	For use instead of touchscreen
LK-102 v3	PDF/A, PDF encryption, digital signature
LK-104 v3	Provides voice guidance functions
LK-105 v4	Searchable PDF
LK-106	Supports native barcode printing
LK-107	Supports native Unicode printing
LK-108	Supports native OCR A and B font printing
LK-110 v2	Generates various file formats incl. DOCX, XLSX and combines LK-102 (encrypted PDF) + LK-105 (searchable PDF/OCR functionality)
LK-111 ThinPrint® Client	Print data compression for reduced network impact
LU-207 Large capacity unit	2,500 sheets / 8.5" x 11" to 12" x 18" / 52–256 gsm
LU-302 Large capacity unit	3,000 sheets / 8.5" x 11" / 52–256 gsm
MK-730 Mount kit	Banner paper guide
MK-735 Mount kit	Installation kit for ID card reader
MK-742 Mount kit	Installation kit for FK-515 fax board
OT-506 Output tray	Output tray use instead of finisher
PC-115 Universal tray (x1)	500 sheets / 5.5" x 8.5" to 11" x 17" / 52–256 gsm
PC-215 Universal tray (x2)	2 x 500 sheets / 5.5" x 8.5" to 11" x 17" / 52–256 gsm
PC-415 Large capacity tray	2,500 sheets / 8.5" x 11" / 52–256 gsm
PI-507 Post inserter for FS-537	Cover insertion, post finishing
PK-519 Punch kit for FS-533	2/3-hole punching, autoswitching
PK-520 Punch kit for FS-536	2/3-hole punching, autoswitching
PK-523 Punch kit for FS-537	2/3-hole punching, autoswitching
RU-513 Relay unit	Required for the FS-537 / FS-537SD, FS-536 / FS-536SD
SC-508 Security kit	Copy Guard function (2x required)
SP-501 Stamp unit	Added fax stamp capability kit
UK-212 Wireless LAN	Wireless LAN to network connector
UK-501 Multi-feed detection kit	Detects multi-feeding in the document feeder
WT-506 Working table	Authentication device placement
ZU-609 Z-fold unit for FS-537	Z-fold for 11" x 17" prints, 2/3-hole punching

*May not be available at time of launch.

PARTNERSHIP

Konica Minolta can help give shape to your ideas and partner with you to achieve your corporate objectives. Contact us to realize opportunities in:

INFORMATION MANAGEMENT

- Enterprise Content Management (ECM)
- Document Management
- Automated Workflow Solutions
- Business Process Automation
- Security and Compliance
- Mobility
- eDiscovery Services

IT SERVICES

- Application Services
- Cloud Services
- IT Security
- Managed IT Services
- IT Consulting & Projects
- Business Consulting Services

TECHNOLOGY

- Office Multifunction Business Solutions
- Commercial and Production Printers
- 3D Printers
- Wide Format Printers
- Laptops, Desktops and Computer Hardware
- Servers and Networking Equipment
- Managed Print Services (MPS)
- Managed Enterprise Services

bizhub

For complete information on Konica Minolta products and solutions, please visit: CountOnKonicaMinolta.com

KONICA MINOLTA

KONICA MINOLTA BUSINESS SOLUTIONS U.S.A., INC.
100 Williams Drive, Ramsey, New Jersey 07446
CountOnKonicaMinolta.com

Item #: 558ESS
11/2017-C

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Printer, Laser, Multifunction

Manufacturer: Hewlett-Packard (650-857-1501)

Vendor: Hewlett-Packard (650-857-1501)

Model: HP LaserJet Pro MFP M479fdn

Alt ID: PRT-MFP

Mfr #: W1A79A#BGJ

Vendor #: W1A79A#BGJ

Multifunction color printer. Print, copy, scan, fax and email. Speeds up to 28 ppm (black and color), 600 x 600 dpi Up to 38,400 x 600 enhanced dpi. Features automatic duplex printing, HP ImageREt 3600 PANTONE calibrated, 4.3 inch intuitive touchscreen Color Graphic Display (CGD), 50-sheet multipurpose tray, 250-sheet input tray and 50-sheet Automatic Document Feeder (ADF). Auto duplex printing, Scan to email, 50-sheet ADF; 2 paper trays (standard). FCC Class A emissions and Energy Star Qualified.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	Yes
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	16.80 in (427 mm)	**Left:**	N/A
Depth:	25.70 in (653 mm)	**Right:**	N/A
Height:	16.30 in (414 mm)	**Front:**	N/A
Max Weight:	52 lbs (23.4 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	110	**Watts:**	550
Hz:	60	**Amps:**	5
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect maximum.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	2	
				Total:	**2**	

Data sheet

HP Color LaserJet Pro MFP M479 series

The HP Color LaserJet Pro MFP M479 - focus your time on growing business and staying ahead.

Winning in business means working smarter. The HP Color LaserJet Pro MFP M479 is designed to let you focus your time where it's most effective-growing your business and staying ahead of the competition.

Dynamic security enabled printer. Only intended to be used with cartridges using an HP original chip. Cartridges using a non-HP chip may not work, and those that work today may not work in the future. http://www.hp.com/go/learnaboutsupplies

HP Color LaserJet Pro MFP M479dw

HP Color LaserJet Pro MFP M479fdn

HP Color LaserJet Pro MFP M479fdw

Built to keep you—and your business—moving forward

- Scan files directly to Microsoft® SharePoint®, email, USB, and network folders.[1]
- Help save time by automating all the steps in a complicated workflow and apply saved settings.[2]
- Print wirelessly with or without the network, stay connected with dual band Wi-Fi and Wi-Fi direct.[3,4,5]
- Print effortlessly from any device, virtually anywhere, toany HP printer—securely through the cloud.[6]

Best-in-class security--detect and stop attacks[7]

- A suite of embedded security features help protect your MFP from being an entry point for attacks.[7]
- Thwart potential attacks and take immediate action with instant notification of possible security issues.[12]
- Help ensure security of confidential information with optional PIN/Pull printing to retrieve print jobs.[8]
- Optional HP JetAdvantage Security Manager lets you set configuration policies and validate settings

Simply designed to uncomplicate your day

- Set up this MFP fast, and easily manage device settings to help increase overall printing efficiency.
- Tackle tasks quickly and easily—with the simple 4.3" (10.9cm) color touchscreen.
- Print Microsoft® office formatted files in addition to PDFs right off your USB drive.[9]
- Avoid interruptions with an HP LaserJet MFP designed to be streamlined for maximum productivity.

Sustainability is smart business

- Avoid frustrating reprints, wasted supplies, and service calls using Original HP toner cartridges.
- Help save paper right out ofthe box. The duplex print setting is set at default paper savings mode.[10]
- Saves up to18% energy over prior products.[11]
- Help save energy with HP Auto-On/Auto-Off Technology.[13]

[1] Requires an Internet connection to the printer. Services may require registration. App availability varies by country, language, and agreements. For details, see http://www.hpconnected.com [2] Connect printer/MFP to the network and complete customization through the Embedded Web [3] Wireless operations are compatible with 2.4 GHz and 5 GHz operations. App or software and HP ePrint account registration may also be required. Some features require purchase of an optional accessory. Learn more at http://www.hp.com/go/mobileprinting [4] Feature is only supported by the HP Color LaserJet Pro MFP M479dw, M479fdw, and M477fnw. Wireless performance is dependent on physical environment and distance from access point, and may be limited during active VPN connections [5] Feature is supported on the HP LaserJet Pro M479dw/M479fnw/M479fdw only. Mobile device needs to be connected directly to the Wi-Fi network of a wireless direct–capable MFP or printer prior to printing. Depending on mobile device, an app or driver may also be required. Learn more at http://www.hp.com/go/businessmobileprinting [6] To enable HP Roam, some devices may require firmware to be upgraded and an optional accessory to add Bluetooth® Low Energy (BLE) beaconing capabilities. Subscription may be required. For more information, visit http://www.hp.com/go/roam [7] Based on HP review of 2019 published security features of competitive in-class printers. Only HP offers a combination of security features that can monitor to detect and automatically stop an attack then self-validate software integrity in a reboot. For a list of printers, visit http://www.hp.com/go/PrintersThatProtect. For more information: http://www.hp.com/go/printersecurityclaims [8] Pin printing enabled via USB installed in rear of device. [9] Microsoft and PowerPoint are U.S. registered trademarks of the Microsoft group of companies. Feature works with Microsoft Word and PowerPoint 2003 and later. Only Latin language fonts are supported. [10] Dependent upon country setup specifications. All new product introductions beginning in Fall 2019 will include consistent worldwide default duplex settings (across bundles/drivers); Spring 2019 will include consistent worldwide default duplex settings for most products across the most common drivers [11] Based on HP Internal testing using normalized TEC Value, 2019. [12] Instant threat notifications can appear on the device control panel when a potential threat occurs from malicious intent or there is a bug or vulnerability in the firmware code of the device. If this error raises concern, please contact your company IT representative or, if unavailable, HP Support, who can investigate the cause through analysis of device syslog data using a standard SIEM tool from McAfee, Splunk, Arcsight or SIEMonster. The control panel error message may show an error code on a blue screen during code signature checks or memory write intrusions. [13] HP Auto-On/Auto-Off Technology capabilities subject to printer and settings; may require a firmware upgrade.

HP Color LaserJet Pro MFP M479fdw

Product walkaround

1. 4.3-inch (10.9 cm) customizable color touchscreen
2. Easy-access USB port[1]
3. Front door release button
4. Front door (access to HP JetIntelligence toner cartridges)
5. Hi-Speed USB 2.0 port, USB port for job storage and PIN printing,[2] Gigabit Ethernet LAN port, Fax port[3]
6. 50-sheet ADF with single-pass, two-sided scanning[4] supports media sizes up to 8.5 x 14 inches (216 x 356 mm)
7. Flatbed scanner handles media sizes up to letter (A4)
8. 150-sheet output bin
9. Dual-band Wi-Fi with Bluetooth® Low Energy[5] for easy wireless printing and setup
10. 50-sheet multipurpose tray 1 supports media sizes up to 8.5 x 14 inches (216 x 356 mm)
11. Automatic two-sided printing
12. 250-sheet tray 2 supports media sizes up to 8.5 x 14 inches (216 x 356 mm)

Front view

Series at a glance



Model	HP Color LaserJet Pro MFP M479dw	HP Color LaserJet Pro MFP M479fdn	HP Color LaserJet Pro MFP M479fdw
Functions	Print, scan, copy	Print, scan, copy, fax[3]	
Print speeds (black and color)[6]	Simplex: Up to 28/27 pages per minute (ppm) (letter/A4) (all models) Duplex: Up to 25/24 images per minute (ipm) (letter/A4) (all models)		
Scan speeds[4,7]	**Letter (Simplex):** 31/21 ppm (black/color) **A4 (Simplex):** 29/20 ppm (black/color)	**Letter Simplex:** Up to 31 ppm/49 ipm (b&w), up to 21 ppm/36 ipm (color) **Letter Duplex:** Up to 49 ipm (b&w), up to 36 ipm (color) **A4 Simplex:** Up to 29 ppm/46 ipm (b&w), up to 20 ppm/34 ipm (color) **A4 Duplex:** Up to 46 ipm (b&w), up to 34 ipm (color)	
Scanning	50-sheet ADF with simplex scanning	50-sheet ADF with single-pass, two-sided scanning	
Two-sided printing	Automatic (Default)	Automatic (Default)	Automatic (Default)
50-sheet multipurpose tray 1, 250-sheet tray 2	√	√	√
Optional 550-sheet tray	Add up to one (all models)		
Input capacity (standard/maximum[8])	Up to 300/850 sheets (all models)		
Control panel display	4.3-inch (10.9 cm) customizable color touchscreen (all models)		
RMPV[9]	Up to 4,000 pages (all models)		
Cartridge yields[10] (A/X)	Black: ~2,400/7,500 pages; Color: ~2,100/6,000 pages (all models)		
Dual-band Wi-Fi with Bluetooth® Low Energy[5]	√	Not available	√

[1] An administrator must enable the easy-access USB port before use. [2] Requires purchase of separate USB flash drive with at least 16 GB capacity. [3] Fax capability is not available on the HP Color LaserJet Pro MFP M479dw model. [4] Single pass, two-sided scanning is not available on the HP Color LaserJet Pro MFP M479dw model. The MFP M479dw offers simplex scanning capabilities. 5 Wireless operations are compatible with 2.4 GHz and 5 GHz operations only. Wi-Fi is a registered trademark of Wi-Fi Alliance®. Bluetooth is a trademark owned by its proprietor and used by HP Inc. under license. Learn more at hp.com/go/mobileprinting. [6] Measured using ISO/IEC 24734 and excludes first set of test documents. For more information, see hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity. [7] Scan speed measured from ADF at default 300 dpi (black-and-white, grayscale, and color). Actual processing speeds may vary depending on scan resolution, network conditions, computer performance, and application software. [8] Purchase of optional paper tray required to reach maximum input capacity. [9] Recommended Monthly Page Volume (RMPV): HP recommends that the number of printed pages per month be within the stated range for optimum device performance, based on factors including supplies replacement intervals and device life over an extended warranty period. [10] Actual yields and costs vary considerably depending on images printed, number of color pages printed, and other factors. Optional high-yield cartridges are not included in printer purchase and must be purchased separately.

HP Services

Downtime can have serious consequences, so HP provides support beyond the standard warranty. You benefit from reduced risk, maximized uptime, predictable service delivery and no unbudgeted repair costs. HP Care Pack Services provide a comprehensive suite of protection services designed to keep HP hardware and software up and running so employees can stay productive.

For carepack availability visit: hp.com/go/cpc

Top features

Today's businesses are always on, and always connected. Choose an MFP that can keep up with how you actually work, collaborate, and get things done.

HP Print Security isn't just about securing printers. It's about helping to secure your network with real-time threat detection, automated monitoring, and software validation—designed to detect and stop an attack as it happens.[7]

You have enough to worry about each day. It's easy to accomplish what you need—and exceed your own expectations—with a streamlined MFP that's simple to use.

Business is all about resource management, and finding efficiencies is everyone's responsibility. HP LaserJet MFPs are designed with the environment in mind, so you can handle what you need while conserving energy wherever possible.

Accessories

CF404A	HP LaserJet 550-sheet Feeder Tray
P0R81AA	HP v222w 16 GB Mini USB Drive

Supplies

W2020A	HP 414A Black LaserJet Toner Cartridge (~2,400 pages)
W2021A	HP 414A Cyan LaserJet Toner Cartridge (~2,100 pages)
W2022A	HP 414A Yellow LaserJet Toner Cartridge (~2,100 pages)
W2023A	HP 414A Magenta LaserJet Toner Cartridge (~2,100 pages)
W2020X	HP 414X Black LaserJet Toner Cartridge (~7,500 pages)
W2021X	HP 414X Cyan LaserJet Toner Cartridge (~6,000 pages)
W2022X	HP 414X Yellow LaserJet Toner Cartridge (~6,000 pages)
W2023X	HP 414X Magenta LaserJet Toner Cartridge (~6,000 pages)

Services

UB9S6E	HP 3 year Next Business Day Service for Color LaserJet Pro MFP M479
UB9S9E	HP 3 year 4 hour 9x5 Service for Color LaserJet Pro MFP M479
UB9T5PE	HP 1 year Post Warranty Next Business Day Service for Color LaserJet Pro MFP M479

[1] Requires an Internet connection to the printer. Services may require registration. App availability varies by country, language, and agreements. For details, see http://www.hpconnected.com [2] Connect printer/MFP to the network and complete customization through the Embedded Web [3] Wireless operations are compatible with 2.4 GHz and 5 GHz operations. App or software and HP ePrint account registration may also be required. Some features require purchase of an optional accessory. Learn more at http://www.hp.com/go/mobileprinting [4] Feature is only supported by the HP Color LaserJet Pro MFP M479dw, M479fdw, and M477fnw. Wireless performance is dependent on physical environment and distance from access point, and may be limited during active VPN connections [5] Feature is supported on the HP LaserJet Pro M479dw/M479fnw/M479fdw only. Mobile device needs to be connected directly to the Wi-Fi network of a wireless direct–capable MFP or printer prior to printing. Depending on mobile device, an app or driver may also be required. Learn more at http://www.hp.com/go/businessmobileprinting [6] To enable HP Roam, some devices may require firmware to be upgraded and an optional accessory to add Bluetooth® Low Energy (BLE) beaconing capabilities. Subscription may be required. For more information, visit http://www.hp.com/go/roam [7] Based on HP review of 2019 published security features of competitive in-class printers. Only HP offers a combination of security features that can monitor to detect and automatically stop an attack then self-validate software integrity in a reboot. For a list of printers, visit http://www.hp.com/go/PrintersThatProtect. For more information: http://www.hp.com/go/printersecurityclaims [8] Additional solution such as HP Access Control or HP JetAdvantage Private Print is required to use optional proximity card reader. pin printing enabled via USB installed in rear of device. [9] Microsoft and PowerPoint are U.S. registered trademarks of the Microsoft group of companies. Feature works with Microsoft Word and PowerPoint 2003 and later. Only Latin language fonts are supported. [10] Dependent upon country setup specifications. All new product introductions beginning in Fall 2019 will include consistent worldwide default duplex settings (across bundles/drivers); Spring 2019 will include consistent worldwide default duplex settings for most products across the most common drivers [11] Based on HP Internal testing using normalized TEC Value, 2019.

HP Color LaserJet Pro MFP M479 series

Technical Specifications	HP Color LaserJet Pro MFP M479dw(W1A77A)	HP Color LaserJet Pro MFP M479fdn(W1A79A)	HP Color LaserJet Pro MFP M479fdw(W1A80A)
AIO functions	Print, copy, scan, email	Print, copy, scan, fax, email	
Print speed	**SimplexLetter:** Up to 28 ppm black; Up to 28 ppm color; **SimplexA4:** Up to 27 ppm black; Up to 27 ppm color [9]; **DuplexLetter:** Up to 25 ipm black; Up to 25 ipm color; **DuplexA4:** Up to 24 ipm black; Up to 24 ipm color; **FirstPageOut(Ready):** As fast as 9.5 sec black; As fast as 11.1 sec color [11]		
Print resolution	**Black (best):** 600 x 600 dpi, Up to 38, 400 x 600 enhanced dpi; **Colour (best):** 600 x 600 dpi, Up to 38, 400 x 600 enhanced dpi		
Print Technology	Laser; **Print Resolution Technologies:** HP ImageREt 3600, PANTONE® calibrated		
Print Cartridges Number	4 (1 each black, cyan, magenta, yellow)		
Standard Print Languages	HP PCL 6, HP PCL 5c, HP postscript level 3 emulation, PDF, URF, Native Office, PWG Raster		
Printer Smart Software Features	Apple AirPrint™, Mopria certified, Google Cloud Print 2.0, Wi-Fi Direct Printing, ROAM enabled for easy printing, HP ePrint, HP Auto-On/Auto-Off Technology, Bluetooth® Low-Energy, Intuitive 4.3" touchscreen control panel, Scan/print from Cloud using business apps on the control panel, Job Storage with PIN printing, Print from USB, N-up printing, collation	Apple AirPrint™, Mopria certified, Google Cloud Print 2.0, ROAM capable for easy printing, HP ePrint, HP Auto-On/Auto-Off Technology, Intuitive 4.3" touchscreen control panel, Scan/print from Cloud using business apps on the control panel, Job Storage with PIN printing, Print from USB, N-up printing, collation	Apple AirPrint™, Mopria certified, Google Cloud Print 2.0, Wi-Fi Direct Printing, ROAM enabled for easy printing, HP ePrint, HP Auto-On/Auto-Off Technology, Bluetooth® Low-Energy, Intuitive 4.3" touchscreen control panel, Scan/print from Cloud using business apps on the control panel, Job Storage with PIN printing, Print from USB, N-up printing, collation
Printer Management	HP Printer Assistant; HP Utility (Mac); HP Device Toolbox; HP Web JetAdmin Software; HP JetAdvantage Security Manager; HP SNMP Proxy Agent; HP WS Pro Proxy Agent; Printer Administrator Resource Kit for HP Universal Print Driver (Driver Configuration Utility - Driver Deployment Utility - Managed Printing Administrator)		
Scan Type / Technology	**Type:** Flatbed, ADF; **Technology:** Contact Image Sensor (CIS)		
Scan Resolution	**Hardware:** Up to 1200 x 1200 dpi; **Optical:** Up to 1200 x 1200 dpi		
Scan File Format	PDF; JPG; TIFF		
Scan Input Modes	Front-panel scan, copy, email, or file buttons; HP Scan software; and user application via TWAIN or WIA		
Scan Size	**ADF:** 216 x 356 mm; 8.5 x 14 in Maximum; 102 x 152 mm; 4 x 6 in Minimum; **Flatbed:** 216 x 297 mm; Up to 29 ppm (b&w), up to 20 ppm (color)	**ADF:** 216 x 356 mm; 8.5 x 14 in Maximum; 102 x 152 mm; 4 x 6 in Minimum; **Flatbed:** 216 x 297 mm; Up to 29 ppm/46 ipm (b&w), up to 20 ppm/34 ipm (color)	**ADF:** 216 x 356 mm; 8.5 x 14 in Maximum; 102 x 152 mm; 4 x 6 in Minimum; **Flatbed:** 216 x 297 mm; Up to 29 ppm/46 ipm (b&w), up to 20 ppm/35 ipm (color)
Scan Speed	Up to 29 ppm (b&w), up to 20 ppm (color) [16]	Up to 29 ppm/46 ipm (b&w), up to 20 ppm/34 ipm (color) [16]; **Duplex:** Up to 46 ipm (b&w), up to 34 ipm (color)	Up to 29 ppm/46 ipm (b&w), up to 20 ppm/35 ipm (color) [16]; **Duplex:** Up to 46 ipm (b&w), up to 34 ipm (color)
Scanner Advanced Features	Scan to cloud (Google Drive and DropBox) Scan to email with LDAP email address lookup, Scan to network folder, Scan to USB, Scan to Microsoft SharePoint®, Scan to computer with software, Quick Sets PDF; JPG Windows HP Scan SW supports PDF, searchable PDF, JPG, RTF, TxT, BMP, PNG, TIFF. Mac HP Easy Scan SW supports PDF, searchable PDF, JPG, RTF, TxT, JPG-2000, PNG, TIFF;	Single-pass 2-sided scanning ADF, Scan to cloud (Google Drive and DropBox) Scan to email with LDAP email address lookup, Scan to network folder, Scan to USB, Scan to Microsoft SharePoint®, Scan to computer with software, Fax archive to network folder, Fax archive to email, Fax to computer, Enable/disable fax, Quick Sets PDF; JPG Windows HP Scan SW supports PDF, searchable PDF, JPG, RTF, TxT, BMP, PNG, TIFF. Mac HP Easy Scan SW supports PDF, searchable PDF, JPG, RTF, TxT, JPG-2000, PNG, TIFF;	
Bit depth / Grayscale levels		30-bit/ 256	
Digital Sending Standard Features	Scan to email with LDAP email address lookup, Scan to network folder, Scan to USB, Scan to Microsoft SharePoint®, Scan to computer with software, Quick Sets	Scan to email with LDAP email address lookup, Scan to network folder, Scan to USB, Scan to Microsoft SharePoint®, Scan to computer with software, Fax archive to network folder, Fax archive to email, Fax to computer, Enable/disable fax, Quick Sets	
Copy Speed	**Simplex Letter:** Up to 28 cpm black; Up to 28 cpm color; **Simplex A4:** Up to 27 cpm black; Up to 27 cpm color [7]; **Duplex Letter:** Up to 25 ipm black; Up to 25 ipm color; **Duplex A4:** Up to 24 ipm black; Up to 24 ipm color; **First Copy Out(Ready):** As fast as 9.8 sec black; As fast as 12.1 sec color		
Copy Resolution	**Black (text and Graphics):** Up to 600 x 600 dpi; **Color (text and Graphics):** Up to 600 x 600 dpi		
Maximum Number of Copies	Up to 999 copies		
Copier Resize	25 to 400%		
Copier Settings	ID Copy; Number of copies; Resize (including 2-Up); Lighter/Darker; Enhancements; Original Size; Binding Margin; Collation; Tray Selection; Two-Sided; Quality (Draft/Normal/Best); Save Current Settings; Restore Factory Defaults		
Fax Speed		**Up to:** 33.6 kbps [17]	
Fax Resolution		**Black (best):** Up to 300 x 300 dpi (halftone enabled); **Black (standard):** 203 x 96 dpi	
Fax Smart Software Features		Permanent fax memory backup; Auto fax reduction; Auto redialing; Delayed sending; Fax forwarding; TAM interface; Junk barrier; Distinctive ring detection; Cover page; Block fax; Billing codes; Save and load; Fax activity reports; Dial prefix setting; Print fax log; HP Digital Fax	
Fax Features		**Fax Memory:** Up to 400 pages; **Auto Fax Reduction Supported:** Yes; **Auto-Redialing:** Yes; **Fax Delayed Sending:** Yes; **Distinctive Ring Detection Supported:** Yes; **Fax Forwarding Supported:** Yes; **Fax Phone TAM Interface Supported:** Yes; **Fax Polling Supported:** Yes (receive only); **Fax Telephone Mode Supported:** Yes; **Junk Barrier Supported:** Yes, CSID matching only (Caller ID not supported); **Maximum Speed Dialing Numbers:** Up to 120 numbers; **PC Interface Supported:** Yes, only for sending	
Standard Connectivity	1 Hi-Speed USB 2.0 port; 1 host USB at rear side; built-in Gigabit Ethernet 10/100/1000 Base-TX network port; 1 Wireless 802.11b/g/n/2.4/5 Ghz Wi-Fi radio	1 Hi-Speed USB 2.0 port; 1 host USB at rear side; built-in Gigabit Ethernet 10/100/1000 Base-TX network port	1 Hi-Speed USB 2.0 port; 1 host USB at rear side; built-in Gigabit Ethernet 10/100/1000 Base-TX network port; 1 Wireless 802.11b/g/n/2.4/5 Ghz Wi-Fi radio
Network Capabilities	Yes, via built-in 10/100/1000Base-Tx Ethernet, Gigabit; Auto-crossover Ethernet; Authentication via 802.1x		
Wireless Capability	Yes, built-in dual-band Wi-Fi; Authentication via WEP, WPA/WPA2, WPA Enterprise; Encryption via AES or TKIP; WPS; Wi-Fi Direct; Bluetooth Low-Energy		Yes, built-in dual-band Wi-Fi; Authentication via WEP, WPA/WPA2, WPA Enterprise; Encryption via AES or TKIP; WPS; Wi-Fi Direct; Bluetooth Low-Energy
Mobile Printing Capability	Apple AirPrint™; Mopria™-certified; ROAM enabled for easy printing; Wi-Fi Direct Printing; Google Cloud Print 2.0; HP ePrint; HP Smart app and other mobile apps. [6]	Apple AirPrint™; Mopria™-certified; ROAM capable for easy printing; Google Cloud Print 2.0; HP ePrint; HP Smart app and other mobile apps. [6]	Apple AirPrint™; Mopria™-certified; ROAM enabled for easy printing; Wi-Fi Direct Printing; Google Cloud Print 2.0; HP ePrint; HP Smart app and other mobile apps. [6]
Memory	**Standard:** 512 MB NAND Flash, 512 MB DRAM; **Maximum:** 512 MB NAND Flash, 512 MB DRAM		
Processor Speed	1200 MHz		
Duty Cycle	**Monthly:** Up to 50,000 pages [12]; **Recommended Monthly Page Volume:** 750 to 4000 [13]		
Paper Handling	**Input Capacities:** 50-sheet multipurpose tray, 250-sheet input tray, 50-sheet Automatic Document Feeder (ADF); Up to 300 sheets standard; Up to 15 envelopes labels legal; **Output Capacities:** 150-sheet output bin; Up to 150 sheets standard labels legal; **Duplex Options:** Automatic (default); **Auto Document Feeder Capacity:** Standard, 50 sheets uncurled; **Envelope Feeder:** No; **Standard Paper Trays:** 2; **Media Types Supported:** Paper (bond, brochure, colored, glossy, letterhead, photo, plain, preprinted, prepunched, recycled, rough), postcards, labels, envelopes; **Media Weight Supported:** Tray 1: 16 to 47 lb bond (up to 52 lb with HP Color laser glossy photo papers); Tray 2: 16 to 43 lb bond (up to 47 lb with postcards, up to 52 lb with HP Color laser glossy photo papers); optional Tray 3: 16 to 43 lb bond (up to 47 lb with postcards, up to 40 lb with HP Color laser glossy photo papers); Automatic duplexer: 16 to 43 lb bond; **Media Sizes Supported:** Tray 1, Tray 2: Letter, legal, executive, Oficio (8.5 x 13 in), 4 x 6 in, 5 x 8 in, envelopes (No 10, Monarch); Optional Tray 3: Letter, legal, executive, Oficio (8.5 x 13 in), 4 x 6 in, 5 x 8 in; Automatic duplexer: Letter, legal, executive, Oficio (8.5 x 13 in); **Media Sizes Custom:** Tray 1: 3 x 5 to 8.5 x 14 in; Tray 2, optional Tray 3: 3.94 x 5.83 to 8.5 x 14 in		

HP Color LaserJet Pro MFP M479 series

Technical Specifications	HP Color LaserJet Pro MFP M479dw(W1A77A)	HP Color LaserJet Pro MFP M479fdn(W1A79A)	HP Color LaserJet Pro MFP M479fdw(W1A80A)
Product Dimensions	**W x D x H:** 16.4 x 18.6 x 15.7 in; 416 x 472 x 400 mm **Maximum:** 16.8 x 25.7 x 16.3 in; 426 x 652 x 414 mm		
Product Weight	51.423.3 kg	51.623.4 kg	
What's in the box	HP Color LaserJet Pro M479; 4 preinstalled HP LaserJet Toner cartridges (Black~2400 pages, Introductory-Cyan, Magenta, Yellow: ~1200 pages); In-box documentation (Getting Started Guide, Install Poster); warranty card (Where required); Internet connection is required to set up the printer. HP printer software is available at http://www.hp.com/support; Power cord; USB cable[2]		
Warranty Features	One-year, next-business day, onsite warranty. Warranty and support options vary by product, country and local legal requirements. Contact your Contractual Vendor or go to hp.com/support to learn about HP award winning service and support options in your region. (wty code 4G; wty ID A001)		
Energy Efficiency Compliance	ENERGY STAR® qualified; EPEAT® Silver; CECP; Blue Angel RAL-UZ 205		
Control Panel	4.3-in intuitive color touchscreen (CGD); 3 Buttons (Home, Help, Back)		
Display Description	4.3" intuitive touchscreen Color Graphic Display (CGD)		
Software Included	No software solutions are included in the Box, only on http://hp.com, http://123.hp.com/laserjet		
Fonts and Typefaces	84 scalable TrueType fonts		
Compatible Operating Systems	Windows Client OS (32/64 bit), Win10, Win8.1, Win 8 Basic, Win8 Pro, Win8 Enterprise, Win8 Enterprise N, Win7 Starter Edition SP1, UPD Win7 Ultimate, Mobile OS, iOS, Android, Mac, Apple® macOS Sierra v10.12, Apple® macOS High Sierra v10.13, Apple® macOS Mojave v10.14, Discrete PCL6 Printer Driver, For more information on the supported operating systems go to http://support.hp.com, Enter your product name and search, Click on User Guides and enter your product name and search for User Guide, Search for your (Product Name) User Guide, Search for the Supported Operating Systems section, UPD PCL6 / PS Printer Drivers, Supported Operating systems, For more information on the supported operating systems see www.hp.com/go/upd		
Compatible Network Operating Systems	Windows Server 2008 R2 64-bit, Windows Server 2008 R2 64-bit (SP1), Windows Server 2012 64-bit, Windows Server 2012 R2 64-bit, Windows Server 2016 64-bit, Failover Cluster 2008 R2, Failover Cluster 2012 R2, Terminal server 2008 R2, Remote Desktop server 2012 R2, Citrix Server 6.5, Citrix xenApp & xenDesktop 7.6, Novell iPrint server, Citrix Ready Kit Certification - Up to Citrix Server 7.18 for more information see http://citrixready.citrix.com, Linux- For more information see http://developers.hp.com/hp-linux-imaging-and-printing, Unix- For more information see http://hp.com/go/unixmodelscripts, UPD PCL6 / PS Printer Drivers, Supported for Compatible Network Operating systems please see http://hp.com/go/upd		
Minimum System Requirements	**PC:** 2 GB available hard disk space, Internet connection, USB port, Internet browser. For additional OS hardware requirements see microsoft.com; **MAC:** 2 GB available hard drive space, Internet connection or USB port, OS hardware requirements see apple.com		
Power	**Power Supply Type:** Internal (Built-in) power supply; **Power Requirements:** 110-volt input voltage: 110 to 127 VAC (+/- 10%), 60 Hz (+/- 3 Hz); 220-volt input voltage: 220 to 240 VAC (+/- 10%), 50/60 Hz (+/- 3 Hz) (Not dual voltage, power supply varies by part number with # Option code identifier); **Power Consumption:** 550 watts (Active Printing), 20 watts (Ready), 0.7 watts (Sleep), 0.7 watts (HP auto-off/auto-on), 0.06 watts (auto-off/manual on), 0.06 watts (Off)[3]		
Acoustics	**Acoustic Power Emissions:** 6.2 B(A); **Acoustic Pressure Emissions:** 49 dB(A)[8]	**Acoustic Power Emissions:** 6.3 B(A); **Acoustic Pressure Emissions:** 49 dB(A)[8]	
Operating Environment	**Operating Temperature Range:** 15 to 30°C; **Recommended Operating Temperature:** 15 to 27°C; **Storage Temperature Range:** -20 to 40°C; **Operating Humidity Range:** 10 to 80% RH (non-condensing); **Recommended Humidity Operating Range:** 20 to 70% RH (non-condensing)		
Security Management	Secure Boot, Secure Firmware Integrity, Runtime Code Integrity, password protected EWS, secure browsing via SSL/TLS 1.0, TLS 1.1, TLS 1.2; IPP over TLS; Network: enable/disable network ports and features, unused protocol and service disablement, SNMPv1, SNMPv2, and SNMPv3, community password change; HP ePrint: HTTPS with certificate validation, HTTP Basic Access Authentication, SASL authentication; LDAP authentication and authorization; Firewall and ACL; control panel lock, certificates configuration, UPD PIN printing, Syslog, signed firmware, administrator settings, access control, 802.1x authentication (EAP-TLS, and PEAP), authentication via WEP, WPA/WPA2 Personal, WPA2-enterprise; encryption via AES or TKIP; Encrypted data storage; Secure data erase; Automatic firmware updates; Secure Encrypted Print via optional job storage, compatible with optional HP JetAdvantage Security Manager, IPPS	Secure Boot, Secure Firmware Integrity, Runtime Code Integrity, password protected EWS, secure browsing via SSL/TLS 1.0, TLS 1.1, TLS 1.2; IPP over TLS; Network: enable/disable network ports and features, unused protocol and service disablement, SNMPv1, SNMPv2, and SNMPv3, community password change; HP ePrint: HTTPS with certificate validation, HTTP Basic Access Authentication, SASL authentication; LDAP authentication and authorization; Firewall and ACL; control panel lock, certificates configuration, UPD PIN printing, Syslog, signed firmware, administrator settings, access control, 802.1x authentication (EAP-TLS, and PEAP); Encrypted data storage; Secure data erase; Automatic firmware updates; Secure Encrypted Print via optional job storage, compatible with optional HP JetAdvantage Security Manager	Secure Boot, Secure Firmware Integrity, Runtime Code Integrity, password protected EWS, secure browsing via SSL/TLS 1.0, TLS 1.1, TLS 1.2; IPP over TLS; Network: enable/disable network ports and features, unused protocol and service disablement, SNMPv1, SNMPv2, and SNMPv3, community password change; HP ePrint: HTTPS with certificate validation, HTTP Basic Access Authentication, SASL authentication; LDAP authentication and authorization; Firewall and ACL; control panel lock, certificates configuration, UPD PIN printing, Syslog, signed firmware, administrator settings, access control, 802.1x authentication (EAP-TLS, and PEAP), authentication via WEP, WPA/WPA2 Personal, WPA2-enterprise; encryption via AES or TKIP; Encrypted data storage; Secure data erase; Automatic firmware updates; Secure Encrypted Print via optional job storage, compatible with optional HP JetAdvantage Security Manager, IPPS

[1] EPEAT® registered where applicable. EPEAT registration varies by country. See http://www.epeat.net for registration status by country. [2] In box cartridges yield ~1,200 color composite (C/Y/M) and ~2,400 black pages based on ISO/IEC 19798 and continuous printing. Actual yields vary considerably based on images printed and other factors. For details see: http://www.hp.com/go/learnaboutsupplies. Pages may vary based on customer printing conditions. [3] Power requirements are based on the country/region where the printer is sold. Do not convert operating voltages. This will damage the printer and void the product warranty. Power consumption values typicallty based on measurement of 115V device. [4] Toner cartridges designed for distribution and use within a designated region only; will not work outside of designated region. [5] Declared yield value in accordance with ISO/IEC 19798. Actual yields vary considerably based on images printed and other factors. For more information, visit http://www.hp.com/go/learnaboutsupplies [6] Local printing requires mobile device and printer to be on the same network (usually Wi-Fi access points bridge wireless to wired connections) or have a direct wireless connection. Wireless performance is dependent on physical environment and distance from access point. Remote printing requires an Internet connection to an HP web-connected printer. Wireless broadband use requires separately purchased service contract for mobile devices. Check with service provider for coverage and availability in your area. For more information visit hp.com/go/mobileprinting. To enable HP Roam, some devices may require firmware to be upgraded and an optional accessory to add Bluetooth® Low Energy (BLE) beaconing capabilities. Subscription may be required. For more information, visit hp.com/go/roam 7 First Copy Out from Ready and Simplex Copy Speed measured using ISO/IEC 29183, Duplex Copy Speed measured using ISO/IEC 24735, excludes first set of test documents. For more information see http://www.hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application and document complexity. [8] Acoustic values are subject to change. For current information see http://www.hp.com/support. Configuration tested: base model, simplex printing, A4 paper at an average of 27 ppm. 9 Measured using ISO/IEC 24734, excludes first set of test documents. For more information see http://www.hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity. 10 Measured using ISO 24734 Feature Test, A5 Landscape Feed. Speed may vary based on content, PC, media orientation, and media type. 11 Measured using ISO/IEC 17629. For more information see http://www.hp.com/go/printerclaims. Exact speed varies depending on the system configuration, software application, driver, and document complexity. 12 Duty cycle is defined as the maximum number of pages per month of imaged output. This value provides a comparison of product robustness in relation to other HP LaserJet or HP Color LaserJet devices, and enables appropriate deployment of printers and MFPs to satisfy the demands of connected individuals or groups. 13 HP recommends that the number of pages per month of imaged output be within the stated range for optimum device performance, based on factors including supplies replacement intervals and device life over an extended warranty period 14 HP SureSupply alerts you when your print cartridge is running low and helps you purchase online or locally through HP or a participating retailer. For more information, visit http://www.hp.com/go/SureSupply; only available with Original HP supplies; Internet access required. 15 BA TEC is equal to Best TEC. Power requirements are based on the country/region where the printer is sold. Do not convert operating voltages. This will damage the printer and void the product warranty. Energy Star value typically based on measurement of 115V device.

Learn more at hp.com

4AA7-4862ENUC, May 2019, R3

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Printer, Wristband

Manufacturer: Zebra Technologies Corp ((847) 634-6700)

Vendor: Zebra Technologies Corp ((847) 634-6700)

Model: ZD510-HC (Healthcare, Direct Thermal)

Alt ID: PRT-WRT

Mfr #: DT ZD510-HC

Vendor #: DT ZD510-HC

Item ID:

Wristband printer. Features: Media cartridge loading, automatic media loading, 300 dpi print resolution (12 dots / mm), Link-OS, real time clock, print speed (automatic selection based on installed wristbands), direct thermal printing of barcodes/text/graphics. Dual-wall frame, ZPL or ZPL LL, 16 MB standard SDRAM memory and 8 MB standard flash memory. E3 element energy equalizer, odometer, tool-less printhead and platen replacement.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	5.00 in (127 mm)	**Left:**	N/A
Depth:	9.50 in (241 mm)	**Right:**	N/A
Height:	7.00 in (178 mm)	**Front:**	N/A
Max Weight:	3 lbs (1.4 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	70
Hz:	60	**Amps:**	.5833
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329	Alcove/WOW-Registration	Project	Draft (New)	1	
				Total:	**1**	

ZD510-HC Wristband Printer

Specifications are provided for reference and are based on printer tests using Zebra® brand wristbands. Results may vary in actual application settings Zebra recommends always qualifying any application with thorough testing.

STANDARD FEATURES

- Quick and easy media cartridge loading
- Automatic media loading — no user contact with the media during loading or removal
- 300 dpi print resolution (12 dots / mm)
- Healthcare Power Supply
- Link-OS
- Real Time Clock
- Print Speed (automatic selection based on installed wristbands)
  - Prints at 2 inches / second (51 mm / s) with healthcare wristbands
  - Prints at 4 inches / second (102 mm / s) with Fun and Splash hospitality / leisure wristbands
- Direct thermal printing of barcodes, text, and graphics
- Dual-wall frame, impact resistant plastic
- ZPL® or ZPL II® programming language
- 16 MB Standard SDRAM memory (256 MB Standard SDRAM)
- 8 MB Standard Flash memory (512 MB Standard Flash)
- E3™ Element Energy™ Equalizer
- Connectivity: USB 2.0, USB Host, Bluetooth Low Energy, 10/100 Ethernet
- Odometer for print length tracking
- Illuminated Media Low / Media Out indicator
- Tool-less printhead and platen replacement
- Unicode™ compliant for multi-language printing

- XML Enabled Printing — allows XML communications from information systems
- Instant media calibration — no wasted media
- 16 resident expandable bitmap fonts
- Resident scalable font
- Head-up sensor
- Media Low and Media Out sensors
- Standard Tear-off mode feature

OPTIONAL FEATURES

- Factory installed wireless – Wi-Fi certified 802.11ac and Bluetooth 4.1; MFi-certified (Apple)
- Font Packs — Asian and other international font kits
- ZBI 2.0 — Field installed

PRINT DNA SOFTWARE SOLUTIONS

Development Tools — An intuitive, easy-to-use software program for creating complex wristband and label designs, purchased separately (option)

Management Tools — Offers basic features for simple wrist band and label design (standard)

Productivity Tools — A design tool for designing and distributing wristband templates for later recalling and printing via XML data streams

Visibility Tools — Centrally manage Zebra printers from a single PC screen anywhere on your global network (option)

ZBI 2.0 — Powerful programming language that lets printers run standalone applications, connect to peripherals, and much more (option)

ZBI-Developer — Programming utility makes it dramatically easier for programmers to create and test complex ZBI 2.0 programs and distribute them to the printer (standard with ZBI 2.0)

Firmware

ZPL II — Universal language for Zebra printers. Simplifies wrist band and label formatting and enables format compatibility with existing systems that run Zebra printers.

Web View — Connect and control Zebra barcode printers via the printer's Web interface using a common Web browser.

Alert — Printers equipped with ZebraNet print servers will notify you via any email-enabled, wired, or wireless device to minimize downtime.

Z-BAND WRISTBAND CARTRIDGE SPECIFICATIONS

Healthcare wristbands feature silver antimicrobial coating, which test results show effectively protects the wristband against S. aureus, P. aeruginosa, E. coli, and MRSA

Select Wristband Options

Style	Size	Length	
		inches	mm
Z-Band Direct	Adult	1 × 11	25.4 × 279.4
Z-Band Direct	Child	1 × 7	25.4 × 177.8
Z-Band Direct	Infant	1 × 6	25.4 × 152.4
Z-Band QuickClip	Adult	1 × 1.1875	30.16 × 279.4
Z-Band QuickClip	Child	1 × 7	25.4 × 177.8
Z-Band Splash	1 size only	1 × 10	25.4 × 254
Z-Band Fun	1 size only	1 × 10	25.4 × 254

For a complete list of Z-band Wristbands please see Zebra.com

Healthcare

- Z-Band Direct have adhesive closure.
- Wristbands available in White, Red, Blue, Yellow, Green, Orange, Pink and Purple.
- Z-Band QuickClip haves clip closure.
- Clips available in White, Red, Blue, Yellow, Green, Pink and Purple.

Hospitality / Leisure

- Z-Band Fun and Splash have adhesive closure.
- Wristbands available in Red, Blue, Yellow, Green, Orange, Pink and Purple.
- Z-Band Splash has waterproof adhesive closure.

CALIBRATION PROCEDURE

The ZD510-HC is equipped with an automatic calibration feature that doesn't waste wristbands.

PRINTING SPECIFICATIONS

- Resolution: 300 dots / inch (dpi) (12 dots / mm)
- Dot size (W x L): 0.0033" x 0.0039" (0.084mm x 0.099mm)
- Minimum print length: 3" (76 mm)
- 3 wristband widths: 0.75", 1.00", and 1.1875" (19.05, 25.4, and 30.16 mm)
- Barcode modulus “X” dimension: 300 dpi = 3.33 mil to 32.67 mil

PHYSICAL SPECIFICATIONS

Attribute	ZD510-HC
Height*	7.0" (178 mm)
Width	5.0" (127 mm)
Depth	9.5" (242 mm)
Weight	3.1 lbs (1.4 kg)

* Requires 6 in. (153mm) above printer to load cartridge

ZPL PROGRAMMING LANGUAGE (ZPL/ZPL II)

- Communicates in printable ASCII characters
- Compatible with mainframe, mini, and PC hosts
- Downloadable objects include graphics and bitmap fonts, wristband templates and formats
- Automatic memory allocation for format while printing
- Automatic serialization of fields
- Format inversion (white on black)
- Mirror-image printing
- Four position field rotation (0°, 90°, 180°, 270°)
- Programmable wristband quantities with print, pause
- Status messages to host upon request

FONT MATRICES: 300 DPI (12 DOTS / MM) PRINTHEADS

Font	Matrix (in dots) (H × W)	Type†	Minimum Character Size (H × W)	Max CPI
A	9 × 5	U-L-D	0.035" × 0.020"	50.5
B	11 × 7	U	0.043" × 0.030"	33.7
C, D	18 × 10	U-L-D	0.070" × 0.040"	25.3
E	41 × 20	OCR-B	0.160" × 0.086"	11.7
F	26 × 13	U-L-D	0.101" × 0.053"	18.9
G	60 × 40	U-L-D	0.234" × 0.158"	6.3
H	30 × 19	OCR-A	0.177" × .0092"	10.8
GS	24 × 24	SYMBOL	0.094" × 0.086"	11.7
P	20 × 18	U-L-D	0.078" × 0.059"	N / A
Q	28 × 24	U-L-D	0.109" × 0.079"	N / A
R	35 × 31	U-L-D	0.137" × 0.102"	N / A
S	40 × 35	U-L-D	0.156" × 0.116"	N / A
T	48 × 42	U-L-D	0.187" × 0.139"	N / A
U	59 × 53	U-L-D	0.230" × 0.175"	N / A
V	80 × 71	U-L-D	0.312 × 0.234"	N / A
Ø	15 x 12	U-L-D	Scalable (Smooth) Font	

† U = Uppercase L = Lowercase D = Descenders

- Character Fonts: Standard bitmapped Zebra fonts: A, B, C, D, E (OCR-B), F, G, H, (OCR-A), GS, P, Q, R, S, T, U, V and Ø Smooth font (CG Triumvirate™ Bold Condensed).
- Supports user defined fonts and graphics — including custom logos
- Bitmap fonts are expandable up to 10 times, height and width independent. Fonts E and H (OCR-B and OCR-A), however, are not considered in spec when expanded.
- Smooth scalable font Ø (CG Triumvirate™ Bold Condensed) is expandable dot-by-dot, height and width independent, while maintaining edges to a maximum 1500 x 1500 dots.

ZPL BARCODE SYMBOLOGIES

- Barcode Ratios: 2:1 (non-rotated) and 3:1
- Linear Barcodes: Code 11, Code 39, Code 93, Code 128, UPC-A, UPC-E, EAN-8, EAN-13, EAN-14, UPC-A and UPC-E with EAN 2 or 5 digit extensions, Plessey, POSTNET, Standard 2 of 5, Industrial 2 of 5, Interleaved 2 of 5, LOGMARS, MSI, Codabar, and GS1 DataBar™ (formerly RSS)
- 2D Barcodes: PDF417, MicroPDF-417, Code 49, Maxicode, Codablock, Data Matrix, QR code, and Aztec

ELECTRICAL SPECIFICATIONS

Universal power supply (PFC Compliant) 100-240VAC, 50-60Hz (70 Watts) External Power Supply

AGENCY APPROVALS

- Emissions: FCC Part 15, Subpart B, VCCI, RCM
- Emissions & Susceptibility – (CE): EN 55032:2012 class B & EN 55024:2010, EN 61000-3-2, EN 61000-3-3, CISPR 32:2015
- Safety: CB Scheme IEC 60950-1 & IEC 62368-1, TUV NRTL
- Power Supply: IEC 60601-1:2012

ZD510-HC ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: 32 to 104 (0 to 40 C) for operating temperature
- Storage Temperature: -40° to 140°F (-40° to 60°C)
- Operating Humidity: 20% to 85% non-condensing R.H.
- Storage Humidity: 5% to 85% non-condensing R.H.

WRISTBAND CARTRIDGE ENVIRONMENTAL SPECIFICATIONS

- Service Temperature: -40° to 140° F (-40° to 60° C)
- Storage Temperature: 32° to 70° F (0° to 21° C) at 35% to 50% RH

PREVENTATIVE MAINTENANCE

Zebra recommends cleaning the printer on a regular basis using standard Zebra printer parts and cleaning supplies. Consult your User Guide for further details.

Disinfectants / Cleaning Solutions

Please consult the Guide to Cleaning and Disinfecting Zebra Healthcare Printers on Zebra.com for a full list of approved cleaning and disinfecting agents.

For more information, visit www.zebra.com/zd510hc

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Part number: ZD510-HC TS 07/17/2018

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Printer, Wristband

Manufacturer: Zebra Technologies Corp ((847) 634-6700)

Vendor: Zebra Technologies Corp ((847) 634-6700)

Model: ZD510-HC (Healthcare, Direct Thermal)

Alt ID: PRT-WRT

Mfr #: DT ZD510-HC

Vendor #: DT ZD510-HC

Item ID:

Wristband printer. Features: Media cartridge loading, automatic media loading, 300 dpi print resolution (12 dots / mm), Link-OS, real time clock, print speed (automatic selection based on installed wristbands), direct thermal printing of barcodes/text/graphics. Dual-wall frame, ZPL or ZPL LL, 16 MB standard SDRAM memory and 8 MB standard flash memory. E3 element energy equalizer, odometer, tool-less printhead and platen replacement.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	5.00 in (127 mm)	**Left:**	N/A
Depth:	9.50 in (241 mm)	**Right:**	N/A
Height:	7.00 in (178 mm)	**Front:**	N/A
Max Weight:	3 lbs (1.4 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	70
Hz:	60	**Amps:**	.5833
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

ZD510-HC Wristband Printer

Specifications are provided for reference and are based on printer tests using Zebra® brand wristbands. Results may vary in actual application settings Zebra recommends always qualifying any application with thorough testing.

STANDARD FEATURES

- Quick and easy media cartridge loading
- Automatic media loading — no user contact with the media during loading or removal
- 300 dpi print resolution (12 dots / mm)
- Healthcare Power Supply
- Link-OS
- Real Time Clock
- Print Speed (automatic selection based on installed wristbands)
  - Prints at 2 inches / second (51 mm / s) with healthcare wristbands
  - Prints at 4 inches / second (102 mm / s) with Fun and Splash hospitality / leisure wristbands
- Direct thermal printing of barcodes, text, and graphics
- Dual-wall frame, impact resistant plastic
- ZPL® or ZPL II® programming language
- 16 MB Standard SDRAM memory (256 MB Standard SDRAM)
- 8 MB Standard Flash memory (512 MB Standard Flash)
- E3™ Element Energy™ Equalizer
- Connectivity: USB 2.0, USB Host, Bluetooth Low Energy, 10/100 Ethernet
- Odometer for print length tracking
- Illuminated Media Low / Media Out indicator
- Tool-less printhead and platen replacement
- Unicode™ compliant for multi-language printing

- XML Enabled Printing — allows XML communications from information systems
- Instant media calibration — no wasted media
- 16 resident expandable bitmap fonts
- Resident scalable font
- Head-up sensor
- Media Low and Media Out sensors
- Standard Tear-off mode feature

OPTIONAL FEATURES

- Factory installed wireless – Wi-Fi certified 802.11ac and Bluetooth 4.1; MFi-certified (Apple)
- Font Packs — Asian and other international font kits
- ZBI 2.0 — Field installed

PRINT DNA SOFTWARE SOLUTIONS

Development Tools — An intuitive, easy-to-use software program for creating complex wristband and label designs, purchased separately (option)

Management Tools — Offers basic features for simple wrist band and label design (standard)

Productivity Tools — A design tool for designing and distributing wristband templates for later recalling and printing via XML data streams

Visibility Tools — Centrally manage Zebra printers from a single PC screen anywhere on your global network (option)

ZBI 2.0 — Powerful programming language that lets printers run standalone applications, connect to peripherals, and much more (option)

ZBI-Developer — Programming utility makes it dramatically easier for programmers to create and test complex ZBI 2.0 programs and distribute them to the printer (standard with ZBI 2.0)

Firmware

ZPL II — Universal language for Zebra printers. Simplifies wrist band and label formatting and enables format compatibility with existing systems that run Zebra printers.

Web View — Connect and control Zebra barcode printers via the printer's Web interface using a common Web browser.

Alert — Printers equipped with ZebraNet print servers will notify you via any email-enabled, wired, or wireless device to minimize downtime.

Z-BAND WRISTBAND CARTRIDGE SPECIFICATIONS

Healthcare wristbands feature silver antimicrobial coating, which test results show effectively protects the wristband against S. aureus, P. aeruginosa, E. coli, and MRSA

Select Wristband Options

Style	Size	Length	
		inches	mm
Z-Band Direct	Adult	1 × 11	25.4 × 279.4
Z-Band Direct	Child	1 × 7	25.4 × 177.8
Z-Band Direct	Infant	1 × 6	25.4 × 152.4
Z-Band QuickClip	Adult	1 × 1.1875	30.16 × 279.4
Z-Band QuickClip	Child	1 × 7	25.4 × 177.8
Z-Band Splash	1 size only	1 × 10	25.4 × 254
Z-Band Fun	1 size only	1 × 10	25.4 × 254

For a complete list of Z-band Wristbands please see Zebra.com

Healthcare

- Z-Band Direct have adhesive closure.
- Wristbands available in White, Red, Blue, Yellow, Green, Orange, Pink and Purple.
- Z-Band QuickClip haves clip closure.
- Clips available in White, Red, Blue, Yellow, Green, Pink and Purple.

Hospitality / Leisure

- Z-Band Fun and Splash have adhesive closure.
- Wristbands available in Red, Blue, Yellow, Green, Orange, Pink and Purple.
- Z-Band Splash has waterproof adhesive closure.

CALIBRATION PROCEDURE

The ZD510-HC is equipped with an automatic calibration feature that doesn't waste wristbands.

PRINTING SPECIFICATIONS

- Resolution: 300 dots / inch (dpi) (12 dots / mm)
- Dot size (W x L): 0.0033" x 0.0039" (0.084mm x 0.099mm)
- Minimum print length: 3" (76 mm)
- 3 wristband widths: 0.75", 1.00", and 1.1875" (19.05, 25.4, and 30.16 mm)
- Barcode modulus “X” dimension: 300 dpi = 3.33 mil to 32.67 mil

PHYSICAL SPECIFICATIONS

Attribute	ZD510-HC
Height*	7.0" (178 mm)
Width	5.0" (127 mm)
Depth	9.5" (242 mm)
Weight	3.1 lbs (1.4 kg)

* Requires 6 in. (153mm) above printer to load cartridge

ZPL PROGRAMMING LANGUAGE (ZPL/ZPL II)

- Communicates in printable ASCII characters
- Compatible with mainframe, mini, and PC hosts
- Downloadable objects include graphics and bitmap fonts, wristband templates and formats
- Automatic memory allocation for format while printing
- Automatic serialization of fields
- Format inversion (white on black)
- Mirror-image printing
- Four position field rotation (0°, 90°, 180°, 270°)
- Programmable wristband quantities with print, pause
- Status messages to host upon request

FONT MATRICES: 300 DPI (12 DOTS / MM) PRINTHEADS

Font	Matrix (in dots) (H × W)	Type†	Minimum Character Size (H × W)	Max CPI
A	9 × 5	U-L-D	0.035" × 0.020"	50.5
B	11 × 7	U	0.043" × 0.030"	33.7
C, D	18 × 10	U-L-D	0.070" × 0.040"	25.3
E	41 × 20	OCR-B	0.160" × 0.086"	11.7
F	26 × 13	U-L-D	0.101" × 0.053"	18.9
G	60 × 40	U-L-D	0.234" × 0.158"	6.3
H	30 × 19	OCR-A	0.177" × .0092"	10.8
GS	24 × 24	SYMBOL	0.094" × 0.086"	11.7
P	20 × 18	U-L-D	0.078" × 0.059"	N / A
Q	28 × 24	U-L-D	0.109" × 0.079"	N / A
R	35 × 31	U-L-D	0.137" × 0.102"	N / A
S	40 × 35	U-L-D	0.156" × 0.116"	N / A
T	48 × 42	U-L-D	0.187" × 0.139"	N / A
U	59 × 53	U-L-D	0.230" × 0.175"	N / A
V	80 × 71	U-L-D	0.312 × 0.234"	N / A
Ø	15 x 12	U-L-D	Scalable (Smooth) Font	

† U = Uppercase L = Lowercase D = Descenders

- Character Fonts: Standard bitmapped Zebra fonts: A, B, C, D, E (OCR-B), F, G, H, (OCR-A), GS, P, Q, R, S, T, U, V and Ø Smooth font (CG Triumvirate™ Bold Condensed).
- Supports user defined fonts and graphics — including custom logos
- Bitmap fonts are expandable up to 10 times, height and width independent. Fonts E and H (OCR-B and OCR-A), however, are not considered in spec when expanded.
- Smooth scalable font Ø (CG Triumvirate™ Bold Condensed) is expandable dot-by-dot, height and width independent, while maintaining edges to a maximum 1500 x 1500 dots.

ZPL BARCODE SYMBOLOGIES

- Barcode Ratios: 2:1 (non-rotated) and 3:1
- Linear Barcodes: Code 11, Code 39, Code 93, Code 128, UPC-A, UPC-E, EAN-8, EAN-13, EAN-14, UPC-A and UPC-E with EAN 2 or 5 digit extensions, Plessey, POSTNET, Standard 2 of 5, Industrial 2 of 5, Interleaved 2 of 5, LOGMARS, MSI, Codabar, and GS1 DataBar™ (formerly RSS)
- 2D Barcodes: PDF417, MicroPDF-417, Code 49, Maxicode, Codablock, Data Matrix, QR code, and Aztec

ELECTRICAL SPECIFICATIONS

Universal power supply (PFC Compliant) 100-240VAC, 50-60Hz (70 Watts) External Power Supply

AGENCY APPROVALS

- Emissions: FCC Part 15, Subpart B, VCCI, RCM
- Emissions & Susceptibility – (CE): EN 55032:2012 class B & EN 55024:2010, EN 61000-3-2, EN 61000-3-3, CISPR 32:2015
- Safety: CB Scheme IEC 60950-1 & IEC 62368-1, TUV NRTL
- Power Supply: IEC 60601-1:2012

ZD510-HC ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: 32 to 104 (0 to 40 C) for operating temperature
- Storage Temperature: -40° to 140°F (-40° to 60°C)
- Operating Humidity: 20% to 85% non-condensing R.H.
- Storage Humidity: 5% to 85% non-condensing R.H.

WRISTBAND CARTRIDGE ENVIRONMENTAL SPECIFICATIONS

- Service Temperature: -40° to 140° F (-40° to 60° C)
- Storage Temperature: 32° to 70° F (0° to 21° C) at 35% to 50% RH

PREVENTATIVE MAINTENANCE

Zebra recommends cleaning the printer on a regular basis using standard Zebra printer parts and cleaning supplies. Consult your User Guide for further details.

Disinfectants / Cleaning Solutions

Please consult the Guide to Cleaning and Disinfecting Zebra Healthcare Printers on Zebra.com for a full list of approved cleaning and disinfecting agents.

For more information, visit www.zebra.com/zd510hc

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Part number: ZD510-HC TS 07/17/2018

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Rack, Crutch/Cane/Walker
Alt ID: RCK-CRU
Manufacturer: Ideal Medical Products Inc. (1-800-321-5490)
Mfr #: RR32
Vendor: Ideal Medical Products Inc. (1-800-321-5490)
Vendor #: RR32
Model: RR32 Universal Wall Storage (Pair)

Pair of Storage Racks for crutches, walkers, rolls. Each rack: 33in.W x 12in.D x 4in.H. Features 6 hooks, steel construction, gray powdercoat finish and 30 lbs capacity per hook.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	66.00 in (1676 mm)	**Left:**	N/A
Depth:	12.00 in (305 mm)	**Right:**	N/A
Height:	4.00 in (102 mm)	**Front:**	N/A
Max Weight:	12 lbs (5.4 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
2 Racks, side by side.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Exercise Station, T-Bar Storage, Universal Rack

Model: ES28

Modular Exercise Station

- 3″ W x 2″ D x 28″ H
- 5 hooks per base, equally spaced
- Add capacity as needed
- Ships parcel freight
- Polished stainless steel
- Includes mounting hardware and starter snap ring
- Model **ES84**: 3 bases, 84″ total

Free Stretch Tube Included with Model **ES84**

Model: 27.300M

Therapy Bar Wall Rack

- 14″ W x 3″ D x 17″ H
- Brown powdercoat finish
- Ships parcel freight
- Steel construction
- 50 lb. capacity
- Weight bars not included

Model: C320TB

Therapy Bar Cart

- 21″ W x 15″ D x 30″ H
- 150 lb. capacity
- Lightweight, poly shelves
- Ships parcel freight
- Gray shelves with aluminum uprights
- Built-in push handles
- Holds up to 15 bar weights
- Weights not included

Model: RR31

Universal Storage Rack

- 33″ W x 12″ D x 4″ H
- Use for crutches, walkers, rolls, etc.
- Steel construction
- Ships parcel freight
- Gray powdercoat finish
- 30 lb. capacity per hook
- Save with pairs ***(RR32)***

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Recorder, CD/DVD**
Manufacturer: Epson America, Inc. ((562) 981-3840)
Vendor: Epson America, Inc. ((562) 981-3840)
Model: Discproducer PP-100III CD/DVD/Blu-ray

Alt ID: RDC-CDD
Mfr #: C11CH40001
Vendor #: C11CH40001

CD/DVD recorder. Features: MicroPiezo printing technology. Comes standard with USB connectivity. Six high-capacity cartridges, each with low-ink sensors. Robotic arm and patented AcuGrip technology. Features a field-replaceable waste tank.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	Yes
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	14.84 in (377 mm)	**Left:**	N/A
Depth:	18.31 in (465 mm)	**Right:**	N/A
Height:	19.40 in (493 mm)	**Front:**	N/A
Max Weight:	46 lbs (21.0 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	52
Hz:	60	**Amps:**	0.43
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	1	
				Total:	**1**	

Discproducer PP-100III CD/DVD/Blu-ray Disc Publisher and Printer

Contact Us 800.463.7766

Mon-Fri 7am-4pm PT

High-quality CD/DVD/Blu-ray printing and publishing at a remarkable value.

The perfect choice for professional CD, DVD, or Blu-ray® disc publishing and printing, the Epson Discproducer™ PP-100III is ideal for businesses looking for high-quality printing, reliable performance and a low total cost of ownership. Built with Epson's world-renowned robotic and printing technologies, it offers easy, unattended production of multiple types of discs — all in one compact device. With Epson's patented MicroPiezo® inkjet technology and six individual ink cartridges, it delivers crisp text and vibrant graphics for use in various industries including healthcare, legal and music. And, with ink sensors, AcuGrip® technology and a field-replaceable waste tank, it's easy to operate and maintain.

Model: C11CH40001

Overview

- **Simple, unattended production** — easily create multiple CD, DVD or Blu-ray discs
- **High-quality printing** — get sharp text and stunning graphics with patented MicroPiezo technology
- **Economical and easy to maintain** — low total cost of ownership
- **Compatibility** — comes standard with USB connectivity
- **Individual ink cartridges** — six high-capacity cartridges, each with low-ink sensors
- **Reliable** — robotic arm and patented AcuGrip technology ensure that only one disc is placed in the drive or on the printer at one time
- **Convenient** — easy front access to the disc drive
- **Built to last** — features a field-replaceable waste tank
- **Compact, durable design** — rugged construction in space-saving format
- **Industry-leading service and support** — for added peace of mind

Specifications

Print:

Printing Technology:
MicroPiezo® Technology

Ink:

Ink Type:
Dye ink

Ink Palette:
- PJ1C1(C): Cyan, C13S020447
- PJ1C2(LC): Lt. Cyan, C13S020448
- PJ1C3(LM): Lt. Magenta, C13S020449
- PJ1C4(M): Magenta, C13S020450
- PJ1C5(Y): Yellow, C13S020451
- PJ1C6(K): Black, C13S020452

Ink Yield Information:
1,000 discs or more[2]

Pad Life:
Approximately 30,000 discs[1]

General:

Operating Systems:
- Windows 10, 8, 7, XP, Windows Server
- OS X®3

Dimensions:
14.84" (W) x 18.31" (D) x 19.4" (H) excluding AC / USB cables

Weight:
Approximately 46.2 lbs, including stackers and ink cartridges, excluding AC cable/discs

Print Other:

Print Speed:
- Speed mode up to 60 discs/hour at 1440 x 720 dpi
- Quality mode up to 40 discs/hour at 1440 x 1440 dpi

Publishing Speed:
- CD: up to 30 discs/hour
- DVD: up to 15 discs/hour
- Blu-ray: up to 8.5 discs/hour

Publishing Modes:
Standard mode up to 50 CDs/DVDs/Blu-rays unattended. Batch mode up to 100 CDs/DVDs/Blu-rays unattended.

Connectivity:

Standard Connectivity:
USB

Media:

Size:
Only standard 120mm discs

Surface:
Inkjet printable

CD / DVD Drive:
2 drives, includes Blu-ray

Type:
CD-R, DVD-R, DVD+R, DVD-R DL, DVD+R DL, BD-R, BD-R DL

Writing Speed:
- CD: maximum 40x
- DVD-R, DVD+R: maximum 12x
- DVD-R DL, DVD+R DL: maximum 8x
- BD-R: maximum 8x
- BD-R DL: maximum 8x

Printer Details:

Software Included:
Total Disc Maker

Interfaces:
USB 3.0 Super Speed

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Refrigerator, Domestic**

Manufacturer: Frigidaire - Div. Electrolux ((800) 374-4432)

Vendor: Frigidaire - Div. Electrolux ((800) 374-4432)

Model: FPRU19F8WF (19 cu.ft./Stainless Steel)

Alt ID: REF-19S

Mfr #: FPRU19F8WF

Vendor #: FPRU19F8WF

Item ID:

Domestic refrigerator. Features: 19 cu. ft. capacity, 2 Glass Shelves, Right Hinge, Automatic Defrost, EvenTemp Cooling System, CrispSeal Crispers, Automatic Alerts, SpacePro Shelving, SpacePro Adjsutable Crisper Bins, SpacePro Full-Width Drawer, PrecisionPro Controls, PowerBright LED Refrigerator Lighting, CrispSeal Crispers with Auto Humidity, PureAir Ultra Filters in Stainless Steel. Energy Star.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	32.88 in (835 mm)	**Left:**	0.19 in (5 mm)
Depth:	27.00 in (686 mm)	**Right:**	0.19 in (5 mm)
Height:	72.50 in (1842 mm)	**Front:**	N/A
Max Weight:	233 lbs (105.6 kg)	**Back:**	1.00 in (25 mm)
Mounting:	Floor	**Top:**	1.00 in (25 mm)
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	REM
Hz:	60	**Amps:**	15
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Minimum Dedicated Circuit Required 15 amps

Depth with Door Open 90 degrees is 58.25 in.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
				Total:	**1**	

Frigidaire Professional

All Refrigerator

19 Cu. Ft. Single-Door Refrigerator

FPRU19F8WF

Available Colors : Stainless Steel

Version : 06/22

Refrigerator

Air Filter	Yes
Crisper Color	Smokey
Door Bin Color	Smokey
Humidity Controls	Automatic
Interior Lighting	LED
Shelf Material	Glass
Water Filter	Yes
Number of Other Door Bins	4
Total Number of Door Bins	4
Number of Adjustable Shelves	2
Number of Fixed Shelves	1
Number of Pull Out Shelves	1
Number of Crispers	2

Controls

Air Filter Indicator	Yes
Digital Display	Yes
Door Ajar Alarm	Yes
Power Failure Alarm	Yes
Sabbath Mode	Yes
Vacation Mode	Yes
Water Filter Indicator	Yes

Dimensions and Volume

Height With Hinge	72 1/2"
Height Without Hinge	71 1/2"
Width of Cabinet	32 7/8"
Depth With Door	27"
Depth With Door 90° Open	58 1/4"
Fresh Food Capacity	18.9 Cu. Ft.

Electrical Specifications

Minimum Circuit Required	15 Amps

General Specifications

Annual Energy	301 kWh
Condenser Type	Dynamic
Cooling System	Single Evaporator
Leveling Legs	Yes
Prop 65 Label	Yes
Refrigerant Type	R-600A
Warranty - Labor	1 Year
Warranty - Parts	1 Year

Performance Certifications and Approvals

ENERGY STAR Certified	Yes

Safety Certifications and Approvals

CSA Listed	Yes

Note: For planning purposes only. Always consult local and national electric, gas and plumbing codes.
Refer to Product Installation Guide for detailed installation instructions on the web at frigidaire.com / frigidaire.ca
Specifications subject to change. Accessories information available on the web at frigidaire.com / frigidaire.ca

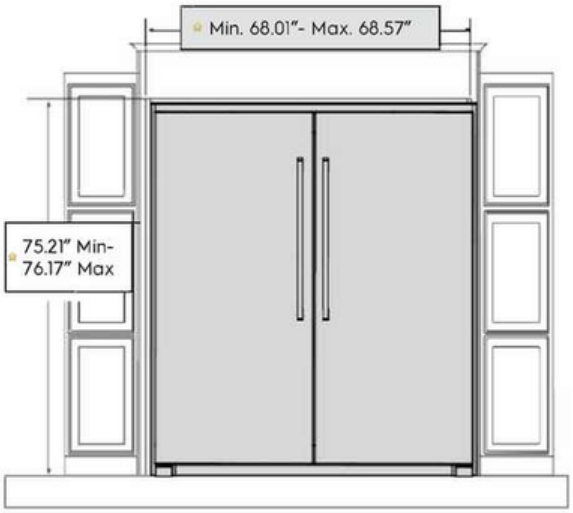
USA • 10200 David Taylor Drive • Charlotte, NC 28262 • 1-800-FRIGIDAIRE • frigidaire.com
CANADA • 5855 Terry Fox Way • Mississauga, ON L5V 3E4 • 1-800-265-8352 • frigidaire.ca

Frigidaire Professional

19 Cu. Ft. Single-Door Refrigerator | FPRU19F8WF

Version : 06/22

75" TRMKTEZ2FL75- flat

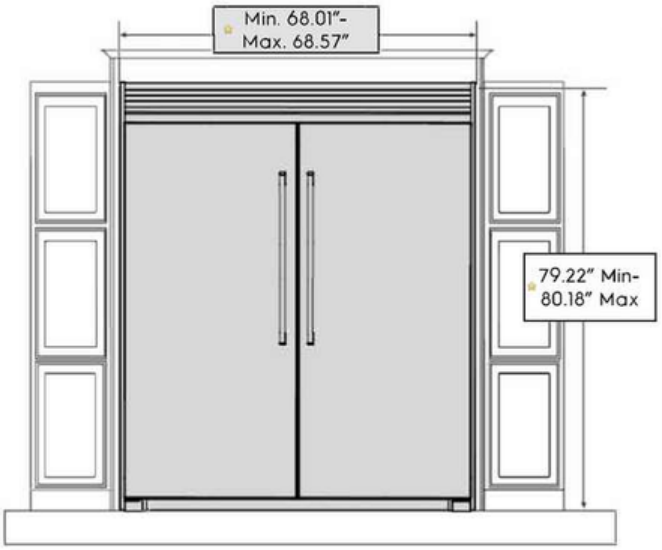


Recommended cutout size for kitchen cabinets:
Height: 75" +/- 0.06"
Width: 66.25" +/- 0.032"
Depth: 25.25" minimum

79" TRMKTEZ2FL79- flat

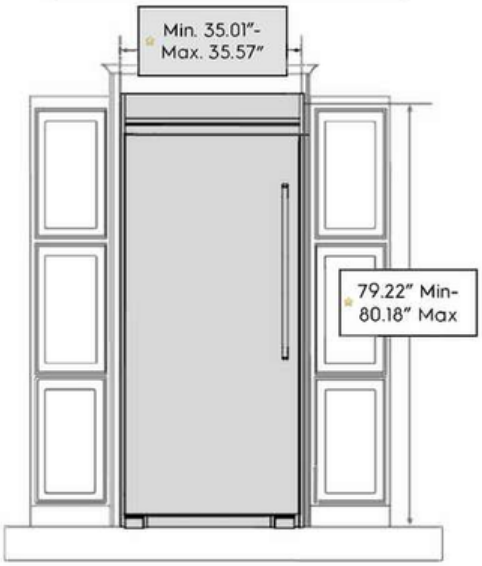
Recommended cutout size for kitchen cabinets:
Height: 79" +/- 0.06"
Width: 66.25" +/- 0.032"
Depth: 25.25" minimum

79" TRMKTEZ2LV79-louvered



Recommended cutout size for kitchen cabinets:
Height: 79" +/- 0.06"
Width: 66.25" +/- 0.032"
Depth: 25.25" minimum

79" TRMKTEZ1FL79- flat



Recommended cutout size for kitchen cabinets:
Height: 79" +/- 0.06"
Width: 33" +/- 0.032"
Depth: 25.25" minimum

Denotes trim kit dimensions only

** For replacement business, we can accommodate a 66" cutout width, but it will be a very tight fit.

Note: For planning purposes only. Always consult local and national electric, gas and plumbing codes.
Refer to Product Installation Guide for detailed installation instructions on the web at frigidaire.com / frigidaire.ca
Specifications subject to change. Accessories information available on the web at frigidaire.com / frigidaire.ca

USA • 10200 David Taylor Drive • Charlotte, NC 28262 • 1-800-FRIGIDAIRE • frigidaire.com
CANADA • 5855 Terry Fox Way • Mississauga, ON L5V 3E4 • 1-800-265-8352 • frigidaire.ca

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Refrigerator, Medical Grade, Undercounter**

Manufacturer: Follett LLC (800-523-9361)

Vendor: Follett LLC (800-523-9361)

Model: Performance Plus REF4P-0R-00-00

Alt ID: REF-MDU

Mfr #: REF4P-0R-00-00

Vendor #: REF4P-0R-00-00

Item ID:

Undercounter medical grade refrigerator. Features: LED controls, right hinged, and stainless door. Custom-designed microprocessor temperature controller, air-cooled refrigeration system with heavy duty 1/5 horsepower compressor, non-CFC R134a refrigerant, programmed automatic defrost every 8 hours, and cabinet-wide temperature remains within ±1 C (1.8 F), even with frequent door openings. Fits below 34 in. ADA countertops without casters, refrigeration system settings accessed through door-mounted controls, exterior LED digital temperature display available in user-programmable C or F with choice of product or air temperature, user-programmable audible and visual high/low alarms, mechanical lock – mounted on side of door, lockable controller so set points cannot be inadvertently changed, flexible internal storage configuration (drawers and shelves interchangeable), Agion antimicrobial, and UV product protection added to molded plastic facade. Two epoxy-coated wire shelves standard, back wall evaporator and front ventilation (no top, back or side clearance required), and edge-mount self-closing hinges.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	C/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	23.75 in (603 mm)	**Left:**	N/A
Depth:	27.00 in (686 mm)	**Right:**	N/A
Height:	31.38 in (797 mm)	**Front:**	N/A
Max Weight:	170 lbs (77.1 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	471
Hz:	60	**Amps:**	4.10
Phase:	Single	**BTU/hr:**	2185
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	Yes	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Requires 15 amps dedicated circuit.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	2	
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
				Total:	**3**	

REF4P ADA-Compatible Performance Plus

medical-grade undercounter refrigerator

Solid door standard

Optional glass door

Model configurations				
Controls	Hinge location[1]	Keypad	Door configuration	**Item number**
LED	right	no	stainless	**REF4P-0R-00-00**
			glass	**REF4P-0R-00-GD**
		yes	stainless	**REF4P-0R-KP-00**
			glass	**REF4P-0R-KP-GD**
	left	no	stainless	**REF4P-0L-00-00**
			glass	**REF4P-0L-00-GD**
		yes	stainless	**REF4P-0L-KP-00**
			glass	**REF4P-0L-KP-GD**

[1] As facing the unit.

Options and accessories

Glass door

Keypad and electronic lock with battery back-up

Replacement NTC probe with NIST-traceable certificate of calibration (item# 01077841)

Epoxy-coated shelf (1) (item# 01059484)

Drawer accessory kit (1 drawer, glide hardware and flush front panel) (item# 01053644)

Drawer accessory kit (2 drawers, glide hardware and flush front panel) (item# 01067750)

Temperature surveillance module (includes alarm, 6.00" (15.24 cm) chart recorder, remote contacts) (item# 00168674)

Universal ADC-compatible bracket (for all medication dispensing system locks) (item# 01059096)

Glycerine, 16 oz (item# 00959296)

Stacking kit (Performance Plus on Performance Plus) (item# 01054006)

Stacking kit (REF/FZR Series on Performance Plus) (item# 01067172)

Temperature alarm with dry contacts for remote alarming (item# 00112185)

Pedestal base, 23.75" wide x 24.00" deep x 17.00" high (60.3 x 61.0 x 43.2 cm), stainless (item# 01059120)

Extra key (item# 01059112)

Casters (set of 4 with spacers) (item# 01053636)

Wall mount kit (item# 00153700)

Seismic bracket kit (item# 01059104)

NO/NC dry contacts for connection to remote alarm systems (item# 01092022)

Features

Superior temperature performance

- custom-designed microprocessor temperature controller
- air-cooled refrigeration system with heavy duty 1/5 horsepower compressor
- environmentally friendly, non-CFC R134a refrigerant
- programmed automatic defrost every 8 hours
- cabinet-wide temperature remains within ±1 C (1.8 F), even with frequent door openings

Convenience and security

- fits below 34.00" (86.4 cm) ADA countertops without casters
- refrigeration system settings accessed through door-mounted controls
- exterior LED digital temperature display available in user-programmable C or F with choice of product or air temperature
- user-programmable audible and visual high/low alarms
- mechanical lock – mounted on side of door
- lockable controller so set points cannot be inadvertently changed
- flexible internal storage configuration (drawers and shelves interchangeable)
- Agion® antimicrobial and UV product protection added to molded plastic façade[1]

Durability and serviceability

- stainless steel construction on exterior and interior
- two epoxy-coated wire shelves standard
- back wall evaporator and front ventilation (no top, back or side clearance required)
- heavy-duty edge-mount self-closing hinges
- right or left-hinged door with integral handle and magnetic gasket door closure provides ease-of-use

Warranty

- 2 year parts and labor
- 5 year compressor parts only
- optional extended one year warranty (item# EW12)
  - 3 year parts and labor
  - 5 year compressor parts only
- optional extended three year warranty (item# EW36)
  - 5 year parts and labor

Certifications

UL CERTIFIED Commercial Refrigerator
SAFETY US/CA – SA12646

[1] Disclaimer: Antimicrobial protection is limited to the plastic façade.

801 Church Lane | Easton, PA 18040, USA
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FOLLETT HEALTHCARE®

Specification

Nominal capacity	3.9 cu ft (110 L)
Ventilation clearance	0.0" for top, side and back clearance

Exterior

W1 Width	23.75" (60.3 cm)
D1 Depth cabinet	25.62" (65.1 cm)
Depth with façade	27.00" (68.6 cm)
H1 Height	31.38" (79.7 cm)
Height with casters	33.88" (86.1 cm)
Door swing	24.00" (61.0 cm) from front of cabinet, 180° from closed

Interior

Width	19.75" (50.2 cm)
Depth	18.32" (46.5 cm)
Height	18.94" (48.1 cm)
Storage system	(2) 18.10" x 19.10" (46.0 x 48.5 cm) epoxy-coated steel shelves

Door configurations

Door	solid, foamed stainless 21.50" x 22.51" x 1.63" (54.6 x 57.2 x 4.0 cm)
Optional glass door	triple pane, low E glass window dimensions 16.30" x 10.90" (41.4 x 27.7 cm)
Door lock	cylinder lock
Door handle	molded into front façade
Door hinges	edge-mount, self-closing, right or left
Gasket	magnetic

Electrical

C1 115 V/60/1 electrical	4.1 run load amps, NEMA 5-15P 90º hospital-grade plug. PVC, SJT, 16GA, 7' (2.1 m) cord.
Maximum size of branch circuit overcurrent device	15 amps dedicated circuit

Controls

Temperature display	standard 7 segment LED
Battery back-up on KP (keypad) models only	(8) AA batteries provide power to keypad, electronic lock and controls
C2 3rd party probe access	rear access port
Factory preset	4.4 C
Product simulation bottle	(1) 60 ml
Programmable operating range	2.2 to 10 C (36 to 50 F)

Alarming

High and low product temperature alarm	audible and visual, user programmable set points in C or F
Probe error alarm	audible and visual — product temperature probes, refrigeration and defrost
Alarm mute	user selectable
Alarm volume	0 -10 adjustable
Min/max temperature log	shows highest and lowest product temperature since last reset occurred

System performance

Refrigerant and charge	R134a refrigerant, 9 oz
Energy consumption	1.8 kWh/day
Nominal heat rejection[1]	415 BTU/hr (122 W)
Max heat rejection	2185 BTU/hr (640 W)

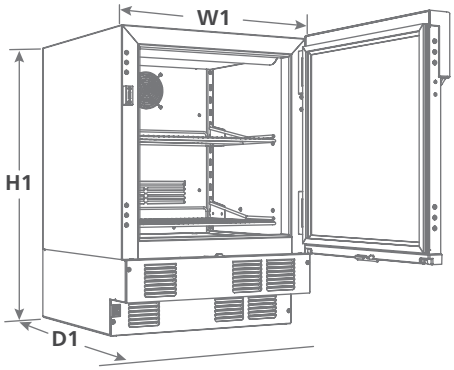
Shipping

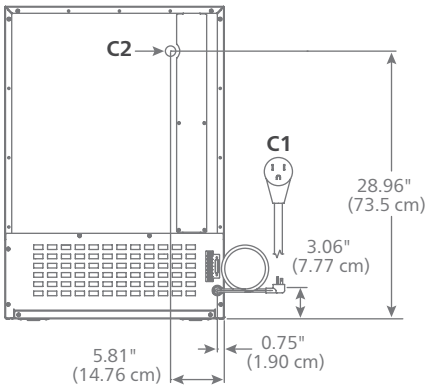
Approximate net weight	170 lb (77 kg)
Approximate ship weight	205 lb (93 kg)

NOTE: For indoor use only

SHORT FORM SPECIFICATION: Performance Plus undercounter refrigerator with choice of solid stainless steel or glass door fits under 34.00" (86.4 cm) ADA-height counter with 3.9 cu ft (110 L) of nominal capacity. Includes (2) epoxy-coated wire shelves, adjustable in 1.5" (3.81 cm) increments. Environmentally responsible R134a forced-air cooled refrigeration system. Top-mounted controls display product or air temperature in user-selectable C or F. Integral high and low temperature alarming. Storage area insulated with CARB compliant non-HFC foam. 7' (2.1 m) power cord with NEMA 5-15P 90º hospital-grade plug. UL and CUL listed.

Dimensional drawing





[1] Nominal heat rejection means heat rejection from a refrigerator in a 75 F (24 C) ambient with proper ventilation, an empty cabinet, default settings, default defrost schedules/durations, and nominal supply 115-120 VAC.

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FOLLETT HEALTHCARE®

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Refrigerator, Domestic, Undercounter**
Manufacturer: Summit Appliance ((800) 932-4267)
Vendor: Summit Appliance ((800) 932-4267)
Model: AL752BKSSTB (ADA Compliant)

Alt ID: REF-USS
Mfr #: AL752BKSSTB
Vendor #: AL752BKSSTB

Undercounter domestic refrigerator designed for general purpose, medical, or commercial applications. Featuring 5.5 cubic feet capacity. Fully finished cabinet used for freestanding, Automatic defrost, Stainless steel door, Professional towel bar handle, Hidden evaporator, Adjustable glass shelves, Adjustable thermostat, Interior light controlled by an on or off rocker switch, Deep shelf space and CFC Free. ADA compliant.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	23.63 in (600 mm)	**Left:**	4.00 in (102 mm)
Depth:	26.00 in (660 mm)	**Right:**	4.00 in (102 mm)
Height:	32.25 in (819 mm)	**Front:**	N/A
Max Weight:	100 lbs (45.4 kg)	**Back:**	4.00 in (102 mm)
Mounting:	Floor	**Top:**	4.00 in (102 mm)
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	104
Hz:	60	**Amps:**	0.9
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Separate circuit recommended. 15 amp circuit breaker required.

Depth with handle shown. Depth with door at 90 degrees 45".

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	1	
				Total:	**1**	

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AL752BKSSTB

32.25" x 23.63" x 23.5" (H x W x D)

ADA compliant all-refrigerator for freestanding general purpose use, auto defrost w/SS door, towel bar handle, and black cabinet

Highlights:

32" height for use in ADA compliant settings

Full 5.5 cu.ft. capacity inside a convenient 24" footprint

Stainless steel wrapped door with professional towel bar handle adds luxury to any setting

Product Features:

ADA compliant	32" height for use in settings complying with ADA guidelines for lower counter height
Automatic defrost	Reduced user maintenance with automatic defrost operation
Stainless steel door	Durable construction brings modern luxury to any setting
Professional towel bar handle	Curved handle in brushed stainless steel offers a sturdy grip with professional elegance
Hidden evaporator	Cold wall design with hidden evaporator and seamless interior
Adjustable glass shelves	Rearrange your refrigerator space to accommodate all shapes and sizes or remove shelves for a simple clean-up
Adjustable thermostat	Dial thermostat located inside for easy temperature management
Interior light on rocker switch	Turn the light on when you need it and off when you're done with a convenient rocker switch located just behind the thermostat
Deep shelf space	Interior accommodates large trays up to 19 1/2" x 15 1/2"

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AL752BKSSTB Specifications:

Overview	
Height of Cabinet	32.0" (81 cm)
Height to Hinge Cap	32.25" (82 cm)
Width	23.63" (60 cm)
Depth	23.5" (60 cm)
Depth with Handle	26.0" (66 cm)
Depth with door at 90°	45.0" (114 cm)
Capacity	5.5 cu.ft. (156 L)
Defrost Type	Automatic
Door	Stainless Steel
Cabinet	Black
US Electrical Safety	ETL
Canadian Electrical Safety	ETL-C
Amps	0.9
Voltage/Frequency	115 V AC/60 Hz
Weight	100.0 lbs. (45 kg)
Shipping Weight	105.0 lbs. (48 kg)
Parts & Labor Warranty	1 Year
Compressor Warranty	5 Years
UPC	761101071718
Refrigerator Features	
Door Swing	RHD
Reversible	Factory Reversible
Shelf Type	Glass
Shelf Qty	3
Adjustable Shelves	Yes
Thermostat Type	Dial
Refrigerant Type	R600a
Refrigerant Amount	0.64oz.
High Side PSI	180.0
Low Side PSI	80.0
Level Legs Qty	2
Interior Light	Yes
Dimensions	
Interior Height	26.25" (67 cm)
Interior Width	21.0" (53 cm)
Interior Depth	17.75" (45 cm)
Compressor Step Height	5.5" (14 cm)
Compressor Step Width	21.0" (53 cm)
Compressor Step Depth	5.5" (14 cm)

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Refrigerator, Domestic with Freezer**
Manufacturer: Summit Appliance ((800) 932-4267)
Vendor: Summit Appliance ((800) 932-4267)
Model: FF1159SS (10.3 cu.ft./Stainless Steel)

Alt ID: RFZ-10S
Mfr #: FF1159SS
Vendor #: FF1159SS

Domestic refrigerator with freezer. Featuring 10.3 cubic feet capacity. Stainless Steel finish, Frost-free operation, Reversible stainless steel doors, Large capacity, Thin-line design, Interior light, Adjustable shelves, Door shelves in both sections, Large Clear crisper, Adjustable thermostat, Interior fan and CFC Free. CEE Tier I and Energy star qualified. ADA compliant design.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	23.63 in (600 mm)	**Left:**	5.00 in (127 mm)
Depth:	26.00 in (660 mm)	**Right:**	5.00 in (127 mm)
Height:	58.88 in (1496 mm)	**Front:**	N/A
Max Weight:	130 lbs (59.0 kg)	**Back:**	5.00 in (127 mm)
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	115	**Watts:**	184
Hz:	60	**Amps:**	1.6
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	Yes
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height includes hinge cap. Depth with door open 48.5"

Separate circuit recommended. 15 amp circuit breaker required.

This appliance is designed to be free-standing only, and should not be recessed or built in.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
				Total:	**1**	

FF1159SS

58.88" x 23.63" x 26" (H x W x D)

ENERGY STAR qualified ADA compliant refrigerator-freezer in stainless steel with frost-free operation

Highlights:

ENERGY STAR qualified performance saves on yearly running costs

Designed to meet ADA guidelines

Slim 24" width offers over 10 cu.ft. of interior storage

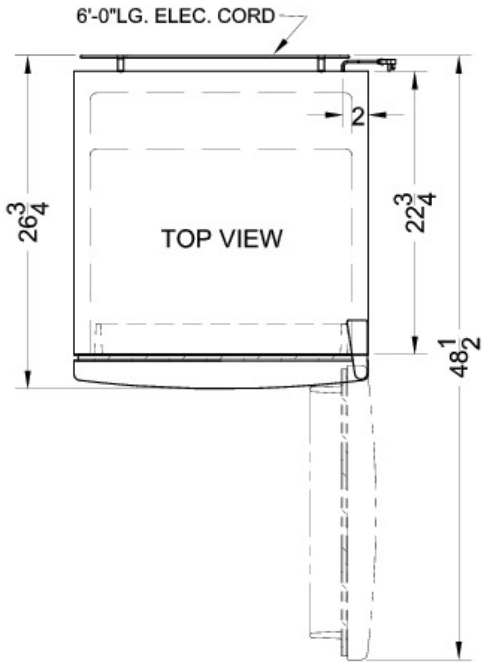
Product Features:

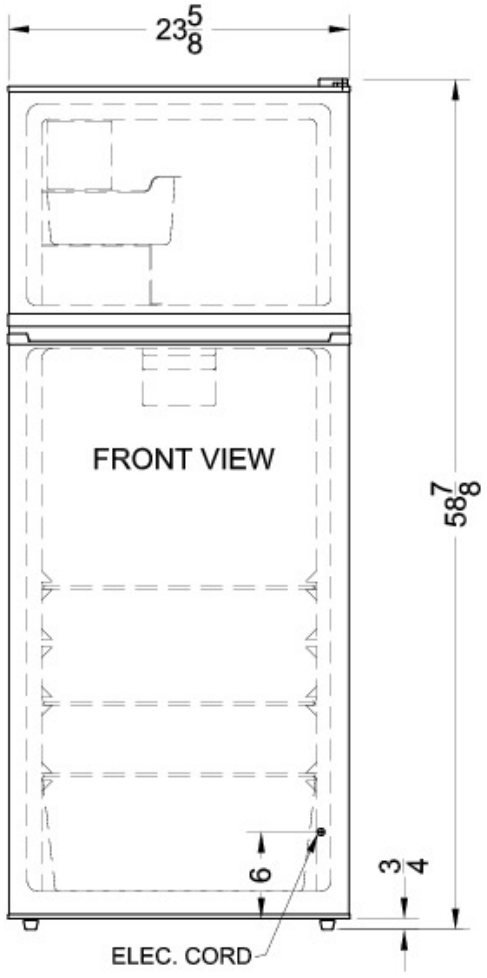
ENERGY STAR Most Efficient 2016 recognition	This unit has been recognized as the Most Efficient of ENERGY STAR 2016, helping to prevent greenhouse gas emissions by meeting rigorous energy efficiency performance levels set by the U.S. Environmental Protection Agency
Frost-free operation	No-frost convenience for reduced user maintenance
ENERGY STAR qualified	Efficient performance meets ENERGY STAR standards for yearly energy savings
CEE Tier I qualified	Efficient design meets CEE Tier I specifications, using 20% less energy than DOE standards require for this product category
ADA compliant design	Unit's height and control location meets guidelines for ADA compliant refrigeration
Reversible stainless steel doors	User-reversible door swing for added flexibility
Large capacity	Over 10 c.f. of interior space
Thin-line design	Limited space is no problem for our thin-line models, designed specifically for those hard-to-fit spots
Interior light	Automatically illuminates when you open the door

SUMMIT

FF1159SS Specifications:

Overview	
Height of Cabinet	58.38" (148 cm)
Height to Hinge Cap	58.88" (150 cm)
Width	23.63" (60 cm)
Depth	26.0" (66 cm)
Depth with door at 90°	48.5" (123 cm)
Capacity	10.3 cu.ft. (292 L)
Defrost Type	Frost-Free
Door	Stainless Steel
Cabinet	Black
US Electrical Safety	UL
Canadian Electrical Safety	ULC
Energy Usage/Year	297.0kWh/year
Amps	1.6
Voltage/Frequency	115 V AC/60 Hz
Weight	130.0 lbs. (59 kg)
Shipping Weight	135.0 lbs. (61 kg)
Estimated Time to Ship	Next day shipping
Parts & Labor Warranty	1 Year
Compressor Warranty	5 Years
Refrigerator-Freezer	
Door Swing	RHD
Reversible	Yes
Adjustable Shelves	Yes
Crisper Qty	1
Crisper Finish	Transparent
Crisper Cover	Glass
Interior Light	Yes
Refrigerator - Interior Height	40.0" (102 cm)
Refrigerator - Interior Width	19.5" (50 cm)
Refrigerator - Interior Depth	14.0" (36 cm)
Refrigerator - Capacity	7.9 cu.ft
Refrigerator - Shelf Type	Wire
Refrigerator - Shelf Qty	2
Refrigerator - Full Door Shelves	4
Freezer - Interior Height	12.25" (31 cm)
Freezer - Interior Width	19.0" (48 cm)
Freezer - Interior Depth	14.0" (36 cm)
Freezer - Capacity	2.4 cu.ft
Freezer - Shelf Type	Wire
Freezer - Shelf Qty	1
Freezer - Full Door Shelves	2
Thermostat Type	Dial
Fan Type	Interior
Refrigerant Type	R134a
Refrigerant Amount	4.2 oz.
High Side PSI	235.0
Low Side PSI	140.0
Level Legs	2





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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Scale, Clinical, Adult, Wheelchair**

Manufacturer: Hillrom - Scale-Tronix (800.535.6663)

Vendor: Hillrom - Scale-Tronix (800.535.6663)

Model: 6702W Oversized Wheelchair w/Handrail,Ht Gauge,Pwr

Alt ID: SCL-WHC

Mfr #: 6702W/60224/845010/845233

Vendor #: 6702W/60224/845010/845233

Oversized adult wheelchair scale with folding access ramps. Configured with optional power adapter (845233), handrail (60224) and height gauge (845010). Designed to weigh patients in electric and oversized wheelchairs. 28 w X 32 d X 2 h (inch) platform. Digital LED display in pounds and kilograms, or kilograms only. Automatic zero, weight recall, reweigh. 880lb/ 400kg weight range. Accuracy: 1/10 lb-100 gm. Power Source-Cordless: 6 D-size disposable batteries. Line cord power available. Made in USA.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	28.25 in (718 mm)	**Left:**	N/A
Depth:	31.75 in (806 mm)	**Right:**	N/A
Height:	3.25 in (83 mm)	**Front:**	N/A
Max Weight:	115 lbs (52.2 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	N/A
Hz:	60	**Amps:**	N/A
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimension reflects platform.

Structural:

Electrical:

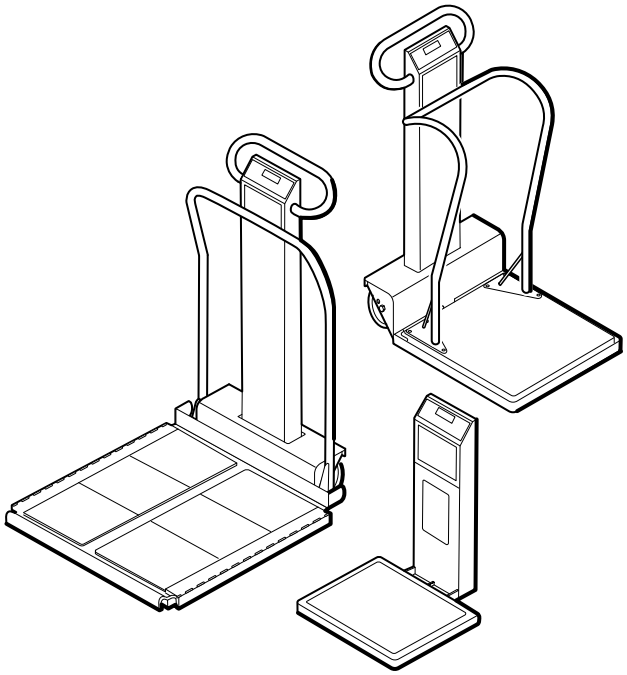
Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

Welch Allyn Masted Scales



Directions for use

Models 5002, 5122, 5702, 6002, 6702, 6702SP, 6702W

Welch Allyn®

Advancing Frontline Care™

Appendices

Specifications

Item	Specification
Scales	5002, 5122, 5702, 6002, 6702, 6702SP, 6702W
Resolution (factory default)	0.1 lb / 100 gm
Weighing capacity	Models 5002 and 6002: 880 lb (400 kg) Models 5702, 6702, 6702SP, 6702W: 1000 lb (454 kg) Model 5122: 660 lb (300 kg)
Readout	Large, bright light-emitting diode display. Selectable weight displayed in pounds or kilograms. Indicator light to show selected units.
Power source	Battery • 6 D alkaline batteries Power adapter • Medical grade UL listed external power supply • Nominal input voltage: 100-240V AC ±10% • Nominal input frequency: 50/60 Hz • Nominal input current: 0.3-0.15Arms @ max load • Nominal output voltage: U_{out} : 12V DC +5% / -5% • Nominal output current: I_{out} : 1000mA
Platform dimensions	5002: 18 in. x 19.5 in. x 1.5 in. 5702: 24 in. x 26 in. x 2 in. 6002: 24 in. x 26 in. x 2 in. 5122: 16 in. x 14 in. x 1.5 in. 6702: 28.25 in. x 29.25 in. x 3.25 in. 6702W: 28.25 in. x 31.75 in. x 3.25 in. 6702SP: 35 in. x 29.75 in. x 3.25 in.

Approved accessories

Model 5002

Part number	Description
845010	Height gauge (in and cm)
845010M	Height gauge (metric only)
845010W	Wall-mounted height gauge (in and cm)
23709	Thermal printer paper (box, 15 rolls)
845233-KIT	12-volt power supply with US AC line cord kit

Model 5122

Part number	Description
845010W	Wall-mounted height gauge (in and cm)
341001	Power adapter

Model 5702

Part number	Description
845010B	Height gauge for 5702 (in and cm)
845010W	Wall-mounted height gauge (in and cm)
23709	Thermal printer paper (box, 15 rolls)
845233-KIT	12-volt power supply with US AC line cord kit

Model 6002

Part number	Description
60224	Handrail
845010	Height gauge (in and cm)
845010M	Height gauge (metric only)
845010W	Wall-mounted height gauge (in and cm)
23709	Thermal printer paper (box, 15 rolls)
845233-KIT	12-volt power supply with US AC line cord kit

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Scanner, Barcode**

Manufacturer: Zebra Technologies Corp ((847) 634-6700)

Vendor: Zebra Technologies Corp ((847) 634-6700)

Model: DS8100 Series Corded and Cordless Handheld Imagers

Alt ID: SCN-BCD

Mfr #: DS8178-SR7U2100SFW

Vendor #: DS8178-SR7U2100SFW

Item ID:

Barcode scanner corded and cordless. Nova White or Twilight Black color. Featuring 1D, 2D, PDF417 decode capability, withstand 50 drops at 6.0 feet or 1.8 meter to concrete, supports Digimarc digital watermark technology, Multi-code Data Formatting (MDF), control scanners from a Smartphone, Tablet or PC, direct decode indicator, good decode LEDs, rear view LEDs, beeper (adjustable tone and volume), dedicated Power Charge Gauge. RoHS compliant.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	2.60 in (66 mm)	**Left:**	N/A
Depth:	4.20 in (107 mm)	**Right:**	N/A
Height:	6.60 in (168 mm)	**Front:**	N/A
Max Weight:	1 lbs (0.2 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Power via host cable.

Input Voltage Range.
DS8178 Cradles 5V 4.7 to 5.5VDC, 12V 10.8 to 13.2VDC.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

The Ultimate in Performance, Innovation and Manageability

Checkout is the last chance to leave your shoppers with a good impression — and the quality of the checkout experience is heavily dependent upon the performance of the scanner you choose. If cashiers need to scan barcodes multiple times or enter unreadable barcodes manually, your checkout lanes can back up quickly, resulting in long lines, long wait times and cashiers that need to focus on ringing up merchandise as quickly as possible instead of focusing on shoppers to provide a better checkout experience. Now, you can give every shopper the ultimate last impression with the DS8100 Series handheld imager. The DS8100 Series rises above conventional imagers, delivering unprecedented scanning performance on 1D and 2D barcodes, innovative productivity enhancing tools, including swappable power sources — a PowerPrecision+ battery or PowerCap™ capacitor[1] — plus unrivaled manageability tools to keep your scanners up, running and in the hands of your cashiers. Keep checkout lines moving and cashiers free to deliver a more personal checkout experience with the DS8100 Series — because when it comes to the checkout experience, only the best will do.

Unprecedented Performance

Unparalleled Performance on Virtually Every Barcode in Any Condition
Only the DS8100 Series combines the power of an 800 MHz microprocessor, a high-resolution megapixel sensor and Zebra's exclusive PRZM Intelligent Imaging technology. With this unique combination of hardware and advanced algorithms, the DS8100 Series instantly captures the most problematic barcodes — including dense, poorly printed, crinkled, faded, distorted, dirty or damaged, as well as electronic barcodes on dimly lit displays.

Superior Scan Range
A scanning range up to 24 in./61 cm, a high resolution imaging sensor and a bright "aiming spot" improve checkout speed. Now, cashiers in busy checkout environments can easily scan items in a customer's shopping cart — without leaving the cash-wrap.

Innovation Beyond the Barcode

Swappable Power Options Reduce Your Investment Risk
Two interchangeable power options are available to power your devices: a PowerPrecision+ battery or a PowerCap capacitor. You can swap power options at any time on all models, right in your facility — no need to purchase separate battery-free and battery powered devices. And managing your power sources is easy. Since the PowerPrecision+ battery and PowerCap capacitor can report their model and serial numbers, you'll always know which power source is in each scanner.

On a single charge, the advanced PowerPrecision+ battery provides over three around-the-clock days of continuous scanning, plus a wealth of metrics for better battery management.

The PowerCap capacitor is ideal when the scanner can always be inserted into a charging cradle when not in use. The largest capacitor in its category, the superior PowerCap offers 2,000 scans on a full charge and 100 scans after as little as 35 seconds in the cradle — both metrics are four times the competition.

Dedicated Power Charge Gauge
See at-a-glance if the PowerPrecision+ battery or the PowerCap capacitor are sufficiently charged at the start of a shift.

Connect+ Contact Technology Designed to Last
The position of the charging contacts in the DS8100 Series charging cradles combined with Zebra's exclusive Connect+ Contact Technology assures reliable, corrosion-free charging over the life of the scanner.

The DS8100 Series — When Your Business Demands the Ultimate in Performance, Workforce Productivity and Customer Service.

For more information, visit www.zebra.com/ds8100 or access our global contact directory at www.zebra.com/contact

Support for the Barcode of the Future — Digimarc®
The DS8100 Series supports Digimarc digital watermark technology, which enables a barcode to be printed repeatedly over all surfaces of a product like wallpaper — yet remain completely invisible to the naked eye. Cashiers no longer need to locate and position a barcode in the field of view of the imager, enabling faster checkout and easier self-checkout.

Eliminate Bluetooth Interference with Wi-Fi Friendly Mode
Only operate on channels that are not shared with your wireless LAN (WLAN), protecting service levels for workers and customers.

Capture Multiple Barcodes with One Press of the Scan Trigger
Multi-code Data Formatting (MDF) provides the ability to capture multiple barcodes and transmit only those required in the precise order the application requires.

Capture Drivers License Data (DL Version Required)
With one press of the scan trigger, cashiers can capture and parse data on drivers licenses to automatically populate a loyalty or credit card application, verify age for age-restricted purchases and more.

Direct Decode Indicator Improves Productivity
Since the illumination on the barcode flashes to indicate a good decode, workers never need to pause to make sure a barcode was captured correctly.

Unrivaled Manageability

Identify and Correct Problem Barcodes with ScanSpeed Analytics
Get the information you need to spot and correct barcode issues before they impact worker productivity and customer service quality. Only from Zebra, ScanSpeed Analytics captures barcode type, scan speed and more for every scanned barcode. And an image of the barcode with the slowest scan time helps you proactively identify and address issues to improve scan speed.

Visionary Visibility Into Battery Performance Metrics
The PowerPrecision+ battery provides a wealth of health information, including charge cycles consumed, a State-of-Health meter and whether the battery can still hold a full charge. Now, you can easily spot, order and replace aging batteries before battery failures interrupt front end operations and cause checkout delays.

Control Your Scanners From a Smartphone, Tablet or PC
With this easy-to-use application, you can: control your imager's beeper, vibration and LED to set user alerts; display scanned barcode data; access model and serial number; and access battery statistics and more from Android, iOS and Windows smartphones, tablets and PCs.

No-cost Tools to Meet Advanced Management Needs
With 123Scan, you can easily create configuration barcodes to program scanners. If your imagers are in multiple locations across the country or around the world, with Scanner Management Service (SMS), you can configure and update the firmware for any DS8100 Series device that is plugged into the host — no depot staging or user action is required — such as the scanning of a configuration barcode.

Easy Application Development
Get everything you need to easily integrate scanning into your business applications with our Scanner Software Development Kits (SDKs) for Windows, Android, iOS and Linux. These SDKs provide documentation, drivers, test utilities and sample source code.

Simplify the Entire Scanning Experience with DataCapture DNA
Hardware is just the start of what you need to maximize the value of your scanners. The DS8100 Series is powered by DataCapture DNA, a set of unique development, management, visibility and productivity tools. Leveraging Zebra's 50 years of innovation, DataCapture DNA turns Zebra scanners into powerful tools that lower your TCO and help workers get more done each day. Decrease development cycles with development tools. Dramatically simplify scanner deployments of any size with management tools. Get the remote analytics you need to keep scanners up and running with visibility tools. And reach new levels of productivity with innovations that streamline tasks, allowing workers to capture the data the drives your business, faster and easier than ever.

DS8100 Series Specifications

Physical Characteristics

Dimensions	**Corded DS8108 and Cordless DS8178:** 6.6 in. H x 2.6 in. W x 4.2 in. D 16.8 cm. H x 6.6 cm. W x 10.7 cm. D **Standard Cradle:** 2.8 in. H x 3.3 in. W x 8.3 in. D 7.1 cm. H x 8.4 cm. W x 21.1 cm. D **Presentation Cradle:** 2.9 in. H x 3.7 in. W x 4.8 in. D 7.4 cm. H x 9.4 cm. W x 12.2 cm. D
Weight	**Corded DS8108:** 5.4 oz./154 g **Cordless DS8178:** 8.3 oz./235.3 g **Desk/Wall Cradle:** 7.1 oz./202 g **Presentation Cradle:** 6.5 oz./182 g
Input Voltage Range	**DS8108:** 4.5 to 5.5VDC **DS8178 Cradles:** 5V: 4.7 to 5.5VDC; 12V: 10.8 to 13.2VDC
Current[2]	**Corded DS8108 Operating Current at Nominal Voltage (5.0V):** 450 mA **Cradle:** 470 mA (typical) Standard USB; 743mA (typical) 12V
Color	Nova White, Twilight Black
Supported Host Interfaces	USB Certified, RS232, Keyboard Wedge, TGCS (IBM) 46XX over RS485
Keyboard Support	Supports over 90 international keyboards
FIPS Security Certification	Certified Compliant with FIPS 140-2
User Indicators	Direct decode indicator, good decode LEDs, rear view LEDs, beeper (adjustable tone and volume), dedicated Power Charge Gauge

Performance Characteristics

Light Source	Aiming Pattern; circular 617nm amber LED
Illumination	(2) 645nm red LEDs
Imager Field of View	48° H x 37° V nominal
Image Sensor	1,280 x 960 pixels
Minimum Print Contrast	16% minimum reflective difference
Skew/Pitch Roll Tolerance	+/- 60°; +/- 60°; 0-360°

Imaging Characteristics

Graphics Format	Images can be exported as Bitmap, JPEG or TIFF
Image Quality	109 PPI on an A4 document
Minimum Element Resolution	Code 39 - 3.0 mil; Code 128 - 3.0 mil; Data Matrix - 6.0 mil; QR Code - 6.0 mil; PDF - 5.0 mil

User Environment

Operating Temperature	32° to 122° F/0° to 50° C
Charging Temperature	32° to 104° F/0° to 40° C
Storage Temperature	-40° to 158° F/-40° to 70° C
Humidity	5% to 95% RH, non-condensing
Drop Specification	Designed to withstand multiple drops at 6.0 ft/1.8 m to concrete
Tumble Specification	Designed to withstand 2,000 1.5 ft./0.5 m tumbles[3]
Environmental Sealing	IP52
Electrostatic Discharge (ESD)	**DS8108/DS8178 and Cradles:** ESD per EN61000-4-2, +/-15 KV Air, +/-8 KV Direct, +/-8 KV Indirect
Ambient Light Immunity	0 to 9,000 Foot Candles/0 to 96,840 Lux

Radio Specifications

Bluetooth Radio	**Standard Bluetooth Version 4.0 with BLE:** Class 1 330 ft./100m and Class 2 33 ft./10m, Serial Port and HID Profiles
Adjustable Bluetooth Power	Class 1: Output power adjustable down from 4 dBm in 8 Steps Class 2: Output power adjustable down from 2 dBm in 8 Steps

Power

PowerPrecision+ Li-Ion Battery	Capacity: 2500 mAh Number of scans from full charge: 65,000[4] Charge time from empty to full: 9 hours over USB Charge time from audible low charge warning to Ready-to-Scan at 20% of full charge (default): 3 hours over USB
PowerCap Capacitor	Capacity: 440 F Number of scans from full charge: 2,000[4] Number of scans from Ready-To-Scan at 20% of full charge (default): 200[4] Number of scans from Ready-To-Scan at 15% of full charge: 100[4] Charge time from empty to full: 30 min over USB Charge time from audible low charge warning to Ready-to-Scan at 20% of full charge (default): 90 sec over USB Charge time from audible low charge warning to Ready-to-Scan at 15% of full charge: 35 sec over USB

Regulatory

Electrical Safety	EN 60950-1 2ed + A11 + A1 + A12 + A2:2013, IEC 60950-1 2ed + A1 + A2, UL 60950-1, CAN/CSA-C22.2 No. 60950-1-07
Environmental	RoHS EN 50581
LED Safety	IEC 62471
IT Emissions	EN 55022 (Class B); EN 55032 (Class B)
IT Immunity	EN 55024
Harmonic Current Emissions	EN 61000-3-2
Voltage Fluctuation and Flicker	EN 61000-3-3
Radio Frequency Devices	47 CFR Part 15, Subpart B, Class B
Digital Apparatus	ICES-003 Issue 6, Class B

Accessories

Standard cradle, presentation cradle, wall mount bracket, spare battery, spare PowerCap; document capture stands

Decode Capabilities[5]

1D	Code 39, Code 128, Code 93, Codabar/NW7, Code 11, MSI Plessey, UPC/EAN, I 2 of 5, Korean 3 of 5, GS1 DataBar, Base 32 (Italian Pharma)
2D	PDF417, Micro PDF417, Composite Codes, TLC-39, Aztec, DataMatrix, MaxiCode, QR Code, Micro QR, Chinese Sensible (Han Xin), Postal Codes, SecurPharm, DotCode, Dotted DataMatrix
Digimarc	Digital watermark technology

Decode Ranges (Typical)[6]

Symbology/Resolution	Near/Far
Code 39: 3 mil	2.2 in./5.6 cm to 5.0 in./12.7 cm
Code 39: 20 mil	0 in./0 cm to 36.8 in./93.5 cm
Code 128: 3 mil	2.6 in./6.6 cm to 4.5 in./11.4 cm
Code 128: 5 mil	1.6 in./4.1 cm to 8.4 in./21.3 cm

Put the DS8100 Series to Work in:

Retail
- Point-of-Sale (POS)
- Loyalty applications
- Electronic coupon redemption
- Backroom receiving
- Inventory management

Hospitality
- Check-in
- Ticketing (concerts, sporting events and more)
- Loyalty cards

Transportation and Logistics
- Shipping and receiving
- Picking
- Product tracking
- Ticketing (airports, train and bus terminals)
- Postal

Light/Clean Manufacturing
- Product and component tracking
- Work-in-process (WIP)

Government
- Lottery and gaming
- Administration
- Banking

Code 128: 15 mil	0 in./0 cm to 27.1 in./68.8 cm
PDF 417: 5 mil	2.3 in./5.8 cm to 6.4 in./16.3 cm
PDF 417: 6.7 mil	1.8 in./4.6 cm to 8.5 in./21.6 cm
UPC: 13 mil (100%)	0 in./0 cm to 24.0 in./61.0 cm
Data Matrix: 7.5 mil	2.1 in./5.3 cm to 6.9 in./17.5 cm
Data Matrix: 10 mil	1.1 in./2.8 cm to 9.9 in./25.1 cm
QR: 20 mil	.1 in./.3 cm to 17.6 in./44.7 cm

Warranty

Subject to the terms of Zebra's hardware warranty statement, the DS8178 and the CR8178 are warranted against defects in workmanship and materials for a period of three years from the date of shipment. The DS8108 is warranted against defects in workmanship and materials for a period of five years from the date of shipment. Complete Zebra hardware product warranty statement: www.zebra.com/warranty

Recommended Services

Zebra OneCare Select; Zebra OneCare Essential

Utilities and Management

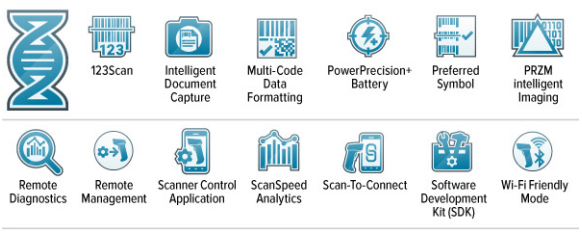
123Scan	Programs scanner parameters, upgrades firmware, displays scanned barcode data, scanning statistics, battery health, asset data and prints reports. www.zebra.com/123scan
Symbol Scanner SDK	Generates a fully-featured scanner application, including documentation, drivers, test utilities and sample source code. www.zebra.com/scannersdk-forwindows
Scanner Management Service (SMS)	Remotely manages your Zebra scanner and queries its asset information. www.zebra.com/sms

Footnotes

1 Requires firmware version CAACXS00-004-R00 or later.
2 Refer to Product Reference Guide for currents when other power sources are used.
3 1 tumble = 0.5 cycle.
4 At one scan per second.
5 Refer to Product Reference Guide for complete list of symbologies.
6 Printing resolution, contrast, and ambient light dependent.

DataCapture DNA

DataCapture DNA is a suite of highly intelligent firmware, software, utilities and apps exclusively engineered to add functionality and simplify the deployment and management of Zebra scanners. For more information about DataCapture DNA and its applications, please visit www.zebra.com/datacapturedna



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Part number: SS-DS8100 08/12/2019 HTML

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Scanner, Barcode**
Manufacturer: Zebra Technologies Corp ((847) 634-6700)
Vendor: Zebra Technologies Corp ((847) 634-6700)
Model: Symbol LS2208 (USB Kit with Stand)

Alt ID: SCN-BCS
Mfr #: LS2208-SR20007R-NA
Vendor #: LS2208-SR20007R-NA

Scanner barcode. Cash Register White or Twilight Black color. Includes USB cable and stand. Featuring 1D scanning, 17 inch wide working range on 100 percent UPC/EAN symbols, Plug-and-play, universal cable, intuitive scanning, functions normally after repeated 5 feet or 1.5 meter drops to concrete and enables Advanced Data Formatting (ADF). RoHS compliant.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	2.50 in (64 mm)	**Left:**	N/A
Depth:	3.34 in (85 mm)	**Right:**	N/A
Height:	6.00 in (152 mm)	**Front:**	N/A
Max Weight:	0 lbs (0.1 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Powered via USB cable connection to host.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	2	
				Total:	**2**	

SYMBOL LS2208

Our Best Selling Handheld Scanner
INCREASED PRODUCTIVITY, LOWER TCO

The LS2208 handheld scanner from Zebra offers high performance scanning at a moderate price point. From the retail point-of-sale to school book checkout, the LS2208 provides fast, reliable scanning in a durable, lightweight form factor, delivering enhanced productivity and efficiency while reducing your total cost of ownership (TCO).

HIGH PERFORMANCE SCANNING — FAST
With aggressive scanning capabilities and a wide working range, the LS2208 accurately captures data fast, helping employees work quickly and efficiently. And you'll be up and running fast, because the LS2208 is easy to deploy and use, thanks to its plug-and-play installation and intuitive, user-friendly design, which requires little or no training. Plus the ergonomic, balanced form factor reduces user fatigue to maximize user comfort.

DURABLE, FUTURE-PROOF CONSTRUCTION
The LS2208 is engineered for continuous, heavy usage all day, every day and has been tested to withstand multiple 5 ft./1.5m drops to concrete. The patented single board construction eliminates a common point of failure the interconnection between multiple boards – and the patented frictionless liquid polymer scan element delivers integral shock protection to further ensure reliable operation. Scratch-resistant tempered glass helps preserve bar code scanning accuracy. Integrated multiple interfaces, universal cable compatibility and support for emerging symbologies provide the investment protection you need to help ensure that the scanner you buy today will work with the system you use tomorrow.

PROVEN QUALITY YOU CAN TRUST
When you choose the LS2208, you receive the added assurance of purchasing a product from Zebra — the global leader in handheld bar code scanning with millions of scanners in use every day by the world's largest retailers worldwide. And since even the most reliable scanners require a support plan, Zebra's Service from the Start Advance Exchange Support provides next-business-day delivery of a replacement device for true service peace of mind. This offering also includes Zebra's unique Comprehensive Coverage, which extends normal wear and tear to cover accidental damage to exit windows, scan elements, housings and more at no extra charge.

FEATURES

Durable construction: single board construction; meets Zebra's stringent 5 ft. drop tests; scratch-resistant tempered glass exit window
Designed for continuous usage all day, every day; significantly reduces downtime and repair costs

High performance 1-D laser scanner
Accurate first time scanning; always ready for the next scan; increased productivity resulting in shorter check-out lines and better customer service

Wide working range: contact to 17 in./43 cm on 100% UPC/EAN symbols
Improves productivity

Multiple interfaces available
Simplifies installation and integration; future-proof solution helps ensure compatibility with your host/POS today and tomorrow

Plug-and-play; universal cable; intuitive scanning
Rapid deployment; single cable connects to any computing environment; practically eliminates setup and training time for faster return on investment

Ergonomic and lightweight design
Reduces user fatigue with sleek, balanced form for maximum user comfort and productivity

Hands-free Intellistand™
Enables presentation scanning and easy switching between hands-free and handheld modes

Advanced Data Formatting (ADF)
Enables users to modify data prior to sending to host computer, reducing costly modifications to the host software

RELIABLE SCANNING AND PROVEN QUALITY YOU CAN TRUST.

FOR MORE INFORMATION, VISIT WWW.ZEBRA.COM/LS2208 OR ACCESS OUR CONTACT DIRECTORY AT WWW.ZEBRA.COM/CONTACT

LS2208 Specifications

PHYSICAL CHARACTERISTICS

Dimensions	6 in. H x 2.5 in. W x 3.34 in. D 15.2 cm H x 6.3 cm W x 8.4 cm
Weight	5.29 oz/150 gm
Voltage and Current	5 volts +/- 10% at 130 mA typical, 175 mA max
Power Source	Host power or external power supply
Colour	Cash Register White or Twilight Black

PERFORMANCE CHARACTERISTICS

Scanner Type	Bi-directional
Light Source	650 nm visible laser diode
Scan Element Frequency	50Hz
Scan Rate	100 scans per second typical
Nominal Working Distance	See chart below.
Print Contrast	20% minimum reflective difference
Roll (Tilt): 1	1 +/- 30 degrees
Pitch: 2	2 +/- 65 degrees
Skew (Yaw): 3	3 +/- 60 degrees
Decode Capability	UPC/EAN, UPC/EAN with Supplementals, UPC/ EAN 128, Code 39, Code 39 Full ASCII, Code 39 TriOptic, Code 128, Code 128 Full ASCII, Codabar, Interleaved 2 of 5, Discrete 2 of 5, Code 93, MSI, Code 11, IATA, GS1 DataBar (formerly RSS) variants, Chinese 2 of 5
Interfaces Supported	USB, RS232, Keyboard Wedge, IBM 468x/9x

NOMINAL WORKING DISTANCE

	DEPTH OF FIELD
Label Density	**LS2208**
Paper Label	
Code 39 - 5 mil	**English:**2.50" - 6.00" **Metric:**6.00 - 15.25 cm
Code 39 - 7.5 mil	**English:**1.50" - 10.00" **Metric:**3.80 - 25.40 cm
Code 39 – 10 mil	**English:**1.00" - 14.25" **Metric:**2.54 - 14.25 cm
100% UPC – 13 mil	**English:**0 - 17.00" **Metric:**0 - 43.00 cm
Code 39 – 20 mil	**English:**0 - 23.00" **Metric:**0 - 58.50 cm
Code 39 – 40 mil	**English:**0 - 30.00" **Metric:**0 - 76.00 cm

USER ENVIRONMENT

Operating Temp.	32° to 122° F/0° to 50° C
Storage Temp.	-40° to 158° F/-40° to 70° C
Humidity	5% to 95% relative humidity, noncondensing
Drop Specifications	Unit functions normally after repeated 5 ft./1.5 m drops to concrete
Ambient Lighting	Tolerant to typical artificial indoor and Tolerance: natural outdoor (direct sunlight) lighting conditions. Fluorescent, Incandescent, Mercury Vapor, Sodium Vapor, LED4: 450 Ft Candles (4,844 Lux) Sunlight: 8000 Ft Candles (86,111 Lux)
Electrostatic Discharge	Conforms to 15 kV air discharge and 8 kV of contact discharge

REGULATORY

Electrical Safety	Certified to UL1950, CSA C22.2 No. 950, EN60950/IEC950
EMI/RFI	FCC Part 15 Class B, ICES-003 Class B, European Union EMC Directive, Australian SMA, Taiwan EMC, Japan VCCI/MITI/Dentori.
Laser Safety	CDRH Class II, IEC Class 2
Environmental	Compliant with RoHS directive 2002/95/EEC

ACCESSORIES

Hands-Free Intellistand™	20-61019-01R or 20-61019-02R

WARRANTY

The LS2208 is warranted against defects in workmanship and materials for a period of 5 years (60 months) from date of shipment, provided that the product remains unmodified and is operated under normal and proper conditions. See full warranty for details.

1 - Roll (Tilt): Controlled by rotating the wrist clockwise or counterclockwise 2 - Pitch: Controleed by dropping or raising the wrist 3 - Skew (Yaw): Controlled by rotating the wrist from left to right or vice versa 4 - LED lighting with high AC ripple content can impact scanning performance

Ideal For These Applications:

Industries

- Retail

ZEBRA

Corporate and International Headquarters | Zebra.com/contact

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Scanner, Document, Countertop
Manufacturer: Fujitsu ((408) 746-6000)
Vendor: Fujitsu ((408) 746-6000)
Model: fi-7030

Alt ID: SCN-CTP
Mfr #: PA03750-B005
Vendor #: PA03750-B005

Countertop document scanner with scan speed up to 27 ppm. 600 dpi and 50-page automatic document feeder. Monochrome and color scanning. Includes high-speed USB 2.0 connectivity, PaperStream IP (TWAIN/ISIS), and PaperStream Capture. Energy Star Qualified.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	11.50 in (292 mm)	**Left:**	N/A
Depth:	5.75 in (146 mm)	**Right:**	N/A
Height:	5.25 in (133 mm)	**Front:**	N/A
Max Weight:	7 lbs (3.2 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	17
Hz:	60	**Amps:**	0.1
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	2	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	2	
				Total:	**5**	

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fi-7030 At a glance

Functional Specifications			
Image sensor type		Color CIS (Contact Image Sensor) x 2 (front x 1, back x 1)	
Output resolution	Color (24-bit), Grayscale (8-bit), Monochrome (1-bit) [1]	50 to 600 dpi, 1200 dpi [2,3]	
Halftone Patterns		4 dither patterns and error diffusion	
Grayscale		8-bit/256 level	
Color		24-bit/16,777,216 single pass color	
Performance			
Scanning speeds	200 or 300 dpi, Letter, Color, Grayscale and Monochrome [4]	Simplex 27 ppm [5,6]	Duplex 54 ipm [5,6]
Scanning modes		Simplex and Duplex	
Document feeding method		Automatic Document Feeder (ADF)	
ADF capacity [7]		50 Sheets (A4: 20 lb. or 80 g/m^2)	
Document Size	ADF minimum	2 in. x 2 in. (51 mm x 51 mm)	
	ADF maximum	Legal Portrait (8.5 in. x 14 in. or 216 mm x 356 mm)	
	Long page scanning	8.5 x 220 in. (216 x 5,588 mm)	
Interface		USB 2.0 (1.1 compatible)	
JPEG compression		Hardware real-time JPEG compression available	
Physical Specifications			
Power Requirements (auto-switching)		100 to 240 VAC, 50/60 Hz	
Power Consumption		17 W or less	
Operating Environment	Temperature	42° F to 95° F (5° C to 35° C)	
	Relative Humidity	20 % to 80 % (non-condensing)	
Dimensions (W x D x H)		290 x 146 x 130 mm (11.41 x 5.74 x 5.11 in.)	
Weight		2.9 kg (6.4 lb)	
Inbox Contents		AC cable & adapter, USB cable, Setup DVD-ROM	
Bundled Software (DVD format)		PaperStream IP (TWAIN/ISIS) Driver, 1D Barcode for PaperStream (Download), Software Operation Panel, Error Recovery Guide, PaperStream Capture, Scanner Central Admin Agent	
Enviromental designations [9]		ENERGY STAR 2.0®, RoHS, EPEAT Silver	
Options		Carrier Sheet	
OS Support		Windows® 10 (32-bit/64-bit), Windows® 8.1/8 (32-bit/64-bit), Windows® 7 (32-bit/64-bit), Windows Vista® (32-bit/64-bit), Windows Server® 2012 R2 (64-bit), Windows Server® 2012 (64-bit), Windows Server® 2008 R2 (64-bit), Windows Server® 2008 (32-bit/64-bit)	
Features		Ultrasonic Intelligent MultiFeed Function Double Feed Detection and Long Document Scanning [10]	

Fast and compact, the fi-7030 is capable of scanning a wide range of paper and features our great PaperStream drivers and software to make your workload easier to manage.

Meet the full-featured entry-level professional scanner from Fujitsu

- Starts up in 1 second from sleep mode
- Powers through your documents at up to 54 images per minute
- Capable of scanning sticky notes, taped receipts, and labels without misfeeding
- Supports documents up to 220" long

Intelligent image processing with PaperStream IP

PaperStream IP (PSIP) is a TWAIN/ISIS®-compliant driver that cleans up and optimizes scanned images without any advance settings. PSIP features:

- **Auto Color Detection** to automatically identify the best color mode for the document
- **Auto Deskew** to automatically corrects skewed images
- **Blank Page Detection** to automatically remove blank pages
- **Front and Back Merge** to place two sides of a page into one convenient image
- **Automatic hole punch removal**

PaperStream Capture makes scanning fast and easy

Eliminate the learning curve. PaperStream Capture's user-friendly interface allows easy operation from start to finish. Changing scan settings is simple. Indexing and sorting features include barcode, patch code, and blank page separation – making batch scanning a breeze for operators.

Centralized fleet management

Includes Scanner Central Admin to remotely manage your entire fi Series fleet.
Effectively allocate your resources based on scan volume, consumables wear, and more.

Make it even better with PaperStream Capture Pro

Optional **PaperStream Capture Pro** software offers superior front-end capture, image processing, and options for enhanced data extraction and indexing for release.

1 Maximum output resolutions may vary, depending upon the size of the area being scanned and whether the scanner is scanning in simplex or duplex **2** Software interpolated **3** Scanning limitations brought about by scanning mode, document size and available memory may occur when scanning at high resolutions (600 dpi or higher) **4** Intel® Core™ i5 desktop processor 2.5 GHz or higher, 4 GB RAM is recommended **5** Actual scanning speeds are affected by data transmission and software processing times **6** JPEG compressed figures **7** Maximum capacity varies,depending upon paper thickness **8** Excluding the ADF hopper **9** PFU Limited, a Fujitsu company, has determined that this product meets RoHS requirements (2005/95/EC) **10** Capable of scanning documents that exceed A4 sheets in length. However, the scanning of documents longer than 34" requires lower resolution (200 DPI or less)

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Disposal, Sharps, Wall Mount

Manufacturer: Stericycle (866-783-7422)

Vendor: Stericycle (866-783-7422)

Model: Bio Systems C-04RES-04 w/Locking Bracket

Alt ID: SHP-WMT

Mfr #: C-04RES-04/WB-04

Vendor #: C-04RES-04/WB-04

Wall mounted sharps disposal. 4 gallon, red, and vertical drop lid. Configured with WB-04 locking wire wall bracket (red) and key. Provided at no charge with monthly service contract.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	13.75 in (349 mm)	**Left:**	N/A
Depth:	7.75 in (197 mm)	**Right:**	N/A
Height:	21.25 in (540 mm)	**Front:**	N/A
Max Weight:	13 lbs (5.9 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Max weight reflects container full.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**30**	

Container Options

2 , 3 & 4 Gallon Containers

Code # C-02RES-0203, C-03RES-0203, C-04RES-04

Our **2, 3 & 4 gallon containers** are appropriate for patient rooms and medication areas where security and convenience are critical. The fill line and contents are readily visible through the container's large window.

8 Gallon Container

Code # C-08-2004LR

For increased capacity, the **8 gallon container** is utilized in intensive care, pharmacies, labs and the ER.

17 Gallon Container

Code # C-17

The **17 gallon container** is appropriate for the OR, ER and labs where a higher volume of sharps waste is generated.

Product Codes

Product Code	Description	Approximate Dimensions (Height x Depth x Width)
C-02RES-0203	2 gallon container (red) with vertical drop lid	15.1" x 4.73" x 12.5"
C-02RES-0203-OC	2 gallon container (red), vertical drop lid, outer cabinet (beige) and key	15.5" x 5.59" x 14.5"
OC-02-2004	2 gallon outer cabinet only (beige)	13.25" x 5.59" x 14.5"
C-03RES-0203	3 gallon container (red) with vertical drop lid	21.1" x 4.73" x 12.5"
C-03RES-0203-OC	3 gallon container (red), vertical drop lid, outer cabinet (beige) and key	21.5" x 5.59" x 14.5"
OC-03-2004	3 gallon outer cabinet only (beige)	19.25" x 5.59" x 14.5"
0203LIDX	2 & 3 gallon vertical drop lid	4.75 x 4.73" x 12.5"
0203WMA	2 & 3 gallon locking wall mount (beige) and key	2.75" x 5.75" x 13"
0203SB	2 & 3 gallon countertop stability base (beige)	4.25" x 7.01" x 11.99"
0203LIDX	4 gallon vertical drop lid	4.78" x 6.85" x 12.25"
04HORZ-2007	4 gallon horizontal drop lid	4.78" x 6.85" x 12.25"
C-04RES-04	4 gallon container (red) with vertical drop lid	21.25" x 6.75" x 11.75"
C-04RES-04HORZ	4 gallon container (red) with horizontal drop lid	21.25" x 6.75" x 11.75"
C-04RES-04-OC	4 gallon container (red), vertical drop lid, outer cabinet (beige) and key	21.81" x 7.47" x 14.5"
C-04RES-04HORZ-OC	4 gallon container (red), horizontal drop lid, outer cabinet (beige) and key	21.81" x 7.47" x 14.5"
OC-04-2004	4 gallon outer cabinet only (beige)	19.25" x 7.47" x 14.5"
WB-04	4 gallon locking wire wall bracket (red) and key	7.12" x 7.75" x 13.62"
C-08-2004LR	8 gallon container only (red)	19.7" x 12.95" x 11.25"
08FT-2004	8 gallon funnel top lid	1.25" x 11.25" x 11.25"
08TT-2004	8 gallon trap top lid	1" x 11.25" x 11.25"
WB-08	8 gallon wire wall bracket (red)	21.5" x 13.25" x 14"
D-08	8 gallon wire dolly (red)	23" x 13" x 13.5"
DWS-08	8 gallon wire step-on dolly (red)	23" x 16.5" x 14.25"
C-17	17 gallon container only (red)	24.75" x 17.5" x 13.25"
L-17	17 gallon transport lid (black)	17.25" x 12.62"
L2-17	17 gallon 2 part slide top lid (black)	17.25" x 12.62"
LH-17	17 gallon hamper top lid (black)	17.25" x 12.62"
DWS-17	17 gallon wire step-on dolly (red) for 2 part slide top lid	29.75" x 22.5" x 14.5"
DWSH-17	17 gallon wire step-on dolly (red) for hamper top lid	29.75" x 22.5" x 14.5"
D-17	17 gallon black dolly (black)	9.75" x 19" x 14.25"

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(Rev. 10/07)

STC_BIOPRBRO_1007

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Speaker, Ceiling Mount - MUSIC**
Manufacturer: Black Diamond Video ((877) 549-6600)
Vendor: Black Diamond Video ((877) 549-6600)
Model: BDV-CM-SPK (Electro-Voice EVID C8.2LP)

Alt ID: SPK-CLG
Mfr #: BDV-CM-SPK
Vendor #: BDV-CM-SPK

Ceiling Mounted Speaker: Freq. Response (-10 dB): 50 Hz - 20 kHz, Coverage (Conical): 110°, Power Handling: 100 W Cont. / 400 W Peak,

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	10.75 in (273 mm)	**Left:**	N/A
Depth:	10.75 in (273 mm)	**Right:**	N/A
Height:	7.00 in (178 mm)	**Front:**	N/A
Max Weight:	11 lbs (5.0 kg)	**Back:**	N/A
Mounting:	Ceiling	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Cut Out Size: 10.8"

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329	Waiting Rm	Project	Draft (New)	4	
ED/1st Flr	C466	Waiting Rm/Public	Project	Draft (New)	6	
				Total:	**10**	

BDV# BDV-CM-SPK

EVID™

EV Innovative Design

EVID C8.2LP Ceiling

8” Two-Way Coaxial Ceiling Loudspeaker System

Step Up To Electro-Voice®

Key Features:

- **Low Profile 8" coaxial two-way**
- **Waveguide coupled Ti Tweeter**
- **Full bandwidth overload protection**
- **Front baffle wattage tap adjustment**
- **Integrated low loss matching transformer allows for either 70v/100v or 8-ohm operation**
- **Includes tile bridge and mounting ring for easy installation**
- **Integrated ported enclosure for extended bass response**
- **Ideal for ceiling spaces with tight clearance**

General Description:

The Electro-Voice ® EVID C8.2LP loudspeaker system is a complete two-way ceiling loudspeaker in a low profile package. The package consists of a bezel assembly, grille, rear enclosure, 8-inch coax two-way loudspeaker and internal line-matching transformer. The loudspeaker features a waveguide coupled titanium coated dome tweeter. The EVID C8.2LP loudspeaker utilizes a 2nd order crossover network at 2.5 kHz, with a comprehensive protection circuit to protect the network, woofer, and tweeter drivers from excessive power levels. The C8.2LP utilizes a transformer that offers a selection of 1.88 (70-V only), 3.75, 7.5, 15 or 30 watts delivered to the loudspeaker system using either 70-V or 100-V lines, or 8 ohm bypass. Selection is via a convenient switch on the front baffle. The perforated grille is finished in semi-gloss white powder-coated enamel. The baffle and bezel are constructed from UL 94V-0 rated ABS. The rear enclosure is constructed from zinc-plated, heavy gauge steel. The low profile enclosure makes it easy to mount in tight spaces. A rear cover, with provisions for a junction box fitting, provides access to a 4-pin terminal block that allows direct connection to the speaker with 12 gauge wire and provides pass through to additional speakers. A tile bridge is included for safe suspension of the C8.2LP ceiling systems in a drop ceiling that uses mineral wool, or other fiber-based ceiling tiles. The EVID line of ceiling speakers has been designed to work together as a complete system in a wide range of different ceiling constructions. They provide wide dispersion, high-efficiency, high-maximum output, ease of installation, and wide-range reproduction of music or voice.

Technical Specifications:

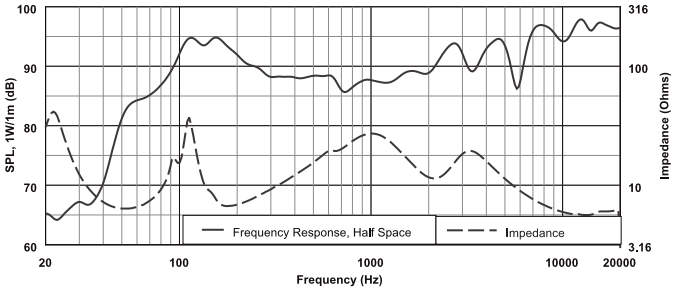
Freq. Response (-10 dB):	50 Hz - 20 kHz
Coverage (Conical):	110°
Power Handling:	100 W Cont. / 400 W Peak
Sensitivity (SPL 1W/1m):	91 dB
Max Calculated SPL:	117 dB
Impedance:	8 Ohms nominal (transformer bypass)
Network:	Network and transducers protected, 12 dB/oct 2.6 kHz
LF Transducer:	8 in. (200 mm) Polypropylene cone
HF Transducer:	1 in (25 mm) Ti Mylar laminate
Transformer Taps:	70V: 1.88, 3.75, 7.5, 15 or 30W 100V: 3.75, 7.5, 15 or 30W Bypass: 8 Ohms
Connectors:	Phoenix type removable, with screw terminals and "loop-thru", accepts 12 ga wire
Enclosure Material:	Baffle- UL 94V-O rated ABS Backcan-Zinc plated steel
Grille:	Perforated powder coated steel with safety tether
Support Hardware:	Tile bridge, backing plate support, cutout template, paint shield
Dim (H x Dia.):	7.0" x 10.6" (178mm x 270mm)
Cutout Size:	10.8" (274mm)
Net Weight (each):	11.0 lbs (5.0 kg)
Shipping Weight (pair):	24.0 lbs (11.0 kg)

All Specifications based on Half Space Environment in ceiling.

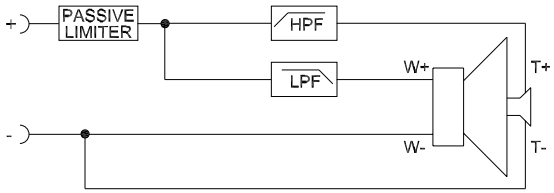
Architects' & Engineers' Specifications:

The EVID C8.2LP loudspeaker system shall be comprised of a UL 94V-0 fire rated ABS baffle/bezel assembly, zinc plated steel rear enclosure, powder coated grille with safety tether, transformer with 8 ohm bypass, and 8-inch polypropylene low frequency transducer with coaxially-mounted waveguide coupled 1 inch titanium coated dome tweeter. The loudspeaker shall meet the following criteria: power rating shall be 100 watts of EIA RS-426A pink noise (6 dB crest factor). Frequency response, uniform from 50 Hz to 20 kHz. Pressure sensitivity, 91dB SPL at 1 meter (3.3 feet) on axis with one watt of pink noise (ref. 20µPa). Minimum impedance, 6.0 ohms. The loudspeaker shall be 178 mm (7.0 in.) deep and 270 mm (10.6 in.) in diameter. Weight shall be 5.0 kg. (11.0 lb) The coaxial ceiling loudspeaker shall be the Electro-Voice ® model EVID C8.2LP.

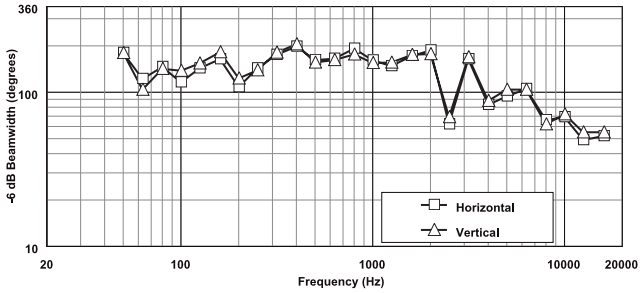
Frequency Response:



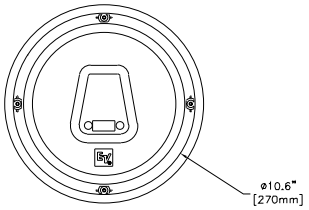
Block Diagram:

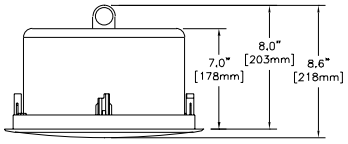


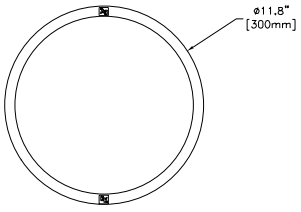
Beamwidth:



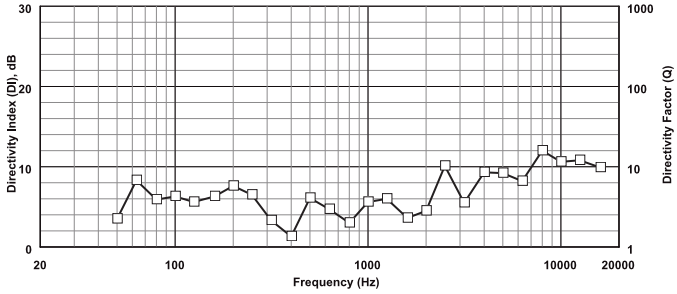
Dimension Drawings:







Directivity:



Performance Match:

- EVID C10.1 Subwoofer
- CPS-1 Power Amplifier
- CPS-2 Power Amplifier
- CPS-2T Power Amplifier
- MA-1206 Mixer Amplifier
- MA-1212 Mixer Amplifier

EVID C8.2 Part Number

- 301318-000

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Specifications subject to change without notice.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Stand, IV, Chrome
Manufacturer: Steelcraft, Inc. ((800) 225-7710)
Vendor: Steelcraft, Inc. ((800) 225-7710)
Model: 1099 (5-leg, 4 hook)

Alt ID: STD-IV4
Mfr #: 1099
Vendor #: 1099

Chrome IV stand. 22” diameter 5-leg cast base, 4 hook ram horn solution holder, height range 70"-110", 3” roller blade casters.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	22.00 in (559 mm)	**Left:**	N/A
Depth:	22.00 in (559 mm)	**Right:**	N/A
Height:	110.00 in (2794 mm)	**Front:**	N/A
Max Weight:	34 lbs (15.4 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height reflects pole fully extended, minimum height 70".

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	10	
				Total:	**10**	

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#2006

The #2006 is the classic single pump IV stand. All steel double chrome plate construction ensures long term reliability in the hospital environment.

- 23" diameter, all steel five-point base with Nickel Chrome Plate Finish
- 3" premium roller blade casters
- Double chrome plated 1" to 7/8" telescoping upright with posi-lock coupling to eliminate slippage.
- Four hook ram's horn type solution holder
- Height Range 68" to 108"
- Weight: 20 lbs
- Base and pole shipped in separate boxes

#1099

The #1099 is a small foot print Heavy Duty IV stand designed to support multiple pumps.

- 22" diameter, low center of gravity castbase
- 3" premium roller blade casters
- Double chrome plated 1.25" to 1" telescoping upright with posi-lock coupling to eliminate slippage
- Four hook ram's horn type solution holder
- Height Range 70" to 110"
- Weight: 34 lbs
- Base and pole shipped in separate boxes

#3099

The #3099 is a low center of gravity Heavy Duty IV stand appropriate for Multiple pumps on its twin uprights.

- 22" diameter, low center of gravity cast base
- 3" premium roller blade casters
- Dual double chrome plated 1.25" to 1" telescoping upright with posi-lock coupling to eliminate slippage.
- Dual four hook ram's horn type solution holders
- Height Range 85" to 110"
- Weight: 40 lbs - Base and pole shipped in separate boxes

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Stool, Exam, Cusion-Seat w/ Glides **Alt ID:** STL-CSN

Manufacturer: Midmark Corporation - Medical ((800) 643-6275) **Mfr #:** 274-001

Vendor: Midmark Corporation - Medical ((800) 643-6275) **Vendor #:** 274-001

Model: Ritter 274 Classic Series

Cushion seat exam stool with spindle height adjustment from 18 to 24.5 inches. Five-leg, chrome caster base. Weight capacity 225 lbs. **Item ID:**

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	21.50 in (546 mm)	**Left:**	N/A
Depth:	21.50 in (546 mm)	**Right:**	N/A
Height:	24.50 in (622 mm)	**Front:**	N/A
Max Weight:	15 lbs (6.8 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Stools & Cha

Designed and manufactured to exceed your expectations

It begins with a wide, five-leg caster base that provides support and stability. The star-shaped base allows closer accessibility to the patient while heavy duty, dual-wheel, hooded casters enable stools to maneuver quietly over all types of surfaces.

Adding to the strength and stability of our stools is the solid steel machine screw on manual models, or air cylinder on pneumatic models. The air cylinder further acts as a built-in shock absorber, taking the abuse of a hard day's work instead of you, and presents a simple and efficient method for adjusting the seat height (ideal for multi-physician practices).

Comfort is provided in the form of a wide, amply padded seat section constructed of dense foam. A beadless upholstery seam eliminates the seat edge from digging into your legs. Add a backrest to promote better posture and support to leave you feeling less fatigued at day's end.

With many choices, colors and accessories, there is certain to be a stool just right for you.

276 Air Lift Stool

Our best selling stool! The 276 has become the industry standard in healthcare facilities.

Classic Series Stools

The healthcare industry's most demanded stools and the foundation of our seating product line. The Classic Series features a polished aluminum/black accented five-leg caster base and hood and a hand ring or foot lever height control on pneumatic models. The seat height of the 274 (without back) and 275 (with back) adjusts manually while the 276 (without back) and 277 (with back) adjusts pneumatically. The 278 (foot lever) and 279 (hand ring) offer pneumatic height adjustment and a surgical armrest to stabilize the surgeon's arm during delicate procedures.

S P E C I F I C A T I O N S

Classic Series Stools

Seat Height:
18" – 24.5" (274-278)
19" – 25.5" (279)

Seat Diameter: 16.25"

Seat Cushion Thickness: 3.25"

Back Cushion Dimensions:
14" W x 7.5" H (275, 277)

Caster Base Diameter: 21.5"

Weight Capacity:
350 lb (274, 276)
225 lb (275, 277, 278, 279)

Value Series Stools

Seat Height:
18" – 24.5" (270-273)

Seat Diameter: 16.25"

Seat Cushion Thickness: 3.25"

Back Cushion Dimensions:
14" W x 7.5" H (271, 273)

Caster Base Diameter: 23"

Weight Capacity:
300 lb (270, 272)
225 lb (271, 273)

Classic and Value Series Options

Locking casters

Soft rubber casters

Glides

6" Lab height extension

Foot ring

425/427 Air Lift Physician Stools

Seat Height:
17.5" – 24" (425)
17" – 23" (427)

Seat Cushion Dimensions:
16.5" W x 17" D

Seat Cushion Thickness: 3"

Back Cushion Dimensions:
13" W x 9.5" H
(with back kit accessory)

Caster Base Diameter: 23"

Weight Capacity: 225 lb

281 Blood Drawing Chair

Seat Height: 20"

Seat Cushion Dimensions:
20" W x 16.5" D

Seat Cushion Thickness: 2"

Back Cushion Dimensions:
20" W x 16.5" H

Inside Arm Width: 21"

Outside Arm Width: 32"

Storage Drawer Capacity:
8.5" W x 15.25" D x 4.5" H

Weight Capacity: 400 lb

680 Side Chair

Seat Height: 17"

Seat Cushion Dimensions:
18" W x 19.5" D

Seat Cushion Thickness: 2"

Back Cushion Dimensions:
18" W x 13.5" H

Inside Arm Width: 17.5"
(on model with arms)

Outside Arm Width: 23.5"
(on model with arms)

Weight Capacity: 400 lb

Classic and Value Series Backrest

Classic Series Glides

Value Series Glides

Classic and Value Series Locking Casters

Classic Series Soft Rubber Casters

Value Series Soft Rubber Casters

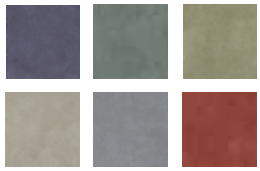
Classic Series 277 shown with optional 6" lab height extension and foot ring.

Ritter®
by MIDMARK

Upholstery Colors:

Ritter: Navy, Dusty Blue, Moss, Clay, Pebble Grey, Shadow, Perfect Plum and Black

Midmark Premium Solid: Blueberry, Silver Sage, Tea Green, Fossil Grey, Cashmere Blue, Terra Cotta and Black



Midmark Premium Pattern: Belagio, Siena, Tuscany, Firenze, Capri and Treviso

Midmark Ultra-Premium: Ultra-Pacific Blue, Ultra-Spruce, Ultra-Olivine, Ultra-Arctic, Ultra-Sky, Ultra-Canyon and Ultra-Raven Wing

**There will be an additional charge for Midmark Ultra-Premium.*

Midmark is an ISO 13485 and ISO 9001 Certified Company.

For more information
or a demonstration, contact
your Midmark Dealer, or contact
Midmark Corporation,
Versailles, Ohio.
Call: 1-800-MIDMARK
Fax: 1-800-365-8631
midmark.com

Litho in U.S.A. 007-0558-00 Rev. E1 (8/16)

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Stool, Step, w/Handrail**
Manufacturer: Blickman Industries ((800) 247-5070)
Vendor: Blickman Industries ((800) 247-5070)
Model: 1251 Chrome

Alt ID: STL-SHR
Mfr #: 1011251000
Vendor #: 1011251000

Step stool with handrail. Welded steel construction w/ triple chrome plating, non-slip black rubber mat, rubber tipped legs and stool surface is 11-3/8in D x 14-1/4in W x 9in H.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	15.25 in (387 mm)	**Left:**	N/A
Depth:	11.38 in (289 mm)	**Right:**	N/A
Height:	35.75 in (908 mm)	**Front:**	N/A
Max Weight:	11 lbs (5.0 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C019	Clean Supply	Project	Draft (New)	1	
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	2	
				Total:	**3**	

Exam Room

Foot Stools

9" HIGH FOOT STOOLS

Description: Our 9" high foot stools come in either chrome or stainless steel and consist of one step 9" off the ground with non-slip rubber treads and feet tips. A 35 3/4" tall handrail for additional support is available for the chrome stool.

All 9" stools have the same dimensions:
Width: 14 1/4" x Height: 9" x Depth: 11 3/8"

Stainless Steel Stool

Name	Model #	Item #	Ship Weight
Stainless Steel Stool	1260SS	1011260000	8 lbs.

Chrome Stool
with Handrail

Parts Also Sold Separately

#1250 - Stool

#651 - Handrail

Name	Model #	Item #	Ship Weight
Chrome Stool with HR	1251	1011251000	11 lbs.*
ORDER SEPARATELY			
Chrome Stool	1250	1021251640	7 lbs.
Handrail (35 3/4" tall)	651	7900651000	4 lbs.

*Shipping weight with an asterisk is the combined shipping weight of separate parts

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Stretcher, Bariatric w/ Scale**

Manufacturer: Pedigo Products, Inc ((800) 822-3501)

Vendor: Pedigo Products, Inc ((800) 822-3501)

Model: 7500 Wide Trauma / Transport Special Package

Alt ID: STR-BRI

Mfr #: 7500-W-SPEC

Vendor #: 7500-W-SPEC

Item ID:

Trauma/transport stretcher with 31-inches wide patient surface and 750 lb. weight capacity. Special package includes 4-inch premium mattress (#5851002), IV pole (#2101) and extended 2-year warranty. Features 6th wheel steering, dual release stainless steel glide & tuck hand rails, integrated push/pull handles, center column design, quick-release O2 tank holder, positive/negative trendelenburg, pneumatic assist fowler, dual side-mounted hydraulic foot pedals, four corner IV pole receptacles, four restraint strap positions, full PVC perimeter bumper, 8-inch casters. Available with made of CuVerro antimicrobial copper alloy side rails. Please see stretcher accessories page for available accessory and upgrade options.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	Yes
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	33.50 in (851 mm)	**Left:**	N/A
Depth:	83.00 in (2108 mm)	**Right:**	N/A
Height:	46.75 in (1187 mm)	**Front:**	N/A
Max Weight:	485 lbs (220.0 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height includes side rails.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**1**	

PEDIGO
transport/trauma stretcher

stretcher series
7500
STANDARD FEATURES

STANDARD FEATURES

- 750 lbs. weight capacity
- **IS6™** Instant Steer 6 Wheel Steering
- Side Rails - dual release stainless steel glide & tuck
- Integrated push/pull handles
- Center column design with precision ball bearings
- Quick-Release O_2 Tank Holder (US Patent 7,865,984 B2)
- Dual Trendelenburg assist cylinders (positive/negative - pneumatic)
- Mechanical Level Lock
- Pneumatic assist fowler 600N (135#) force
- Dual side-mounted hydraulic foot pedals
- Brake & Steer activated foot pedals
- Four corner IV pole receptacles
- Four restraint strap positions
- High impact corner bumper
- 8" easy mobility casters
- Latex-free

SPECIFICATIONS

Model Number	7500N	7500W
Weight Capacity	750 lbs. (340 kg)	750 lbs. (340 kg)
Overall Length	83" (211 cm)	83" (211 cm)
Overall Width	29.5" (75 cm)	33.5" (85 cm)
Height Range		
Low	23" (58 cm)	23" (58 cm)
High	32.75˝(83 cm)	32.75˝(83 cm)
Litter Positioning		
Fowler Backrest	0°-90°	0°-90°
Trendelenburg	+12°	+12°
Reverse Trendelenburg	-7°	-7°
Patient Surface	77" x 27" (196 x 69 cm)	77" x 31" (196 x 77 cm)
Side Rails	14" x 76" (36 x 193 cm)	14" x 76" (36 x 193 cm)
Casters	8" (20 cm)	8" (20 cm)
Warranty *	1 year parts and labor	1 year parts and labor

** 7500 Special Package Warranty (7500-SPEC): 2 year parts and labor.*

OPTIONS

Accessory	N	W
X-Ray Board		
Full	750203	750204
Partial	750205	750206
Mattresses:		
3" Standard (black)	5828002	5831002
3" Premium (blue)	5850002	5852002
4" Standard (black)	5829002	5832002
4" Premium (blue)	5851002	5853002
4" Pressure Relief	5833002	5834002
5" Premium (blue)†	5855002	5856002
† *Special order only.*		
Restraint Straps Options:		
Velcro (pair)	5903001	*same*
Buckle (pair)	5904001	*same*
Side Rail Options:		
CuVerro® Rails	750302	*same*
Rail Pad (pair)	5716001	*same*

Accessory	N	W
IV Pole Options:		
Fixed Height	2101	*same*
Adjustable/Removable	5984001	*same*
Adjustable Attached	750501	750502
Fold Down	59175001	*same*
IV Pole Caddy	59163001	*same*
Push/Pull Bar Options:		
Push/Pull Handles *(CuVerro®)*	750223	750224
Push/Pull Bar *(Removable)*	5985001	5986001
Bar Pad	5704001	5705001
Chart Holder	5967001	*same*
Monitor Tray Board	59115001	59116001
(includes chart holder 5967001)		
Knee Flex		
Hand Crank	750201	750202
Hydraulic	750208	750209


Leg Lift Knee Flex Trauma

Accessory	N	W
Pedal Configuration Options:		
Hydraulic Release Pedal	750106	*same*
Foot-End **iS6™** Pedal	750107	*same*
Foot-End **iS6™** Pedal & Hydraulic Release Pedal	750108	*same*
Additional Options:		
Storage Bag Hook	750215	*same*
Paper Roll Holder	5966001	5966003
O_2 Tank Holder (Vertical)	5981001	*same*
400N (90#) pneumatic assist fowler	750602	*same*
Head/Foot Extension	5996001	*same*
Head/Foot 3" Pad	5708001	*same*
Stirrups Set 59100001		*same*

800.822.3501 • FAX 360.696.1700 • www.pedigo-usa.com
Proudly Made in the USA
4000 SE Columbia Way • Vancouver, Washington 98661
04/19 MM-83

PEDIGO

stretcher series
7500
transport / trauma stretcher

iS6™ six wheel steering

THE GUARDIAN TRANSPORT STRETCHER

stretcher series

7500

trauma / transport stretcher

Pedigo's 7500 Series Stretcher allows for the transfer of patients easily and comfortably with a load capacity up to 750 pounds. Superior stability, mobility, and braking capabilities make the 7500 versatile for all your department needs such as OR, ED, PACU, Patient Transportation, Radiology or Cath Lab.

1

RAIL SYSTEM:

Full length stainless steel side rails feature integrated push-pull handles with latch releases located at all four corners of the stretcher. Easy one-handed operation. No hinges, mechanical connections or plastic couplings to trap debris or fluid. Easy to wipe clean and disinfect.

2

O_2 TANK HOLDER:

Pedigo's ergonomic Quick-Release O_2 Tank Holder is side-mounted and conveniently located under the patient surface to reduce caregiver bending. (US Patent 7,865,984 B2)

3

SIX WHEEL STEERING:

The two Instant Steer wheels are centered directly under the chassis for increased control and maneuverability. Dual ball bearing wheels feature a softer wheel tread for improved grip and traction.

4

CENTER COLUMN SUPPORT:

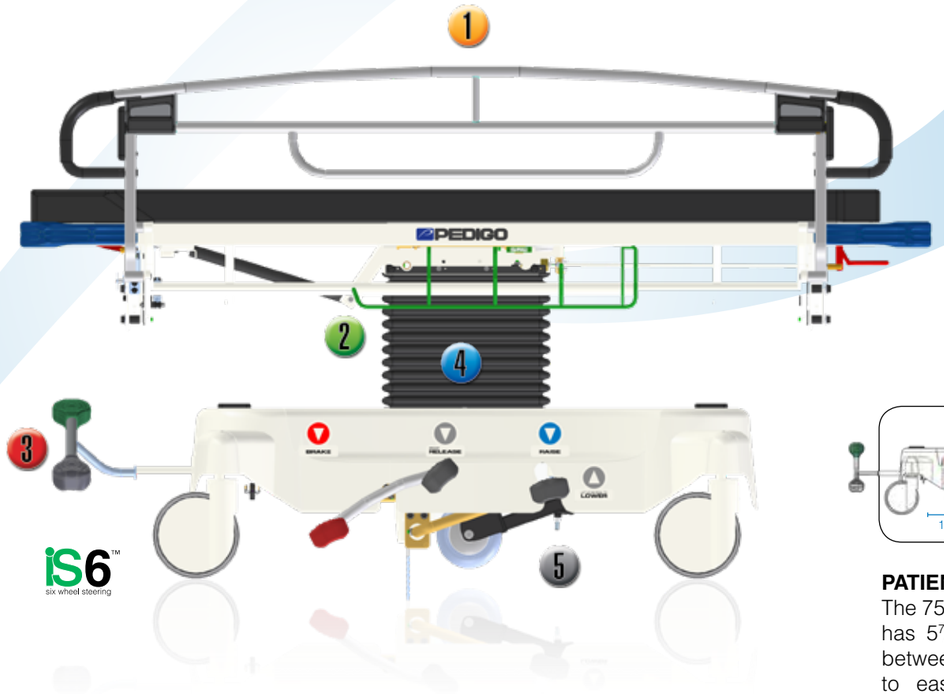
Sturdy steel column with single hydraulic lift cylinder design uses sixteen precision ball-bearings to smoothly raise and lower the patient.

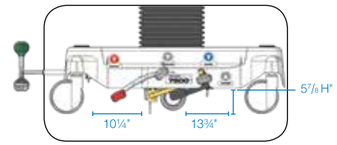
5

HYDRAULIC PEDALS:

Hydraulic foot pedals are located on each side of the stretcher within the patient care zone. Color-coded pedals and function graphics are quickly and easily understood.

PEDIGO®





PATIENT LIFTS:

The 7500 Series Stretcher has 5⅞"H of clearance between floor and cowling to easily accommodate and utilize patient lifts.

CUVERRO®

BACTERICIDAL COPPER SURFACES

Now as an added protection in the ongoing battle with bacteria, Pedigo offers the option of side rails made from CuVerro® **bactericidal copper alloy**.

Copper is an intrinsic antimicrobial element and CuVerro® is the ***ONLY*** solid touch surface metal registered by the EPA to continuously kill bacteria[1] that cause infections and pose a risk to human health. Lab tests show more than 99.9% of bacteria[1] associated with disease and infection, including MRSA[1], are killed within two hours when in contact with copper. Bacteria will continue to be killed 24 hours a day, week after week, between regular cleanings.

[1] CuVerro® alloys have proven effectiveness on MRSA (Methicillin-Resistant Staphylococcus aureus), Staphylococcus aureus, Enterobacter aerogenes, Pseudomonas aeruginosa, and Escherichia coli 0157:H7 and VRE (Vancomycin-Resistant Enterococcus). CuVerro is a registered trademark of GBC Metals LLC, d/b/a Olin Brass.

THE GUARDIAN

TRAUMA / TRANSPORT STRETCHER

with CuVerro® Side Rails

7500 Series GUARDIAN Package
includes:

- CuVerro® Side Rails
- 7500 Transport Stretcher
- Quick-Release™ O_2 Tank Holder
- 4" Blue Premium Mattress
- **iS6** Instant Steer 6th Wheel Steering
- Fold Down IV pole
- IV Caddy

*Because stretcher side rails should **protect**,*
not infect.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Stretcher, Procedure, OB/GYN**
Manufacturer: Hillrom - Bed & Stretcher Group (800-445-3730)
Vendor: Hillrom - Bed & Stretcher Group (800-445-3730)
Model: OB-GYN P8050

Alt ID: STR-GYN
Mfr #: P8050
Vendor #: P8050

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	Yes
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	36.00 in (914 mm)	**Left:**	N/A
Depth:	83.00 in (2108 mm)	**Right:**	N/A
Height:	37.00 in (940 mm)	**Front:**	N/A
Max Weight:	350 lbs (158.8 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height reflects floor to top of sleep deck

Structural:

Electrical:

Plumbing:

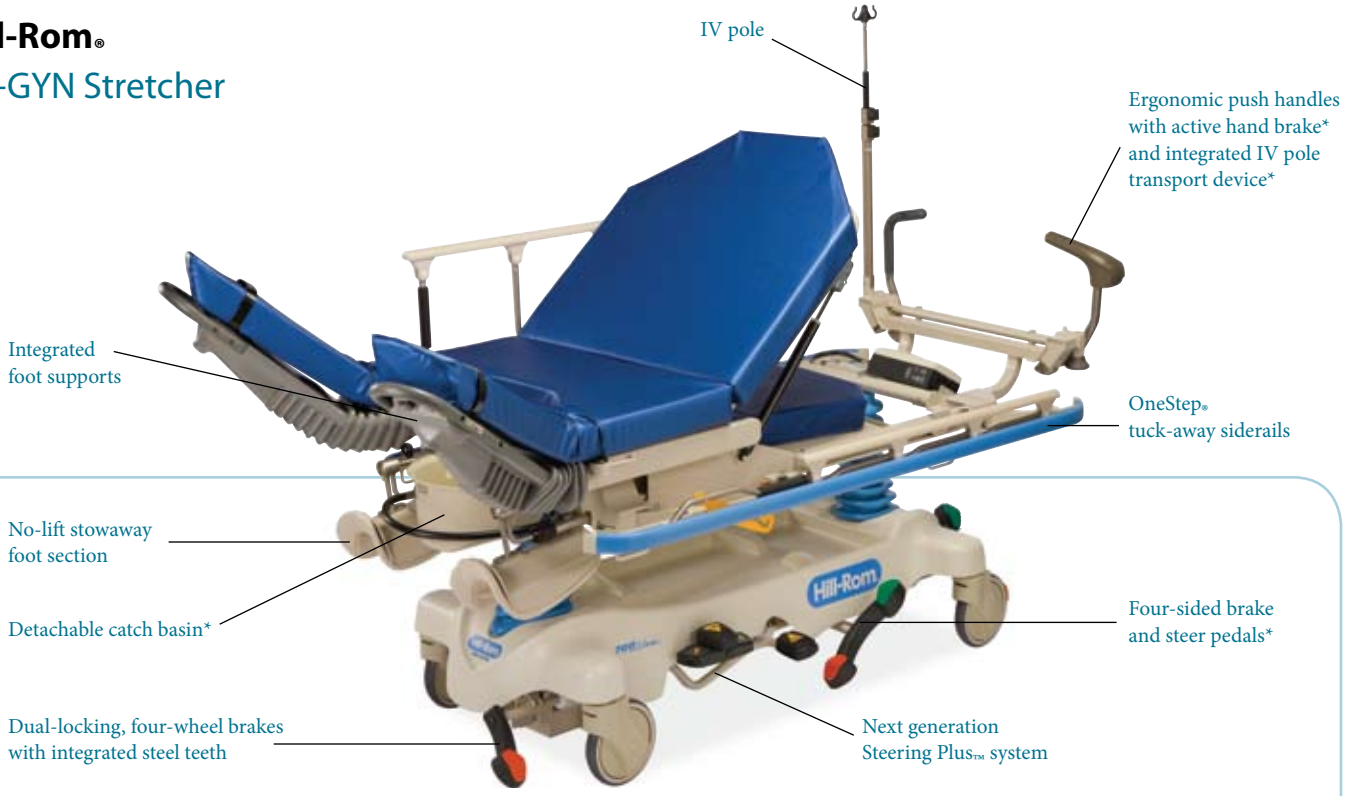
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Hill-Rom®

OB-GYN Stretcher



At a glance

Hill-Rom stretcher key features:

- **700 lb weight capacity**
- **Sliding litter** enables quick and easy patient positioning
- **Stowaway foot section** eliminates heavy lifting and storage concerns
- **Integrated foot supports** save time by eliminating the need to search for stirrups and calf supports
- **Integrated catch basin***, combined with patient grip handles, offers convenience and saves time
- **Next generation Steering Plus™** system for crisp cornering and control
- **Dual-locking four-wheel brakes** for a strong, stable platform
- **Power washable**
- **Three year parts warranty** and lifetime frame weld warranty

* Optional feature

Hill-Rom® OB-GYN Stretcher

With its fast and easy patient positioning, Hill-Rom's OB-GYN stretcher (P8050) is ideal for use in both maternity and emergency. Built to last year after year, this stretcher offers outstanding mobility, convenience and quality.

Mobility. Why struggle to steer and stop? An optional active hand brake reduces strain of going down ramps and sudden stops. Our integrated IV pole transport device helps you to maneuver stretcher and IV pole stands with ease. The next generation Steering Plus™ system allows crisp cornering and control.

Convenience. Save time with this stretcher's integrated foot supports, sliding litter and optional catch basin. Reduce heavy lifting and storage concerns with our stowaway foot section. An optional built-in fiber optic exam light eliminates searching for another piece of equipment.

Quality. Our reinforced frames are made of heavy-gauge, automotive grade steel for long-lasting quality — and a 700 lb weight capacity to handle higher patient weights. Nickel-plated push handles, IV poles, siderails and other components offer superior rust resistance, even in harsh environments.

Hill-Rom®

Enhancing Outcomes for Patients and Their Caregivers.™

Hill-Rom®

OB-GYN Stretcher

Features	Standard Features	Optional Features
700 lbs weight capacity	•	
Sliding patient litter	•	
Integrated foot supports	•	
No-lift stowaway foot section	•	
Active hand brake		•
Integrated IV pole transport device		•
Brake/Steer pedals – head and foot	•	
Brake/Steer pedals – all four sides		•
Next generation Steering Plus™ system	•	
Ergonomic push handles		•
Permanent IV pole – 3 stage (head only)		•
30-inch width	•	
Siderail system	Tuck-away	
Radiolucent deck	•	
3-inch high density foam mattress with fire barrier	•	
Factory mounted light		•
Bumper colors – choice of neutral, blue, red, teal or purple	Choice	

Integrated Foot Supports

Integrated IV Pole Transport Device

Active Hand Brake

Factory Mounted Light

Technical Specifications

Maximum weight limit.....700 lbs (317.5 kg)
Low position – floor to top of surface.....24.5" (62.2 cm)
High position – floor to top of surface.....37" (94 cm)
Overall length .....80.5" (204.5 cm)
Overall width (siderails up) .....35.5" (90.2 cm)
Overall width (siderails stored) .....31" (78.7 cm)
Siderail length.....47" (119.4 cm)
Siderail height above mattress/surface.....13" (33.0 cm)
Mattress size .....30" (76.2 cm) x 75" (190.5 cm)
Maximum head elevation .....90°
Maximum Trend/Reverse Trend.....18°
Floor to base clearance .....3.5" (8.9 cm)
Caster size.....8" (20.3 cm)

Accessories

- Stretcher pillow
- IV transporter
- Patient tray
- Utility tray
- Oxygen tank holder
- Liquid oxygen tank holder
- Infusion support system
- Siderail covers
- Armboard
- Detachable headboard
- Lateral x-ray cassette holder
- Chart holder
- Convertible footboard/headboard
- Accessory IV pole
- Transport straps
- Foot extender
- Paper roll dispenser
- Integrated telescoping calf supports
- Integrated catch basin

145650 rev 2 8/26/09

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Stretcher, Procedure / Recovery w/ 30" Mattress w/ Scale

Alt ID: STR-PRC

Manufacturer: Hillrom - Bed & Stretcher Group (800-445-3730)

Mfr #: P8000

Vendor: Hillrom - Bed & Stretcher Group (800-445-3730)

Vendor #: P8000

Model: Procedural Stretcher P8000

Procedure/recovery stretcher. Height adjustable (20.7in in low position; 34.25in in high position). 700 lb. weight capacity, 3 inch high density foam mattress w/ fire barrier, integrated IV pole transport device, power washable, tuck-away side rails, head/foot brake/steer pedals, Trendelenburg/Reverse Trendelenburg, hydraulic foot controls utilizing Tri-Pedal design on both sides, pneumatic head section, (4) 3/4in standard IV pole sockets, large storage area, high impact shroud with oxygen tank storage, full perimeter bumper, (6) transport strap locations.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	Yes
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	35.50 in (902 mm)	**Left:**	N/A
Depth:	83.00 in (2108 mm)	**Right:**	N/A
Height:	34.25 in (870 mm)	**Front:**	N/A
Max Weight:	295 lbs (133.8 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height reflects floor to top of sleep deck

Width reflects Overall width (siderails up)

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	3	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
				Total:	**31**	

Procedural Stretcher

Item Description: Patient Stretcher, Procedural

Model Number: P8000

JSN Number: M4665

Warranty: 1 Year From Delivery Date

Installation: _____

Proposal Number: _____

Facility: _____

City, State: _____

Estimated Delivery: _____

Delivery Cost: _____

Taxes: _____

Product Standard Features

- 26" Width
- Bumper Protected Siderails
- Trendelenburg/Reverse Trendelenburg
- Six Transport Strap Locations
- 3" Comfortline® Foam Mattress
- Steering Plus™ System
- OneStep® Tuck-Away Siderails
- Brake/Steer – Head and Foot
- Dual-Sided hi/lo Hydraulic Control Pedals
- 3/4" Standard IV Pole Sockets
- 700 lb Weight Capacity
- Full Perimeter Bumpering
- Smooth Deck Design
- Decals Options
- Bumper Color Options – choice of neutral, blue, red, teal or purple (green bumpers only for IntelliDrive® models)

Product Accessory Options

- ☐ 30" Width
- ☐ Auto Contour™ Mechanism (includes BackSaver Fowler® and Knee Gatch)
- ☐ Manual Knee Gatch
- ☐ Enhanced Safety Siderail
- ☐ 4" or 5" Comfortline® Foam Mattress
- ☐ 5" AccuMax Quantum™ Mattress (Elastimax or Hypolex)
- ☐ IntelliDrive® Powered Transport
- ☐ BackSaver Fowler® Feature
- ☐ Brake/Steer – All Four Sides
- ☐ 3-Sided hi/lo Hydraulic Control Pedals
- ☐ Ergonomic Push Handles
- ☐ Ergonomic Push Handles with Integrated IV Pole Transport Holder
- ☐ Active Hand Brake
- ☐ Integrated O_2 Tank Holder with Utility Tray
- ☐ Removable IV Pole – 2 Stage
- ☐ Permanent IV Pole – 3 Stage (40 lbs weight capacity)
- ☐ Integrated Dual-Display Scale
- ☐ Radiolucent Deck
- ☐ Upright Chest X-Ray Cassette Holder

Procedural Stretcher

Item Description: Patient Stretcher, Procedural

Model Number: P8000

JSN Number: M4665

Proposal Number: _____

Technical Specifications

Safe Working Load (includes patient weight, accessories, and mattress)	700 lbs (317.5 kg)
Low position (floor to top of sleep deck)*	20.5" (52 cm)
High position (floor to top of sleep deck)	34.25" (87 cm)
Overall length	83" (210.8 cm)
Overall width (siderails up)	32" (81.3 cm) or 36" (91.4 cm)
Overall width (siderails stored)	30.38" (77.15 cm) or 34.38" (87.31 cm)
Siderail length	47" (119.4 cm)
Siderail height above sleep deck	14.5" (36.8 cm) Max
Comfortline® mattress size	26" (66 cm) x 75" (190.5 cm) or 30" (76.2 cm) x 75" (190.5 cm)
Maximum head elevation	90°; 70° with Auto Contour™
Maximum Trend/Reverse Trend	18°
Floor to base clearance	3.5" (8.9 cm)
Caster size	8" (20.3 cm)

Electrical Information	120/230 V | 7/3A | 50/60 Hz

Warranty

Frame & Welds for life of product
Three-year parts
Two-year mattress
One-year labor

Accessory Options — Please confirm accessory availability for model of stretcher ordered

Accessory IV pole	Liquid oxygen tank holder
Ankle stirrups	Oxygen tank holder
Armboard	Paper roll dispenser
Chart holder	Patient tray
Convertible footboard	Restraint straps
Detachable footboard	Siderail covers
Foot extender	Stretcher pillow
Infusion support system	Transport straps
IV transporter	Utility tray
Lateral X-ray cassette holder	

**Dependent on configuration*

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For further information about this product or a service, please contact your local Hill-Rom representative or visit our webpage:

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Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Server, Synchronized, Wireless Clock System**
Manufacturer: Primex, Inc (800-537-0464)
Vendor: Primex, Inc (800-537-0464)
Model: OneVue Sync Transmitter

Alt ID: SVR-CWL
Mfr #:
Vendor #:
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	ZZZ	Miscellaneous Costs	Project	Draft (New)	1	
				Total:	**1**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Table, Changing, Infant, Wall Mount

Alt ID: TBL-CGR

Manufacturer: Koala Kare Products ((888) 733-3456)

Mfr #: KB310-SSRE

Vendor: Koala Kare Products ((888) 733-3456)

Vendor #: KB310-SSRE

Model: Horizontal Recessed Stainless Steel KB310-SSRE

Item ID: TA-14

Wall mounted infant changing station. Features: One-piece, deep-drawn, uniform grain stainless steel components eliminate seams, sharp edges and weld lines, and provide a modern visual aesthetic. Thoughtful patron amenities enhance the end-user experience, and include Microban product protection, laser etched logo, a redesigned liner dispenser and a convenient stainless steel bag hook for safely storing a diaper bag off the floor. The dual liner cavity has an internal spring tab that pushes liners forward while only allowing single liner dispensing. Each cavity holds 25 liners and locking mechanism minimizes operator refills and discourages potential vandalism. The product includes child protection straps and bag hooks. Bed surface exclusively contains Microban antimicrobial, reducing odor causing bacteria.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	Yes
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	C/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	41.31 in (1049 mm)	**Left:**	N/A
Depth:	17.41 in (442 mm)	**Right:**	N/A
Height:	26.22 in (666 mm)	**Front:**	N/A
Max Weight:	80 lbs (36.3 kg)	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No		
Water - Hot:	No	**Drain:**	No		
Water - Treated:	No	**Steam:**	No		
Vent:	No	**Vacuum - Dental / Medical:**	No	/	No
Tech Connect:	No				

Structural Requirements

Seismic:	Yes	**Pre-approval:**	

Product and Project Item Notes

Specification:
Wall opening: 37-1/16W x 21-5/8H inches

Depth reflects extended (open) from wall. Depth recessed into wall: 3-31/32 inches.
Depth closed: 2-23/32 inches (from finish face of wall)

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	
				Total:	**1**	

KB310-SSRE Horizontal Stainless Steel Recessed-Mounted Baby Changing Station

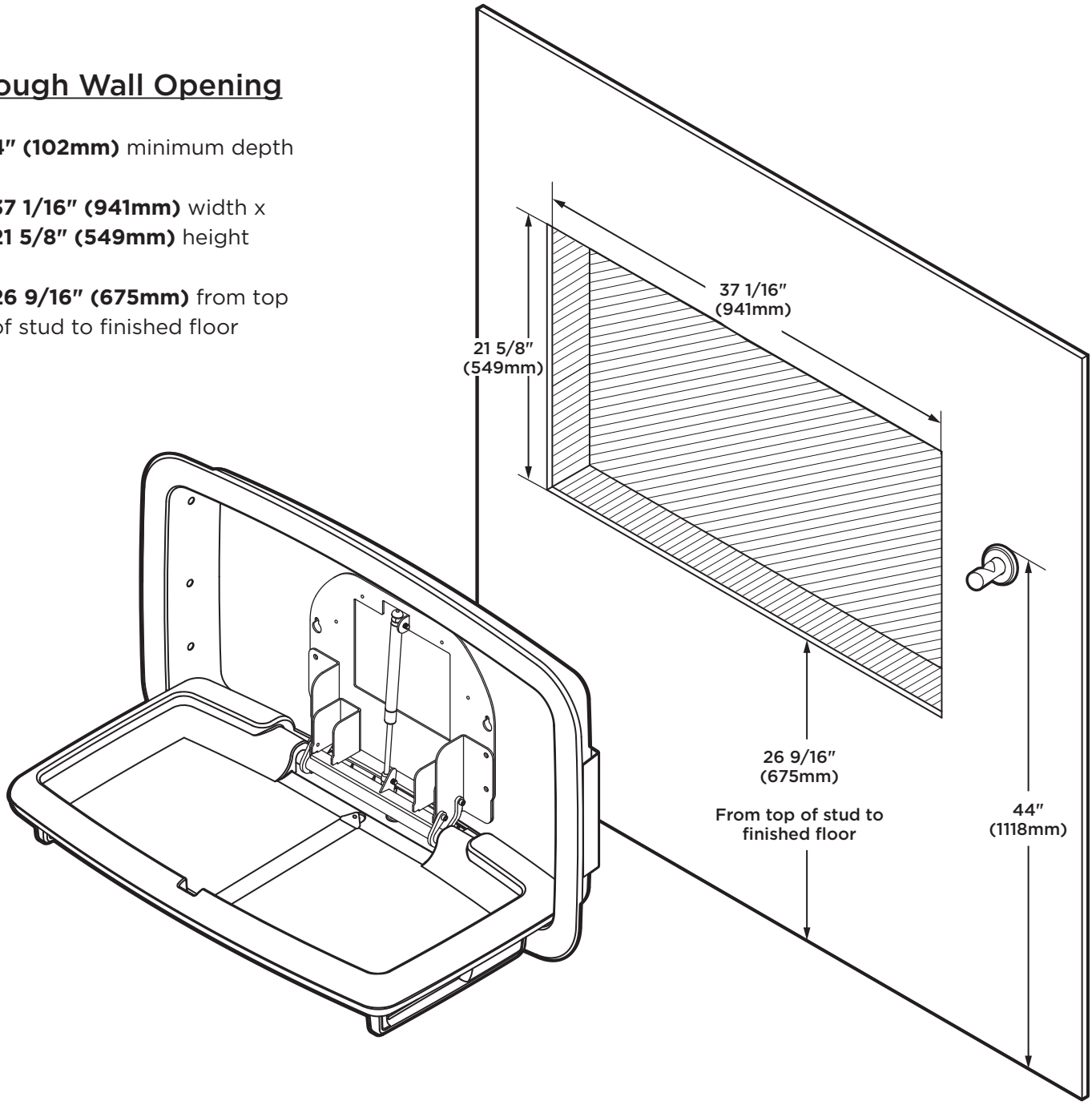
Technical Data Sheet

Color

- **KB310-SSRE Stainless Steel**
- **KB310-SSRE-MBLK Matte Black**

Rough Wall Opening

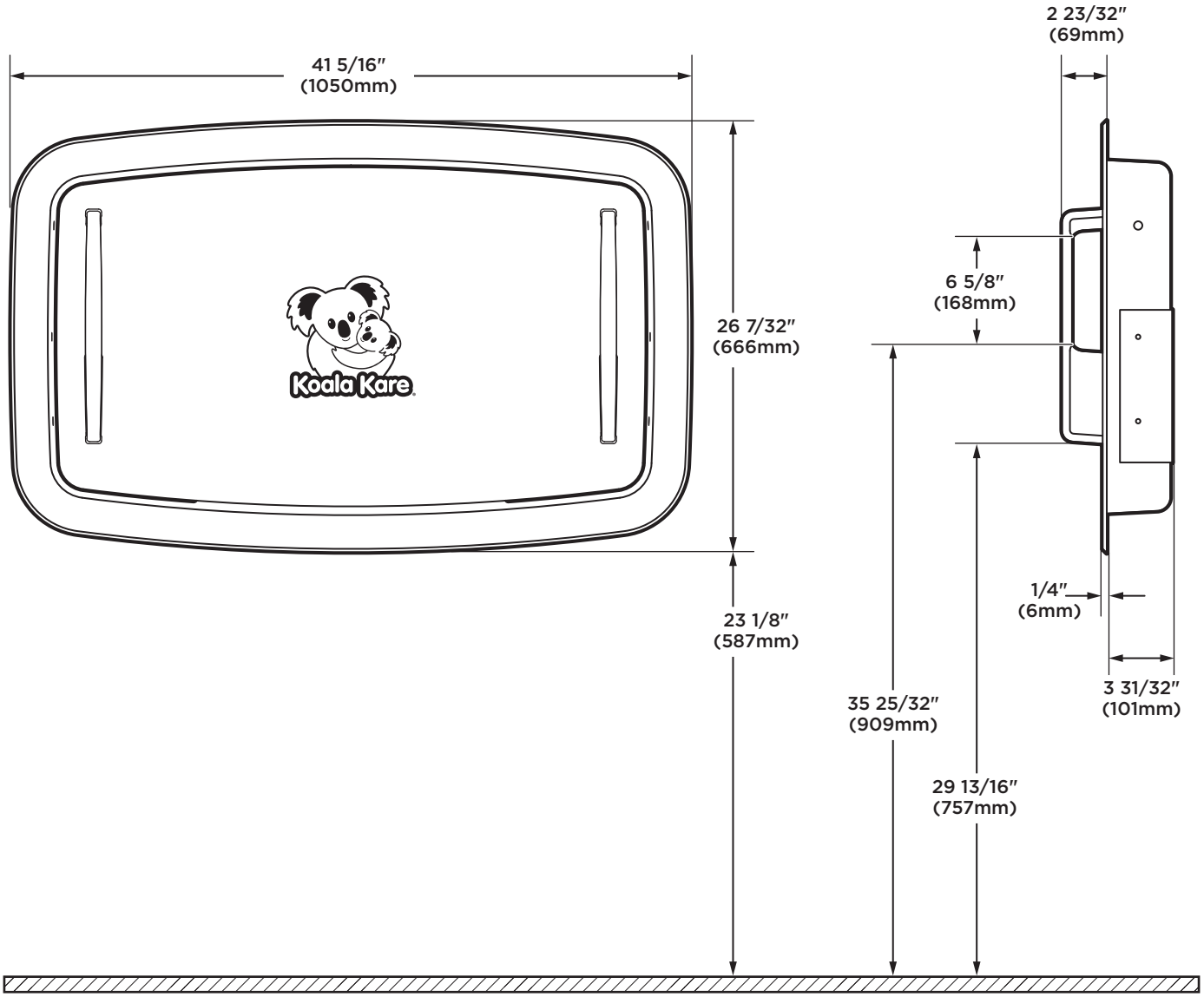
- **4" (102mm)** minimum depth
- **37 1/16" (941mm)** width x **21 5/8" (549mm)** height
- **26 9/16" (675mm)** from top of stud to finished floor



*Diagrams are not to scale.

KB310-SSRE Horizontal Stainless Steel Recessed-Mounted Baby Changing Station

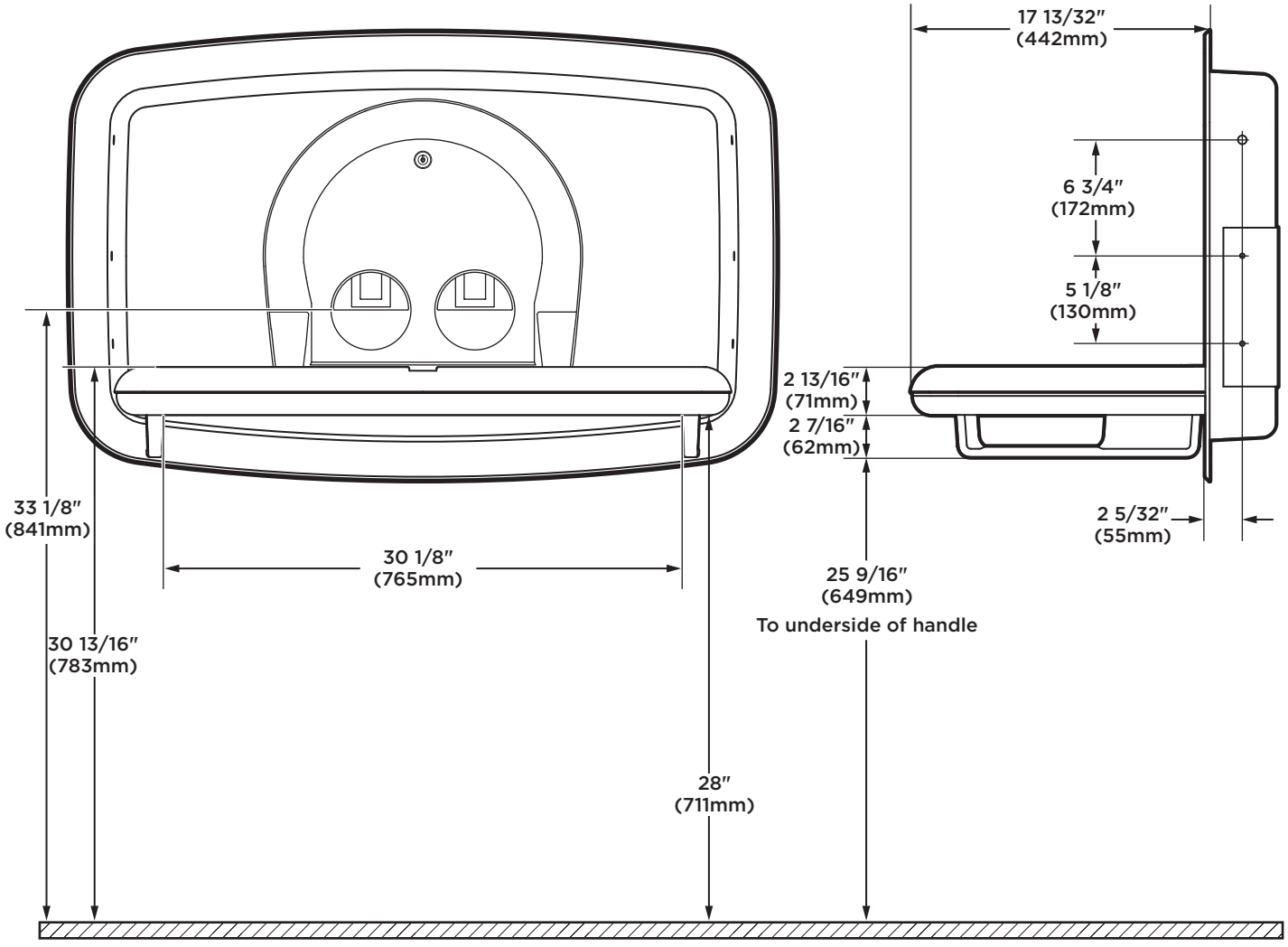
Closed Position



*Diagrams are not to scale.

KB310-SSRE Horizontal Stainless Steel Recessed-Mounted Baby Changing Station

Open Position



*Diagrams are not to scale.

KB310-SSRE Horizontal Stainless Steel Recessed-Mounted Baby Changing Station

Information

Material

Grey injection-molded polypropylene with Microban® antimicrobial additive embedded into the bed surface. Reinforced steel-on-steel hinge mechanism and plated or powder coated steel mounting chassis with mounting hardware included. Satin finished 304 stainless steel deep drawn outer shell and recessed pan. Injection molded aluminum handles with satin stainless steel finish. Solid stainless steel external bag hook. Labeled usage instructions and safety messages. Contoured changing surface area 535 sq. In (3452 sq. cm) and comes complete with safety strap. Dual cavity liner dispenser holds approximately 50 KB150-99 bed liners.

Note: For EN 12221:2008+A1:2013 compliant units a safety strap can not be provided with the unit. Should you require one, it can be ordered separately P/N 310-44-KIT.

Operation

Concealed pneumatic cylinder and metal mounting chassis provides controlled, slow opening and closing of bed. Polypropylene is easy to clean and resists odors and bacterial growth. Complies with ASTM static load performance requirements when properly installed. Internal liner dispenser with integrated spring tab dispensed one liner at a time. Handles guide patron to operate unit with less than 5lbs of force and act as cane detection if unit is left in open (down) position.

Warning: To ensure that the unit supports the intended loads, baby changing stations must be properly installed according to the manufacturer's instructions.

Specification

Baby changing station shall have durable, single piece deep drawn 304 satin finished stainless steel outer shell and recessed pan, with injection-molded polypropylene interior. Design of unit shall be recess-mounted. Unit shall be equipped with a pneumatic cylinder for controlled opening and closing of bed. Bed shall be secured to metal mounting chassis with a concealed steel-on-steel hinge. No hinge structure shall be exposed on interior or exterior surfaces. Unit shall have mounting hardware included. Unit shall have Microban® antimicrobial embedded into plastic material on the changing surface. Unit shall fully comply with ADA regulations when properly installed. Bed shall have smooth concave changing area with a safety strap and external stainless steel hook for bags or purse provided.

The design and manufacture of Koala products is intended to be compliant with the 2010 ADA Standards for Accessible Design and the 2009 ICC A117.1, Accessible and Usable Buildings and Facilities. Unit shall conform to ASTM F2285-04(16) Standard Safety Performance Specification for Diaper Changing Tables for Commercial Use, ANSI Z535.4 Product Safety Signs and Labels, EN 12221:2008+A1: 2013. Unit shall have a built-in Liner Dispenser for use with 3-ply chemical free biodegradable bed liners, instructional graphics and safety messages in 4 languages. Unit shall be backed by manufacturer's 5-year limited warranty on materials and workmanship and include a provision for replacement caused by vandalism.

Unit shall be manufactured in the U.S.A.

ADA Requirements

Additional information on how this product complies with ADA requirements can be found in the KB310 & KB311 Baby Changing Stations Accessibility Compliance document on **www.koalabear.com**.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet. The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions without notice.

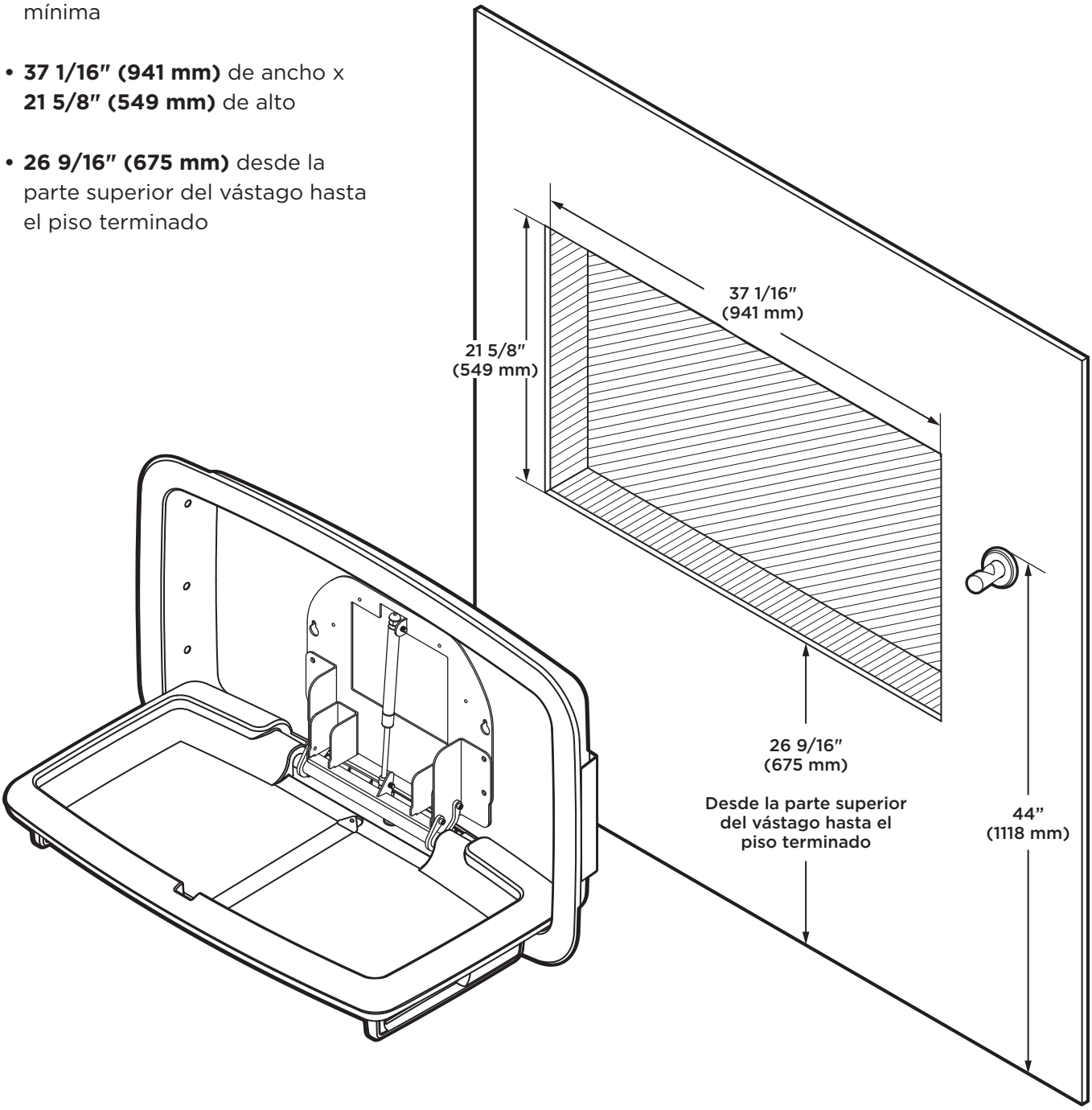
Koala Kare Products
A Division of Bobrick

6982 South Quentin Street, Centennial, CO 80112-3945
Main: 303.539.8300 **| Toll Free:** 888.733.3456 **| Fax:** 303.539.8399
Website: koalabear.com **| Email:** customerservice@koalabear.com

Cambiador para bebés KB310-SSRE
Ficha de datos técnicos

Abertura de la pared

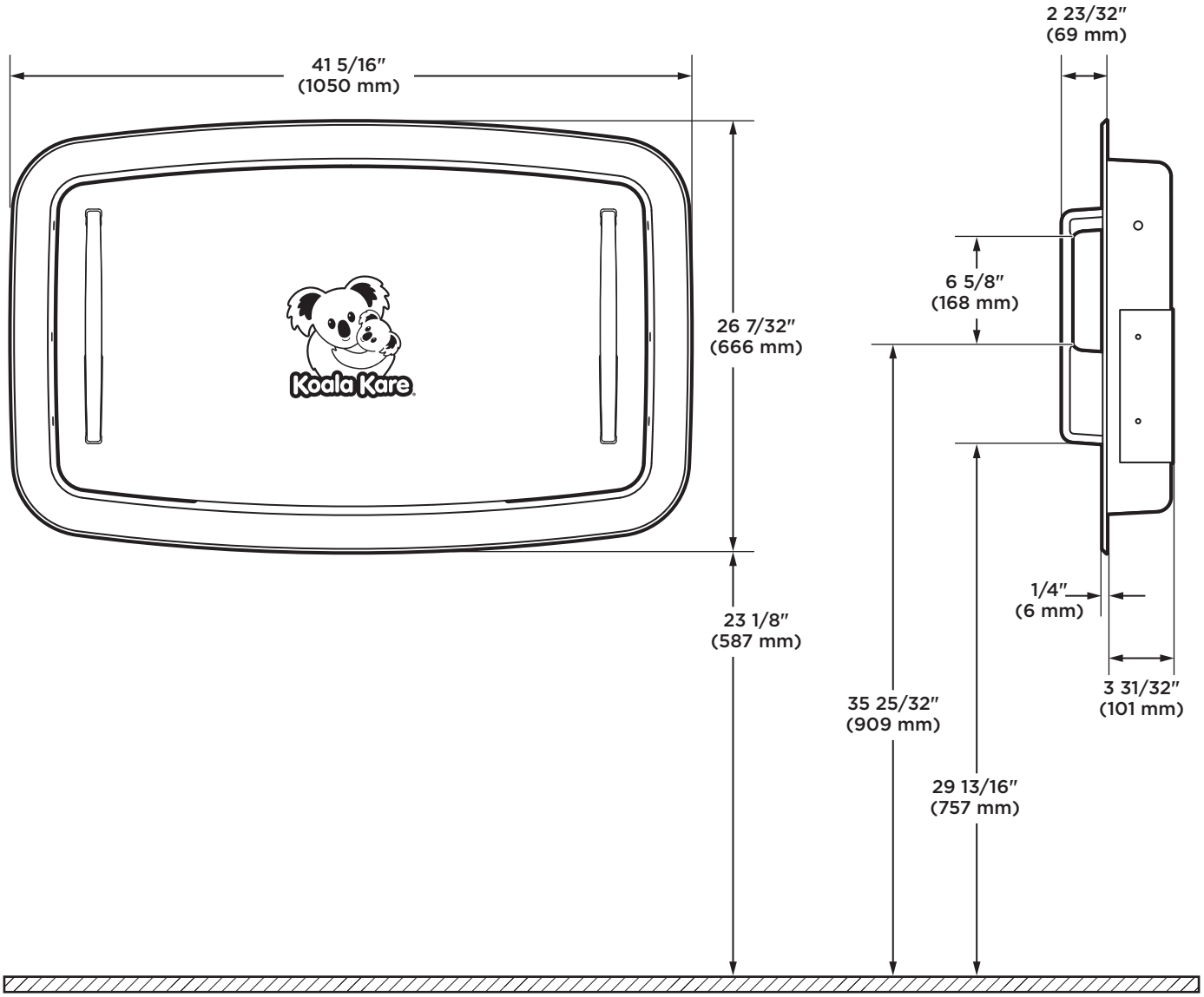
- **4" (102 mm)** de profundidad mínima
- **37 1/16" (941 mm)** de ancho x **21 5/8" (549 mm)** de alto
- **26 9/16" (675 mm)** desde la parte superior del vástago hasta el piso terminado



*Los diagramas no están a escala.

Cambiador para bebés KB310-SSRE

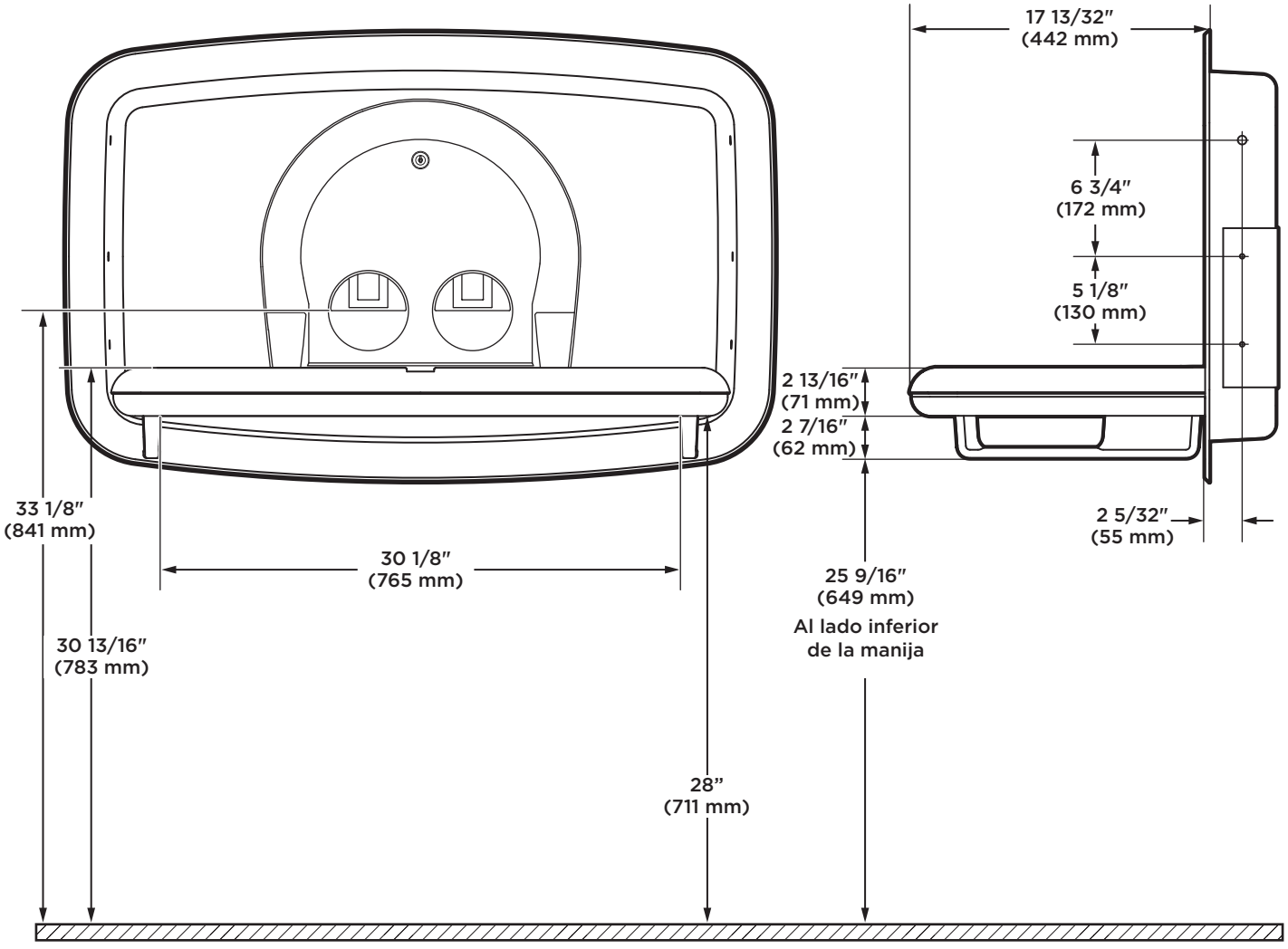
Posición cerrada



*Los diagramas no están a escala.

Cambiador para bebés KB310-SSRE

Posición abierta



*Los diagramas no están a escala.

Cambiador para bebés KB310-SSRE
Información

Material

Polipropileno gris moldeado a inyección con aditivo antimicrobiano Microban® incorporado en la superficie de la plataforma. Mecanismo con bisagra de acero sobre acero y chasis de montaje de acero revestido o recubierto en polvo con tornillería de montaje. Carcasa exterior y bandeja empotrada con dibujo profundo de acero inoxidable 304 con terminación satinada. Manijas de aluminio moldeado a inyección con terminación satinada de acero inoxidable. Gancho externo para el bolso de acero inoxidable macizo. Instrucciones de uso etiquetadas y mensajes de seguridad. El área de la superficie para cambiar al bebé con contorno es de 535 in2 (3452 cm2) y trae una correa de seguridad. El dispensador de protectores de dos cavidades puede alojar hasta aproximadamente 50 protectores para la plataforma KB150-99.

Nota: Para las unidades que cumplen con EN 12221:2008+A1:2013, no se puede proporcionar una correa de seguridad con la unidad. Si necesita uno, se puede pedir por separado P/N 310-44-KIT.

Funcionamiento

El cilindro neumático oculto y el chasis de montaje metálico ofrecen una apertura y un cierre controlados y lentos de la plataforma. El polipropileno es fácil de limpiar y resiste olores y crecimiento bacteriano. Cumple los requisitos de desempeño para cargas estáticas de ASTM cuando está instalado correctamente. El dispensador de protectores interno con lengüeta a resorte integrada dispensa de a un protector por mes. Las manijas guían el patrón para operar la unidad con menos de 5 lb de fuerza y actúan como lugar detección mediante un bastón si la unidad se deja en posición abierta (hacia abajo).

Advertencia: Para asegurar que la unidad sostenga las cargas previstas, los cambiadores deben instalarse correctamente según las instrucciones del fabricante.

Especificaciones

El cambiador para bebés tiene una carcasa exterior y una bandeja empotrada resistentes de una pieza con dibujo profundo de acero inoxidable 304 con terminación satinada, con un interior de polipropileno moldeado a inyección. El diseño de la unidad es montado empotrado. La unidad está equipada con un cilindro neumático para abrir y cerrar la plataforma de manera controlada. La plataforma está fija al chasis de montaje metálico con una bisagra de acero sobre acero oculta. No hay ninguna estructura de bisagra expuesta en las superficies interior ni exterior. La unidad incluye la tornillería de montaje. La unidad tiene el antimicrobiano Microban® incorporado en el material plástico de la superficie para cambiar al bebé. Cuando se instala correctamente, la unidad cumple completamente las normas de la ley ADA. La plataforma tiene un área cóncava para cambiar al bebé con una correa de seguridad y un gancho de acero inoxidable externo para el bolso.

Está previsto que el diseño y la fabricación de los productos Koala cumplan las normas para el diseño accesible de 2010 de la ley ADA e ICC A117.1 Edificios e instalaciones accesibles y utilizables 2009. La unidad cumple la especificación de desempeño estándar en seguridad de ASTM para las mesa para cambiar pañales para uso comercial, F2285-04(16), y de letreros y etiquetas de advertencia de los productos ANSI Z535.4, EN 12221:2008+A1: 2013. La unidad tiene un dispensador de protectores incorporado para utilizarse con protectores biodegradables de 3 pliegues y sin químicos para la plataforma, gráficos instructivos y mensajes de seguridad en 4 idiomas. La unidad cuenta con el respaldo de la garantía limitada del fabricante durante 5 años para material y mano de obra e incluye una disposición para el reemplazo causado por el vandalismo.

La unidad se fabrica en los EE. UU.

Requisitos según la ADA

Hay información adicional sobre las maneras en que este producto cumple con la ADA en el documento titulado *KB310 & KB311 Baby Changing Stations Accessibility Compliance* (Cumplimiento de la accesibilidad de los cambiadores para bebés KB300 y KB301) en **www.koalabear.com**.

Las ilustraciones y las descripciones que se incluyen corresponden a la producción a la fecha de esta ficha de datos técnicos. El fabricante se reserva el derecho de hacer modificaciones y mejoras en los diseños y en las dimensiones sin previo aviso, algo que lleva a cabo de cuando en cuando.

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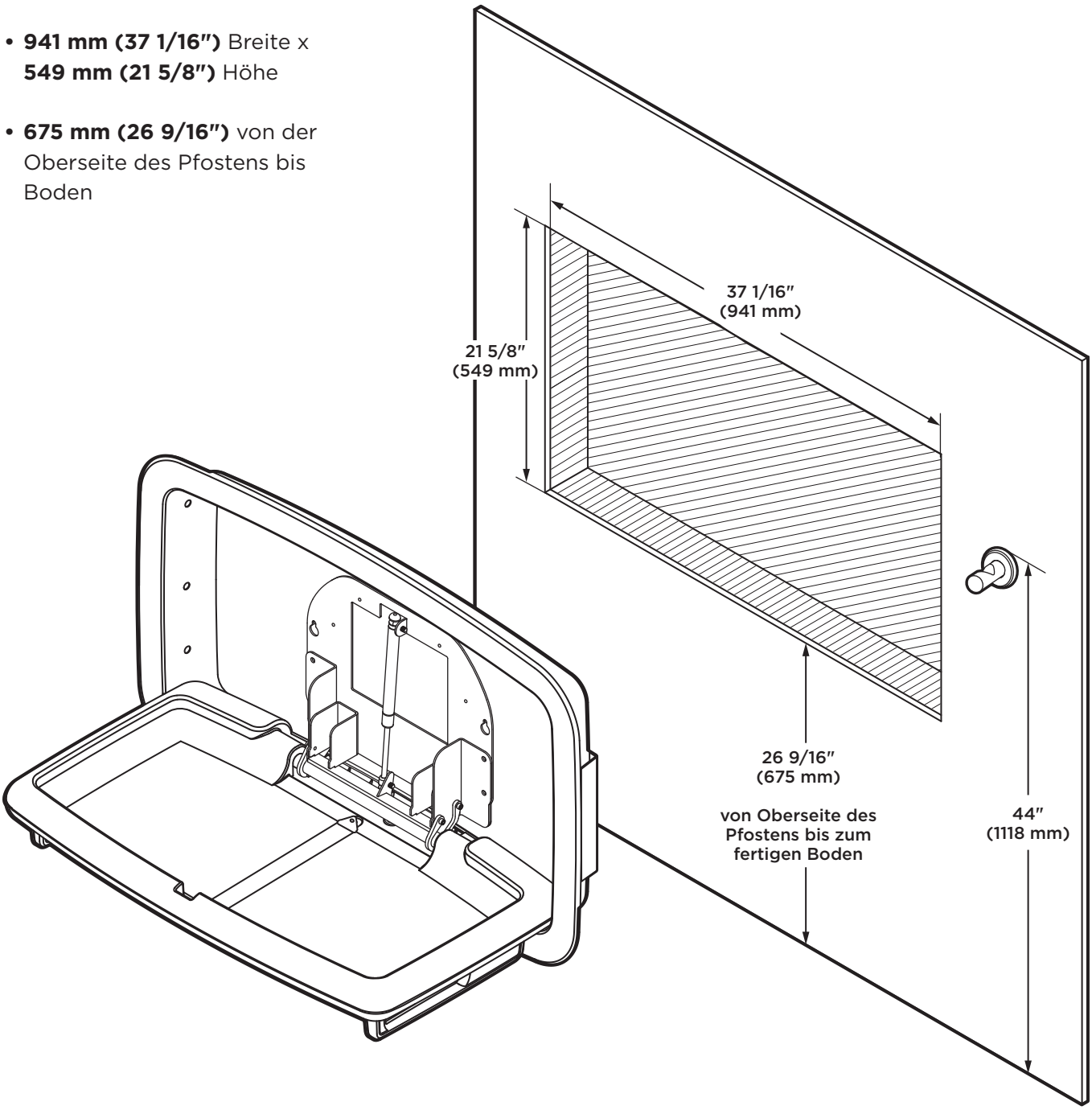
Sitio web: koalabear.com **| Correo electrónico:** customerservice@koalabear.com

KB310-SSRE Babywickeltisch
Technisches Datenblatt

Wandausschnitt

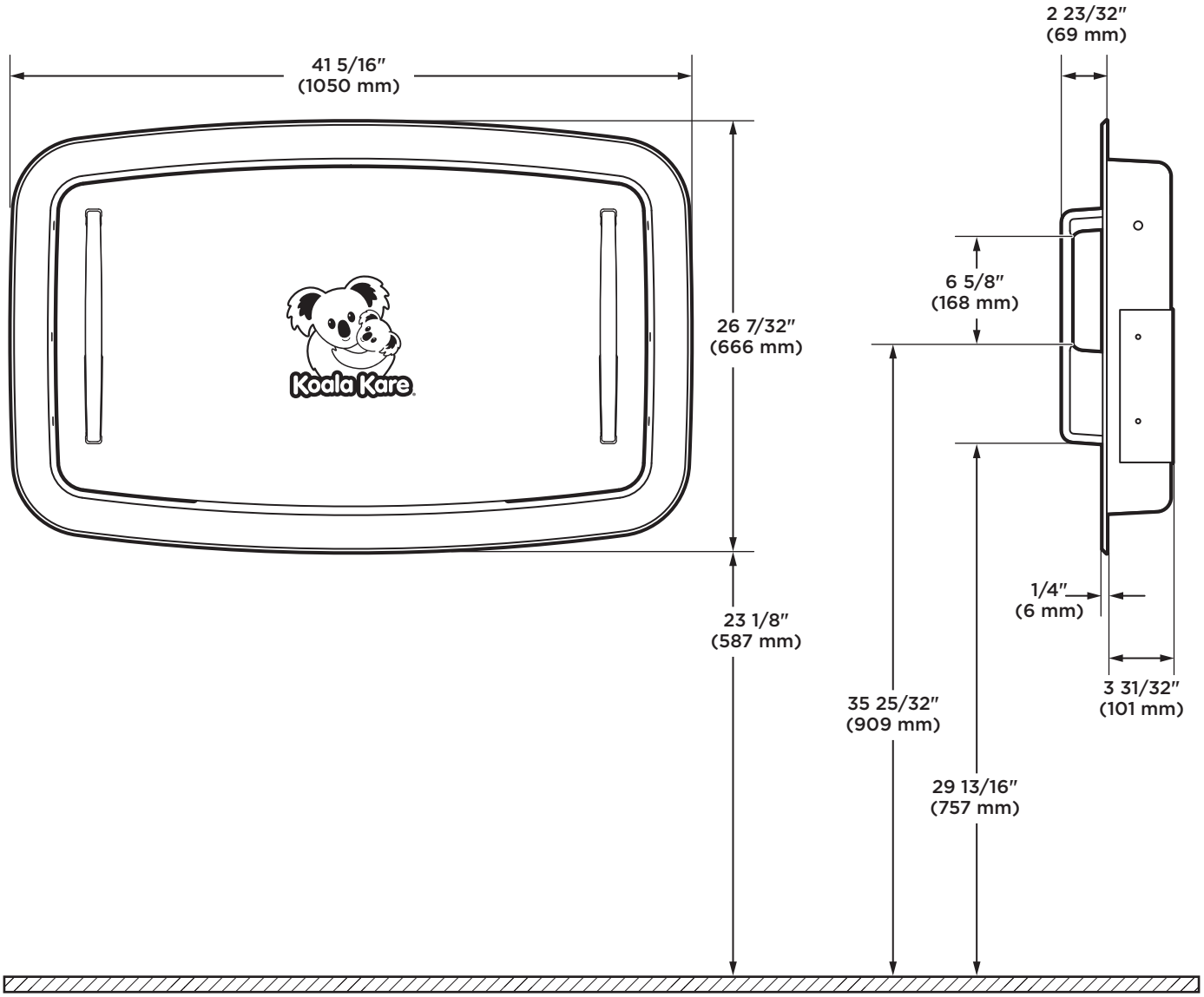
- **102 mm (4")** Mindesttiefe
- **941 mm (37 1/16")** Breite x **549 mm (21 5/8")** Höhe
- **675 mm (26 9/16")** von der Oberseite des Pfostens bis Boden



*Abbildungen sind nicht maßstabsgetreu.

KB310-SSRE Babywickeltisch

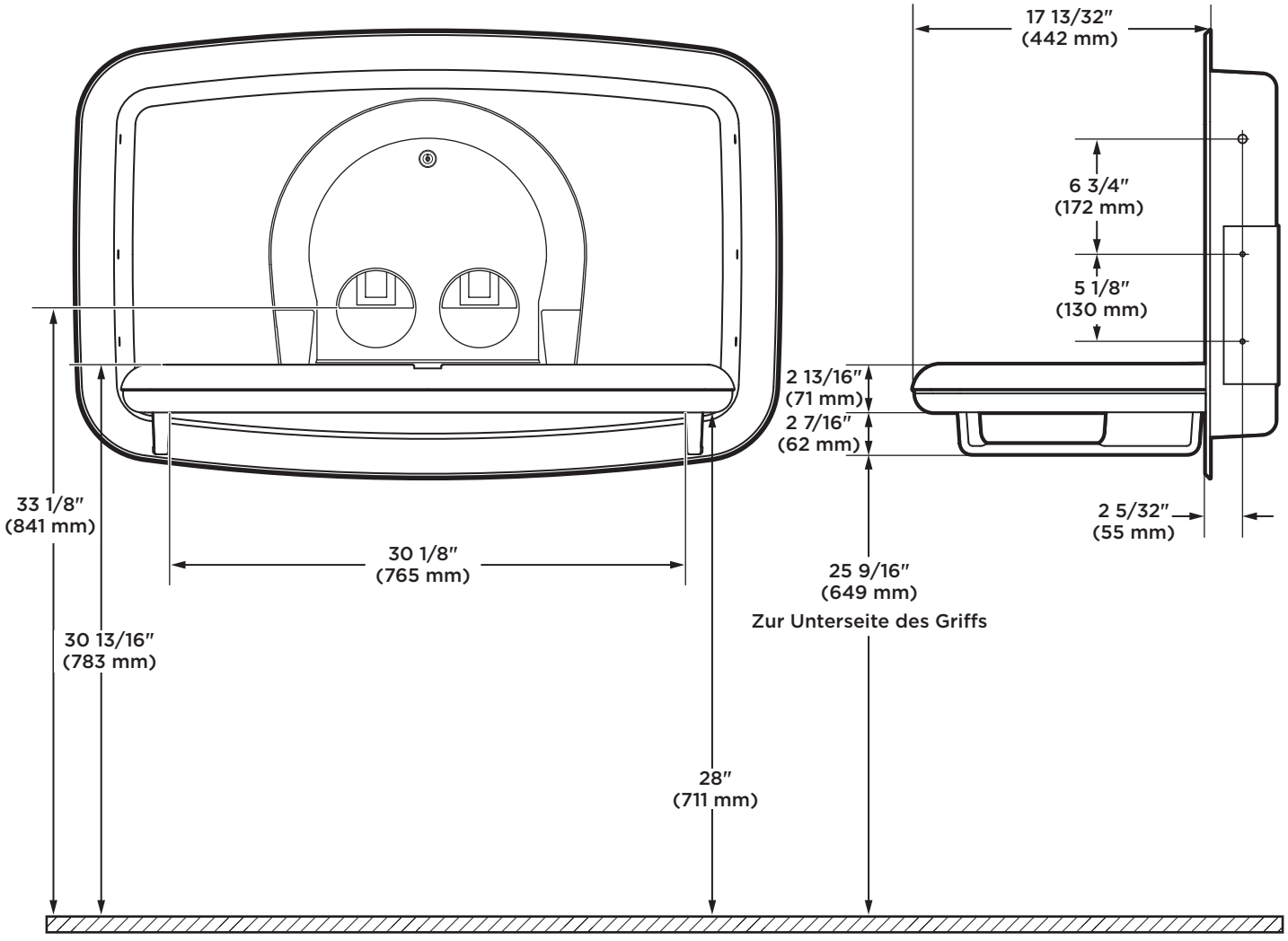
Geschlossene Position



*Abbildungen sind nicht maßstabsgetreu.

KB310-SSRE Babywickeltisch

Geöffnete Position



*Abbildungen sind nicht maßstabsgetreu.

KB310-SSRE Babywickeltisch
Informationen

Material

Graues, spritzgegossenes Polypropylen mit Microban®-antimikrobiellen Zusatzstoffen in der Bettoberfläche. Verstärkte Stahl-auf-Stahl-Scharniere und beschichtetes oder pulverbeschichtetes Edelstahlchassis mit Befestigungsteilen enthalten. Äußere Schale aus tiefgezogenem Edelstahl CrNi18-8 (1.431) mit mattem Finish und versenkte Wanne. Spritzgegossene Aluminiumgriffe mit matt geschliffenem Edelstahl-Finish. Externer Beutelhaken aus Edelstahl. Mit Benutzeranweisungen und Sicherheitshinweisen. Konturierte Wickeloberfläche misst 3452 cm^2 und umfasst einen Sicherheitsgurt. Integrierter Auflagenspender, der ca. 50 KB150-99 Hygieneauflagen fasst.

Hinweis: Für EN 12221:2008+A1:2013 konforme Geräte kann kein Sicherheitsgurt mit dem Gerät geliefert werden. Sollten Sie einen benötigen, kann dieser separat bestellt werden P/N 310-44-KIT.

Bedienung

Konstruktion mit verdecktem pneumatischem Zylinder und Metallchassis ermöglicht ein reguliertes, langsames Öffnen und Schließen des Betts. Polypropylen ist pflegeleicht und ist beständig gegen Geruch und Bakterienwachstum. Bei vorschriftsmäßiger Anbringung entspricht die Wickelstation den ASTM-Anforderungen für statische Belastung. Interner Überzugspender mit integrierter federbelasteter Raste spendet pro Betätigung einen Überzug. Die Griffe ermöglichen es dem Benutzer, die Einheit mit einem Kraftaufwand von unter 2,5 kg zu bedienen, und dienen zur Erkennbarkeit mit einem Stock, wenn das Gerät in der offenen (unteren) Position belassen wird.

Warnung: Um zu gewährleisten, dass die Einheit den beabsichtigten Belastungen standhält, müssen Babywickelstationen gemäß der Herstelleranleitung installiert werden.

Technische Beschreibung

Babywickeltisch mit einteiliger äußerer Schale aus tiefgezogenem Edelstahl CrNi18-8 (1.431) mit mattem Finish und versenkte Wanne mit spritzgegossenem Polypropylen-Innenteil. Die Einheit ist zum Wandeinbau vorgesehen. Die Einheit ist mit einem pneumatischen Zylinder zum geregelten Öffnen und Schließen des Betts ausgerüstet. Das Bett wird mit einem verdeckten Stahl-auf-Stahl-Scharnier am Metallchassis befestigt. Kein Teil der Scharnierkonstruktion liegt an inneren oder äußeren Oberflächen frei. Der Einheit liegen Befestigungsteile bei. Das Kunststoffmaterial auf der Wickeloberfläche ist mit antibakteriellem Microban®-Schutz ausgerüstet. Die Einheit entspricht bei vorschriftsmäßiger Installation vollständig den ADA-Bestimmungen. Das Bett hat einen glatten, konkaven Wickelbereich mit einem Sicherheitsgurt und einem externen Haken für Beutel oder Taschen.

Design und Herstellung der Koala-Produkte erfolgt gemäß den 2010 ADA Standards for Accessible Design und 2009 ICC A117.1, Accessible and Usable Buildings and Facilities. Die Einheit entspricht den folgenden Normen: ASTM F2285-04(16) Standard Safety Performance Specification for Diaper Changing Tables for Commercial Use, ANSI Z535.22 Product Safety Signs and Labels, EN 12221:2008+A1 2013. Die Einheit hat einen integrierten Auflagenspender zur Verwendung mit 3-lagigen, chemikalienfreien, biologisch abbaubaren Hygieneüberzügen, Anleitungsabbildungen und Sicherheitshinweise in 4 Sprachen. Für die Einheit wird eine 5-jährige beschränkte Herstellergarantie für Material- und Herstellungsfehler und eine 5-jährige Ersatzgarantie für Vandalismus gewährt.

Die Einheit wird in den USA hergestellt.

ADA-Anforderungen

Zusätzliche Informationen dazu, wie dieses Produkt die ADA-Anforderungen erfüllt, sind im Dokument *KB310 & KB311 Baby Changing Stations Accessibility Compliance* (KB310 & KB311 Babywickeltische – Erfüllung der Vorgaben für eine barrierefreie Bedienung) auf **www.koalabear.com** zu finden.

Die Abbildungen und Beschreibungen in diesem Datenblatt beziehen sich auf Produkte, wie sie zu dem in diesem technischen Datenblatt angegebenen Datum hergestellt wurden. Der Hersteller behält sich das Recht vor, von Zeit zu Zeit Änderungen und Verbesserungen an Konstruktion und an den Abmessungen vorzunehmen.

Koala Kare Products
A Division of Bobrick

6982 South Quentin Street, Centennial, CO 80112-3945
Zentrale: 303.539.8300 **| Gebührenfrei:** 888.733.3456 **| Fax:** 303.539.8399
Website: koalabear.com **| E-Mail:** customerservice@koalabear.com

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Telephone, Desktop, Analog (EMERGENCY-YELLOW)
Alt ID: TEL-DKE
Manufacturer: TBD (888-555-1212)
Mfr #: TBD
Vendor: TBD (888-555-1212)
Vendor #: TBD
Model: TBD
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	N/A	**Left:**	N/A
Depth:	N/A	**Right:**	N/A
Height:	N/A	**Front:**	N/A
Max Weight:	N/A	**Back:**	N/A
Mounting:	N/A	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	1	
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	2	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	2	
				Total:	**6**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Telephone, Desktop
Manufacturer: TBD (888-555-1212)
Vendor: TBD (888-555-1212)
Model: TBD

Alt ID: TEL-DSK
Mfr #:
Vendor #:
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C468	Office	Project	Draft (New)	1	
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	5	
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	3	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	11	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	13	
				Total:	**33**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Telephone, Wall
Manufacturer: TBD (888-555-1212)
Vendor: TBD (888-555-1212)
Model: TBD

Alt ID: TEL-WMT
Mfr #:
Vendor #:
Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	6-IT/Computers	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/C	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	N/A	**Left:**	N/A
Depth:	N/A	**Right:**	N/A
Height:	N/A	**Front:**	N/A
Max Weight:	N/A	**Back:**	N/A
Mounting:	Wall	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329	Alcove/WOW-Registration	Project	Draft (New)	2	
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**3**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Thermometer, Digital

Manufacturer: Hillrom - Welch Allyn, Inc. ((800) 535-6663)

Vendor: Hillrom - Welch Allyn, Inc. ((800) 535-6663)

Model: SureTemp Plus 692 w/ M690 Mobile Stand

Alt ID: THM-STD

Mfr #: 01692-700/08273-000

Vendor #: 01692-700/08273-000

Digital electronic thermometer on mobile stand with interchangeable oral probe well. Features: Oral probe with 9 ft cord, last temperature recall, 60-second pulse/respiration timer, backlit display with electronic ID and anti-theft security system. Provides 4-6 second oral, 10-13 second pediatric axillary and 12-15 second adult axillary temperature readings (F or C).

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	12.00 in (305 mm)	**Left:**	N/A
Depth:	12.00 in (305 mm)	**Right:**	N/A
Height:	31.46 in (799 mm)	**Front:**	N/A
Max Weight:	24 lbs (10.8 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Thermometer requires 3 AA batteries.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

SureTemp Plus 692—setting the standard of care

ID field for electronic labeling of thermometer

User-selectable icon and/or words for identification of thermometer mode

Battery life indicator

Interchangeable probe with push-button probe cover ejection

Removable probe well for easy cleaning

C/F button for toggling between Fahrenheit and Celsius

Prominent recall button for display of last temperature taken

Ergonomic design with rubberized grips

Convenient storage for 25 probe covers

Large, easy-to-read, backlit LCD

Mode button for selecting oral, pediatric axillary or adult axillary

Pulse timer button/ monitor mode

NEW feature makes it easier to switch to Monitor Mode for measuring a patient's thermal steady state (approx. 3 to 5 minutes)

Interchangeable rectal probe and well reduce risk of cross-contamination

The **SureTemp Plus 692** with **standard wall mount** has storage for an additional 50 probe covers.

The **SureTemp Plus 692**—setting the standard of care even higher

SureTemp Plus 692 Product Specifications		
Calibration Accuracy	±0.2 °F (±0.1 °C) (Monitor Mode)	
Temperature Predict Time	Oral: **Adult Axillary** (18 years and older): **Pediatric Axillary** (17 years and younger): Rectal:	Approximately 4-6 secs Approximately 12-15 secs Approximately 10-13 secs Approximately 10-13 secs
Unit Dimensions	8.46" x 3.18" x 2.43" (215 mm x 81 mm x 62 mm)	
Weight	12.6 oz (357 g)	
Ambient Temperature Range	50.0 °F (10 °C) to 104 °F (40.0 °C)	
Patient Temperature Range	80.0 °F (26.7 °C) to 110 °F (43.3 °C)	
Power Source	(3) 1.5Vdc AA batteries	
Battery Life	Approximately 5,000 temperatures	

Ordering Information:

THERMOMETERS

01692-200 SureTemp Plus 692 Electronic Thermometer, Wall Mount, Security System with ID Location Field, Oral Probe and Oral Probe Well with 4ft cord

01692-201 SureTemp Plus 692 Electronic Thermometer, Wall Mount, Security System with ID Location Field, Rectal Probe and Rectal Probe Well with 4ft cord

01692-300 SureTemp Plus 692 Electronic Thermometer, One per room, Wall Mount, Oral Probe and Oral Probe Well with 9ft cord (must be locked to the wall)

01692-301 SureTemp Plus 692 Electronic Thermometer, One Per Room, Wall Mount, Rectal Probe and Rectal Probe Well with 9ft cord (must be locked to the wall)

01692-700 SureTemp Plus 692 Electronic Thermometer, Wall Mount, Oral Probe and Oral Probe Well with 9ft cord, with Rolling Stand and Holder for Spare Probe & Well

ACCESSORIES

21326-0000 Wall Holder
21330-0000 Holder for Spare Probe and Well
06138-000 Calibration Key Assembly, 690/692
02892-000 Probe and Well Kit, 4ft, Rectal
02892-100 Probe and Well Kit, 9ft, Rectal
02893-000 Probe and Well Kit, 4ft, Oral
02893-100 Probe and Well Kit, 9ft, Oral
02891-0000 Probe Well, Blue
02891-1000 Probe Well, Red
08273-000 Thermometer Stand with Holder for Spare Probe and Well
21333-0000 Bracket, M600 Stand Upgrade, with Holder for Spare Probe and Well
98025-0000 Extended Warranty M692

REPLACEMENT PROBE COVERS

05031-101 Case of 1,000 Probe Covers

Contact your Welch Allyn representative or visit www.welchallyn.com to learn more.

Welch Allyn, Inc.
4341 State Street Road
Skaneateles Falls, NY 13153 USA
(p) 800.535.6663 (f) 315.685.3361

www.welchallyn.com

Welch Allyn®

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Thermometer, Temporal Artery**
Manufacturer: Exergen Corp ((800) 422-3006)
Vendor: Exergen Corp ((800) 422-3006)
Model: TAT 5000

Alt ID: THM-TMP
Mfr #: 124275
Vendor #: 124275

Temporal artery thermometer. Disposable cover use option otherwise no disposable covers needed. Auto-shut off, low battery indicator. Selects most accurate of 1000 scans per second.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	2.00 in (51 mm)	**Left:**	N/A
Depth:	8.00 in (203 mm)	**Right:**	N/A
Height:	1.25 in (32 mm)	**Front:**	N/A
Max Weight:	0 lbs (0.2 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	3	
				Total:	**3**	

Specification	TAT-5000
Clinical Accuracy	± 0.2°F or 0.1°C Per ASTM E1112
Temperature Range	61 to 110°F (16 to 43°C)
Arterial Heat Balance Range for Body Temperature*	94 to 110°F (34.5 to 43°C)
Operating Environment	60 to 104° F (16 to 40°C)
Resolution	0.1°F or C
Response Time	~ 0.04 seconds
Battery Life	15,000 readings**
Time Displayed on Screen	30 seconds
Size	2.0" x 8.0" x 1.25" (5 cm x 20 cm x 3 cm)
Weight	7.9 oz. (223 g)
Display Type and Size	Large bright LED's
Construction Method	• Industrial duty impact resistant casing • Hermetically sealed sensing system • Stainless steel probe

Complies with EN 60601-1 3rd edition

*Automatically applied when temperature is within normal body temperature range, otherwise reads surface temperature.

** Approximate number of readings when scanning for 5 seconds and reading the temperature display for 3 seconds before turning thermometer off.

	Symbol for Manufacturer		Do not throw this device away in the trash, contact Exergen Corp. for disposal and recycling instructions.
	Caution, Consult Accompanying Documents	IPX0	Ordinary Equipment
	Consult Instructions for Use		"On" (only for part of Equipment)
	Degree of Protection Against Electrical Shock Type BF Applied Part, Battery Operated		MEDICAL ELECTRICAL EQUIPMENT ANSI/AAMI/ES60601-1: 2005/(R)2012 3rd Edition including Amendment 1; CAN/CSA-C22.2 No. 60601.1: 2014; IEC 60601-1-6; ISO 80601-2-56: Particular Requirements For Basic Safety and Essential Performance of Clinical Thermometers For Body Temperature Measurement

Exergen TemporalScanner Temporal Artery Thermometer

Changing the Way the World Takes Temperature

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www.exergen.com

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project
Specification Coversheet

Description: Track, Ceiling, IV, Straight
Manufacturer: A.R. Nelson Co. ((636) 225-4700)
Vendor: Medline Industries Inc. ((847) 643-3318)
Model: 4000B Telescoping Bottle Holder (Straight)

Alt ID: TKC-IVP
Mfr #: 4000B
Vendor #: IV4000108A

Straight IV ceiling track. Features: Four IV stations at the bottom, telescoping shaft, single hand adjustment, non-conductive nylon bushing, aluminum body with bright dipped anodized finish and release button. Based on 9'-0" ceiling height.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	1-Fixed	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	C/C	**Type:** Medical	**Green:** No

Physical Requirements

Width:	11.00 in (279 mm)	**Left:**	N/A
Depth:	11.00 in (279 mm)	**Right:**	N/A
Height:	45.00 in (1143 mm)	**Front:**	N/A
Max Weight:	5 lbs (2.3 kg)	**Back:**	N/A
Mounting:	Ceiling	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height reflects when fully extended. 29 in. when closed.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

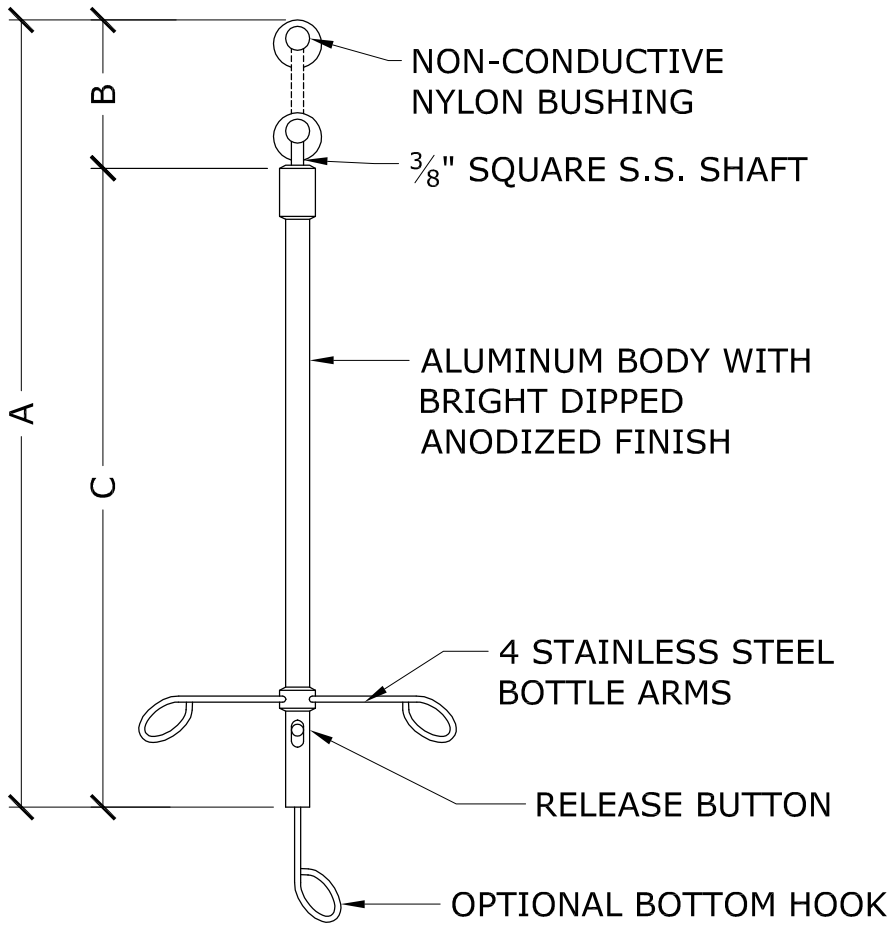
Model 4000B
Telescoping Bottle Holder

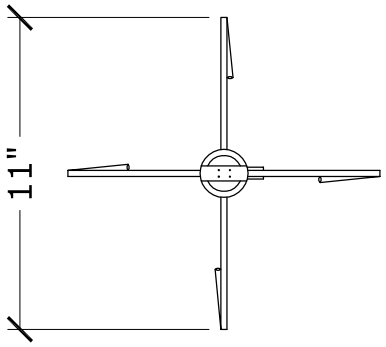
nelson
Cubicle Curtains • Track • IV Systems

CEILING HEIGHT	FULLY EXTENDED (A)	VERTICAL TRAVEL (B)	CLOSED (C)
8'-0"	28"	10"	18"
8'-6"	39"	16"	23"
9'-0"	45"	16"	29"
9'-6"	51"	16"	35"
10'-0"	57"	16"	41"
10'-6"	63"	16"	47"

BOTTLE HOLDER FEATURES	
NUMBER OF I.V. HOOKS	4
I.V. HOOK LOCATION	BOTTOM
VERTICAL ADJUSTMENTS	16" TELESCOPING SQUARE SHAFT (10" ADJ. ON 8'-0" C.H.)

QUANTITY	CEILING HEIGHT





TOP VIEW

ARCHITECT		DATE	
CONTRACTOR		DATE REV	
DISTRIBUTOR		DRAWN BY	
PROJECT		JOB #	
		SHEET	

3555 SCARLET OAK BLVD. ST. LOUIS, MO 63122 PH 636-225-4700 800-377-6625 FAX 636-225-9090
Contact us by email at inquiry@arnelson.com or visit our website www.arnelson.com

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Tray, Patient, Overbed, Stretcher Accessory**
Alt ID: TRY-OBS
Manufacturer: Hillrom - Bed & Stretcher Group (800-445-3730)
Mfr #:
Vendor: Hillrom - Bed & Stretcher Group (800-445-3730)
Vendor #:
Model: P490B - Tray, Patient, Overbed, Stretcher Accessory
Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	0-Unassigned	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
				Total:	**29**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Television, 36-43 in., Flat Panel

Manufacturer: LG Commercial Products ((888) 865-3026)

Vendor: LG Commercial Products ((888) 865-3026)

Model: 43 in. UT672M Series 4K UHD Pro:Centric Smart

Alt ID: TV4-3CM

Mfr #: 43UT672M0UC

Vendor #: 43UT672M0UC

43-inch flat panel television. Featuring 4K ULTRA HD Resolution, Pro Centric with Integrated Pro Idiom, USB Data Cloning, Pillow Speaker Interface. Direct backlight unit, 3840 x 2160 (UHD), 300 nits brightness, 60 Hz refresh rate, HDR 10 Pro, Tru 4K Upscaler, LG Connect (LG TV Plus App), Kensington Lock, Ceramic Black color, VESA 200 x 200. UL-Listed Healthcare TV, RoHS Compliant, California Energy Commission (CEC) Compliant.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	38.31 in (973 mm)	**Left:**	N/A
Depth:	3.35 in (85 mm)	**Right:**	N/A
Height:	22.52 in (572 mm)	**Front:**	N/A
Max Weight:	18 lbs (8.0 kg)	**Back:**	N/A
Mounting:	Special	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	110
Hz:	60	**Amps:**	.9166
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect without stand (Depth: Front to VESA).

Depth with stand: 3.3 inch

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C027; C050	Alcove/Patient Tracking-Corridors	Project	Draft (New)	2	
ED/1st Flr	C329	Waiting Rm	Project	Draft (New)	1	
ED/1st Flr	C466	Waiting Rm/Public	Project	Draft (New)	1	
				Total:	**4**	

*Actual product appearance may differ from the above simulated scene.

UL Listed Ultra HD Hospital TV

UT672M Series

Commercial Lite	Pro:Centric	Pro:Centric Enhanced	**Pro:Centric Smart**

The UT672M Hospital TV series provides advanced technology designed to meet the needs of patients and staff. A cost-effective solution for healthcare facilities, the TV features include Pillow Speaker support and Hospital UL Certification, which are designed to enhance patient-centered care.

LG | Business Solutions

UL Listed Ultra HD Hospital TV

UT672M SERIES

FEATURES FOR THE HOSPITAL ENVIRONMENT

Pillow Speaker Ready

Audio and video can be controlled directly by a pillow speaker for patient convenience.*

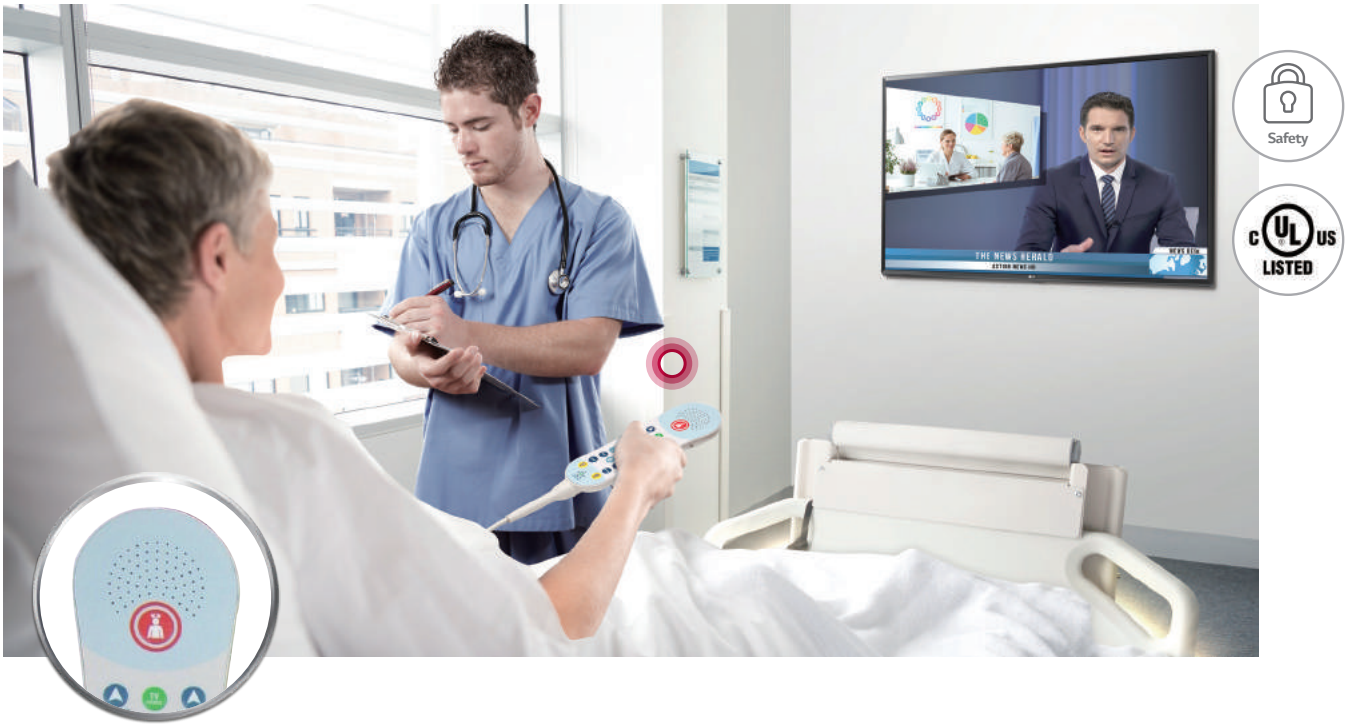
* Requires third-party pillow speaker.

Nurse Call System

Improve patient care and staff response with this reliable nurse call system using a pillow speaker. Hospital staff can quickly and easily be called when needed.

UL Hospital Grade Listed

The UT672M series is UL listed for use in healthcare and hospital environments.



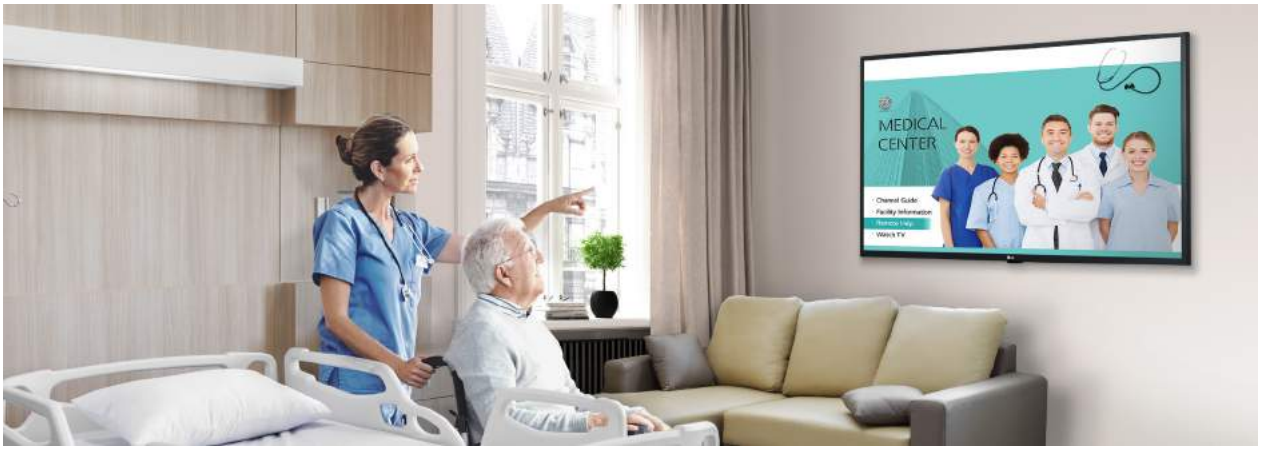
UL Listed Ultra HD Hospital TV

UT672M SERIES

FEATURE HIGHLIGHTS

Pro:Centric Application Platform

An industry-leading television that supports the Pro:Centric platform, LG's new UT672M Series allows healthcare facilities to customize the patient room experience. The Pro:Centric application enables the UT672M to provide an interactive program guide and display facility information, such as dietary menus and patient room information.*



* May require additional software and hardware to support third-party partner interactive systems or LG's Free-to-Guest Mode / Pro:Centric application

First Use Wizard

The First Use Wizard offers quick configuration options including Express Script, which allows you to easily enable and configure Hospital Mode features.

Pro:Idiom

Digital Rights Management (DRM) technology unlocks access to premium content to help assure rapid and broad deployment of HDTV and other high-value digital content.

Above screen image is simulated.

UL Listed Ultra HD Hospital TV

UT672M SERIES

FEATURE HIGHLIGHTS

Ultra HD 4K Resolution

UHD delivers a resolution four times higher than that of Full HD, creating a more realistic and immersive television viewing experience. The stunning 8.3 million pixels create flawless images with incredibly vivid detail.

Instant On

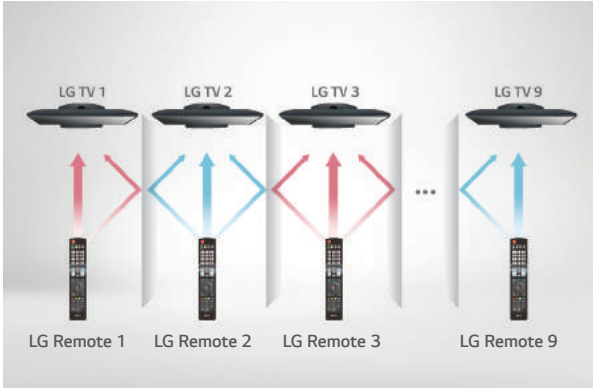
When the TV is turned off, the Instant On feature allows the Pro:Centric app to remain loaded giving guests quick access to content when they turn on the TV.

Self Diagnostics via USB

The UT672M TV Series stores 24-hour diagnostic data, which can be saved to a USB memory device, enabling service engineers to identify technical issues quickly and easily.

Multi-code IR

Multi-code IR* function eliminates any remote control signal interference between TVs in rooms with multiple TVs installed.



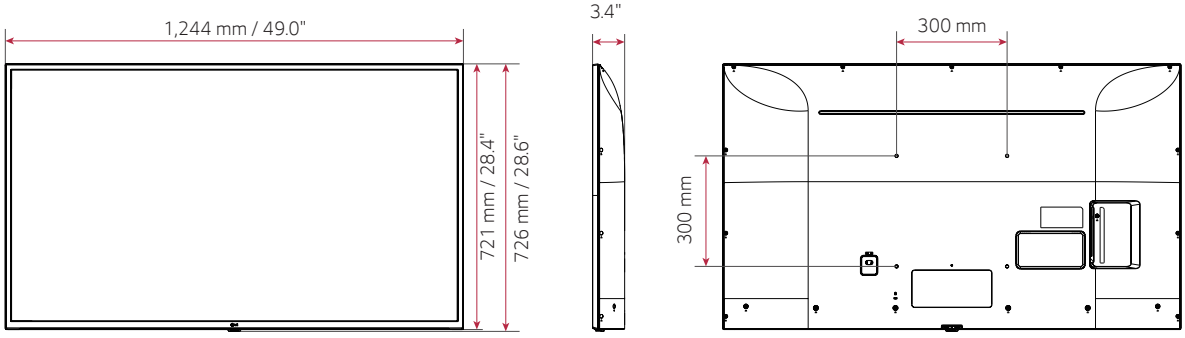
* Requires optional multi-code IR remote.

UL Listed Ultra HD Hospital TV

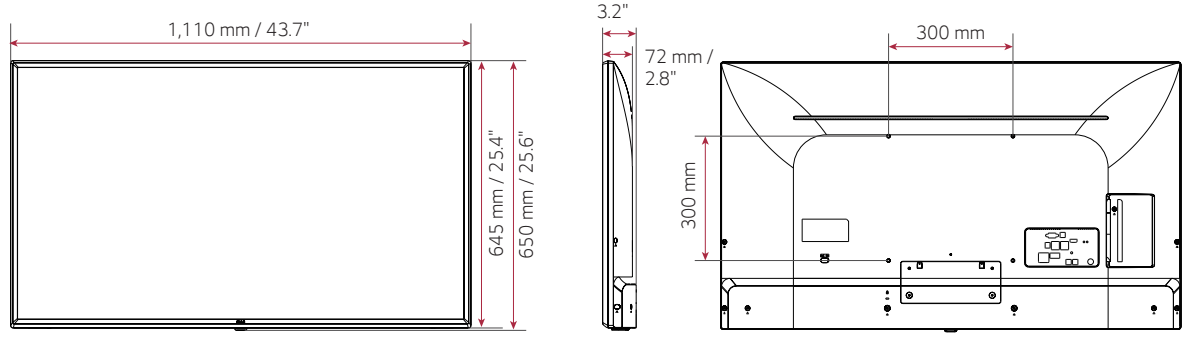
UT672M SERIES

DIMENSIONS

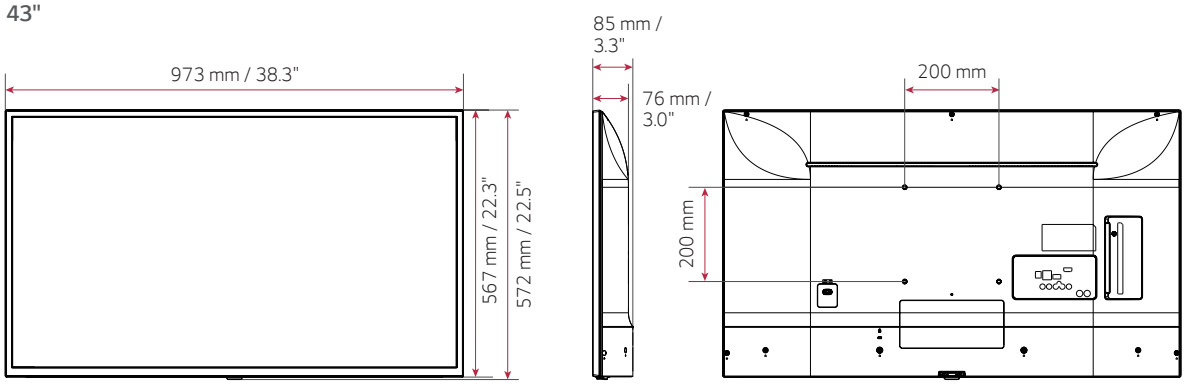
55"



49"



43"



Design and specifications subject to change without notice. Please contact your LG sales team to verify before ordering.

UL Listed Ultra HD Hospital TV

UT672M SERIES

SPECIFICATIONS

		43UT672M0UC	49UT672M0UB	55UT672M0UC
DISPLAY	Diagonal Size	43"	49"	55"
	Resolution	3840 x 2160 (UHD)	3840 x 2160 (UHD)	3840 x 2160 (UHD)
	Backlight Unit Type	Direct	Direct	Direct
	Brightness	300 nits	400 nits	400 nits
	Dynamic Contrast Ratio (Dynamic MCI (Hz))	1,000,000:1	1,000,000:1	1,000,000:1
	Static (Panel) Contrast Ratio	1200:1	1200:1	1300:1
	Refresh Rate	60 Hz	60 Hz	60 Hz
	Response Time (G to G)	8 ms	9 ms	8 ms
	Life Span	30,000 hours	30,000 hours	30,000 hours
VIDEO	HDR 10 Pro	Yes	Yes	Yes
	HDR HLG	Yes	Yes	Yes
	UHD Contents Streaming Support	USB / IP / HDMI / RF	USB / IP / HDMI / RF	USB / IP / HDMI / RF
	Tru 4K Upscaler	Yes	Yes	Yes
BROADCASTING	Digital	ATSC / Clear QAM / VSB	ATSC / Clear QAM / VSB	ATSC / Clear QAM / VSB
	Analog	NTSC	NTSC	NTSC
	MPEG-2 / MPEG-4 H.264 Decoding	Yes	Yes	Yes
AUDIO	Speaker (Sound Output)	10 W + 10 W	10 W + 10 W	10 W + 10 W
	Speaker System	2.0 ch	2.0 ch	2.0 ch
	One Touch Sound Tuning	Yes	Yes	Yes
	LG Sound Sync	Yes	Yes	Yes
HOSPITALITY	Pro:Centric Data Streaming (IP & RF)	Yes	Yes	Yes
	Pro:Centric IP Return Path	Yes	Yes	Yes
	Pro:Centric webRTC (Real Time Communication)	Yes	Yes	Yes
	Pro:Centric Direct (HTML)	Yes	Yes	Yes
	Pro:Centric Application (Java)	Yes	Yes	Yes
	Pro:Idiom Software DRM	Yes	Yes	Yes
SMART FEATURES	Smart Launcher	Yes	Yes	Yes
	Web Browser	Yes	Yes	Yes
	Pre-loaded Apps	Yes	Yes	Yes
	Magic Motion Remote (MMR) Compatible	Yes	Yes	Yes
	SoftAP	Yes	Yes	Yes
	Wi-Fi	Yes	Yes	Yes
	Screen Share (Miracast / WiDi)	Yes	Yes	Yes
	Smart Share (DLNA)	Yes	Yes	Yes
	LG Connect (LG TV Plus App)	Yes	Yes	Yes
	DIAL	Yes	Yes	Yes
	Beacon	Yes	Yes	Yes
	Bluetooth Audio Playback	Yes	Yes	Yes

UL Listed Ultra HD Hospital TV

UT672M SERIES

SPECIFICATIONS

		43UT672M0UC	49UT672M0UB	55UT672M0UC
OTHER FEATURES	First Use Wizard	Yes	Yes	Yes
	USB Data Cloning	Yes	Yes	Yes
	WOL	Yes	Yes	Yes
	SNMP	Yes	Yes	Yes
	SI Compatible	Yes (MPI, RS-232C)	Yes (MPI, RS-232C)	Yes (MPI, RS-232C)
	Simplink (HDMI-CEC) plus CEC-HTNG	Yes (1.4)	Yes (1.4)	Yes (1.4)
	IR Out	Yes (MPI, RS-232C)	Yes (MPI, RS-232C)	Yes (MPI, RS-232C)
	Multi-code IR	Yes	Yes	Yes
	Installer Menu	Yes	Yes	Yes
	Welcome Screen (Boot Logo)	Yes	Yes	Yes
	Instant On	Yes	Yes	Yes
	VLAN	Yes	Yes	Yes
	RJP (Remote Jack Pack) Compatibility	HDMI (CEC)	HDMI (CEC)	HDMI (CEC)
	USB Auto Playback	Yes	Yes	Yes
	Auto Off / Sleep Timer	Yes / Yes	Yes / Yes	Yes / Yes
	Smart Energy Saving	Yes	Yes	Yes
	Motion Eye Care	Yes	Yes	Yes
	Embedded *b*-LAN	Yes	Yes	Yes
	UL Hospital Grade Listed	Yes	Yes	Yes
	Pillow Speaker Interface	Yes	Yes	Yes
INTERFACES	HDMI In	2 (2.0)	2 (2.0)	2 (2.0)
	USB	2 (2.0)	2 (2.0)	2 (2.0)
	RF In	Yes	Yes	Yes
	Optical Digital Audio Out	Yes	Yes	Yes
	RS-232C In (Control & Service)	3.5 mm (TXD, RXD, IR Out, GND)	3.5 mm (TXD, RXD, IR Out, GND)	3.5 mm (TXD, RXD, IR Out, GND)
	LAN (RJ45)	Yes (Ethernet)	Yes (Ethernet)	Yes (Ethernet)
	Speaker Out / Line Out	3.5 mm Stereo Jack	3.5 mm Stereo Jack	3.5 mm Stereo Jack
	TV-Link Configuration (for *b*-LAN)	Yes	Yes	Yes
	Game Control / MPI (RJ12)	Yes	Yes	Yes
	Service Port	3.5 mm Stereo Jack	3.5 mm Stereo Jack	3.5 mm Stereo Jack
	Pillow Speaker (6 pin DIN)	Yes	Yes	Yes
MECHANICALS	Front Color	Ceramic Black	Ceramic Black	Ceramic Black
	VESA Compatible (W x H)	200 x 200	300 x 300	300 x 300
	Kensington Lock	Yes	Yes	Yes
	Weight	17.6 lbs / 8.0 kg	24.5 lbs / 11.1 kg	31.5 lbs / 14.3 kg
	Shipping Weight	22.3 lbs / 10.1 kg	29.1 lbs / 13.2 kg	42.6 lbs / 19.3 kg
	Dimensions without Stand (W x H x D) (Depth: Front to VESA)	38.3" x 22.5" x 3.0" / 973 x 572 x 76 mm	43.7" x 25.6" x2.8" / 1,110 x 650 x 72 mm	49" x 28.6" x 3.4" / 1,244 x 726 x 87 mm
	Dimensions without Stand (W x H x D) (Depth: Front to Lower Back)	38.3" x 22.5" x 3.3" / 973 x 572 x 85 mm	43.7" x 25.6" x 3.2" / 1,110 x 650 x 81 mm	49.0" x 28.6" x 3.4" / 1,244 x 726 x 87 mm
	Shipping Dimensions (W x H x D)	41.7" x 26.0" x 6.0" / 1,060 x 660 x 152 mm	47.0" x 30.3" x 6.2" / 1,193 x 770 x 158 mm	53.5" x 32.9" x 6.9" / 1,360 x 835 x 175 mm
	Bezel Width (L / R / T / B)	14 / 14 / 14 / 20 mm	17 / 17 / 17 / 21 mm	16 / 16 / 16 / 22 mm
POWER	Power Supply	120 V, 50 / 60 Hz	120 V, 50 / 60 Hz	120 V, 50 / 60 Hz
	Max Power Consumption	110 W	125 W	165 W
	Typical Power Consumption	53 W	56 W	71 W
	Standby Power Consumption	Less than 0.5 W	Less than 0.5 W	Less than 0.5 W
WARRANTY & OTHER	Standards	UL	UL	UL
	EMC Certification	FCC	FCC	FCC
	Accessories	Power Cord	Power Cord	Power Cord
	Chromecast Anti-theft Cover	Yes (Optional)	Yes (Optional)	Yes (Optional)
	Power Cord	1.8 m, Right Angle	1.8 m, Right Angle	1.8 m, Right Angle
	Warranty	Two-Year Limited Warranty	Two-Year Limited Warranty	Two-Year Limited Warranty
	UPC	7 19192 63101 4	7 19192 63100 7	7 19192 63099 4

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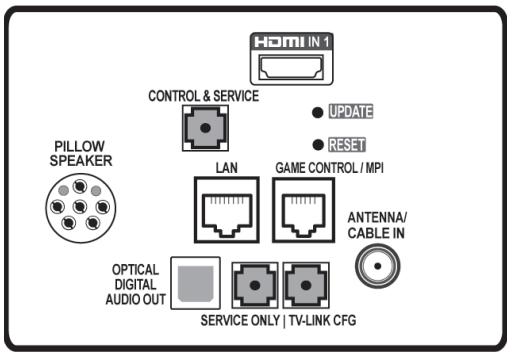
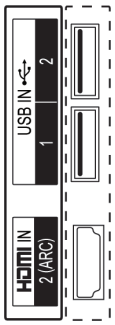
CONNECTIVITY





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www.linkedin.com/company/lg-commercial-displays-usa
www.youtube.com/lgcommercialdisplayusa
800-228-1236 | Hospitality Sales

SPEC_UT672M_1019SD_LR

LG Business Solutions

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Television, 36-43 in., Flat Panel

Manufacturer: LG Commercial Products ((888) 865-3026)

Vendor: LG Commercial Products ((888) 865-3026)

Model: 43 in. UT672M Series 4K UHD Pro:Centric Smart

Alt ID: TV4-3CM

Mfr #: 43UT672M0UC

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43-inch flat panel television. Featuring 4K ULTRA HD Resolution, Pro Centric with Integrated Pro Idiom, USB Data Cloning, Pillow Speaker Interface. Direct backlight unit, 3840 x 2160 (UHD), 300 nits brightness, 60 Hz refresh rate, HDR 10 Pro, Tru 4K Upscaler, LG Connect (LG TV Plus App), Kensington Lock, Ceramic Black color, VESA 200 x 200. UL-Listed Healthcare TV, RoHS Compliant, California Energy Commission (CEC) Compliant.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V	**Type:** Non-Medical	**Green:** Yes

Physical Requirements

Width:	38.31 in (973 mm)	**Left:**	N/A
Depth:	3.35 in (85 mm)	**Right:**	N/A
Height:	22.52 in (572 mm)	**Front:**	N/A
Max Weight:	18 lbs (8.0 kg)	**Back:**	N/A
Mounting:	Special	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	110
Hz:	60	**Amps:**	.9166
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Dimensions reflect without stand (Depth: Front to VESA).

Depth with stand: 3.3 inch

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
				Total:	**1**	

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UL Listed Ultra HD Hospital TV

UT672M Series

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UL Listed Ultra HD Hospital TV

UT672M SERIES

FEATURES FOR THE HOSPITAL ENVIRONMENT

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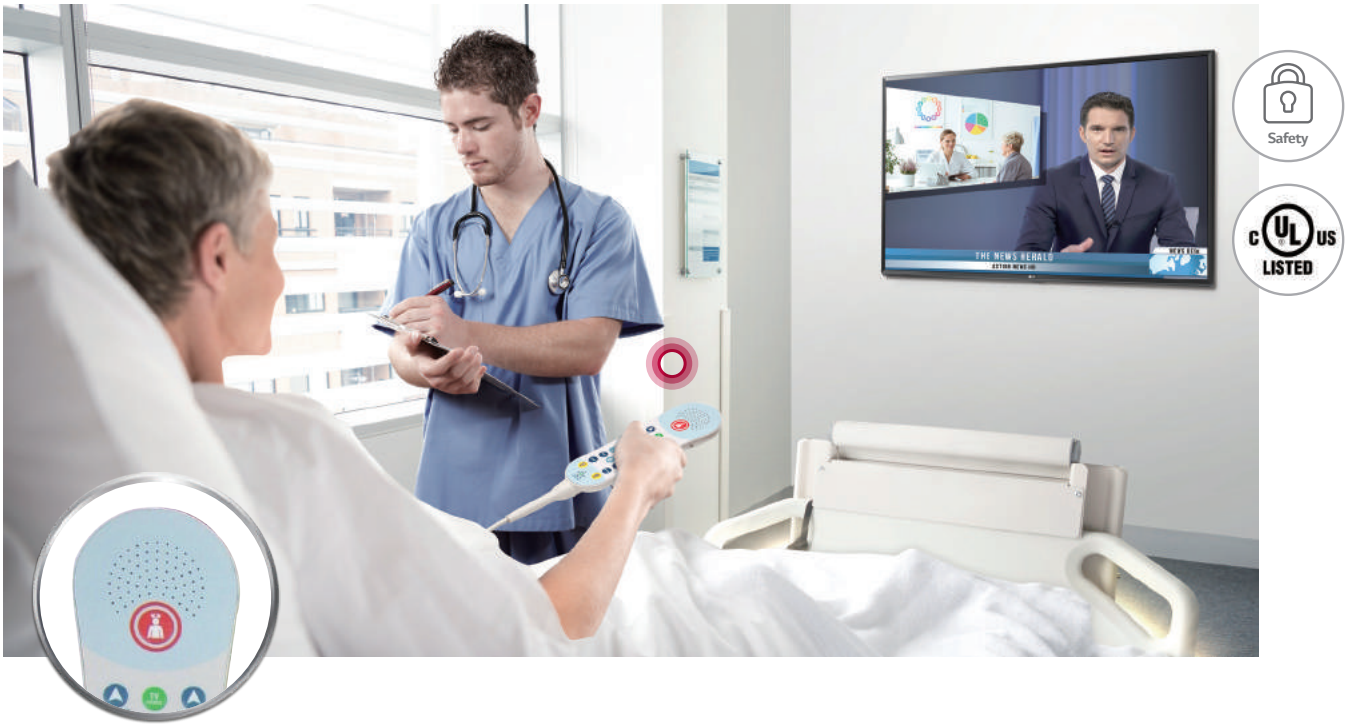

UL Listed Ultra HD Hospital TV

UT672M SERIES

FEATURE HIGHLIGHTS

Pro:Centric Application Platform

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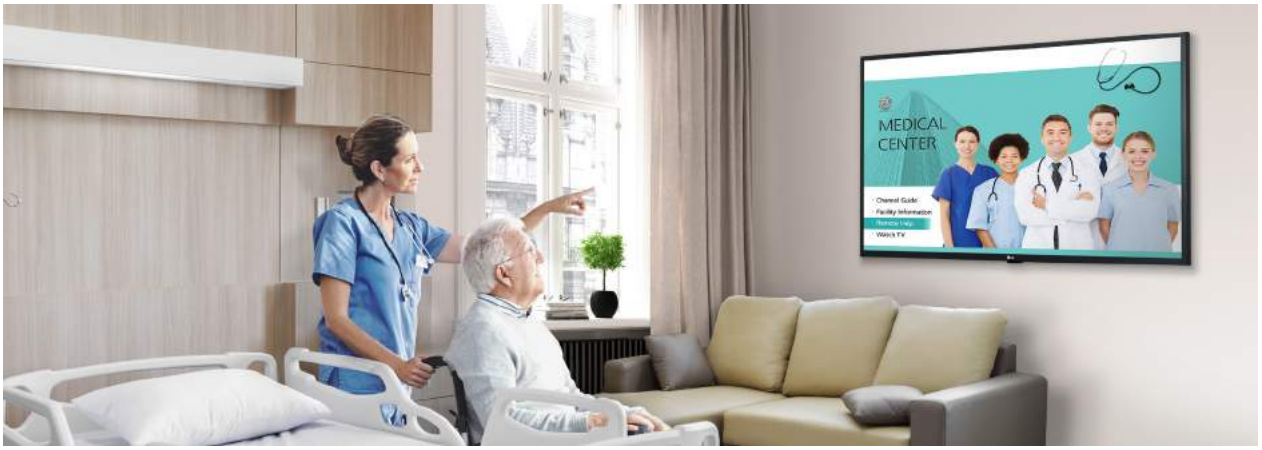

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UT672M SERIES

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UHD delivers a resolution four times higher than that of Full HD, creating a more realistic and immersive television viewing experience. The stunning 8.3 million pixels create flawless images with incredibly vivid detail.

Instant On

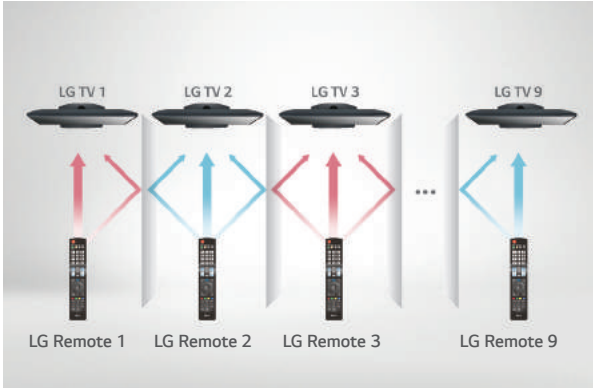
When the TV is turned off, the Instant On feature allows the Pro:Centric app to remain loaded giving guests quick access to content when they turn on the TV.

Self Diagnostics via USB

The UT672M TV Series stores 24-hour diagnostic data, which can be saved to a USB memory device, enabling service engineers to identify technical issues quickly and easily.

Multi-code IR

Multi-code IR* function eliminates any remote control signal interference between TVs in rooms with multiple TVs installed.



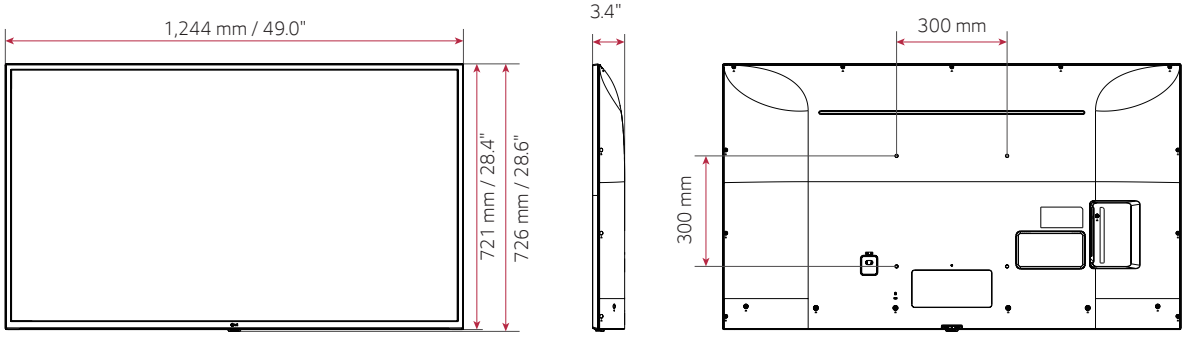
* Requires optional multi-code IR remote.

UL Listed Ultra HD Hospital TV

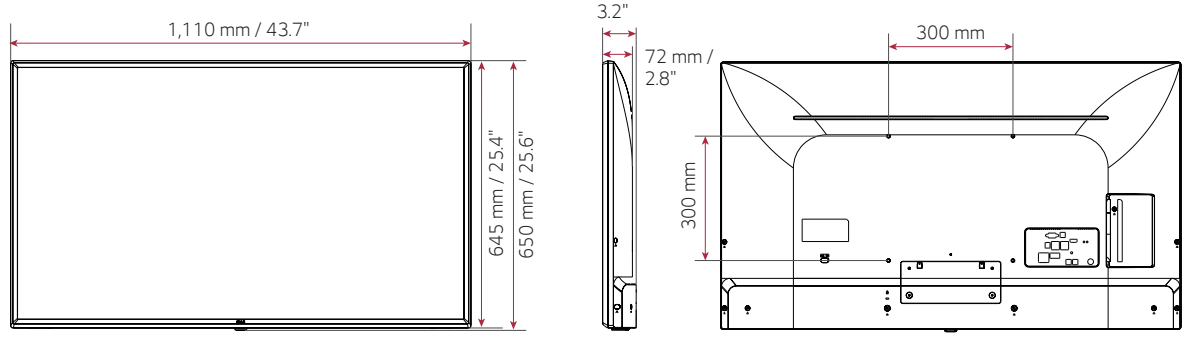
UT672M SERIES

DIMENSIONS

55"



49"



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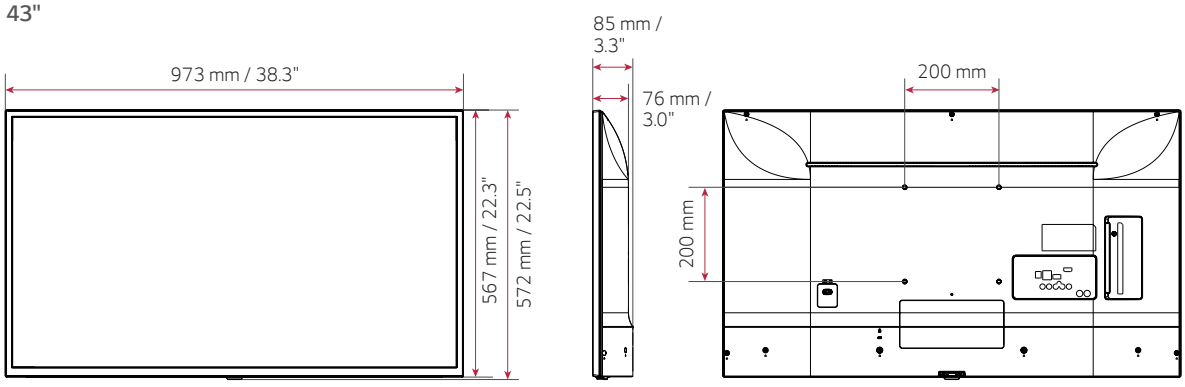

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UL Listed Ultra HD Hospital TV

UT672M SERIES

SPECIFICATIONS

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	Brightness	300 nits	400 nits	400 nits
	Dynamic Contrast Ratio (Dynamic MCI (Hz))	1,000,000:1	1,000,000:1	1,000,000:1
	Static (Panel) Contrast Ratio	1200:1	1200:1	1300:1
	Refresh Rate	60 Hz	60 Hz	60 Hz
	Response Time (G to G)	8 ms	9 ms	8 ms
	Life Span	30,000 hours	30,000 hours	30,000 hours
VIDEO	HDR 10 Pro	Yes	Yes	Yes
	HDR HLG	Yes	Yes	Yes
	UHD Contents Streaming Support	USB / IP / HDMI / RF	USB / IP / HDMI / RF	USB / IP / HDMI / RF
	Tru 4K Upscaler	Yes	Yes	Yes
BROADCASTING	Digital	ATSC / Clear QAM / VSB	ATSC / Clear QAM / VSB	ATSC / Clear QAM / VSB
	Analog	NTSC	NTSC	NTSC
	MPEG-2 / MPEG-4 H.264 Decoding	Yes	Yes	Yes
AUDIO	Speaker (Sound Output)	10 W + 10 W	10 W + 10 W	10 W + 10 W
	Speaker System	2.0 ch	2.0 ch	2.0 ch
	One Touch Sound Tuning	Yes	Yes	Yes
	LG Sound Sync	Yes	Yes	Yes
HOSPITALITY	Pro:Centric Data Streaming (IP & RF)	Yes	Yes	Yes
	Pro:Centric IP Return Path	Yes	Yes	Yes
	Pro:Centric webRTC (Real Time Communication)	Yes	Yes	Yes
	Pro:Centric Direct (HTML)	Yes	Yes	Yes
	Pro:Centric Application (Java)	Yes	Yes	Yes
	Pro:Idiom Software DRM	Yes	Yes	Yes
SMART FEATURES	Smart Launcher	Yes	Yes	Yes
	Web Browser	Yes	Yes	Yes
	Pre-loaded Apps	Yes	Yes	Yes
	Magic Motion Remote (MMR) Compatible	Yes	Yes	Yes
	SoftAP	Yes	Yes	Yes
	Wi-Fi	Yes	Yes	Yes
	Screen Share (Miracast / WiDi)	Yes	Yes	Yes
	Smart Share (DLNA)	Yes	Yes	Yes
	LG Connect (LG TV Plus App)	Yes	Yes	Yes
	DIAL	Yes	Yes	Yes
	Beacon	Yes	Yes	Yes
	Bluetooth Audio Playback	Yes	Yes	Yes

UL Listed Ultra HD Hospital TV

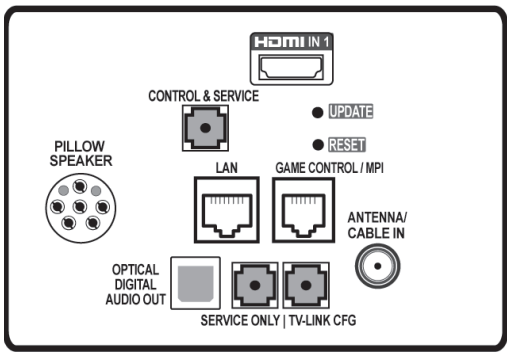
UT672M SERIES

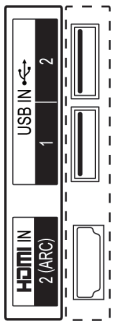
SPECIFICATIONS

		43UT672M0UC	49UT672M0UB	55UT672M0UC
OTHER FEATURES	First Use Wizard	Yes	Yes	Yes
	USB Data Cloning	Yes	Yes	Yes
	WOL	Yes	Yes	Yes
	SNMP	Yes	Yes	Yes
	SI Compatible	Yes (MPI, RS-232C)	Yes (MPI, RS-232C)	Yes (MPI, RS-232C)
	Simplink (HDMI-CEC) plus CEC-HTNG	Yes (1.4)	Yes (1.4)	Yes (1.4)
	IR Out	Yes (MPI, RS-232C)	Yes (MPI, RS-232C)	Yes (MPI, RS-232C)
	Multi-code IR	Yes	Yes	Yes
	Installer Menu	Yes	Yes	Yes
	Welcome Screen (Boot Logo)	Yes	Yes	Yes
	Instant On	Yes	Yes	Yes
	VLAN	Yes	Yes	Yes
	RJP (Remote Jack Pack) Compatibility	HDMI (CEC)	HDMI (CEC)	HDMI (CEC)
	USB Auto Playback	Yes	Yes	Yes
	Auto Off / Sleep Timer	Yes / Yes	Yes / Yes	Yes / Yes
	Smart Energy Saving	Yes	Yes	Yes
	Motion Eye Care	Yes	Yes	Yes
	Embedded *b*-LAN	Yes	Yes	Yes
	UL Hospital Grade Listed	Yes	Yes	Yes
	Pillow Speaker Interface	Yes	Yes	Yes
INTERFACES	HDMI In	2 (2.0)	2 (2.0)	2 (2.0)
	USB	2 (2.0)	2 (2.0)	2 (2.0)
	RF In	Yes	Yes	Yes
	Optical Digital Audio Out	Yes	Yes	Yes
	RS-232C In (Control & Service)	3.5 mm (TXD, RXD, IR Out, GND)	3.5 mm (TXD, RXD, IR Out, GND)	3.5 mm (TXD, RXD, IR Out, GND)
	LAN (RJ45)	Yes (Ethernet)	Yes (Ethernet)	Yes (Ethernet)
	Speaker Out / Line Out	3.5 mm Stereo Jack	3.5 mm Stereo Jack	3.5 mm Stereo Jack
	TV-Link Configuration (for *b*-LAN)	Yes	Yes	Yes
	Game Control / MPI (RJ12)	Yes	Yes	Yes
	Service Port	3.5 mm Stereo Jack	3.5 mm Stereo Jack	3.5 mm Stereo Jack
	Pillow Speaker (6 pin DIN)	Yes	Yes	Yes
MECHANICALS	Front Color	Ceramic Black	Ceramic Black	Ceramic Black
	VESA Compatible (W x H)	200 x 200	300 x 300	300 x 300
	Kensington Lock	Yes	Yes	Yes
	Weight	17.6 lbs / 8.0 kg	24.5 lbs / 11.1 kg	31.5 lbs / 14.3 kg
	Shipping Weight	22.3 lbs / 10.1 kg	29.1 lbs / 13.2 kg	42.6 lbs / 19.3 kg
	Dimensions without Stand (W x H x D) (Depth: Front to VESA)	38.3" x 22.5" x 3.0" / 973 x 572 x 76 mm	43.7" x 25.6" x2.8" / 1,110 x 650 x 72 mm	49" x 28.6" x 3.4" / 1,244 x 726 x 87 mm
	Dimensions without Stand (W x H x D) (Depth: Front to Lower Back)	38.3" x 22.5" x 3.3" / 973 x 572 x 85 mm	43.7" x 25.6" x 3.2" / 1,110 x 650 x 81 mm	49.0" x 28.6" x 3.4" / 1,244 x 726 x 87 mm
	Shipping Dimensions (W x H x D)	41.7" x 26.0" x 6.0" / 1,060 x 660 x 152 mm	47.0" x 30.3" x 6.2" / 1,193 x 770 x 158 mm	53.5" x 32.9" x 6.9" / 1,360 x 835 x 175 mm
	Bezel Width (L / R / T / B)	14 / 14 / 14 / 20 mm	17 / 17 / 17 / 21 mm	16 / 16 / 16 / 22 mm
POWER	Power Supply	120 V, 50 / 60 Hz	120 V, 50 / 60 Hz	120 V, 50 / 60 Hz
	Max Power Consumption	110 W	125 W	165 W
	Typical Power Consumption	53 W	56 W	71 W
	Standby Power Consumption	Less than 0.5 W	Less than 0.5 W	Less than 0.5 W
WARRANTY & OTHER	Standards	UL	UL	UL
	EMC Certification	FCC	FCC	FCC
	Accessories	Power Cord	Power Cord	Power Cord
	Chromecast Anti-theft Cover	Yes (Optional)	Yes (Optional)	Yes (Optional)
	Power Cord	1.8 m, Right Angle	1.8 m, Right Angle	1.8 m, Right Angle
	Warranty	Two-Year Limited Warranty	Two-Year Limited Warranty	Two-Year Limited Warranty
	UPC	7 19192 63101 4	7 19192 63100 7	7 19192 63099 4

Design and specifications subject to change without notice. Please contact your LG sales team to verify before ordering.

CONNECTIVITY





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SPEC_UT672M_1019SD_LR

LG Business Solutions

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Ventilator, Portable
Manufacturer: Philips Healthcare - Respironics ((800) 345-6443)
Vendor: Philips Healthcare - Respironics ((800) 345-6443)
Model: Trilogy EV-300

Alt ID: VNT-PTB
Mfr #:
Vendor #:
Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Ventilator, Adult / Pediatric / Neonatal

Manufacturer: Hamilton Medical, Inc. ((775) 858-3200)

Vendor: Hamilton Medical, Inc. ((775) 858-3200)

Model: Hamilton T1

Alt ID: VNT-TRP

Mfr #: 161006

Vendor #:

Item ID:

Adult/Pediatric/Neonatal ventilator. Features: Able to display over 50 monitoring parameters. Real time waveforms include Paw, Flow, Volume, Plethysmogram, Capnograph. Operator adjustable alarms. Operates via touch screen or push and turn knob. Ventilation cockpit, patient interfaces and ports, hot-swappable battery. Handle available in different styles. Includes set-up kit and one box of flow sensors. Options not included: APRV/DuoPAP, Trends/Loops or NIV/NIV-ST and must be ordered separately. Does not include optional trolley.

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	12.20 in (310 mm)	**Left:**	N/A
Depth:	10.60 in (269 mm)	**Right:**	N/A
Height:	11.70 in (297 mm)	**Front:**	N/A
Max Weight:	14 lbs (6.5 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	150
Hz:	60	**Amps:**	1.25
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height and depth reflects with handle.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	1	
				Total:	**1**	

HAMILTON-T1

Technical specification for SW 2.2.x

Ventilation modes

Mode form	Mode name	Mode	Adult/Ped	Neonatal
Volume-targeted modes, adaptive pressure controlled	APVcmv / (S)CMV+	Breaths are volume targeted and mandatory.	✓	✓
	APVsimv / SIMV+	Volume-targeted mandatory breaths can be alternated with pressure-supported spontaneous breaths.	✓	✓
Pressure-controlled modes	PCV+	All breaths, whether triggered by the patient or the ventilator, are pressure-controlled and mandatory.	✓	✓
	PSIMV+	Mandatory breaths are pressure controlled. Mandatory breaths can be alternated with pressure-supported spontaneous breaths.	✓	✓
	DuoPAP	Mandatory breaths are pressure controlled. Spontaneous breaths can be triggered at both pressure levels.	O	O
	APRV	Spontaneous breaths can be continuously triggered. The pressure release between the levels contributes to ventilation.	O	O
	SPONT	Every breath is spontaneous, with or without pressure-supported spontaneous breaths.	✓	✓
Intelligent ventilation	ASV	Operator sets %MinVol, PEEP, and Oxygen. Frequency, tidal volume, pressure, and I:E ratio are based on physiological input from the patient.	✓	--
Noninvasive modes	NIV	Every breath is spontaneous.	O	O
	NIV-ST	Every breath is spontaneous as long as the patient is breathing above the set rate. A backup rate can be set for mandatory breaths.	O	O
	nCPAP	Demand flow Nasal Continuous Positive Airway Pressure.	--	O
	nCPAP-PC	Breaths are pressure controlled and mandatory.	--	O
High flow oxygen therapy	HiFlowO2	High flow oxygen therapy. No supported breaths.	O	O

Standard: ✓ Option: O Not applicable: - -

Swiss Quality

HAMILTON MEDICAL

Intelligent Ventilation since 1983

Standard configuration and options (in alphabetical order)

Functions	Adult/Ped	Neonatal
Capnography, mainstream (volumetric) and sidestream	o	o
Communication ports: COM1 port, USB port, Nurse call	o	o
Communication protocols: for details see Connectivity brochure	o	o
Dynamic Lung	✓	--
Event log (up to 1000 events with data and time stamp)	✓	✓
Handles for various options (jet, ambulance, or bed rail mount)	o	o
IntelliTrig (leak compensation)	✓	✓
Languages (English, US-English, Chinese, Croatian, Czech, Danish, Dutch, Finnish, French, German, Greek, Hungarian, Indonesian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian, Slovak, Spanish, Swedish, Turkish)	✓	✓
Manual breath/prolonged inspiration	✓	✓
NBC filter (only for HAMILTON-T1 Military)	o	o
Nebulization, pneumatic	✓	--
Night Vision Goggles (NVG) option	o	o
O2 enrichment	✓	✓
Oxygen adjustable from 21% to 100%	✓	✓
Patient group	✓	o
Print screen	✓	✓
Screen lock	✓	✓
Second battery (hot-swappable)	o	o
Speak valve compatibility	o	--
SpO2 monitoring	o	o
Standby with timer	✓	✓
Suctioning tool	✓	--
Trends/Loops	o	o
Flow trigger	✓	✓
Vent Status (Visual representation of ventilator dependence)	✓	✓

Standard: ✓ Option: o Not available: --

Technical performance

Description	Specification
Automatic expiratory base flow	Adult/Ped: Fixed at 3 l/min Neonatal: Fixed at 4 l/min
Inspiratory pressure	0 to 60 cmH2O
Maximum inspiratory flow	260 l/min (120 l/min with 100% O2)
Minimum expiratory time	20% of cycle time; 0.2 to 0.8 seconds
Means of inspiratory triggering	Flow trigger control
Oxygen mixer accuracy	± (volume fraction of 2.5% + 2.5% of actual reading)
Preoperational checks	Tightness test, Flow Sensor/O2 sensor/CO2 sensor calibration
Tidal volume	Adult/Ped: 20 to 2000 ml Neonatal: 2 to 300 ml
Brightness setting for display	The range is 10% to 100% brightness. By default, Day is set to 80%; Night is set to 40%.
Brightness with NVG option	The range is 1 to 10. The default is 5.

Standards and approvals

Classification	Class IIb, continuously operating according to EC directive 93/42/EEC
Certification	IEC 60601-1:2005/A1:2012, IEC 60601-1-2:2014, ANSI/AAMI ES60601-1:2005/(R)2012, ISO 80601-2-12:2011, CAN/CSA-C22.2 No. 60601-1:14, EN ISO 5356-1:2015, ISO 80601-2-55:2011
Declaration	The HAMILTON-T1 was developed in accordance with pertinent international standards and FDA guidelines. The ventilator is manufactured within an EN ISO 13485 and EN ISO 9001, Council Directive 93/42/EEC, Annex II, Article 3 certified quality management system. The ventilator meets the Essential Requirements of Council Directive 93/42/EEC, Annex I.
Electromagnetic compatibility	According IEC 60601-2:2014
Air transport compatibility	EN1789:2007+A2:2014, EN 13718-1:2014, EN 794-1:1997 +A2:2009, RTCA/DO-160G, MIL-STD-461F, MIL-STD-810G, Chg. 1, Meth 500.6, Proc. II Operation/Air Carriage, mod.
Safety Class	Class II, Type B applied part (ventilator breathing system, VBS), type BF applied part CO2 sensor including CO2 module connector; SpO2 sensor including adapter, continuous operation according to IEC 60601-1

Pneumatic performance

High-pressure O2	Pressure:	2.8 to 6 bar / 41 to 87 psi
	Connector:	DISS (CGA 1240) or NIST
Low-pressure O2	Pressure:	Maximum 6 bar / 87 psi
	Connector:	Quick-coupling system, compatible with Colder Products Company (CPC) PMC series
Air supply	Integrated turbine	
Inspiratory outlet (To patient port)	Connector:	ISO ID15/OD22 conical
Expiratory outlet (From patient port)	Connector (on expiratory valve)	ISO ID15/OD22 conical

Electrical specifications

Input power	100 to 240 VAC ±10%, 50/60 Hz 12 to 28 VDC (total range 10.2 to 30.3 VDC)	
Power consumption	50 VA typical, 150 VA maximum	
Battery	Electrical specifications:	10.8 V DC, 6.7 Ah, 72 Wh, 50 W typical, 150 W maximum
	Type:	Lithium-ion, supplied by Hamilton Medical only
	Normal operating time:	Typically 4 hours with one battery, 8 hours with two batteries One battery, display brightness = 80%: 4 h One battery, display brightness = 20%: 4.5 h Two batteries, display brightness = 80%: 8 h Two batteries, display brightness = 20%: 9.25 h

Graphical patient data

Graphic type/tab name	**Options**
Waveforms	Pressure, Volume, Flow, PCO2 [1], FCO2 [1], Plethysmogram[2]
Intelligent panels	Dynamic Lung [3], Vent Status, ASV Graph [4]
Trends	1-, 6-, 12-, 24-, or 72-h[5] trend data for a selected parameter or combination of parameters
Loops	Pressure/Volume, Pressure/Flow, Volume/Flow, Volume/PCO2[1], Volume/FCO2[1]

Alarms[6]

Priority	**Alarm**
High priority	Apnea time (s), ExpMinVol high/low (l/min), Oxygen high/low (%), Pressure high/low (cmH2O), Flow sensor calibration needed, Exhalation obstructed, Disconnection, Oxygen supply failed
Medium priority	fTotal high/low (b/min), PetCO2 high/low (mmHg), Pressure limitation (cmH2O), Vt high/low (ml), SpO2 high/low, High PEEP, Loss of PEEP, Pulse high/low
Low priority	High SpO2, Loss of external power

[1] CO2 option required.
[2] SpO2 option required.
[3] Only for adult/pediatric patients.
[4] Only in ASV mode.
[5] 72-hour trend not available in all markets.
[6] For a complete list of alarms, see your ventilator *Operator's Manual*.

Control settings and ranges[7]

Parameter (units)	Range Adult/Ped	Range Neonatal
Apnea backup	On, Off	On, Off
ETS (%)	5 to 80	5 to 80
Flow (l/min)	2 to 80[8]	2 to 12
Flow trigger (l/min)	1 to 20	0.1 to 5
Height (cm)	30 to 250	--
Height (in)	12 to 98	--
I:E	1:9 to 4:1	1:9 to 4:1
%MinVol (%)	25 to 350	--
Oxygen (%)	21 to 100	21 to 100
PEEP (cmH2O)	0 to 35	3 to 25
Pasvlimit (cmH2O)	5 to 60	--
Pcontrol (cmH2O)	5 to 60	3 to 45
Phigh APRV (cmH2O)	0 to 60	0 to 45
Phigh DuoPAP (cmH2O)	0 to 60	3 to 45
Pinsp (cmH2O)	3 to 60	3 to 45
Plow APRV (cmH2O)	0 to 35	0 to 25
Pramp (ms)	0 to 2000	0 to 600
Psupport (cmH2O)	0 to 60	0 to 45
Rate (b/min)	1 to 80	1 to 80
Sex	Male, Female	--
Sigh	On, Off	--
SpO2 monitoring	On, Off	On, Off
SpeakValve	On, Off	--
TI (s)	0.1 to 12	0.1 to 12
TI max (s)	1 to 3	0.25 to 3
Thigh APRV (s)	0.1 to 40	0.1 to 40
Thigh DuoPAP (s)	0.1 to 40	0.1 to 40
Tlow APRV (s)	0.2 to 40	0.2 to 40
Vt (ml)	20 to 2000	2 to 300
Vt/Weight (ml/kg)	--	5 to 12
Weight (kg)	--	0.2 to 30

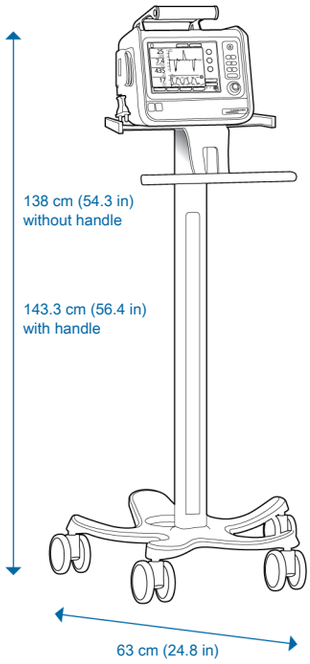
[7] Parameter settings and ranges can vary depending on the selected mode.
[8] Flow limited to 60 l/min in some markets.

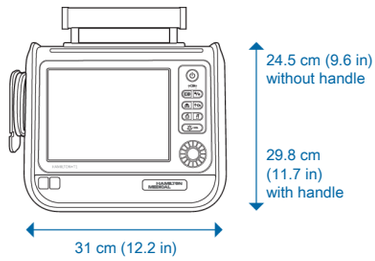
Monitoring parameters

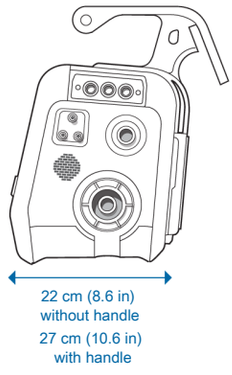
Parameter (units)		Description
Pressure	AutoPEEP (cmH2O)	Unintended positive end-expiratory pressure
	PEEP/CPAP (cmH2O)	PEEP (positive end-expiratory pressure) and CPAP (continuous positive airway pressure)
	Pinsp (cmH2O)	Inspiratory pressure
	Pmean (cmH2O)	Mean airway pressure
	Ppeak (cmH2O)	Peak airway pressure
	Pplateau (cmH2O)	Plateau or end-inspiratory pressure
Flow	Control Flow (l/min)	The set flow of gas to the patient when using HiFlowO2.
	Flow (l/min)	In nCPAP mode, the average flow, updated every second. In nCPAP-PC mode, the average flow during expiration, updated every breath.
	Insp Flow (peak) (l/min)	Peak inspiratory flow, spontaneous or mandatory
	Exp Flow (peak) (l/min)	Peak expiratory flow
Volume	ExpMinVol or MinVol NIV (l/min)	Expiratory minute volume
	MVSpont or MVSpont NIV (l/min)	Spontaneous expiratory minute volume
	VTE or VTE NIV (ml)	Expiratory tidal volume
	VTI (ml)	Inpiratory tidal volume
	VLeak (%)	Leakage percent or total minute volume leakage
	MVLeak (l/min)	Leakage percent or total minute volume leakage
CO2	FetCO2 (%)	Fractional end-tidal CO2 concentration
	PetCO2 (mmHg)	End-tidal CO2 pressure
	slopeCO2 (%CO2/l)	Slope of the alveolar plateau in the PetCO2 curve, indicating the volume/flow status of the lungs
	V'alv (l/min)	Alveolar minute ventilation
	Vtalv (ml)	Alveolar tidal ventilation
	V'CO2 (ml/min)	CO2 elimination
	VDaw (ml)	Airway dead space
	VDaw/VTE (%)	Airway dead space fraction at the airway opening
	VeCO2 (ml)	Exhaled CO2 volume
	ViCO2 (ml)	Inspired CO2 volume
SpO2	SpO2 (%)	Oxygen saturation
	Pulse (1/min)	Pulse
	SpO2/FiO2 (%)	The SpO2/FiO2 ratio (%) is an approximation of the PaO2/FiO2 ratio, which, in contrast to PaO2/FiO2, can be calculated noninvasively and continuously.
	PI (%)	Perfusion index
	PVI (%)	Pleth variability index
	SpCO (%)	Carboxyhaemoglobin saturation

Parameter (units)		Description
SpO2	SpMet (%)	Methaemoglobin saturation
	SpHb (g/dl or mmol/l)	Total haemoglobin
	SpOC (ml/dl)	Oxygen content
Oxygen	Oxygen (%)	Oxygen concentration of the delivered gas
	Oxygen consumption (l/min)	The current oxygen consumption rate
Time	I:E	Inspiratory:expiratory ratio
	fControl (b/min)	Mandatory breath frequency
	fSpont (b/min)	Spontaneous breathing frequency
	fTotal (b/min)	Total breathing frequency
	TI (s)	Inspiratory time
	TE (s)	Expiratory time
Lung mechanics	Cstat (ml/cmH2O)	Static compliance
	P0.1 (cmH2O)	Airway occlusion pressure
	PTP (cmH2O*s)	Pressure time product
	RCexp (s)	Expiratory time constant
	Rinsp (cmH2O / (l/s))	Inspiratory flow resistance
	RSB (1 / (l*min))	Rapid shallow breathing index

Physical characteristics







Weight	6.5 kg (14.3 lb) 18.5 kg (40.8 lb) with trolley The trolley can accommodate a maximum safe working load of 44 kg (97 lb)
Dimensions	See graphic above
Monitor	Type: TFT color Size: 640 x 480 pixels, 8.4 in (214 mm) diagonal
Trolley accessories	HAMILTON-H900 mounting system, optional O2 bottle holding system, optional tubing support arm

Manufacturer:

Hamilton Medical AG

Via Crusch 8, 7402 Bonaduz, Switzerland

☎ +41 58 610 10 20

info@hamilton-medical.com

www.hamilton-medical.com

689334/08

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Wheelchair, Adult, Transport**
Manufacturer: STAXI Corporation Ltd. (877-677-8294)
Vendor: STAXI Corporation Ltd. (877-677-8294)
Model: Ranger Chair w/ Cushion [RA010-C]

Alt ID: WHC-ADB
Mfr #: RA010-C
Vendor #: RA010-C

Nestable wheelchair with anti-microbial cushion. Non-removable parts, non-foldable, traceable serial number. Brakes, anti-tip design, lifting armrests, footrests, courtesy rack and luggage area. 800 lb. capacity. Specify color when ordering. **No weblink available from Supplier. Contact Supplier for more information.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	Yes
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	34.00 in (864 mm)	**Left:**	N/A
Depth:	39.00 in (991 mm)	**Right:**	N/A
Height:	41.00 in (1041 mm)	**Front:**	N/A
Max Weight:	79 lbs (35.8 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
No weblink available from Supplier. Contact Supplier for more information.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C305	Storage/Wheelchair	Project	Draft (New)	2	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**4**	

staxi® Ranger Chair - 800lb Capacity

Anti-microbial Cushions
For optimum hygiene and ease of maintenance.

Lifting Armrests
Facilitates easy and safe side entry and exit of passengers. Anti-Microbial.

Non Folding Frame
Strong, durable and safe.

Footrest
For passenger comfort and safety. Lift for front entry option.

Turns within its own circumference

Fail-safe Brake System
For passenger safety and security.

Courtesy Rack
Ideal for storage of small bags, papers, magazines. Hanging hooks 25lbs (11.5kg) weight capacity – ideal for handbags, hand luggage, medical charts.

Large Luggage Area
For passenger convenience and safety.

High Quality Casters & Anti-tip Design
Easy to maneuver for a smooth and reliable ride.

The Ranger is the ideal chair for hospital facilities, airports and stadiums.

staxi® Ranger Chair – Technical Specification

Overall Dimensions				
Width*	Length	Seat to Floor	Back Height	Seat Width
31″ (788mm)	39″ (991mm)	22″ (559mm)	41″ (1040mm)	24″ (610mm)

Nesting Dimensions		
Nest	Nest with cushion	First chair
11.5″ (292mm)	12.5″ (320mm)	39″ (991mm)

Weight		
Chair weight 79lbs (36kg)	Shipping Weight 99lbs (45kg)	Occupancy Capacity 800lbs (363kg)

STAXI ® Corporation Limited recommend that each ***staxi*** ® transportation chair is fitted with a ***staxi*** ® seatbelt.

The ***staxi***® Ranger comes with a ***3-year parts warranty***.

Colors
Specially Formulated, Anti-Bacterial Paint. Mar-resistant. Weather Resistant and UV Protected.
Blue, Red and Diamond Black

Chair Specifications	
Arm Rests	Steel Oval Tubing. Non-porous sleeve. Lift for easy transfer
Footrests	Steel. Non-Removable. Lifts for comfort
Brake	Automatic; Fail Safe Ratchet
Wheels	2 1/8 ″ (54mm) composite wheel. 10″ (203mm) diameter. Non-marring
Casters	5″ (127mm). Urethane. Sealed bearing. Non-marring
Frame	Heavy duty; Formed oval tubing
Cushion	Antimicrobial treated upholstery.

***Overall Chair Width Including O2 Holder:** 34″ (864mm)

www.staxi.com
customerservice@staxi.com
1.866.969.1463

staxi®
Progress Through Innovation™

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Wheelchair, Adult, Transport**
Manufacturer: Stryker Medical ((269) 329-2100)
Vendor: Stryker Medical ((269) 329-2100)
Model: Prime TC (Swing Away Flip-up Footrests)

Alt ID: WHL-ATR
Mfr #: 1460-000-000
Vendor #: 1460-000-000

Adult transport chair with swing-away flip-up footrests. Features fold back stand assist armrests, BackSmart push handles, anti-tip wheels with one-touch central brake, chart holder, Big Wheel maneuverability. Power washable, nestable frame with yellow activation points. 500lb. maximum weight. IV pole and Foley bag hooks optional.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O **Type:** Medical	**Green:**	No

Physical Requirements

Width:	28.30 in (719 mm)	**Left:**	N/A
Depth:	40.20 in (1021 mm)	**Right:**	N/A
Height:	45.00 in (1143 mm)	**Front:**	N/A
Max Weight:	45 lbs (20.4 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C305	Storage/Wheelchair	Project	Draft (New)	2	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**4**	

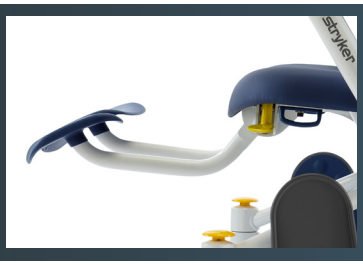
Prime TC®
Transport Chair

Patient transport redefined.

When it comes to the patient experience, details matter. That is why every aspect of the Prime TC Transport Chair is designed to help create a welcoming and safe environment that speaks volumes to caregivers, patients and their family members. Obvious touchpoints help make operation intuitive for all users. BackSmart ergonomics have been incorporated into the design to help reduce the bending and reaching that may be associated with caregiver injury. A rigid frame helps enhance durability while reducing the risk of theft. This investment in the well-being of patients and caregivers tells them you care about their comfort and safety – it tells them that they matter.

Flip-up footrests help reduce trip hazards by providing a clear path of patient ingress and egress. Foot-operated swing away functionality enhances access to the patient and closer positioning to beds, cars or tables.

BackSmart push handles help enhance caregiver safety by allowing caregivers to position their elbows at an ergonomic 90-degree angle and accommodate caregivers of virtually any height.



Optional leg supports are permanently attached for comfortable elevation in a fixed upright position. Easily stow away when not in use.

Big Wheel maneuverability helps make steering and cornering easier.

One-touch central brake reduces bending and reaching while enhancing caregiver efficiency.

Stand-assist armrests provide a raised and extended touchpoint for patient ingress and egress.

Rigid, nestable frame helps prevent theft while preserving valuable floor space.

Designed for cleanability, the chair frame consists of seamless components that are easy to disinfect and are power-washable.*

Yellow activation points make operation intuitive for all users.

Movable, but not removable, components help reduce the risk of lost or stolen parts.

500 lb. safe working load accommodates even heavy patients.

Durable 1" thick IV pole is chrome-plated to prevent rust and features enclosed hooks for safety.

Upright O_2 tank holder helps minimize bending and lifting required to place a heavy O_2 tank underneath the chair.

*Chairs with the optional padded seat are not power washable.

Prime TC®
Transport Chair

Standard features

- Stand-assist armrests
- Flip-up footrests with swing-away functionality
- BackSmart Push Handles
- One-touch central brake
- Anti-tip wheels
- Chart holder
- Molded plastic, seamless design
- Power-washable*
- Rigid powder-coated steel frame
- Nesting design
- Yellow activation points
- Big Wheel maneuverability
- Non-removable parts

Optional features

- Leg supports
- Upright O_2 tank holder
- Chrome-plated, 1″ thick IV pole
- IV pole topper available in six color options
- Foley bag hooks
- Padded seat*
- Lap belt

*Chairs with the optional padded seat are not power-washable

Specifications

Model number	1460
Overall length	40.2″ (102.1 cm)
Overall width	28.3″ (71.8 cm)
Seat width	21.5″ (54.6 cm)
Seat height	
From footrest	15″ (38.1 cm)
From floor	21″ (53.3 cm)
Chair height	
With IV pole	73″ (185.4 cm)
Without IV pole	45″ (114.3 cm)
Push handle grip range	
Width	16″-20.5″ (40.6-52.1 cm)
Height from floor	35″-45″ (88.9-114.3 cm)
Weight capacity	500 lbs. (226.8 kg)

Warranty

Three years parts, one year labor and travel

3800 E. Centre Avenue
Portage, MI 49002 USA
t: 269 329 2100
toll free: 800 327 0770

www.patienthandling.stryker.com

Mkt Lit-807 07 DEC 2012 Rev C.3

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Warmer, Fluid/ Blood, Portable**

Manufacturer: 3M Health Care (1-888-364-3577)

Vendor: 3M Health Care (1-888-364-3577)

Model: Ranger Blood/Fluid Warming System Model 245

Alt ID: WMR-FLU

Mfr #: 24500

Vendor #: 24500

Portable blood/IV fluids warmer. Features: warms fluids from KVO to 30,000 ml per hour. Uses disposable warming sets, audible and visual alarms for over and under temperature, output temperature of 33°C to 41°C.

Item ID:

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	7.50 in (191 mm)	**Left:**	N/A
Depth:	10.00 in (254 mm)	**Right:**	N/A
Height:	4.50 in (114 mm)	**Front:**	N/A
Max Weight:	8 lbs (3.6 kg)	**Back:**	N/A
Mounting:	Counter/Cart/Table/Pole	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	110	**Watts:**	900
Hz:	60	**Amps:**	7.5
Phase:	Single	**BTU/hr:**	880
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C023	Storage/Equipment	Project	Draft (New)	2	
				Total:	**2**	

3M™ Ranger™ Blood/Fluid Warming Unit

Model 245 Specifications

Set Point Temperature 41°C
Flow Rates

Pediatric	KVO – 100 mL/min
Standard Flow	KVO – 150 mL/min
High Flow	KVO – 500 mL/min

Alarms (audible and visual)
Over-temperature primary setpoint: 43°C
Over-temperature secondary setpoint: 44°C

Device Rating
100 - 120 VAC, 50/60 Hz
220 - 240 VAC, 50/60 Hz

Leakage Current
Meets leakage current requirements in accordance with UL / IEC 60601-1

Dimensions
19 W x 11 H x 25 D cm (7.5 W x 4.5 H x 10 D in)

Weight
3.4 kg (7.7 lb)

Packaging
1/Box

3M™ Ranger™ Blood/Fluid Warming Sets

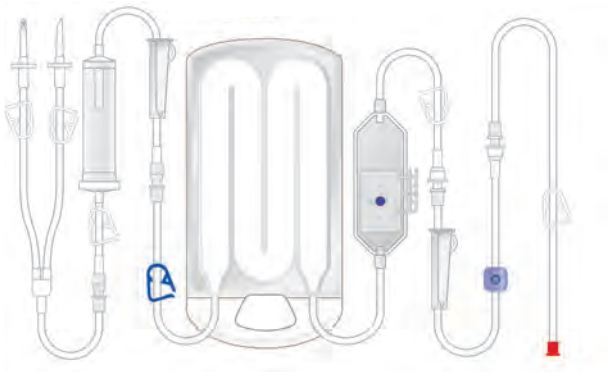
Warming sets accommodate up to 300 mmHg of pressure and are made without natural rubber latex and without DEHP. There are 10 warming sets contained in each case, that are sterilized - EtO. For single use only.

High Flow Warming Sets: KVO - 500 mL/min or 30 L/hr

Model 24355

Priming volume 150 mL

Components
two bag spikes
drip chamber with 150 micron blood filter
roller clamps
cassette
auto-venting bubble trap
needleless injection port
52 cm (1.52 m) / 60 in (5 ft) patient line



Model 24370

Priming volume 89 mL

Components
Cassette, auto-venting bubble trap, roller clamp
121 cm (1.21 m) / 48 in (4 ft) patient line

Model 24365

Priming volume 65 mL

Components
Cassette
auto-venting bubble trap

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Warmer, Patient, Hypothermia**
Alt ID: WMR-HYP
Manufacturer: 3M Infection Prevention Division ((651) 733-1110)
Mfr #: 87500
Vendor: 3M Infection Prevention Division ((651) 733-1110)
Vendor #: 87500
Model: Bair Paws System Model 875

Forced-air Patient warming system. Features: Ability to pre-warm patients to help in the prevention of unintended hypothermia. Patients control the unit's airflow and temperature (ambient to 43 degrees Celsius). "Snap-fit" flexibility in mounting the unit on the wall, a bedrail or an IV pole. The unit can also be placed on a flat surface. Built-in hose storage and lightweight design. Dust filter included.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	7.70 in (196 mm)	**Left:**	N/A
Depth:	4.00 in (102 mm)	**Right:**	N/A
Height:	13.00 in (330 mm)	**Front:**	N/A
Max Weight:	7 lbs (3.2 kg)	**Back:**	N/A
Mounting:	Special	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	552
Hz:	60	**Amps:**	4.6
Phase:	Single	**BTU/hr:**	1000
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Can be wall, pole or rail mounted.
Detachable hose dimension: 78"L x 1.5"W. Temperature controller dimensions: 5.8"L x 2.5"W.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**2**	

3M™ Bair Paws™ System
Warming Unit Model 875

Bair Paws™

Versatile Patient Warming

The 3M™ Bair Paws™ system is revolutionizing forced-air warming by providing clinicians options for comfort and clinical warming throughout the perioperative process in one convenient gown. When connected to a Bair Paws warming unit, the Bair Paws gown provides clinical prewarming or comfort warming as patients await surgery. In the O.R., the same gown offers clinical warming for select surgical procedures when connected to a 3M™ Bair Hugger™ warming unit. The gown continues to warm in PACU, with both comfort and clinical capabilities.

3M

Mounting configurations:

Wall Mount
90080

IV Pole Mount
90076

Bedrail Mount
90079

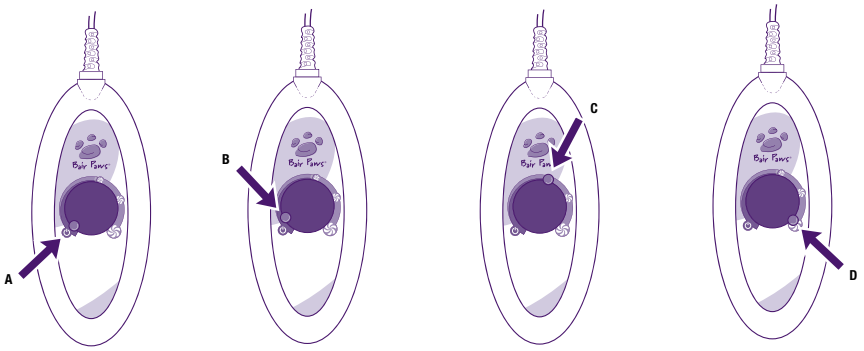
Wall-to-Rail Mount
90074

Only the 3M™ Bair Paws™ system offers patient-adjustable warming with a simple twist, as the unit's handheld controller allows patients to adjust the temperature of the air flowing through the gown to a level that's right for them.

The warming unit model 875 is lightweight, simple to use and is placed easily on the wall, bedrail, IV pole or a flat surface.

The Bair Paws warming unit provides:

- The ability to prewarm patients to help in the prevention of unintended hypothermia
- Personalized comfort as patients control the unit's airflow and temperature (ambient to 43°C)
- Easy "snap-fit" flexibility in mounting the unit on the wall, a bedrail or an IV pole. The unit can also be placed on a flat surface.
- Convenient, built-in hose storage
- Small, lightweight design



When the knob is in position A, the warming unit is OFF.

As the knob is rotated from position A to B, the warming unit turns on LOW AIRFLOW and LOW HEAT.

By turning the knob from position B to C, the air temperature increases from slightly above room temperature to approximately 41ºC (106ºF), while the blower remains on LOW AIRFLOW.

As the knob rotates clockwise past position C, the air temperature and blower's airflow both increase.

At position D, the warming unit is on HIGH HEAT and HIGH AIRFLOW. The air temperature will stabilize at 43º ± 3ºC (109º ± 5.4ºF).

Specifications

Dimensions
13" high x 7.7" wide x 4" deep (33 cm high x 19.6 cm wide x 10.2 cm deep)

Weight
7.0 lb (3.2 kg)

Operating Temperatures
User adjustable from ambient to 43º ± 3ºC

Filter
Dust filter

Device Ratings
110-120 VAC, 50/60 Hz, 4.6A
220-240 VAC, 50/60 Hz, 2.8A

Gown Sizes and Configurations

Pediatric
33" long; 40" sweep

Small
44" long; 55" sweep

Standard
51" long; 64" sweep

X-Large
51" long; 122" sweep

Gown kits include patient warming gown, bonnet, booties, personal belongings bag and shoe bag.

Ordering Information

Patient Warming Gown

81501	Pediatric	20/case
81001	Standard	30/case
81101	Small	20/case
81201	X-Large	20/case

Patient Warming Gown with Booties

83501	Pediatric	20/case
83001	Standard	30/case
83101	Small	20/case
83201	X-Large	20/case

Patient Warming Gown Kit

84501	Pediatric	20/case
84001	Standard	30/case
84101	Small	20/case
84201	X-Large	20/case

Patient Booties

90065	Std. Booties	30 pairs/case
90091	XL Booties	30 pairs/case

3M

Arizant Healthcare Inc., a 3M company
10393 West 70th St.
Eden Prairie, MN 55344 USA
Phone 800-733-7775
Fax 800-775-0002
www.bairpaws.com

For more information please contact your 3M Patient Warming representative at 1-800-733-7775 or visit www.bairpaws.com.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Disposal, Pharmaceutical, Container**
Alt ID: WSL-PH8

Manufacturer: Bemis Manufacturing Company (800.558.7651)
Mfr #: 4008050

Vendor: Bemis Manufacturing Company (800.558.7651)
Vendor #: 4008050

Model: Sentinel 4008 050 (8 Gallon)

Pharmaceutical waste disposal container, 8 gallon capacity. Blue container, hinged with gasketed lid, absorbent pads, molded-in handles. Separate round opening accepts small items. Uses #430 cart. Not for Sharps Use. Ships 10/case.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Medical	**Green:** No

Physical Requirements

Width:	16.50 in (419 mm)	**Left:**	N/A
Depth:	11.81 in (300 mm)	**Right:**	N/A
Height:	15.88 in (403 mm)	**Front:**	N/A
Max Weight:	4 lbs (1.8 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Structural:
Electrical:
Plumbing:
Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	4	Disposals: Black; Green; Purple; Blue
				Total:	**4**	

PHARMACEUTICAL WASTE CONTAINERS

Designed for the disposal of expired or unused non-hazardous pharmaceuticals

FEATURES & BENEFITS

Designed for the disposal of expired or unused nonhazardous pharmaceuticals such as antibiotics, IVs, pills, etc.

Ideal for use in pharmacies, nursing stations and med carts

Blue color and special labeling easily distinguishes from other disposal containers for sharps, chemotherapy and Hazardous pharmaceutical waste

Gasketed lids and absorbent pads provide leak resistance

Available in 2, 8 and 11-gallon sizes

Nestable to save space and reduce shipping costs

English, Spanish and French labeling

*Notes: Container **NOT** for sharps use; pharmaceutical waste must be incinerated*

PHARMACEUTICAL WASTE CONTAINERS WITH MOUNTING OPTIONS

PRODUCT/DESCRIPTION	CATALOG #	PACKAGING	MOUNTING OPTIONS
 **2-GALLON PHARMACEUTICAL CONTAINER** • screw-on cap; posts on lid for holding cap in place when in use • for use on tabletop or wall-mounted • uses bracket/key #445 for wall mounting **Height:** 9" **Length:** 11 ⅝" **Width:** 7 ¾"	4002 050 blue w/gasket lid/ absorbent pad	30/CASE	 445 020
 **8-GALLON PHARMACEUTICAL CONTAINER** • hinged lid accommodates large items • separate round opening accepts small items • molded-in handles for easy lifting and transport • uses cart #430 for mobility **Height:** 15 ⅞" **Length:** 16 ½" **Width:** 11 13/16"	4008 050 blue w/gasket lid/ absorbent pad	10/CASE	 430 030
 **11-GALLON PHARMACEUTICAL CONTAINER** • hinged lid accommodates large items • separate round opening accepts small items • molded-in handles for easy lifting and transport • uses cart #430 for mobility **Height:** 22 ½" **Length:** 16 ½" **Width:** 11 13/16"	4011 050 blue w/gasket lid/ absorbent pad	6/CASE	 430 030

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Can, Step-On**

Manufacturer: Rubbermaid Commercial Products (800-347-9800)

Vendor: Rubbermaid Commercial Products (800-347-9800)

Model: 1883460 Slim Jim Resin Front Step 18 Gal/Beige

Alt ID: WST-18W

Mfr #: 1883460

Vendor #: 1883460

Item ID:

Step-on waste can with 18-gallon capacity. Beige. Features plastic construction, quiet and controlled lid closure, internal hinge design, liner retainer band, and built-in wheels. Meets OSHA and OBRA standards. Factory mutual certified.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	19.70 in (500 mm)	**Left:**	N/A
Depth:	12.20 in (310 mm)	**Right:**	N/A
Height:	31.60 in (803 mm)	**Front:**	N/A
Max Weight:	12 lbs (5.2 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C049A; C049B	Alcove/Sink-Handwash	Project	Draft (New)	2	
ED/1st Flr	C329	Alcove/WOW-Registration	Project	Draft (New)	1	
ED/1st Flr	C024; C025; C035; C036	Toilet/Patient	Project	Draft (New)	4	
ED/1st Flr	C007; C042	Toilet/Patient - Isolation	Project	Draft (New)	2	
ED/1st Flr	C328	Toilet/Public	Project	Draft (New)	1	
ED/1st Flr	C018	Toilet/Staff	Project	Draft (New)	1	
ED/1st Flr	C013 - C040	Treatment Bay/Cubicle	Project	Draft (New)	9	
ED/1st Flr	C001 - C047	Treatment Rm - Private	Project	Draft (New)	17	
ED/1st Flr	C008; C043	Treatment Rm/Isolation	Project	Draft (New)	2	
ED/1st Flr	C033	Treatment Rm/PersonOfSize (Bariatric)	Project	Draft (New)	1	
ED/1st Flr	C329	Waiting Rm	Project	Draft (New)	2	

ED/1st Flr	C466	Waiting Rm/Public	Project	Draft (New)	2	

Total: 44

Resin Slim Jim® Step-On Containers

Slim profile and small footprint maximize space to fit in the tightest spaces.

- Commercial-grade pedal tested to 300,000 cycles to ensure life in heavy-use environments*
- Robust lid structure features a rigid arch design to prevent warping
- Stainless steel components resist corrosion for long-lasting, smooth operation
- Liner retainer band and cinch easily and securely holds polyliners
- Optional dual-stream rigid liner simplifies sorting, making recycling quick and easy
- Increased foot pedal clearance for easier access and operation
- Quiet and controlled lid closure minimizes noise to enhance guest and patient satisfaction
- Self-extinguishing to ensure fire safety and comply with Factory Manual (FM) regulations
- Meets OSHA and OBRA standards for worker and environmental safety

FM APPROVED OSHA OBRA

1883552

90L/24G

1883455

15L/4G

1883456

30L/8G

1883458

50L/13G

1883460

68L/18G

Resin Step-On Containers

NO.	COLOR	DESCRIPTION	U.S. DIMENSIONS	U.S. CAPACITY	U.S. SHIP WT/CTN	METRIC DIMENSIONS	METRIC CAPACITY	METRIC SHIP WT/CTN	CAN LINERS	PACK
1883455	BEIGE	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883554	WHITE	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883563	RED	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883599	GRAY	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883608	BLACK	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883456	BEIGE	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883555	WHITE	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883564	RED	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883600	GRAY	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883609	BLACK	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883457	BEIGE	Resin End Step	19.6" l x 12.3" w x 22.3" h	8 gal	10.7 lb	497 mm x 311 mm x 566 mm	30 L	4.864 kg	1	1
1883565	RED	Resin End Step	19.6" l x 12.3" w x 22.3" h	8 gal	10.7 lb	497 mm x 311 mm x 566 mm	30 L	4.864 kg	1	1
1883610	BLACK	Resin End Step	19.6" l x 12.3" w x 22.3" h	8 gal	10.7 lb	497 mm x 311 mm x 566 mm	30 L	4.864 kg	1	1
1883458	BEIGE	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883557	WHITE	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883566	RED	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883593	BLUE	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883602	GRAY	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883611	BLACK	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883459	BEIGE	Resin End Step	20.8" l x 13.5" w x 28.4" h	13 gal	15.6 lb	527 mm x 343 mm x 721 mm	50 L	7.091 kg	1	1
1883612	BLACK	Resin End Step	20.8" l x 13.5" w x 28.4" h	13 gal	15.6 lb	527 mm x 343 mm x 721 mm	50 L	7.091 kg	1	1
1883460	BEIGE	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883559	WHITE	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883568	RED	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883604	GRAY	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883613	BLACK	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883551	BEIGE	Resin End Step	22.1" l x 14.7" w x 30.8" h	18 gal	17.1 lb	562 mm x 373 mm x 781 mm	68 L	7.773 kg	1	1
1883614	BLACK	Resin End Step	22.1" l x 14.7" w x 30.8" h	18 gal	17.1 lb	562 mm x 373 mm x 781 mm	68 L	7.773 kg	1	1
1883552	BEIGE	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883561	WHITE	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883570	RED	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883597	BLUE	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883606	GRAY	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883615	BLACK	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883553	BEIGE	Resin End Step	25.1" l x 15.9" w x 32.0" h	24 gal	21.1 lb	637 mm x 403 mm x 813 mm	90 L	9.591 kg	1	1
1883616	BLACK	Resin End Step	25.1" l x 15.9" w x 32.0" h	24 gal	21.1 lb	637 mm x 403 mm x 813 mm	90 L	9.591 kg	1	1

*Based on internal testing

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Can, Bio-Hazardous**

Manufacturer: Continental Commercial Products ((314) 656-4301)

Vendor: Continental Commercial Products ((314) 656-4301)

Model: 23RD Step-On

Alt ID: WST-23B

Mfr #: 23RD

Vendor #: 23RD

Bio-hazardous waste can. Features: 23 Gallon, red color. Stainless steel pedal protector and (2) 2 inch casters.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	19.25 in (489 mm)	**Left:**	N/A
Depth:	16.00 in (406 mm)	**Right:**	N/A
Height:	31.00 in (787 mm)	**Front:**	N/A
Max Weight:	13 lbs (5.9 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
				Total:	**1**	

CONTINENTAL
COMMERCIAL PRODUCTS

STEP-ON Receptacles

THE SOLUTION FOR SANITARY WASTE DISPOSAL!

The Step-On Receptacle line resolves a very important issue ~ cleanliness in waste disposal. Because the lid is activated by a foot pedal, there is no need to touch the lid by hand. This answers the increasing concern about health and safety for the public.

Sturdy, no slip step pedal allows for hands-free use.

Includes a unique “key-way” notch to secure standard size polyliners.

Optional rigid plastic liners assist in offering a no-leak base and provide a convenient means for emptying.

STEP-ON RECEPTACLES

- Allow for convenient and hygienic disposal of various waste types
- Constructed of durable Derma-Tek® plastic ~ will not rust, chip or peel like conventional metal products, and is easy to clean and keep clean
- All plastic construction results in quiet, smooth operation compared to metal units
- Lid closes securely to base to keep odors contained
- Lid attachment is covered at top and does not have hinge pins that will collect dirt
- Available in Red, White and Beige
- Available in 18 and 23 gallon sizes

Wheels are covered to keep debris from interfering with wheel movement.

23BE

Larger sized 23 gallon Step-On receptacles offer:

- Wheels that provide easy mobility and are covered to keep debris from interfering with their movement
- Wire frame ensures that the receptacle will not tip forward when activated, protecting the pedal as well as the user
- Frame is made of plated steel for easy cleaning in medical environments

DERMA-TEK® FINISH

METAL FREE

Smaller sized 18 gallon Step-On receptacles offer:

- Smaller size to fit into tighter spaces
- Non-slip pedal that is quiet when used
- Rounded design is easy to clean
- Large opening for waste disposal

18RD

Brand	Item Number	Item	Dimensions L x W x H	Pack Color	Case Case	Case Weight	Cube
CMC	**18BE**	18 gallon Step-On Receptacle	19¼" x 16" x 25"	Beige	1	13.80 lbs.	3.240
CMC	**18RD**	18 gallon Step-On Receptacle	19¼" x 16" x 25"	Red	1	13.80 lbs.	3.240
CMC	**18WH**	18 gallon Step-On Receptacle	19¼" x 16" x 25"	White	1	13.80 lbs.	3.240
CMC	**23BE**	23 gallon Step-On Receptacle	19¼" x 16" x 31"	Beige	1	11.24 lbs.	2.560
CMC	**23RD**	23 gallon Step-On Receptacle	19¼" x 16" x 31"	Red	1	11.24 lbs.	2.560
CMC	**23WH**	23 gallon Step-On Receptacle	19¼" x 16" x 31"	White	1	11.24 lbs.	2.560
CMC	**15**	Rigid Plastic Liner for #18	17¾" x 13" x 21½"	Black	1	12.84 lbs.	7.870
CMC	**19**	Rigid Plastic Liner for #23	17½" x 12½" x 27½"	Black	1	17.06 lbs.	1.840

Additional colors are available; minimum quantity requirements may apply.

MEETS OSHA REQUIREMENTS

FM APPROVED

FIRE-RESISTANT

REACH COMPLIANCE

CONTINENTAL COMMERCIAL PRODUCTS

305 Rock Industrial Park Drive, Bridgeton, MO 63044, USA • Phone: 314.656.4301 • Fax: 314.770.9938 • www.continentalcommercialproducts.com

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Can, Recycle**

Manufacturer: Continental Commercial Products ((314) 656-4301)

Vendor: Continental Commercial Products ((314) 656-4301)

Model: 8322-1 Wall Hugger Blue (23 gal)

Alt ID: WST-23R

Mfr #: 8322-1

Vendor #: 8322-1

Recycle waste can without handles. Features: rolled rim provides extra strength. Seamless construction, LLDPE body. Blue with white recycle logo. 23 gallon capacity. Mounts to wall with optional 8319 Bracket. Ships 4/case.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	20.00 in (508 mm)	**Left:**	N/A
Depth:	11.00 in (279 mm)	**Right:**	N/A
Height:	30.00 in (762 mm)	**Front:**	N/A
Max Weight:	7 lbs (3.3 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329	Alcove/WOW-Registration	Project	Draft (New)	1	
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	1	
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**6**	

RECYCLING RECEPTACLES 20" x 11" x 30" H

A] WALL HUGGER® RECYCLE RECEPTACLE

Built of durable plastic, these receptacles work efficiently in tight spaces. Their sleek, attractive design holds either 16 or 23 gallons of recyclables, but protrude less than one foot from the wall. A molded-in bag cinch eliminates the need to tie knots in poly liners. The base features molded-in hand grips which provide a secure area to grasp when lifting or dumping. Designed with smooth, seamless construction for easy cleaning and prolonged life. The 23 gallon size is 30˝ tall, making it ideal for placement under standard work tables.

Item #	Size / Style	Color	Case Pack	Case Weight	Case Cube
*8322BK	23 gal.	Black	4	27.10 lbs.	6.200 ft.
8322-1	23 gal.	Blue	4	27.10 lbs.	6.200 ft.
8322-2	23 gal.	Green	4	27.10 lbs.	6.200 ft.
*8316BK	16 gal.	Black	4	22.50 lbs.	5.050 ft.
*H8322BK	23 gal. w/handles	Black	4	27.10 lbs.	7.150 ft.
H8322-1	23 gal. w/handles	Blue	4	27.10 lbs.	7.150 ft.
H8322-2	23 gal. w/handles	Green	4	27.10 lbs.	7.150 ft.
*H8316BK	16 gal. w/handles	Black	4	22.50 lbs.	5.050 ft.

** Items are not stamped with recycle symbol.*

A]

8322-1 / H8322-2

Shown with Quad Dolly and Wall Hugger Recycle Lids.

B] WALL HUGGER® MOUNTING BRACKET

A single Bracket securely mounts any Wall Hugger receptacle, including the Half Round, to the wall. Elevating the receptacle allows easy cleaning of the floor under and around it.

Item #	Description	Color	Case Pack	Case Weight	Case Cube
8319	Mounting Bracket	Grey	4	3.64 lbs.	0.040 ft.

B]

8319

C] WALL HUGGER® RECYCLE LIDS

Wall Hugger Recycle Lids encourage users to sort their recyclables and are color-coded to make the identification easier. Lids fit all rectangular Wall Hugger receptacles.

Item #	Size / Style	Color	Case Pack	Case Weight	Case Cube
7315GN	Lid w/center handle	Green	4	4.00 lbs.	1.000 ft.
7315GY	Lid w/center handle	Grey	4	4.00 lbs.	1.000 ft.
7316BL	Lid w/holes	Blue	4	4.00 lbs.	1.000 ft.
7316GN	Lid w/holes	Green	4	4.00 lbs.	1.000 ft.
7316YW	Lid w/holes	Yellow	4	4.00 lbs.	1.000 ft.
7317BL	Lid w/slot	Blue	4	4.00 lbs.	1.000 ft.

C]

7315GY / 7316GN / 7316YW / 7317BL

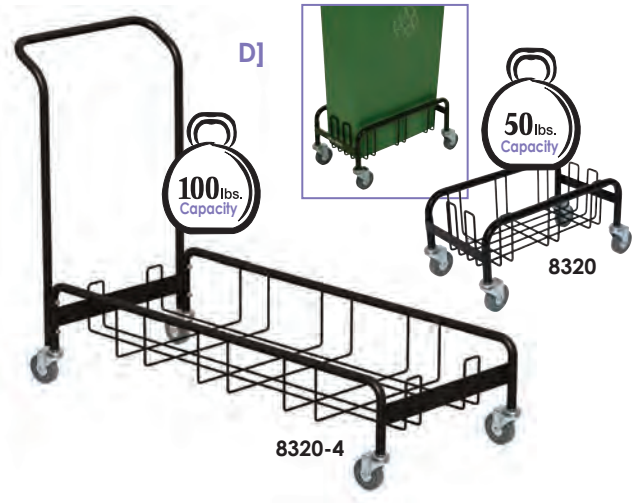
Wall Hugger Recycle Lids come with trilingual (Eng/Sp/Fr) Recycle Material ID Labels to make sorting easy!

D] WALL HUGGER® DOLLIES

The Wall Hugger line offers both Single and Quad-Collection Dollies. These attractive, black powder-coated steel Dollies have 3˝, non-marking, all swivel casters, enabling them to turn any CMC Wall Hugger or other receptacle into a mobile waste or recycle collection system.

Item #	Description	Color	Case Pack	Case Weight	Case Cube
8320	Single Dolly	Black	2	17.00 lbs.	1.650 ft.
8320-4	Quad Dolly	Black	1	18.00 lbs.	3.525 ft.

D]



8320

8320-4

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Can, Step-On**

Alt ID: WST-24W

Manufacturer: Rubbermaid Commercial Products (800-347-9800)

Mfr #: 1883552

Vendor: Rubbermaid Commercial Products (800-347-9800)

Vendor #: 1883552

Model: 1883552 Slim Jim Resin Front Step 24 Gal Beige

Step-on waste can with 24 gallon (90L) capacity. Beige. Features plastic construction, quiet and controlled lid closure, internal hinge design, liner retainer band, and built-in wheels.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	22.40 in (569 mm)	**Left:**	N/A
Depth:	13.90 in (353 mm)	**Right:**	N/A
Height:	32.50 in (826 mm)	**Front:**	N/A
Max Weight:	13 lbs (6.1 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C026A; C043A	Alcove/PPE	Project	Draft (New)	2	
ED/1st Flr	C013A; C017A	Alcove/Waste Can-Treatment Bay	Project	Draft (New)	2	
ED/1st Flr	C021	Nourishment Rm	Project	Draft (New)	1	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	1	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	1	
				Total:	**7**	

Resin Slim Jim® Step-On Containers

Slim profile and small footprint maximize space to fit in the tightest spaces.

- Commercial-grade pedal tested to 300,000 cycles to ensure life in heavy-use environments*
- Robust lid structure features a rigid arch design to prevent warping
- Stainless steel components resist corrosion for long-lasting, smooth operation
- Liner retainer band and cinch easily and securely holds polyliners
- Optional dual-stream rigid liner simplifies sorting, making recycling quick and easy
- Increased foot pedal clearance for easier access and operation
- Quiet and controlled lid closure minimizes noise to enhance guest and patient satisfaction
- Self-extinguishing to ensure fire safety and comply with Factory Manual (FM) regulations
- Meets OSHA and OBRA standards for worker and environmental safety

FM APPROVED OSHA OBRA

1883552

90L/24G

1883455

15L/4G

1883456

30L/8G

1883458

50L/13G

1883460

68L/18G

Resin Step-On Containers

NO.	COLOR	DESCRIPTION	U.S. DIMENSIONS	U.S. CAPACITY	U.S. SHIP WT/CTN	METRIC DIMENSIONS	METRIC CAPACITY	METRIC SHIP WT/CTN	CAN LINERS	PACK
1883455	BEIGE	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883554	WHITE	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883563	RED	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883599	GRAY	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883608	BLACK	Resin Front Step	14.8" l x 9.1" w x 15.7" h	4 gal	4.70 lb	377 mm x 230 mm x 399 mm	15 L	2.136 kg		1
1883456	BEIGE	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883555	WHITE	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883564	RED	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883600	GRAY	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883609	BLACK	Resin Front Step	16.7" l x 10.6" w x 21.1" h	8 gal	6.0 lb	425 mm x 271 mm x 536 mm	30 L	2.727 kg		1
1883457	BEIGE	Resin End Step	19.6" l x 12.3" w x 22.3" h	8 gal	10.7 lb	497 mm x 311 mm x 566 mm	30 L	4.864 kg	1	1
1883565	RED	Resin End Step	19.6" l x 12.3" w x 22.3" h	8 gal	10.7 lb	497 mm x 311 mm x 566 mm	30 L	4.864 kg	1	1
1883610	BLACK	Resin End Step	19.6" l x 12.3" w x 22.3" h	8 gal	10.7 lb	497 mm x 311 mm x 566 mm	30 L	4.864 kg	1	1
1883458	BEIGE	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883557	WHITE	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883566	RED	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883593	BLUE	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883602	GRAY	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883611	BLACK	Resin Front Step	17.9" l x 11.5" w x 28.3" h	13 gal	8.5 lb	456 mm x 292 mm x 719 mm	50 L	3.864 kg		1
1883459	BEIGE	Resin End Step	20.8" l x 13.5" w x 28.4" h	13 gal	15.6 lb	527 mm x 343 mm x 721 mm	50 L	7.091 kg	1	1
1883612	BLACK	Resin End Step	20.8" l x 13.5" w x 28.4" h	13 gal	15.6 lb	527 mm x 343 mm x 721 mm	50 L	7.091 kg	1	1
1883460	BEIGE	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883559	WHITE	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883568	RED	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883604	GRAY	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883613	BLACK	Resin Front Step	19.7" l x 12.2" w x 31.6" h	18 gal	11.5 lb	500 mm x 311 mm x 803 mm	68 L	5.227 kg		1
1883551	BEIGE	Resin End Step	22.1" l x 14.7" w x 30.8" h	18 gal	17.1 lb	562 mm x 373 mm x 781 mm	68 L	7.773 kg	1	1
1883614	BLACK	Resin End Step	22.1" l x 14.7" w x 30.8" h	18 gal	17.1 lb	562 mm x 373 mm x 781 mm	68 L	7.773 kg	1	1
1883552	BEIGE	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883561	WHITE	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883570	RED	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883597	BLUE	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883606	GRAY	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883615	BLACK	Resin Front Step	22.4" l x 13.9" w x 32.5" h	24 gal	13.4 lb	570 mm x 353 mm x 826 mm	90 L	6.091 kg		1
1883553	BEIGE	Resin End Step	25.1" l x 15.9" w x 32.0" h	24 gal	21.1 lb	637 mm x 403 mm x 813 mm	90 L	9.591 kg	1	1
1883616	BLACK	Resin End Step	25.1" l x 15.9" w x 32.0" h	24 gal	21.1 lb	637 mm x 403 mm x 813 mm	90 L	9.591 kg	1	1

*Based on internal testing

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: Waste Can, Open Top

Manufacturer: Continental Commercial Products ((314) 656-4301)

Vendor: Continental Commercial Products ((314) 656-4301)

Model: 2818BK (28 qt.)

Alt ID: WST-28Q

Mfr #: 2818BK

Vendor #: 2818BK

Item ID:

Open top waste can. Features: Commercial, plastic, rectangular, 28 1/8 quart, low profile design. Black color. Ships 12/cs.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	14.50 in (368 mm)	**Left:**	N/A
Depth:	10.50 in (267 mm)	**Right:**	N/A
Height:	15.00 in (381 mm)	**Front:**	N/A
Max Weight:	2 lbs (0.7 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Case ship weight is 27 lbs.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C468	Office	Project	Draft (New)	1	
ED/1st Flr	C467	Registration (5)	Project	Draft (New)	5	
ED/1st Flr	C469	Scheduling (3)	Project	Draft (New)	3	
ED/1st Flr	C049	Workstation/Care Team (11)	Project	Draft (New)	6	
ED/1st Flr	C027	Workstation/Care Team (13)	Project	Draft (New)	6	
				Total:	**21**	

Continental Commercial Products
305 Rock Industrial Park Dr.
Bridgeton, MO 63044
Phone:+1 314.656.4301
Email: JaniCS@contico.com • **Website:** www.continentalcommercialproducts.com

Item # 2818BK, Commercial Plastic Wastebaskets

Commercial Plastic Wastebaskets

28-1/8 qt (26.61 L) Capacity
14-1/2" x 10-1/2" x 15" H (36.83 cm x 26.67 cm x 38.10 cm)

SPECIFICATIONS

CMC Item Name	Wastebasket - Rectangular
Brand	CMC
Stock Item	Yes
Size	14-1/2 x 10-1/2 x 15 in 36.83 x 26.67 x 38.10 cm
Type	Rectangular
Pack Case	12
Case Weight	27.00 lb
Case Cube	2.880
Capacity	28-1/8 qt 26.61 L
Color	Black
Certifications	MEETS OSHA REQUIREMENTS OSHA
Unit of Measure	Each
UPC Code	0 20027 01421 7
UCC Code	1 00 20027 01421 4

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Can, 32-40 Gallon**

Manufacturer: Rubbermaid Commercial Products (800-347-9800)

Vendor: Rubbermaid Commercial Products (800-347-9800)

Model: 2632 BRUTE Gray w/2631 Lid & 2640 Dolly

Alt ID: WST-32W

Mfr #: FG263200GRAY/FG263100GRAY/FG264000BLA

Vendor #: FG263200GRAY/FG263100GRAY/FG264000BLA

32 gallon waste can with lid and 5 wheel dolly (twist on and off). All plastic. Dolly weight capacity of 250 lbs. Gray. List price is for 1 unit each. Optional cases available: Waste Cans 6/case, Lids 6/case, Dolly 2/case.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	25.00 in (635 mm)	**Left:**	N/A
Depth:	25.00 in (635 mm)	**Right:**	N/A
Height:	36.25 in (921 mm)	**Front:**	N/A
Max Weight:	16 lbs (7.2 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height includes dolly.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C020	Soiled Work Rm	Project	Draft (New)	1	
				Total:	**1**	

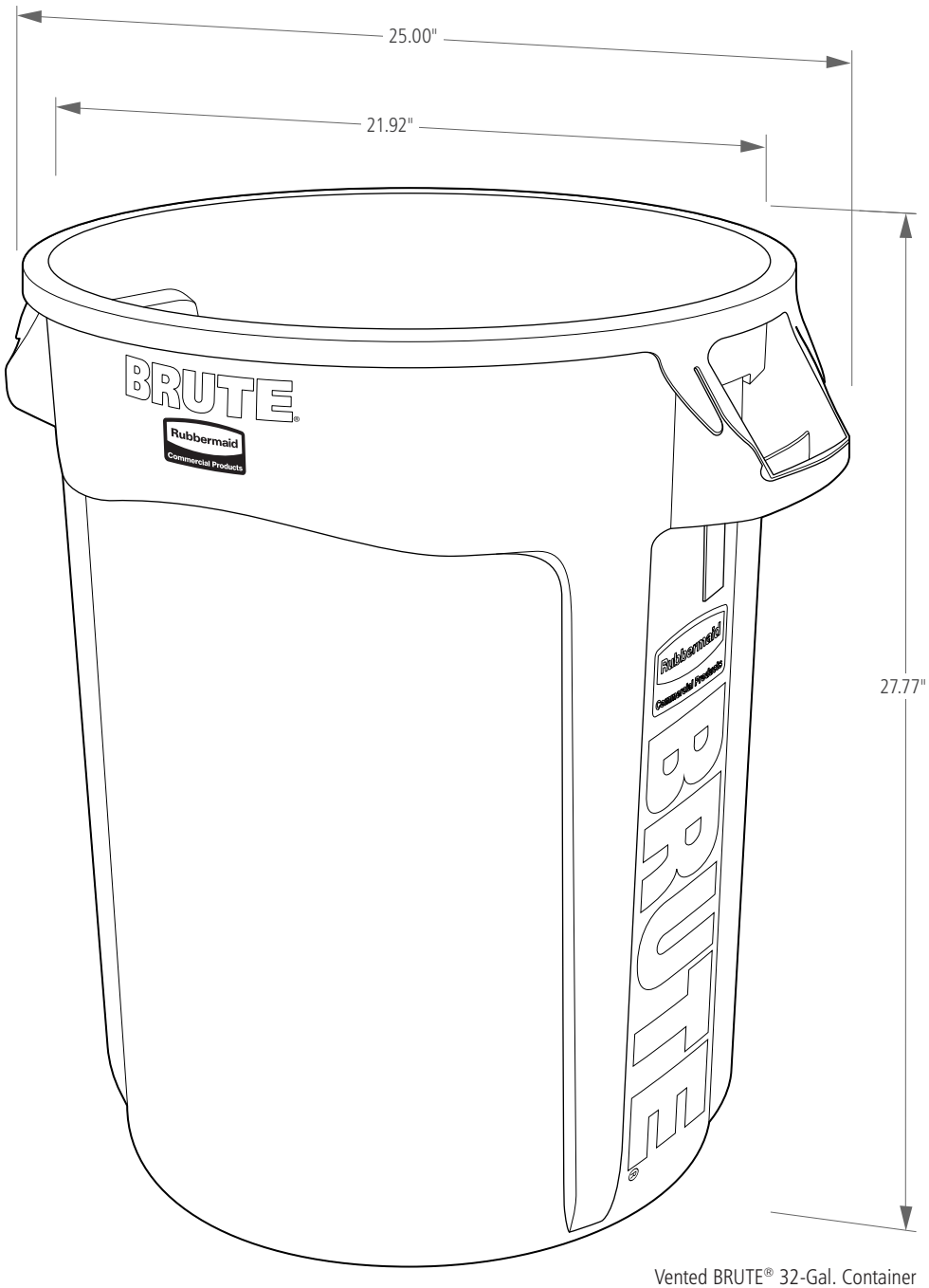
BRUTE® CONTAINERS

BRUTE® containers are guaranteed to never fade, warp, crack, or crush, with a proprietary design constructed with the highest quality material.

Features and Benefits:

- Venting channels make removing liners up to 50% easier, improving productivity and reducing the risk of injury
- Commercial-grade construction guaranteed to never fade, warp, crack, or crush
- Bag cinches secure liners, allowing for knot-free liner changes. Tested to 200,000 cycles
- Contoured base handles improve grip and ergonomics, reducing strain and improving efficiency
- Rim with rib-strengthened design increases strength and resists crushing
- Rounded handles make lifting and moving easier
- Reinforced base is specifically engineered to be dragged over rough surfaces in tough environments

NSF
2 & 21 Compliant



Vented BRUTE® 32-Gal. Container

BRUTE® CONTAINERS

SKU #	DESCRIPTION	COLOR	CAPACITY GAL	HEIGHT IN	DIAMETER IN	DIAMETER WITH HANDLE IN	PACK SIZE
FG261000GRAY	BRUTE® 10 GALLON CONTAINER	GRAY	10G	17.13	15.63	18.00	6
FG261000WHT	BRUTE® 10 GALLON CONTAINER	WHITE	10G	17.13	15.63	18.00	6
FG261000RED	BRUTE® 10 GALLON CONTAINER	RED	10G	17.13	15.63	18.00	6
FG261000YEL	BRUTE® 10 GALLON CONTAINER	YELLOW	10G	17.13	15.63	18.00	6
1779699	BRUTE® 10 GALLON CONTAINER	BLUE	10G	17.13	15.63	18.00	6
FG261000DGRN	BRUTE® 10 GALLON CONTAINER	DARK GREEN	10G	17.13	15.63	18.00	6
1926827	BRUTE® 10 GALLON CONTAINER	BLACK	10G	17.13	15.63	18.00	6
FG262000GRAY	BRUTE® 20 GALLON CONTAINER	GRAY	20G	22.91	19.38	22.50	6
FG262000WHT	BRUTE® 20 GALLON CONTAINER	WHITE	20G	22.91	19.38	22.50	6
FG262000RED	BRUTE® 20 GALLON CONTAINER	RED	20G	22.91	19.38	22.50	6
FG262000YEL	BRUTE® 20 GALLON CONTAINER	YELLOW	20G	22.91	19.38	22.50	6
FG262000BLUE	BRUTE® 20 GALLON CONTAINER	BLUE	20G	22.91	19.38	22.50	6
FG262000DGRN	BRUTE® 20 GALLON CONTAINER	DARK GREEN	20G	22.91	19.38	22.50	6
1779734	BRUTE® 20 GALLON CONTAINER	BLACK	20G	22.91	19.38	22.50	6
FG262073BLUE	BRUTE® 20 GALLON RECYCLING CONTAINER	BLUE	20G	22.91	19.38	22.50	6
1926828	BRUTE® 20 GALLON RECYCLING CONTAINER	DARK GREEN	20G	22.91	19.38	22.50	6
FG263200GRAY	BRUTE® 32 GALLON CONTAINER	GRAY	32G	27.77	21.92	25.00	6
FG263200WHT	BRUTE® 32 GALLON CONTAINER	WHITE	32G	27.77	21.92	25.00	6
FG263200RED	BRUTE® 32 GALLON CONTAINER	RED	32G	27.77	21.92	25.00	6
FG263200YEL	BRUTE® 32 GALLON CONTAINER	YELLOW	32G	27.77	21.92	25.00	6
FG263200BLUE	BRUTE® 32 GALLON CONTAINER	BLUE	32G	27.77	21.92	25.00	6
FG263200DGRN	BRUTE® 32 GALLON CONTAINER	DARK GREEN	32G	27.77	21.92	25.00	6
1867531	BRUTE® 32 GALLON CONTAINER	BLACK	32G	27.77	21.92	25.00	6
FG263273BLUE	BRUTE® 32 GALLON RECYCLING CONTAINER	BLUE	32G	27.77	21.92	25.00	6
1788472	BRUTE® 32 GALLON RECYCLING CONTAINER	DARK GREEN	32G	27.77	21.92	25.00	6
FG264360GRAY	BRUTE® 44 GALLON CONTAINER	GRAY	44G	31.50	24.00	27.75	4
1779740	BRUTE® 44 GALLON CONTAINER	WHITE	44G	31.50	24.00	27.75	4
FG264360RED	BRUTE® 44 GALLON CONTAINER	RED	44G	31.50	24.00	27.75	4
FG264360YEL	BRUTE® 44 GALLON CONTAINER	YELLOW	44G	31.50	24.00	27.75	4
FG264360BLUE	BRUTE® 44 GALLON CONTAINER	BLUE	44G	31.50	24.00	27.75	4
1779741	BRUTE® 44 GALLON CONTAINER	DARK GREEN	44G	31.50	24.00	27.75	4
FG264360BLA	BRUTE® 44 GALLON CONTAINER	BLACK	44G	31.50	24.00	27.75	4
FG264307BLUE	BRUTE® 44 GALLON RECYCLING CONTAINER	BLUE	44G	31.50	24.00	27.75	4
1926829	BRUTE® 44 GALLON RECYCLING CONTAINER	DARK GREEN	44G	31.50	24.00	27.75	4
FG265500GRAY	BRUTE® 55 GALLON CONTAINER	GRAY	55G	33.19	26.38	30.75	3
FG265500WHT	BRUTE® 55 GALLON CONTAINER	WHITE	55G	33.19	26.38	30.75	3
FG265500RED	BRUTE® 55 GALLON CONTAINER	RED	55G	33.19	26.38	30.75	3
FG265500YEL	BRUTE® 55 GALLON CONTAINER	YELLOW	55G	33.19	26.38	30.75	3
1779732	BRUTE® 55 GALLON CONTAINER	BLUE	55G	33.19	26.38	30.75	3
FG265500DGRN	BRUTE® 55 GALLON CONTAINER	DARK GREEN	55G	33.19	26.38	30.75	3
1779739	BRUTE® 55 GALLON CONTAINER	BLACK	55G	33.19	26.38	30.75	3

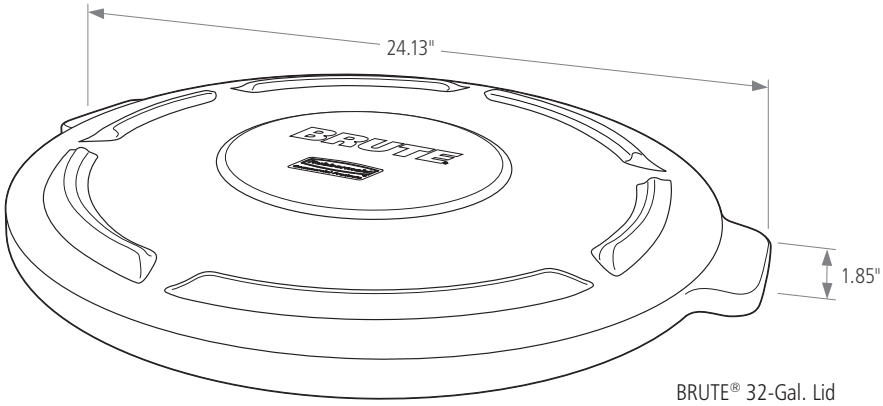
Rubbermaid® Commercial Products

BRUTE® LIDS

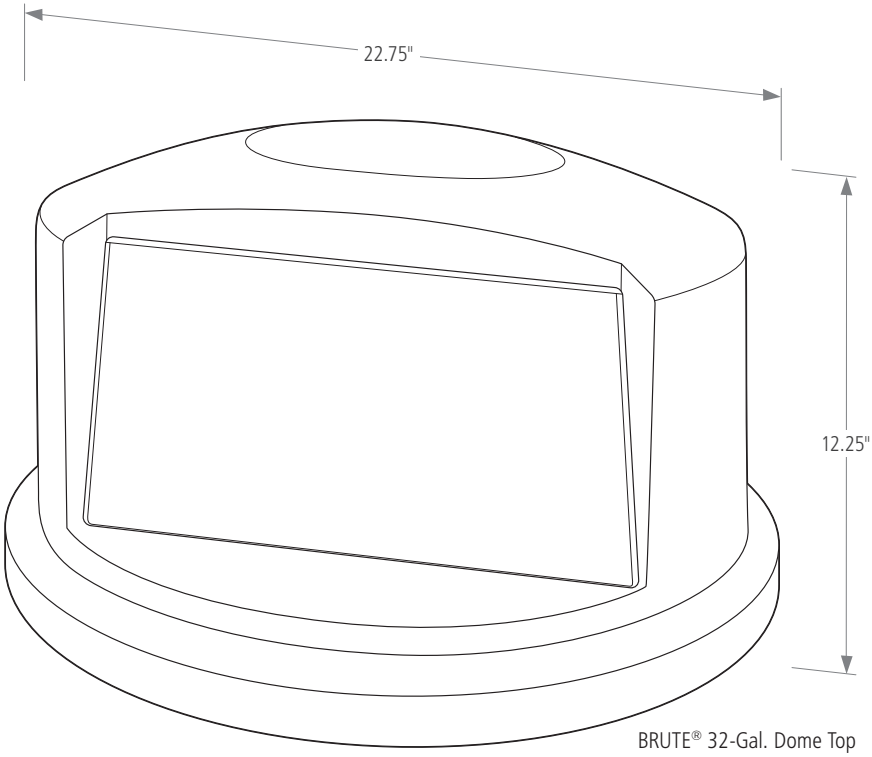
BRUTE® lids are constructed with the highest quality material; a UV inhibitor ensures long life in even the most extreme commercial environments. Lids come in a variety of different styles, including self-draining lids, dome top lids, and funnel lids to meet any commercial need.

Features and Benefits:

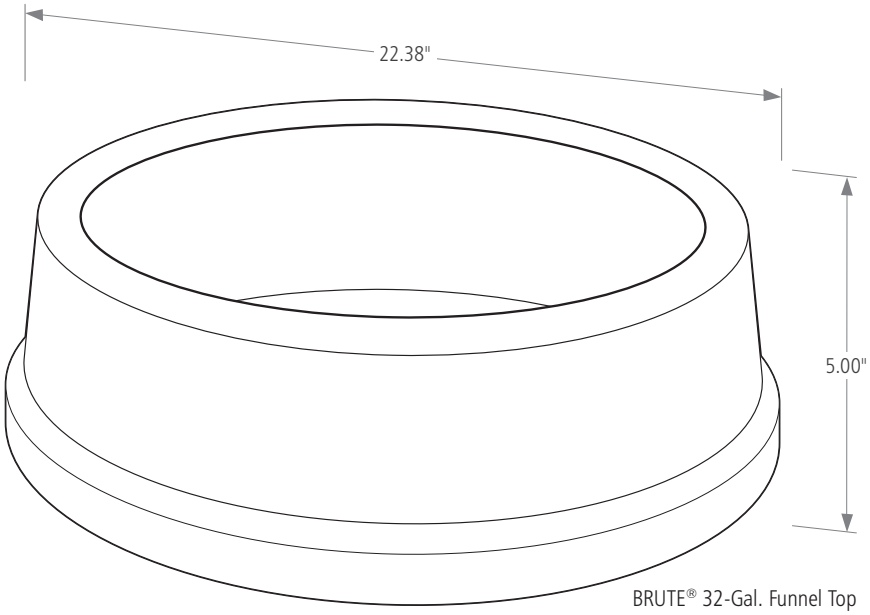
- Self-draining lids have channels that prevent water from pooling, reducing still water buildup, and include ridges that enable stacking to provide space-efficient storage
- Dome top lids have a spring action door that allows for easy trash disposal while keeping odors and insects out
- Self-draining lids and dome top lids both have a snap-lock feature that ensures a secure fit
- Funnel top lids have a cut-out top that enables hands-free refuse disposal and a funnel design that conceals waste from public view



BRUTE® 32-Gal. Lid



BRUTE® 32-Gal. Dome Top



BRUTE® 32-Gal. Funnel Top

BRUTE® LIDS

SKU #	DESCRIPTION	COLOR	FITS	HEIGHT IN	DIAMETER IN	DIAMETER WITH HANDLE IN	PACK SIZE
FG260900GRAY	BRUTE® 10 GALLON LID	GRAY	10G	1.25	15.88	17.13	6
FG260900WHT	BRUTE® 10 GALLON LID	WHITE	10G	1.25	15.88	17.13	6
FG260900RED	BRUTE® 10 GALLON LID	RED	10G	1.25	15.88	17.13	6
FG260900YEL	BRUTE® 10 GALLON LID	YELLOW	10G	1.25	15.88	17.13	6
1779700	BRUTE® 10 GALLON LID	BLUE	10G	1.25	15.88	17.13	6
FG260900DGRN	BRUTE® 10 GALLON LID	DARK GREEN	10G	1.25	15.88	17.13	6
1926826	BRUTE® 10 GALLON LID	BLACK	10G	1.25	15.88	17.13	6
FG261960GRAY	BRUTE® 20 GALLON LID	GRAY	20G	1.80	19.88	21.63	6
FG261960WHT	BRUTE® 20 GALLON LID	WHITE	20G	1.80	19.88	21.63	6
FG261960RED	BRUTE® 20 GALLON LID	RED	20G	1.80	19.88	21.63	6
FG261960YEL	BRUTE® 20 GALLON LID	YELLOW	20G	1.80	19.88	21.63	6
1779731	BRUTE® 20 GALLON LID	BLUE	20G	1.80	19.88	21.63	6
FG261960DGRN	BRUTE® 20 GALLON LID	DARK GREEN	20G	1.80	19.88	21.63	6
FG261960BLA	BRUTE® 20 GALLON LID	BLACK	20G	1.80	19.88	21.63	6
FG263100GRAY	BRUTE® 32 GALLON LID	GRAY	32G	1.85	22.38	24.13	6
FG263100WHT	BRUTE® 32 GALLON LID	WHITE	32G	1.85	22.38	24.13	6
FG263100RED	BRUTE® 32 GALLON LID	RED	32G	1.85	22.38	24.13	6
FG263100YEL	BRUTE® 32 GALLON LID	YELLOW	32G	1.85	22.38	24.13	6
FG263100BLUE	BRUTE® 32 GALLON LID	BLUE	32G	1.85	22.38	24.13	6
FG263100DGRN	BRUTE® 32 GALLON LID	DARK GREEN	32G	1.85	22.38	24.13	6
1867532	BRUTE® 32 GALLON LID	BLACK	32G	1.85	22.38	24.13	6
FG264560GRAY	BRUTE® 44 GALLON LID	GRAY	44G	2.00	24.25	26.75	4
FG264560WHT	BRUTE® 44 GALLON LID	WHITE	44G	2.00	24.25	26.75	4
FG264560RED	BRUTE® 44 GALLON LID	RED	44G	2.00	24.25	26.75	4
FG264560YEL	BRUTE® 44 GALLON LID	YELLOW	44G	2.00	24.25	26.75	4
1779636	BRUTE® 44 GALLON LID	BLUE	44G	2.00	24.25	26.75	4
FG264560DGRN	BRUTE® 44 GALLON LID	DARK GREEN	44G	2.00	24.25	26.75	4
FG264560BLA	BRUTE® 44 GALLON LID	BLACK	44G	2.00	24.25	26.75	4
FG265400GRAY	BRUTE® 55 GALLON LID	GRAY	55G	2.09	26.75	29.13	3
FG265400WHT	BRUTE® 55 GALLON LID	WHITE	55G	2.09	26.75	29.13	3
FG265400RED	BRUTE® 55 GALLON LID	RED	55G	2.09	26.75	29.13	3
FG265400YEL	BRUTE® 55 GALLON LID	YELLOW	55G	2.09	26.75	29.13	3
1779733	BRUTE® 55 GALLON LID	BLUE	55G	2.09	26.75	29.13	3
FG265400DGRN	BRUTE® 55 GALLON LID	DARK GREEN	55G	2.09	26.75	29.13	3
1779738	BRUTE® 55 GALLON LID	BLACK	55G	2.09	26.75	29.13	3
FG263788GRAY	BRUTE® 32 GALLON DOME TOP	GRAY	32G	12.25	22.75	–	1
FG263788RED	BRUTE® 32 GALLON DOME TOP	RED	32G	12.25	22.75	–	1
1829397	BRUTE® 32 GALLON DOME TOP	DARK GREEN	32G	12.25	22.75	–	1
1829398	BRUTE® 32 GALLON DOME TOP	BLUE	32G	12.25	22.75	–	1
1829399	BRUTE® 32 GALLON DOME TOP	YELLOW	32G	12.25	22.75	–	1
FG264788GRAY	BRUTE® 44 GALLON DOME TOP	GRAY	44G	12.63	24.88	–	1
FG264788RED	BRUTE® 44 GALLON DOME TOP	RED	44G	12.63	24.88	–	1
1834838	BRUTE® 44 GALLON DOME TOP	DARK GREEN	44G	12.63	24.88	–	1
1834839	BRUTE® 44 GALLON DOME TOP	YELLOW	44G	12.63	24.88	–	1
1834840	BRUTE® 44 GALLON DOME TOP	BLUE	44G	12.63	24.88	–	1
FG265788GRAY	BRUTE® 55 GALLON DOME TOP	GRAY	55G	14.50	27.25	–	1
FG265788RED	BRUTE® 55 GALLON DOME TOP	RED	55G	14.50	27.25	–	1
FG354300GRAY	BRUTE® 32 GALLON FUNNEL TOP	GRAY	55G	5.00	22.38	–	4

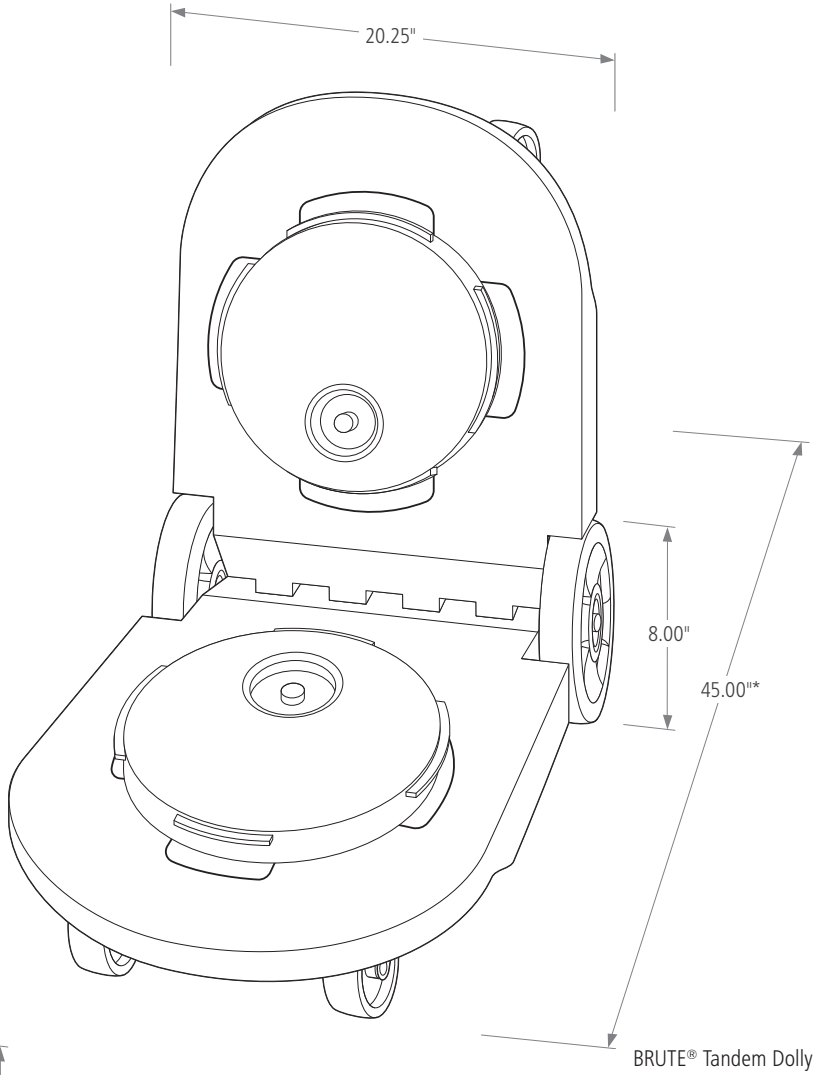
Rubbermaid® Commercial Products

BRUTE® DOLLIES

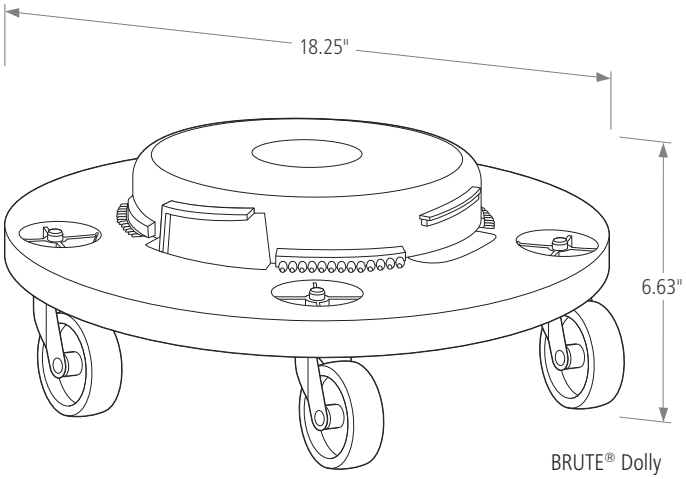
BRUTE® dollies are designed to be durable, long-lasting, and are able to withstand the toughest commercial environments while simplifying everyday tasks.

Features and Benefits:

- Rugged casters help keep fully loaded BRUTE® containers stable, even on rough and uneven floors, and swivel smoothly for easy maneuvering
- Twist locks hold containers securely in place and unlock easily for unloading, allowing for easy transport
- Structural foam construction provides superior strength and durability



BRUTE® Tandem Dolly
* Unfolded



BRUTE® Dolly

BRUTE® DOLLIES

SKU #	DESCRIPTION	COLOR	FITS	LENGTH IN	WIDTH IN	HEIGHT IN	DIAMETER IN	PACK SIZE
FG264000BLA	BRUTE® DOLLY	BLACK	ALL	–	–	6.63	18.25	2
FG264043BLA	BRUTE® QUIET DOLLY	BLACK	ALL	–	–	6.63	18.25	2
FG264600BLA	BRUTE® TANDEM DOLLY	BLACK	ALL	45.00	20.25	8.00	–	1

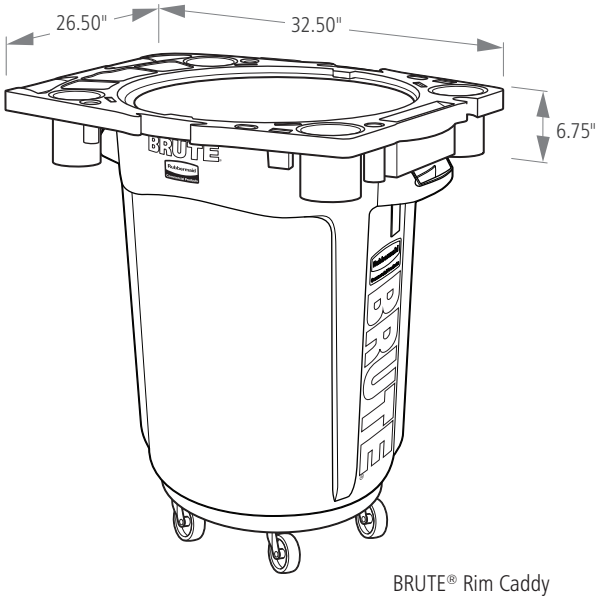
8900 Northpointe Executive Park Drive, Huntersville, NC 28078

BRUTE® CADDIES

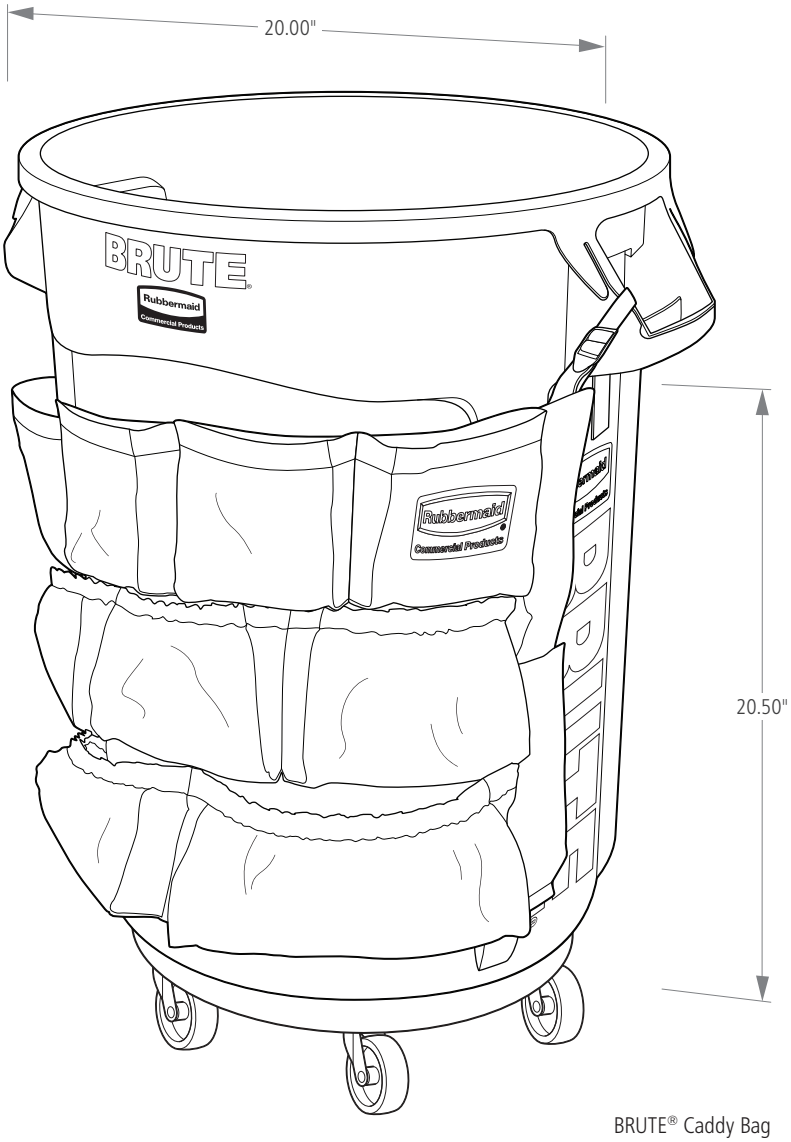
BRUTE® caddies are designed to improve productivity. Caddies make the BRUTE® container more versatile and efficient, making the toughest jobs easier.

Features and Benefits:

- The Caddy Bag is made of a heavy-duty vinyl material with elastic pockets that make on-board storage easy. The adjustable straps make installation and removal easy on 32- and 44-gallon BRUTE® containers
- The Rim Caddy has multiple storage compartments and hooks, along with liner retention bands to keep liners securely in place, and has snap-on tabs to hold the caddy in place



BRUTE® Rim Caddy



BRUTE® Caddy Bag

BRUTE® CADDIES

SKU #	DESCRIPTION	COLOR	FITS	LENGTH IN	WIDTH IN	HEIGHT IN	DIAMETER IN	PACK SIZE
FG264200YEL	BRUTE® CADDY BAG	YELLOW	32 AND 44 GALLON	–	–	20.50	20.00	6
1867533	**EXECUTIVE** BRUTE® CADDY BAG	BLACK	32 AND 44 GALLON	–	–	20.50	20.00	6
FG9W8700YEL	BRUTE® RIM CADDY	YELLOW	44 GALLON	32.50	26.50	6.75	–	1

8900 Northpointe Executive Park Drive, Huntersville, NC 28078

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Can, Dolly**

Manufacturer: Rubbermaid Commercial Products (800-347-9800)

Vendor: Rubbermaid Commercial Products (800-347-9800)

Model: Slim Jim Resin Trainable Dolly

Alt ID: WST-DLR

Mfr #: 1980602

Vendor #: 1980602

Item ID:

Waste can dolly. Designed to support and transport Vented Slim Jim containers. Features: Black. Resin material. Side clip-on connection that allows you to train several dollies together for collection and transportation purposes. Fits both 16 and 23-gallon Slim Jim containers. Foot pedal release. Structural foam construction.

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	14.70 in (373 mm)	**Left:**	N/A
Depth:	23.90 in (607 mm)	**Right:**	N/A
Height:	8.40 in (213 mm)	**Front:**	N/A
Max Weight:	5 lbs (2.2 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

Slim Jim® Accessories

Promote recycling and improve productivity.

Stainless Steel Dollies

- Collect and transport up to four streams of waste and recyclables with the new stainless steel multi-dollies for Slim Jim® containers
- Constructed from high quality stainless steel material that is easy to clean and won't rust or chip in commercial environments
- Features 3" nonmarking quiet casters that allow for smooth and quiet maneuverability
- Locking feature on casters creates a stable recycling station or collection site
- Fits both 16- and 23-gallon Slim Jim® Vented Containers

Resin Trainable Dolly

- Features a side clip-on connection that allows you to train several dollies together for collection and transportation purposes
- Foot pedal release makes disconnecting dollies quick and easy
- Structural foam construction ensures maximum durability in commercial environments
- Fits both 16- and 23-gallon Slim Jim® Vented Containers

1956192 with FG354060BLA / 1956185 / 1956186

1980602

Dollies

NO	COLOR	DESCRIPTION	U.S. DIMENSIONS	U.S. CAPACITY	U.S. SHIP WT/CTN	METRIC DIMENSIONS	METRIC CAPACITY	METRIC SHIP WT/CTN	PACK
1968468	Stainless	Slim Jim® Stainless Steel Dolly for Slim Jim® Containers – Single	20.0" l x 9.3" w x 9.0" h	100.0 lb	11.6 lb	50.8 cm x 23.6 cm x 22.9 cm	45.4 kg	5.2 kg	2
1956191	Stainless	Slim Jim® Stainless Steel Dolly for Slim Jim® Containers – Double	20.0" l x 20.6" w x 9.0" h	200.0 lb	9.9 lb	50.8 cm x 52.3 cm x 22.9 cm	90.7 kg	4.5 kg	1
1956192	Stainless	Slim Jim® Stainless Steel Dolly for Slim Jim® Containers – Triple	20.0" l x 32.5" w x 9.0" h	300.0 lb	13.6 lb	50.8 cm x 82.6 cm x 22.9 cm	136.1 kg	6.2 kg	1
1980602	Black	Slim Jim® Resin Trainable Dolly for Slim Jim® Containers	23.9" l x 14.7" w x 8.4" h	120.0 lb	11.9 lb	60.7 cm x 37.3 cm x 21.3 cm	54.4 kg	5.4 kg	2

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Can, Roll Out/Pull Out w/ Trash And Recycle Can** **Alt ID:** WST-PLO

Manufacturer: Hafele America Co. (8004233531) **Mfr #:**

Vendor: Hafele America Co. (8004233531) **Vendor #:**

Model: Waste Bin/Pull Out-KessebohmerTrack And Can-(1) Grey/Trash-(1) Blue/Recycle

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:		**Left:**	
Depth:		**Right:**	
Height:		**Front:**	
Max Weight:		**Back:**	
Mounting:		**Top:**	
		Bottom:	

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C329A	Alcove/Beverage	Project	Draft (New)	2	
ED/1st Flr	C305	Break Rm/Radiology	Project	Draft (New)	1	
ED/1st Flr	C466	Waiting Rm/Public	Project	Draft (New)	2	
				Total:	**5**	

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: **Waste Can, Swing Top**

Alt ID: WST-SWG

Manufacturer: Rubbermaid Commercial Products (800-347-9800)

Mfr #: FG354060GRAY/FG267360GRAY

Vendor: Rubbermaid Commercial Products (800-347-9800)

Vendor #: FG354060GRAY/FG267360GRAY

Model: Slim Jim Vented 23 Gal/Gray w/Swing Lid

23-gallon waste can with swing lid, gray. Venting channels, bag cinches, swing lid with molded-in handles. Custom imprinting available.

Item ID:

General Product Detail

Arch Sig:	No	**Spatially Sig:**	No
Arch Code:	3-Movable, Non-Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/O	**Type:** Non-Medical	**Green:** No

Physical Requirements

Width:	11.70 in (297 mm)	**Left:**	N/A
Depth:	22.00 in (559 mm)	**Right:**	N/A
Height:	35.00 in (889 mm)	**Front:**	N/A
Max Weight:	6 lbs (2.7 kg)	**Back:**	N/A
Mounting:	Floor	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	N/A	**Watts:**	N/A
Hz:	N/A	**Amps:**	N/A
Phase:	N/A	**BTU/hr:**	N/A
KVA:	N/A	**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	N/A

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	No		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C022	Med-Prep Rm	Project	Draft (New)	1	
				Total:	**1**	

Slim Jim® Containers with Venting Channels

Slim Jim® Containers with venting channels deliver the most efficient solution for collection, transportation, and disposal of multi-stream waste and recyclables.

- Venting channels make removing liners up to 80% easier, improving productivity and reducing the risk of worker injury*
- Four bag cinches secure liners around the rim of the container and allow for quick, knot-free liner changes
- Handles at the base and rim of the container improve grip and control while lifting and emptying full containers
- Rim with rib-strengthened design increases strength and resists crushing
- Build a recycling station with a variety of dolly and lid options to meet any facility need
- **Use Waste Stream Label Kit Version E (1977789) to ensure waste sortation accuracy. See more on page 44.**

1971258 FG354060GRAY

Can Liner Cinches
Four pull-through holes and can liner cinches eliminate knot tying.

1956185 1956186 1956187 1956188 1956189 FG354060BLA FG354060BEIG

NO.	COLOR	DESCRIPTION	U.S. DIMENSIONS	U.S. CAPACITY	U.S. SHIP WT/CTN	METRIC DIMENSIONS	METRIC CAPACITY	METRIC SHIP WT/CTN	CAN LINERS	PACK
1971258	GRAY	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 25.0" h	16 gal	26.0 lb	55.9 cm x 27.9 cm x 63.5 cm	60.6 L	11.8 kg	5009-88A	4
1971259	BEIGE	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 25.0" h	16 gal	26.0 lb	55.9 cm x 27.9 cm x 63.5 cm	60.6 L	11.8 kg	5009-88A	4
1956181	BROWN	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 25.0" h	16 gal	26.0 lb	55.9 cm x 27.9 cm x 63.5 cm	60.6 L	11.8 kg	5009-88A	4
1971257	BLUE	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 25.0" h	16 gal	26.0 lb	55.9 cm x 27.9 cm x 63.5 cm	60.6 L	11.8 kg	5009-88A	4
1955960	GREEN	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 25.0" h	16 gal	26.0 lb	55.9 cm x 27.9 cm x 63.5 cm	60.6 L	11.8 kg	5009-88A	4
1955959	BLACK	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 25.0" h	16 gal	26.0 lb	55.9 cm x 27.9 cm x 63.5 cm	60.6 L	11.8 kg	5009-88A	4
FG354060**	**GRAY, BEIG, BLA**	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 30.0" h	23 gal	31.8 lb	55.9 cm x 27.9 cm x 76.2 cm	87.1 L	14.4 kg	5009-88A	4
1956187	BROWN	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 30.0" h	23 gal	31.8 lb	55.9 cm x 27.9 cm x 76.2 cm	87.1 L	14.4 kg	5009-88A	4
1956185	BLUE	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 30.0" h	23 gal	31.8 lb	55.9 cm x 27.9 cm x 76.2 cm	87.1 L	14.4 kg	5009-88A	4
1956189	RED	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 30.0" h	23 gal	31.8 lb	55.9 cm x 27.9 cm x 76.2 cm	87.1 L	14.4 kg	5009-88A	4
1956188	YELLOW	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 30.0" h	23 gal	31.8 lb	55.9 cm x 27.9 cm x 76.2 cm	87.1 L	14.4 kg	5009-88A	4
1956186	GREEN	Slim Jim® Container with Venting Channels	22.0" l x 11.0" w x 30.0" h	23 gal	31.8 lb	55.9 cm x 27.9 cm x 76.2 cm	87.1 L	14.4 kg	5009-88A	4
FG354007	**BLUE, GRN**	Slim Jim® Container with Venting Channels – Recycling	22.0" l x 11.0" w x 30.0" h	23 gal	31.8 lb	55.9 cm x 27.9 cm x 76.2 cm	87.1 L	14.4 kg	5009-88A	4

*Based on internal testing.

**Custom imprinting available; contact Rubbermaid Customer Service at (800) 347-9800 for details.

When ordering products with **BOLD** color codes, please specify color code after the product number. Refer to the Standard Color Guide at the back of the catalog.

Slim Jim® Recycling Lids

Intuitive recycling lids with color-coding options ensure recyclables get into the right bins.

- Lids are available with the following lid openings: Open top, Bottles/Cans, Paper, and Mixed Recycling
- Integrated billboard is sized to fit compatible waste stream labels
- Material Composition: Polypropylene
- Fits: 16 Gal and 23 Gal Slim Jim® containers
- **Use Waste Stream Label Kit Version F (2018391) to ensure waste sortation accuracy. See more on page 44.**


Open Top
2018252


Bottles/Cans
2018258


Paper
2018276


Mixed Recycling
2018302

Slim Jim® Vertical Recycling Lids

NO.	COLOR	DESCRIPTION	U.S. DIMENSIONS	U.S. SHIP WT/CTN	PACK
2018252	Blue	Slim Jim® Vertical Lid – Open Top	20.4" l x 11.5" w x 6.0" h		4
2018218	Red	Slim Jim® Vertical Lid – Open Top	20.4" l x 11.5" w x 6.0" h		4
2018219	Yellow	Slim Jim® Vertical Lid – Open Top	20.4" l x 11.5" w x 6.0" h		4
2018220	Green	Slim Jim® Vertical Lid – Open Top	20.4" l x 11.5" w x 6.0" h		4
2018253	Black	Slim Jim® Vertical Lid – Open Top	20.4" l x 11.5" w x 6.0" h		4
2018254	Brown	Slim Jim® Vertical Lid – Open Top	20.4" l x 11.5" w x 6.0" h		4
2018258	Blue	Slim Jim® Vertical Lid – Bottles/Cans	20.4" l x 11.5" w x 6.0" h		4
2018255	Red	Slim Jim® Vertical Lid – Bottles/Cans	20.4" l x 11.5" w x 6.0" h		4
2018256	Yellow	Slim Jim® Vertical Lid – Bottles/Cans	20.4" l x 11.5" w x 6.0" h		4
2018257	Green	Slim Jim® Vertical Lid – Bottles/Cans	20.4" l x 11.5" w x 6.0" h		4
2018260	Brown	Slim Jim® Vertical Lid – Bottles/Cans	20.4" l x 11.5" w x 6.0" h		4
2018276	Blue	Slim Jim® Vertical Lid – Paper	20.4" l x 11.5" w x 6.0" h		4
2018272	Red	Slim Jim® Vertical Lid – Paper	20.4" l x 11.5" w x 6.0" h		4
2018274	Yellow	Slim Jim® Vertical Lid – Paper	20.4" l x 11.5" w x 6.0" h		4
2018275	Green	Slim Jim® Vertical Lid – Paper	20.4" l x 11.5" w x 6.0" h		4
2018278	Brown	Slim Jim® Vertical Lid – Paper	20.4" l x 11.5" w x 6.0" h		4
2018302	Blue	Slim Jim® Vertical Lid – Mixed Recycling	20.4" l x 11.5" w x 6.0" h		4
2018279	Red	Slim Jim® Vertical Lid – Mixed Recycling	20.4" l x 11.5" w x 6.0" h		4
2018280	Yellow	Slim Jim® Vertical Lid – Mixed Recycling	20.4" l x 11.5" w x 6.0" h		4
2018301	Green	Slim Jim® Vertical Lid – Mixed Recycling	20.4" l x 11.5" w x 6.0" h		4
2018304	Brown	Slim Jim® Vertical Lid – Mixed Recycling	20.4" l x 11.5" w x 6.0" h		4

Slim Jim® Lids

- Encourage waste separation and recycling with interchangeable, color-coded lids
- Swing Lid conceals waste from view and provides no-touch access
- Hinged Lid folds flat while in use and completely covers waste when closed; complies with Health and Human Services Standard


Handle Top Lid
FG268888LGRAY


Bottles and Cans Lid
FG269288BLUE


Swing Lid
FG267360GRAY


Hinged Lid
FG267400BLA

NO.	COLOR	DESCRIPTION	U.S. DIMENSIONS	U.S. SHIP WT/CTN	PACK
FG268888L	**GRAY**	Slim Jim® Handle Top	20.4" l x 11.2" w x 3.8" h	4.1 lb	4
FG267360	**BEIG, BLA, BLUE, GRAY**	Slim Jim® Swing Lid for Slim Jim® Containers	20.5" l x 11.7" w x 5.0" h	12.5 lb	4
1829400	GREEN	Slim Jim® Swing Lid for Slim Jim® Containers	20.5" l x 11.4" w x 5.0" h	12.5 lb	4
FG269288	**BLUE, BRN, GRN, RED, YEL**	Slim Jim® Bottles and Cans Recycling Lid for Slim Jim® Containers	20.4" l x 11.3" w x 2.8" h	3.9 lb	4
FG270388	**BLUE**, GRN	Slim Jim® Paper Recycling Lid for Slim Jim® Containers	20.5" l x 11.5" w x 2.8" h	4.1 lb	4
1788372	BLUE	Slim Jim® Mixed Recycling Lid for Slim Jim® Containers	21.1" l x 12.1" w x 2.8" h	5.4 lb	4
1788373	**GRN**	Slim Jim® Recycling Mixed Lid Green	20.5" l x 11.5" w x 2.8" h	4.1 lb	4
FG267400	BLA	**Executive** Slim Jim® Hinged Lid for Slim Jim® Containers	21.0" l x 13.5" w x 1.2" h	6.5 lb	4
FG9W1600L	**GRAY**	Slim Jim® Confidential Document Lid	20.4" l x 11.4" w x 2.1" h		4

When ordering products with **BOLD** color codes, please specify color code after the product number. Refer to the Standard Color Guide at the back of the catalog.

Medical Equipment Resources, Ltd.

University Hospital - ED Expansion Project

Specification Coversheet

Description: X-Ray Unit, Mobile, Digital
Manufacturer: Carestream Health ((888) 777-2072)
Vendor: Carestream Health ((888) 777-2072)
Model: DRX-Revolution

Alt ID: XRY-MBL
Mfr #: 1019397
Vendor #: 1019397

Item ID:

Mobile digital x-ray unit. Features collapsible column, touch-screen display, bins for gloves, extra batteries, markers, bags and lockable storage for the detector. Specify choice of detectors (not included): DRX-1 (uses a Gadolinium Scintillator: GOS), DRX-1C (uses a Cesium Scintillator: Csl) or DRX 2530C (smaller Cesium Scintillator for pediatric or orthopedic imagine).

General Product Detail

Arch Sig:	Yes	**Spatially Sig:**	No
Arch Code:	2-Movable, Elect	**ADA:**	No
Custom Code:	Unassigned	**Antimicrobial:**	No
Furnish Install:	O/V **Type:** Medical	**Green:**	No

Physical Requirements

Width:	22.75 in (578 mm)	**Left:**	N/A
Depth:	48.00 in (1219 mm)	**Right:**	N/A
Height:	77.00 in (1956 mm)	**Front:**	N/A
Max Weight:	1268 lbs (575.2 kg)	**Back:**	N/A
Mounting:	Floor-Mobile	**Top:**	N/A
		Bottom:	N/A

Electrical Requirements

Volts:	120	**Watts:**	REM
Hz:	60	**Amps:**	20
Phase:	Single	**BTU/hr:**	N/A
KVA:		**Ded. Circuit:**	No
Emer. Power:	No	**Plug Type:**	Type B (NEMA 5-15)

Utility and Technology Requirements

Water - Cold:	No	**Gasses:**	No
Water - Hot:	No	**Drain:**	No
Water - Treated:	No	**Steam:**	No
Vent:	No	**Vacuum - Dental / Medical:**	No / No
Tech Connect:	Yes		

Structural Requirements

Seismic:	No	**Pre-approval:**	

Product and Project Item Notes

Specification:
Height with column extended is 77 inches.

Structural:

Electrical:

Plumbing:

Mechanical:

Location

Department	Room#	Room	Funding Source	Item Status	Qty	Item Notes
ED/1st Flr	C026	Alcove/XRay Portable	Project	Draft (New)	1	
				Total:	**1**	

INNOVATION ON THE MOVE.

X-Factor thinking has revolutionized portable imaging. The CARESTREAM DRX-Revolution Mobile X-ray System lets you bring the key capabilities of a radiology room right to the patient – at the bedside, in the OR, the ICU or EDU.

MOBILITY REDEFINED.

OPTIMIZED IMAGING.

The DRX-Revolution features a unique tube-and-grid alignment system that delivers superb X-ray quality and encourages grid use. A powerful 32kW generator, dual-focal spot tube and EVP Plus image processing combine to further optimize images. This means fewer retakes and more support for faster, more accurate diagnoses.

The DRX-Revolution also offers prior image review, including techniques and exposure history with its PACS-based query/retrieve capability.

Custom Capabilities for ICU and Pediatric Imaging
You can enhance your system with a specialized ICU package that includes Tube and Line Visualization capability; it provides a companion image that is enhanced for a clear view of tube and PICC lines to verify correct positioning.

The Pediatric package utilizes image processing specific to pediatric views. It's designed to optimize image quality by utilizing pediatric-specific acquisition and processing parameters that suppress noise and enhance detail based on patient size.

Your Choice of DRX Detectors
The DRX-1 Detector uses a Gadolinium (GOS) Scintillator for general radiography imaging.

The DRX-1C Detector uses a Cesium (CsI) Scintillator for dose-sensitive applications like pediatrics, with increased DQE and MTF.

The DRX 2530C Detector offers all the performance of the DRX-1C Detector in a smaller-format design, optimal for pediatric imaging – offering fast, easy positioning in incubator trays. The 2530C is also ideal for orthopaedic imaging.

CARESTREAM Smart Services

A PARTNER WHO CARES AS MUCH AS YOU DO.

A Community of Service and Support

Benefit from all the advantages of our Customer Success Network. We work continuously to provide superb imaging performance, offer you new innovations as your needs change, and help you make the most of your budget and resources. Carestream's Customer Success Network surrounds you with a dynamic team of exceptional experts, with a Single Point of Entry for easy, customized access to the right people in every situation.

You and your patients will benefit from the expertise and best practices only Carestream can deliver, based on thousands of customer engagements worldwide and our 100-year heritage in medical-imaging innovation.

Detector Specifications:

DRX-1/DRX-1C Detectors
Receptor Type: Amorphous Silicon
Conversion Screen: GOS or CsI
Pixel Size: 139 µm x 139 µm
Physical Size: 35 cm x 43 cm (ISO 4090) 38.35 cm x 45.95 cm x 1.55 cm

DRX 2530C Detector
Wireless standard 802.11n
Image Size: 25 x 30 cm
Pixel Pitch: 0.139 mm
Physical Size: 28.4 x 41.5 x 1.6 cm (11.2 x 16.3 x .63 in)

Product Specifications:

X-ray Generator
Maximum Power Output: 32kW
kVp Range: 40 to 150 kVp
mAs Range: 0.1 to 320 mAs

X-ray Tube
Focal Spot Size: 0.6 mm / 1.2 mm
Target Angle: 14 degrees
Anode Heat Capacity: 300 kHU (212 kJ)

Tube Head Movement
Maximum SID to Floor: 2022 mm (79.6 in.)
Minimum SID to Floor: 683 mm (26.9 in.)
Tube Arm Reach: 1351 mm (53.2 in.) (center of cart to axis of X-ray beam)
Column Rotation Range: +/- 270 degrees
Tube Rotation: +180 degrees CW/ -135 degrees CCW
Tube Tilt: -10 to +90 degrees
Collimator Rotation Range: +/- 90 degrees

Physical Characteristics
Weight: 575 kg (1268 lbs)
Height (column collapsed): 1295 mm (51.0 in.)
Height (column extended): 1956 mm (77.0 in.)
Width: 576 mm (22.7 in.)
Length: 1219 mm (48.0 in.)

User Interface
Primary: 19 in. Touch Screen
Secondary (tube head): 8 in. Touch Screen

carestream.com

Carestream

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Item Detail Report

Legend:
O - Owner Furnish/Install
C - Contractor Furnish/Install
V - Vendor Furnish/Install

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
	30							
AMF-SRO	1 C/C	2	Amplifier, Power, Stereo Samson SERVO 120A	Black Diamond Video (BDV-AMP) Black Diamond Video (BDV-AMP)	ED/1st Flr Miscellaneous Costs ZZZ	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
ANZ-URN	1 O/O	2	Analyzer, Lab, Urinalysis, Semi-Automated Clinitek Status +	Siemens Healthcare Diagnostics (1780) Siemens Healthcare Diagnostics (1780)	ED/1st Flr Soiled Work Rm C020	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
BAR-G36 TA-05	1 C/C	1	Bar, Grab, Toilet/Shower B-6806 x 36 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 36) Bobrick Washroom Equipment, Inc. (B-6806 x 36)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G36 TA-05	4 C/C	1	Bar, Grab, Toilet/Shower B-6806 x 36 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 36) Bobrick Washroom Equipment, Inc. (B-6806 x 36)	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G36 TA-05	2 C/C	1	Bar, Grab, Toilet/Shower B-6806 x 36 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 36) Bobrick Washroom Equipment, Inc. (B-6806 x 36)	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
BAR-G36 TA-05	1 C/C	 1	Bar, Grab, Toilet/Shower B-6806 x 36 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 36) Bobrick Washroom Equipment, Inc. (B-6806 x 36)	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
	8							
BAR-G42 TA-06	1 C/C	 1	Bar, Grab, Toilet/Shower B-6806 x 42 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 42) Bobrick Washroom Equipment, Inc. (B-6806 x 42)	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G42 TA-06	2 C/C	 1	Bar, Grab, Toilet/Shower B-6806 x 42 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 42) Bobrick Washroom Equipment, Inc. (B-6806 x 42)	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G42 TA-06	4 C/C	 1	Bar, Grab, Toilet/Shower B-6806 x 42 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 42) Bobrick Washroom Equipment, Inc. (B-6806 x 42)	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G42 TA-06	1 C/C	 1	Bar, Grab, Toilet/Shower B-6806 x 42 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 42) Bobrick Washroom Equipment, Inc. (B-6806 x 42)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
	8							
BAR-G18 TA-07A	1 C/C	 1	Bar, Grab, Toilet/Shower B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18) Bobrick Washroom Equipment, Inc. (B-6806 x 18)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G18 TA-07A	4 C/C	 1	Bar, Grab, Toilet/Shower B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18) Bobrick Washroom Equipment, Inc. (B-6806 x 18)	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G18 TA-07A	2 C/C	 1	Bar, Grab, Toilet/Shower B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18) Bobrick Washroom Equipment, Inc. (B-6806 x 18)	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
BAR-G18 TA-07A	1 C/C	1	Bar, Grab, Toilet/Shower B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18) Bobrick Washroom Equipment, Inc. (B-6806 x 18)	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G18 TA-07B	1 C/C	1	Bar, Grab, Toilet/Shower w/ Peened Surface B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface) Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G18 TA-07B	2 C/C	1	Bar, Grab, Toilet/Shower w/ Peened Surface B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface) Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G18 TA-07B	4 C/C	1	Bar, Grab, Toilet/Shower w/ Peened Surface B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface) Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-G18 TA-07B	1 C/C	1	Bar, Grab, Toilet/Shower w/ Peened Surface B-6806 x 18 Straight Grab Bar	Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface) Bobrick Washroom Equipment, Inc. (B-6806 x 18 w/ Peened Surface)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
	16							
BAR-SWU TA-13	1 C/C	1	Bar, Grab, Toilet/Shower, Swing Arm B-4998 Swing-Up	Bobrick Washroom Equipment, Inc. (B-4998) Bobrick Washroom Equipment, Inc. (B-4998)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-SWU TA-13	4 C/C	1	Bar, Grab, Toilet/Shower, Swing Arm B-4998 Swing-Up	Bobrick Washroom Equipment, Inc. (B-4998) Bobrick Washroom Equipment, Inc. (B-4998)	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
BAR-SWU TA-13	2 C/C	 1	Bar, Grab, Toilet/Shower, Swing Arm B-4998 Swing-Up	Bobrick Washroom Equipment, Inc. (B-4998) Bobrick Washroom Equipment, Inc. (B-4998)	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-SWU TA-13	1 C/C	 1	Bar, Grab, Toilet/Shower, Swing Arm B-4998 Swing-Up	Bobrick Washroom Equipment, Inc. (B-4998) Bobrick Washroom Equipment, Inc. (B-4998)	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
	8							
BAR-GTW TA-08	1 C/C	 1	Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface B-6861.99 Two-Wall Shower Grab Bar	Bobrick Washroom Equipment, Inc. (B-6861.99) Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-GTW TA-08	2 C/C	 1	Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface B-6861.99 Two-Wall Shower Grab Bar	Bobrick Washroom Equipment, Inc. (B-6861.99) Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-GTW TA-08	4 C/C	 1	Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface B-6861.99 Two-Wall Shower Grab Bar	Bobrick Washroom Equipment, Inc. (B-6861.99) Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
BAR-GTW TA-08	1 C/C	 1	Bar, Grab, Toilet/Shower, Two Wall w/ Peened Surface B-6861.99 Two-Wall Shower Grab Bar	Bobrick Washroom Equipment, Inc. (B-6861.99) Bobrick Washroom Equipment, Inc. (B-6861.99 w/ Peened Surface)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
	8							
BIN-STD	1 O/V	 3	Bin, Shredding, Secure Standard Front Load	Shred-it, Inc. ( ) Shred-it, Inc. ( )	ED/1st Flr Registration (5) C467	Operating ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
BIN-SJR	1		Bin, Shredding, Secure	Shred-it, Inc. ( )	ED/1st Flr	Operating	Draft (New)	
	O/V	3	Mini Console	Shred-it, Inc. ( )	Scheduling (3)	ED Expansion	Unassigned	
					C469	ED Expansion	Unassigned	
BIN-SJR	2		Bin, Shredding, Secure	Shred-it, Inc. ( )	ED/1st Flr	Operating	Draft (New)	
	O/V	3	Mini Console	Shred-it, Inc. ( )	Workstation/Care Team (11)	ED Expansion	Unassigned	
					C049	ED Expansion	Unassigned	
BIN-SJR	2		Bin, Shredding, Secure	Shred-it, Inc. ( )	ED/1st Flr	Operating	Draft (New)	
	O/V	3	Mini Console	Shred-it, Inc. ( )	Workstation/Care Team (13)	ED Expansion	Unassigned	
					C027	ED Expansion	Unassigned	
	5							
BIN-SLY	100		Bin, Supply	Pegasus Medical Concepts, Inc. (2-205BK)	ED/1st Flr	Project	Draft (New)	
	O/O	3	Hanging Bin 2-205BK	Pegasus Medical Concepts, Inc. (2-205BK)	Clean Supply	ED Expansion	Unassigned	
					C019	ED Expansion	Unassigned	
	100							
BKT-CWS	17		Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	ED/1st Flr	Project	Draft (New)	
	C/C	1	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Treatment Rm - Private	ED Expansion	Unassigned	
					C001 - C047	ED Expansion	Unassigned	
BKT-CWS	9		Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	ED/1st Flr	Project	Draft (New)	
	C/C	1	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Treatment Bay/Cubicle	ED Expansion	Unassigned	
					C013 - C040	ED Expansion	Unassigned	
BKT-CWS	1		Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	ED/1st Flr	Project	Draft (New)	
	C/C	1	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Treatment Rm/PersonOfSize (Bariatric)	ED Expansion	Unassigned	
					C033	ED Expansion	Unassigned	
BKT-CWS	2		Bracket, Computer Workstation	Ergotron Inc. (45-358-026)	ED/1st Flr	Project	Draft (New)	
	C/C	1	LX Sit-Stand Wall Mount System w/Medium CPU Holder	Ergotron Inc. (45-358-026)	Treatment Rm/Isolation	ED Expansion	Unassigned	
					C008; C043	ED Expansion	Unassigned	
	29							
BKT-PCW	1		Bracket, Computer Workstation	GCX Corporation (ITK-0003-02)	ED/1st Flr	Project	Draft (New)	
	C/C	1	VHM Extended w/ Ergo & CPU Mount	GCX Corporation (ITK-0003-02)	Med-Prep Rm	ED Expansion	Unassigned	
					C022	ED Expansion	Unassigned	
	1							

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
BKT-VTS	17 C/C	 1	Bracket, Monitor, Wall 19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21) GCX Corporation (WC-0002-05/AG-0018-21)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
BKT-VTS	2 C/C	 1	Bracket, Monitor, Wall 19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21) GCX Corporation (WC-0002-05/AG-0018-21)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
BKT-VTS	1 C/C	 1	Bracket, Monitor, Wall 19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21) GCX Corporation (WC-0002-05/AG-0018-21)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
BKT-VTS	9 C/C	 1	Bracket, Monitor, Wall 19" Seismic Channel w/12" M Series Arm	GCX Corporation (WC-0002-05/AG-0018-21) GCX Corporation (WC-0002-05/AG-0018-21)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	29							
BKT-TVT	2 C/C	 1	Bracket, Television, Wall, Flat Panel SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640) Peerless-AV (ST640)	ED/1st Flr Alcove/Patient Tracking-Corridors C027; C050	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
BKT-TVT	1 C/C	 1	Bracket, Television, Wall, Flat Panel SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640) Peerless-AV (ST640)	ED/1st Flr Waiting Rm C329	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
BKT-TVT	1 C/C	 1	Bracket, Television, Wall, Flat Panel SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640) Peerless-AV (ST640)	ED/1st Flr Waiting Rm/Public C466	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
BKT-TVT	1 C/C	 1	Bracket, Television, Wall, Flat Panel SmartMount ST640 Univ. Tilt (Security, 32"- 50")	Peerless-AV (ST640) Peerless-AV (ST640)	ED/1st Flr Break Rm/Radiology C305	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	5							

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
BUK-MWR	1		Bucket, Mopping	Filmop USA LLC (0100SL2601C)	ED/1st Flr	Project	Draft (New)	
	O/O	3	Maxi Jolly Split Bucket System	Filmop USA LLC (0100SL2601C)	EVS	ED Expansion	Unassigned	
					C041	ED Expansion	Unassigned	
	1							
CAB-W2G	2		Cabinet, Warming, Dual, Freestanding	Skytron (SS2207-MG)	ED/1st Flr	Project	Draft (New)	
	O/C	2	SS2207-MG (Glass Doors)	Skytron (SS2207-MG)	Clean Supply	ED Expansion	Unassigned	
					C019	ED Expansion	Unassigned	
	2							
CAM-CCT	1		Camera, CCTV, Color	Hanwha Techwin America (QND-8080R)	ED/1st Flr	Project	Draft (New)	
	O/V	1	Hanwha QND-8080R	Hanwha Techwin America (QND-8080R)	Med-Prep Rm	ED Expansion	Unassigned	
					C022	ED Expansion	Unassigned	
	1							
CRT-LTK	1		Cart / Truck, Linen, Bulk	InterMetro Industries Corp (TXPB-BLK48SEC)	ED/1st Flr	Project	Draft (New)	
	O/O	3	MetroTrux Secure TXPB-BLK48	InterMetro Industries Corp (TXPB-BLK48SEC)	Soiled Work Rm	ED Expansion	Unassigned	
					C020	ED Expansion	Unassigned	
	1							
CRT-WOW	1		Cart, Computer, Workstation	JACO Inc. (520-L500 w/ 51-3648 Scanner Holder)	ED/1st Flr	Project	Draft (New)	
	O/O	3	UltraLite 520 (LCD Mount, L500)	JACO Inc. (520-L500 w/ 51-3648 Scanner Holder)	Alcove/WOW-Registration	ED Expansion	Unassigned	
					C329	ED Expansion	Unassigned	
	1							
CRT-EC6	1		Cart, Cylinder, D&E, Multi	Anthony Welded Products, Inc. (6064)	ED/1st Flr	Project	Draft (New)	
	O/O	3	6064 (6 Cap.)	Anthony Welded Products, Inc. ( )	Workstation/Care Team (13)	ED Expansion	Unassigned	
					C027	ED Expansion	Unassigned	
CRT-EC6	1		Cart, Cylinder, D&E, Multi	Anthony Welded Products, Inc. (6064)	ED/1st Flr	Project	Draft (New)	
	O/O	3	6064 (6 Cap.)	Anthony Welded Products, Inc. ( )	Workstation/Care Team (11)	ED Expansion	Unassigned	
					C049	ED Expansion	Unassigned	
	2							

Medical Equipment Resources, Ltd.
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Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
CRT-F20	1 O/O	3	Cart, Foodservice, Meal/Tray MD20SLP -20 Tray	Aladdin Temp-Rite, LLC (MD20SLP6B4-45) Aladdin Temp-Rite, LLC (MD20SLP6B4-45)	ED/1st Flr Nourishment Rm C021	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CRT-HKP	1 O/O	3	Cart, Housekeeping, Polymer Alpha ES EquoDose 50 Complete Workstation	Filmop USA LLC (AA1807706U002) Filmop USA LLC (AA1807706U002)	ED/1st Flr EVS C041	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CRT-CST	1 O/O	3	Cart, Procedure, Cast Flexline Cast FLCAST	InterMetro Industries Corp (FLCAST) InterMetro Industries Corp (FLCAST)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CRT-DFA	1 O/O	2	Cart, Procedure, Difficult Airway Starsys Difficult Airway SXRSDIFAIR	InterMetro Industries Corp (SXRSDIFAIR) InterMetro Industries Corp (SXRSDIFAIR)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CRT-ENT	1 O/O	3	Cart, Procedure, ENT StarSys ENT Cart (Single)	InterMetro Industries Corp (SXRSENT1) InterMetro Industries Corp (SXRSENT1)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CRT-5DE	3 O/O	3	Cart, Procedure, General 5-Drw Steel Mini Bge/Bge (Electronic)	Armstrong Medical Industries (AMC-1B-E) Armstrong Medical Industries (AMC-1B-E)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CRT-5DE	3 O/O	3	Cart, Procedure, General 5-Drw Steel Mini Bge/Bge (Electronic)	Armstrong Medical Industries (AMC-1B-E) Armstrong Medical Industries (AMC-1B-E)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	6							

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
CRT-MD6	1 O/O	3	Cart, Procedure, General TrippNT 51071 6 Drawer Blue WBB815770	Global Industrial Equipment Company (WBB815770) Global Industrial Equipment Company ( )	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CRT-GPN	2 O/O	3	Cart, Procedure, General Flexline Bedside FLBED	InterMetro Industries Corp (FLBED) InterMetro Industries Corp ( )	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CRT-GPN	17 O/O	3	Cart, Procedure, General Flexline Bedside FLBED	InterMetro Industries Corp (FLBED) InterMetro Industries Corp ( )	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CRT-GPN	2 O/O	3	Cart, Procedure, General Flexline Bedside FLBED	InterMetro Industries Corp (FLBED) InterMetro Industries Corp ( )	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CRT-GPN	9 O/O	3	Cart, Procedure, General Flexline Bedside FLBED	InterMetro Industries Corp (FLBED) InterMetro Industries Corp ( )	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CRT-GPN	1 O/O	3	Cart, Procedure, General Flexline Bedside FLBED	InterMetro Industries Corp (FLBED) InterMetro Industries Corp ( )	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	31							
CRT-PG5	2 O/O	3	Cart, Procedure, General Flexline Standard 5-Drwr w/Passive Lock FLP22010	InterMetro Industries Corp (FLP22010) InterMetro Industries Corp (FLP22010)	ED/1st Flr Clean Supply C019	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
CRT-CDE	1 O/O	3	Cart, Procedure, Resuscitation AR-6 Standard Steel w/ EB-1 Deluxe Acc'y Pkg	Armstrong Medical Industries (AR-6 / EB-1) Armstrong Medical Industries (AR-6 / EB-1)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CRT-CDE	1 O/O	3	Cart, Procedure, Resuscitation AR-6 Standard Steel w/ EB-1 Deluxe Acc'y Pkg	Armstrong Medical Industries (AR-6 / EB-1) Armstrong Medical Industries (AR-6 / EB-1)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
	2							
CRT-SBK	3 O/O	3	Cart, Supply, Bin/ Basket E-Style Single Rack Unit (SG-8-E)	Pegasus Medical Concepts, Inc. (SG-8-E) Pegasus Medical Concepts, Inc. (SG-8-E)	ED/1st Flr Clean Supply C019	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	3							
CRT-S48	6 O/O	3	Cart, Supply, Chrome, 48 inch Super Adjustable Super Erecta 48x18x69 (5-Tier)	InterMetro Industries Corp ((5x)A1848NC/(4x)63UP/5MP/5MPB) InterMetro Industries Corp ((5x)A1848NC/(4x)63UP/5MP/5MPB)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	6							
CRT-L48	1 O/O	3	Cart, Supply, Linen, 48 inch Super Erecta w/Cover (24"x48")	InterMetro Industries Corp (A2448NC/74UP/2448FG/5MP/5MPB/EP37C/EP57C/VUCMB) InterMetro Industries Corp (A2448NC/74UP/2448FG/5MP/5MPB/EP37C/EP57C/VUCMB)	ED/1st Flr Clean Supply C019	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CRT-SUT	1 O/O	3	Cart, Supply, Suture Flexline 5-Drwr w/Touchpad & Dividers (Green)	InterMetro Industries Corp (FL24K w/Options) InterMetro Industries Corp (FL24K w/Options)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CRT-U3S	1 O/O	3	Cart, Utility, Stainless 939 Tough Transport	Lakeside Manufacturing, Inc. (939) Lakeside Manufacturing, Inc. (939)	ED/1st Flr Nourishment Rm C021	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
CSW-SWM TA-01	1 C/C	1	Chair, Clinical, Shower, Wall Mount 4CS.447.UL01 - ADA Shower Seat	PBA ( ) PBA ( )	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	White; Provide blocking as required.

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
	1							
CLK-AWL	1 C/C	1	Clock, Analog, Synchronized, Wireless WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A) La Crosse Technology (WT-3122A)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CLK-AWL	9 C/C	1	Clock, Analog, Synchronized, Wireless WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A) La Crosse Technology (WT-3122A)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CLK-AWL	1 C/C	1	Clock, Analog, Synchronized, Wireless WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A) La Crosse Technology (WT-3122A)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CLK-AWL	17 C/C	1	Clock, Analog, Synchronized, Wireless WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A) La Crosse Technology (WT-3122A)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CLK-AWL	2 C/C	1	Clock, Analog, Synchronized, Wireless WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A) La Crosse Technology (WT-3122A)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CLK-AWL	1 C/C	1	Clock, Analog, Synchronized, Wireless WT-3122A 12.5 inch Atomic Wall Clock	La Crosse Technology (WT-3122A) La Crosse Technology (WT-3122A)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	31							
COF-SGC	1 O/C	1	Coffee Maker, Single Cup, Plumbed K150P Commercial Brewing System - Plumbed	Keurig Green Mountain (K150P) Keurig Green Mountain (K150P)	ED/1st Flr Nourishment Rm C021	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
COF-SGC	1 O/C	1	Coffee Maker, Single Cup, Plumbed K150P Commercial Brewing System - Plumbed	Keurig Green Mountain (K150P) Keurig Green Mountain (K150P)	ED/1st Flr Alcove/Beverage C329A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

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COF-SGC	1		Coffee Maker, Single Cup, Plumbed	Keurig Green Mountain (K150P)	ED/1st Flr	Project	Draft (New)	
	O/C	1	K150P Commercial Brewing System - Plumbed	Keurig Green Mountain (K150P)	Break Rm/Radiology C305	ED Expansion ED Expansion	Unassigned Unassigned	
	3							
COM-VID	4		Communication Device, Video Interpreter	Stratus Video (Stratus Stand)	ED/1st Flr	Project	Draft (New)	
	O/O	2	Stratus Stand w/iPad Air 2	Stratus Video (Stratus Stand)	Storage/Equipment C023	ED Expansion ED Expansion	Unassigned Unassigned	
	4							
CMP-EXC	3		Compression Unit, Extremity Pump, Rapid Inflation	Arjo Inc (526000-01)	ED/1st Flr	Project	Draft (New)	
	O/O	2	Flowtron Continuous/Sequential DVT Pump - ACS900	Arjo Inc (526000-01)	Storage/Equipment C023	ED Expansion ED Expansion	Unassigned Unassigned	
	3							
CMP-AL1	2		Computer, Desktop, All-in-One	Dell Inc. ( )	ED/1st Flr	Project	Draft (New)	
	O/O	6	OptiPlex 7400 All-In-One	Dell Inc. ( )	Treatment Rm/Isolation C008; C043	ED Expansion ED Expansion	Unassigned Unassigned	
CMP-AL1	9		Computer, Desktop, All-in-One	Dell Inc. ( )	ED/1st Flr	Project	Draft (New)	
	O/O	6	OptiPlex 7400 All-In-One	Dell Inc. ( )	Treatment Bay/Cubicle C013 - C040	ED Expansion ED Expansion	Unassigned Unassigned	
CMP-AL1	17		Computer, Desktop, All-in-One	Dell Inc. ( )	ED/1st Flr	Project	Draft (New)	
	O/O	6	OptiPlex 7400 All-In-One	Dell Inc. ( )	Treatment Rm - Private C001 - C047	ED Expansion ED Expansion	Unassigned Unassigned	
CMP-AL1	1		Computer, Desktop, All-in-One	Dell Inc. ( )	ED/1st Flr	Project	Draft (New)	
	O/O	6	OptiPlex 7400 All-In-One	Dell Inc. ( )	Treatment Rm/PersonOfSize (Bariatric) C033	ED Expansion ED Expansion	Unassigned Unassigned	
	29							
PCD-AL1	1		Computer, Desktop, All-in-One	Lenovo (M700z)	ED/1st Flr	Project	Draft (New)	
	O/O	6	M810Z	Lenovo (M700z)	Alcove/WOW-Registration C329	ED Expansion ED Expansion	Unassigned Unassigned	
PCD-AL1	1		Computer, Desktop, All-in-One	Lenovo (M700z)	ED/1st Flr	Project	Draft (New)	
	O/O	6	M810Z	Lenovo (M700z)	Med-Prep Rm C022	ED Expansion ED Expansion	Unassigned Unassigned	
	2							

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
CMD-A2M	13 O/O	6	Computer, Desktop, All-in-One M810Z w/ Dual Monitors	Lenovo (M700z) Lenovo (M700z)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CMD-A2M	11 O/O	6	Computer, Desktop, All-in-One M810Z w/ Dual Monitors	Lenovo (M700z) Lenovo (M700z)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CMD-A2M	3 O/O	6	Computer, Desktop, All-in-One M810Z w/ Dual Monitors	Lenovo (M700z) Lenovo (M700z)	ED/1st Flr Scheduling (3) C469	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CMD-A2M	1 O/O	6	Computer, Desktop, All-in-One M810Z w/ Dual Monitors	Lenovo (M700z) Lenovo (M700z)	ED/1st Flr Office C468	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CMD-A2M	5 O/O	6	Computer, Desktop, All-in-One M810Z w/ Dual Monitors	Lenovo (M700z) Lenovo (M700z)	ED/1st Flr Registration (5) C467	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	33							
CUR-CUB	1 O/C	5	Curtain, Cubicle, Disposable Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable) Medline Industries Inc. (Curtain/Disposable)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CUR-CUB	9 O/C	5	Curtain, Cubicle, Disposable Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable) Medline Industries Inc. (Curtain/Disposable)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CUR-CUB	2 O/C	5	Curtain, Cubicle, Disposable Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable) Medline Industries Inc. (Curtain/Disposable)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
CUR-CUB	17 O/C	5	Curtain, Cubicle, Disposable Curtain/Disposable	Medline Industries Inc. (Curtain/Disposable) Medline Industries Inc. (Curtain/Disposable)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	29							
DFB-PCE	1 O/O	2	Defibrillator, Monitor, w/Pacing R Series Plus w/Exp Pkg and Pacing	Zoll Medical Corporation (3 0520 0000 0111 0013) Zoll Medical Corporation (3 0520 0000 0111 0013)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Sits on stainless steel table

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DFB-PCE	1 O/O	 2	Defibrillator, Monitor, w/Pacing R Series Plus w/Exp Pkg and Pacing	Zoll Medical Corporation (3 0520 0000 0111 0013) Zoll Medical Corporation (3 0520 0000 0111 0013)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Sits on stainless steel table
	2							
DSY-OTO	9 O/C	 1	Diagnostic System, Integrated Green Series 777 [77791-2MPX]	Hillrom - Welch Allyn, Inc. (77791-2MPX) Hillrom - Welch Allyn, Inc. (77791-2MPX)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSY-OTO	1 O/C	 1	Diagnostic System, Integrated Green Series 777 [77791-2MPX]	Hillrom - Welch Allyn, Inc. (77791-2MPX) Hillrom - Welch Allyn, Inc. (77791-2MPX)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSY-OTO	17 O/C	 1	Diagnostic System, Integrated Green Series 777 [77791-2MPX]	Hillrom - Welch Allyn, Inc. (77791-2MPX) Hillrom - Welch Allyn, Inc. (77791-2MPX)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSY-OTO	2 O/C	 1	Diagnostic System, Integrated Green Series 777 [77791-2MPX]	Hillrom - Welch Allyn, Inc. (77791-2MPX) Hillrom - Welch Allyn, Inc. (77791-2MPX)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	29							
DIA-RNL EXISTING	3 O/O	 2	Dialysis Unit, Renal Replacement PrismaFlex	Baxter Healthcare (113081) Baxter Healthcare (113081)	ED/1st Flr Storage/Equipment C023	Existing (Reuse) ED Expansion ED Expansion	Draft (Existing) Unassigned Unassigned	
	3							
DSP-CLN	1 O/C	 1	Dispenser, Cleaning Solution J-Fill QuattroSelect (Air Gap)	Diversey Care (D3764735) Diversey Care (D3764735)	ED/1st Flr EVS C041	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
DSP-DWP	17 O/C	 1	Dispenser, Disinfectant Wipes, Wall Mount MSC351128	Medline Industries Inc. (MSC351128) Medline Industries Inc. (MSC351128)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
DSP-DWP	2 O/C	1	Dispenser, Disinfectant Wipes, Wall Mount MSC351128	Medline Industries Inc. (MSC351128) Medline Industries Inc. (MSC351128)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-DWP	1 O/C	1	Dispenser, Disinfectant Wipes, Wall Mount MSC351128	Medline Industries Inc. (MSC351128) Medline Industries Inc. (MSC351128)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-DWP	9 O/C	1	Dispenser, Disinfectant Wipes, Wall Mount MSC351128	Medline Industries Inc. (MSC351128) Medline Industries Inc. (MSC351128)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	29							
DSP-EMS	1 O/C	1	Dispenser, Emesis Bag, Wall Mount NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP) Medline Industries Inc. (NONEMBGDISP)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-EMS	9 O/C	1	Dispenser, Emesis Bag, Wall Mount NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP) Medline Industries Inc. (NONEMBGDISP)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-EMS	17 O/C	1	Dispenser, Emesis Bag, Wall Mount NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP) Medline Industries Inc. (NONEMBGDISP)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-EMS	2 O/C	1	Dispenser, Emesis Bag, Wall Mount NONEMBGDISP	Medline Industries Inc. (NONEMBGDISP) Medline Industries Inc. (NONEMBGDISP)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	29							
DSP-GV3	2 O/C	1	Dispenser, Glove, Triple Box 305362 Clear PETG	Omnimed, Inc (305362) Omnimed, Inc (305362)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

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DSP-GV3	17		Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	ED/1st Flr	Project	Draft (New)	
	O/C	1	305362 Clear PETG	Omnimed, Inc (305362)	Treatment Rm - Private	ED Expansion	Unassigned	
					C001 - C047	ED Expansion	Unassigned	
DSP-GV3	1		Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	ED/1st Flr	Project	Draft (New)	
	O/C	1	305362 Clear PETG	Omnimed, Inc (305362)	Soiled Work Rm	ED Expansion	Unassigned	
					C020	ED Expansion	Unassigned	
DSP-GV3	1		Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	ED/1st Flr	Project	Draft (New)	
	O/C	1	305362 Clear PETG	Omnimed, Inc (305362)	Med-Prep Rm	ED Expansion	Unassigned	
					C022	ED Expansion	Unassigned	
DSP-GV3	1		Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	ED/1st Flr	Project	Draft (New)	
	O/C	1	305362 Clear PETG	Omnimed, Inc (305362)	Treatment Rm/PersonOfSize (Bariatric)	ED Expansion	Unassigned	
					C033	ED Expansion	Unassigned	
DSP-GV3	9		Dispenser, Glove, Triple Box	Omnimed, Inc (305362)	ED/1st Flr	Project	Draft (New)	
	O/C	1	305362 Clear PETG	Omnimed, Inc (305362)	Treatment Bay/Cubicle	ED Expansion	Unassigned	
					C013 - C040	ED Expansion	Unassigned	
	31							
DSP-HSZ	9		Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	ED/1st Flr	Project	Draft (New)	
	O/C	1	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Treatment Bay/Cubicle	ED Expansion	Unassigned	
					C013 - C040	ED Expansion	Unassigned	
DSP-HSZ	1		Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	ED/1st Flr	Project	Draft (New)	
	O/C	1	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Treatment Rm/PersonOfSize (Bariatric)	ED Expansion	Unassigned	
					C033	ED Expansion	Unassigned	
DSP-HSZ	1		Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	ED/1st Flr	Project	Draft (New)	
	O/C	1	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Clean Supply	ED Expansion	Unassigned	
					C019	ED Expansion	Unassigned	
DSP-HSZ	1		Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	ED/1st Flr	Project	Draft (New)	
	O/C	1	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Med-Prep Rm	ED Expansion	Unassigned	
					C022	ED Expansion	Unassigned	
DSP-HSZ	1		Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	ED/1st Flr	Project	Draft (New)	
	O/C	1	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Waiting Rm	ED Expansion	Unassigned	
					C329	ED Expansion	Unassigned	
DSP-HSZ	1		Dispenser, Hand Sanitizer, Wall Mount	GOJO Industries (7724-01)	ED/1st Flr	Project	Draft (New)	
	O/C	1	Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01)	Nourishment Rm	ED Expansion	Unassigned	
					C021	ED Expansion	Unassigned	

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DSP-HSZ	1 O/C	1	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01) GOJO Industries (7724-01)	ED/1st Flr Soiled Work Rm C020	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-HSZ	1 O/C	1	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01) GOJO Industries (7724-01)	ED/1st Flr EVS C041	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-HSZ	17 O/C	1	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01) GOJO Industries (7724-01)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-HSZ	2 O/C	1	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01) GOJO Industries (7724-01)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-HSZ	1 O/C	1	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01) GOJO Industries (7724-01)	ED/1st Flr Alcove/Beverage C329A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-HSZ	1 O/C	1	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01) GOJO Industries (7724-01)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-HSZ	1 O/C	1	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01) GOJO Industries (7724-01)	ED/1st Flr Waiting Rm/Public C466	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-HSZ	1 O/C	1	Dispenser, Hand Sanitizer, Wall Mount Purell ES8 Touch-Free (7724-01)	GOJO Industries (7724-01) GOJO Industries (7724-01)	ED/1st Flr Break Rm/Radiology C305	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	39							
DSP-MAU	1 O/V	2	Dispenser, Medication, Auxiliary Pyxis MedStation 4000 (7-Drwr, 7 Cubie)	BD - Becton, Dickinson and Company (M4A7DRW7) BD - Becton, Dickinson and Company (M4A7DRW7)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							

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DSP-MTS	1		Dispenser, Medication, Auxiliary	BD - Becton, Dickinson and Company ( )	ED/1st Flr	Project	Draft (New)	
	O/V	2	Pyxis MedStation ES Single Column	BD - Becton, Dickinson and Company ( )	Med-Prep Rm	ED Expansion	Unassigned	
					C022	ED Expansion	Unassigned	
	1							
DSP-MDM	1		Dispenser, Medication, Host (Main)	BD - Becton, Dickinson and Company (M4MB6DR7W3)	ED/1st Flr	Project	Draft (New)	
	O/V	2	MedStation 4000 (6-Drwr, 3 Cubie)	BD - Becton, Dickinson and Company (M4MB6DR7W3)	Med-Prep Rm	ED Expansion	Unassigned	
					C022	ED Expansion	Unassigned	
	1							
DSP-MLK	1		Dispenser, Medication, Lock Module	BD - Becton, Dickinson and Company (MSRM)	ED/1st Flr	Project	Draft (New)	
	O/V	2	SMART Remote Manager	BD - Becton, Dickinson and Company (MSRM)	Med-Prep Rm	ED Expansion	Unassigned	
					C022	ED Expansion	Unassigned	
	1							
DSP-PSS TA-09	1		Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	ED/1st Flr	Project	Draft (New)	
	O/C	1		Kimberly-Clark Professional (09216)	Med-Prep Rm	ED Expansion	Unassigned	
					C022	ED Expansion	Unassigned	
DSP-PSS TA-09	1		Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	ED/1st Flr	Project	Draft (New)	
	O/C	1		Kimberly-Clark Professional (09216)	Nourishment Rm	ED Expansion	Unassigned	
					C021	ED Expansion	Unassigned	
DSP-PSS TA-09	1		Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	ED/1st Flr	Project	Draft (New)	
	O/C	1		Kimberly-Clark Professional (09216)	Toilet/Public	ED Expansion	Unassigned	
					C328	ED Expansion	Unassigned	
DSP-PSS TA-09	1		Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	ED/1st Flr	Project	Draft (New)	
	O/C	1		Kimberly-Clark Professional (09216)	Soiled Work Rm	ED Expansion	Unassigned	
					C020	ED Expansion	Unassigned	
DSP-PSS TA-09	17		Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216)	ED/1st Flr	Project	Draft (New)	
	O/C	1		Kimberly-Clark Professional (09216)	Treatment Rm - Private	ED Expansion	Unassigned	
					C001 - C047	ED Expansion	Unassigned	

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DSP-PSS TA-09	1 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-PSS TA-09	4 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-PSS TA-09	2 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-PSS TA-09	1 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Alcove/Beverage C329A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-PSS TA-09	9 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-PSS TA-09	2 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Alcove/Sink-Handwash C049A; C049B	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-PSS TA-09	2 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-PSS TA-09	1 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-PSS TA-09	1 O/C	1	Dispenser, Paper Towel, Surface Mount, Stainless Steel SCOTTFOLD Compact [09216]	Kimberly-Clark Professional (09216) Kimberly-Clark Professional (09216)	ED/1st Flr Break Rm/Radiology C305	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

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	44							
DSP-PPE	2 O/C	1	Dispenser, Personal Protection, Wall Mount, Recessed RE101-0012 Semi-Recessed	Bowman Dispensers (RE101-0012) Bowman Dispensers (RE101-0012)	ED/1st Flr Alcove/PPE C026A; C043A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
DSP-STN TA-03	1 C/C	1	Dispenser, Sanitary Napkin, Stainless Steel B-35139 TrimLine Series Surface-Mounted	Bobrick Washroom Equipment, Inc. (B-35139) Bobrick Washroom Equipment, Inc. (B-35139)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
DSP-SPG TA-10	1 O/C	1	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01) GOJO Industries (5134-01)	ED/1st Flr Soiled Work Rm C020	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-SPG TA-10	1 O/C	1	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01) GOJO Industries (5134-01)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-SPG TA-10	1 O/C	1	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01) GOJO Industries (5134-01)	ED/1st Flr Nourishment Rm C021	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-SPG TA-10	1 O/C	1	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01) GOJO Industries (5134-01)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-SPG TA-10	1 O/C	1	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01) GOJO Industries (5134-01)	ED/1st Flr Alcove/Beverage C329A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-SPG TA-10	2 O/C	1	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01) GOJO Industries (5134-01)	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
DSP-SPG TA-10	4 O/C	1	Dispenser, Soap, Wall Mount PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01) GOJO Industries (5134-01)	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

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DSP-SPG	1		Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	ED/1st Flr	Project	Draft (New)	
TA-10	O/C	1	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Toilet/Staff C018	ED Expansion ED Expansion	Unassigned Unassigned	
DSP-SPG	9		Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	ED/1st Flr	Project	Draft (New)	
TA-10	O/C	1	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Treatment Bay/Cubicle C013 - C040	ED Expansion ED Expansion	Unassigned Unassigned	
DSP-SPG	1		Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	ED/1st Flr	Project	Draft (New)	
TA-10	O/C	1	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Treatment Rm/PersonOfSize (Bariatric) C033	ED Expansion ED Expansion	Unassigned Unassigned	
DSP-SPG	2		Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	ED/1st Flr	Project	Draft (New)	
TA-10	O/C	1	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Treatment Rm/Isolation C008; C043	ED Expansion ED Expansion	Unassigned Unassigned	
DSP-SPG	2		Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	ED/1st Flr	Project	Draft (New)	
TA-10	O/C	1	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Alcove/Sink-Handwash C049A; C049B	ED Expansion ED Expansion	Unassigned Unassigned	
DSP-SPG	17		Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	ED/1st Flr	Project	Draft (New)	
TA-10	O/C	1	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Treatment Rm - Private C001 - C047	ED Expansion ED Expansion	Unassigned Unassigned	
DSP-SPG	1		Dispenser, Soap, Wall Mount	GOJO Industries (5134-01)	ED/1st Flr	Project	Draft (New)	
TA-10	O/C	1	PURELL CS4 Soap Dispenser Push-Style (Graphite)	GOJO Industries (5134-01)	Break Rm/Radiology C305	ED Expansion ED Expansion	Unassigned Unassigned	
	44							
DSP-TLP	1		Dispenser, Toilet Paper, Surface Mount, Stainless Steel Coreless Double Roll [09606]	Kimberly-Clark Professional (09606)	ED/1st Flr	Project	Draft (New)	
TA-02	O/C	1		Kimberly-Clark Professional (09606)	Toilet/Staff C018	ED Expansion ED Expansion	Unassigned Unassigned	
DSP-TLP	4		Dispenser, Toilet Paper, Surface Mount, Stainless Steel Coreless Double Roll [09606]	Kimberly-Clark Professional (09606)	ED/1st Flr	Project	Draft (New)	
TA-02	O/C	1		Kimberly-Clark Professional (09606)	Toilet/Patient C024; C025; C035; C036	ED Expansion ED Expansion	Unassigned Unassigned	
DSP-TLP	2		Dispenser, Toilet Paper, Surface Mount, Stainless Steel Coreless Double Roll [09606]	Kimberly-Clark Professional (09606)	ED/1st Flr	Project	Draft (New)	
TA-02	O/C	1		Kimberly-Clark Professional	Toilet/Patient - Isolation C007; C042	ED Expansion ED Expansion	Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
				(09606)				
DSP-TLP TA-02	1 O/C	1	Dispenser, Toilet Paper, Surface Mount, Stainless Steel Coreless Double Roll [09606]	Kimberly-Clark Professional (09606) Kimberly-Clark Professional (09606)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	8							
DSP-TSC TA-04	1 O/C	1	Dispenser, Toilet Seat Cover Scott Personal Seat Cover Dispenser	Kimberly-Clark Professional (09512) Kimberly-Clark Professional (09512)	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
DSP-WCT	1 O/C	1	Dispenser, Water, Filtered Innowave Chiller 3	Waterlogic Commercial Products, LLC (Innowave Chiller 3) Waterlogic Commercial Products, LLC (Innowave Chiller 3)	ED/1st Flr Alcove/Beverage C329A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
DSL-2GW	1 O/C	1	Disposal, Sharps, Wall Mount Bio Systems C-02RES-0203-OC	Stericycle (C-02RES-0203-OC) Stericycle (C-02RES-0203-OC)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
SHP-WMT	1 O/C	1	Disposal, Sharps, Wall Mount Bio Systems C-04RES-04 w/Locking Bracket	Stericycle (C-04RES-04/WB-04) Stericycle (C-04RES-04/WB-04)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
SHP-WMT	17 O/C	1	Disposal, Sharps, Wall Mount Bio Systems C-04RES-04 w/Locking Bracket	Stericycle (C-04RES-04/WB-04) Stericycle (C-04RES-04/WB-04)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
SHP-WMT	2 O/C	1	Disposal, Sharps, Wall Mount Bio Systems C-04RES-04 w/Locking Bracket	Stericycle (C-04RES-04/WB-04) Stericycle (C-04RES-04/WB-04)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
SHP-WMT	1 O/C	1	Disposal, Sharps, Wall Mount Bio Systems C-04RES-04 w/Locking Bracket	Stericycle (C-04RES-04/WB-04) Stericycle (C-04RES-04/WB-04)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
SHP-WMT	9 O/C	1	Disposal, Sharps, Wall Mount Bio Systems C-04RES-04 w/Locking Bracket	Stericycle (C-04RES-04/WB-04) Stericycle (C-04RES-04/WB-04)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	30							
DOP-VSC	1 O/O	2	Doppler, Vascular Dopplex D900 w/EZ8 Probe	Arjo - Huntleigh Healthcare, Inc (D900-P-USA/EZ8) Arjo Inc (D900-P-USA/EZ8)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
ECG-CRT	2 O/O	2	Electrocardiograph (ECG), Interpretive MAC VU360 Resting ECG Workstation w/ Basic Trolley	GE Healthcare - Cardiology (MAC VU360) GE Healthcare - Cardiology (MAC VU360)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
ECG-CRT	2 O/O	2	Electrocardiograph (ECG), Interpretive MAC VU360 Resting ECG Workstation w/ Basic Trolley	GE Healthcare - Cardiology (MAC VU360) GE Healthcare - Cardiology (MAC VU360)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	4							
MDG-AIR	3 O/O	3	Flowmeter, Air Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO) Precision Medical (1MFA2005PTO)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-AIR	9 O/O	3	Flowmeter, Air Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO) Precision Medical (1MFA2005PTO)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-AIR	1 O/O	3	Flowmeter, Air Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO) Precision Medical (1MFA2005PTO)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
MDG-AIR	2 O/O	3	Flowmeter, Air Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO) Precision Medical (1MFA2005PTO)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-AIR	17 O/O	3	Flowmeter, Air Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA2005PTO) Precision Medical (1MFA2005PTO)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	32							
MDG-OXF	34 O/O	3	Flowmeter, Oxygen Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO) Precision Medical (1MFA1005PTO)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-OXF	4 O/O	3	Flowmeter, Oxygen Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO) Precision Medical (1MFA1005PTO)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-OXF	2 O/O	3	Flowmeter, Oxygen Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO) Precision Medical (1MFA1005PTO)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-OXF	18 O/O	3	Flowmeter, Oxygen Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO) Precision Medical (1MFA1005PTO)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-OXF	6 O/O	3	Flowmeter, Oxygen Chrome (0-15 lpm, Ohmeda, Power Take Off)	Precision Medical (1MFA1005PTO) Precision Medical (1MFA1005PTO)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	64							
HMP-32G	2 O/O	3	Hamper, Linen Delta 32 Gallon Linen Hamper	Filmop USA LLC (0000C0412xx) Filmop USA LLC (0000C0412xx)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
HMP-32G	2		Hamper, Linen	Filmop USA LLC (0000C0412xx)	ED/1st Flr	Project	Draft (New)	
	O/O	3	Delta 32 Gallon Linen Hamper	Filmop USA LLC (0000C0412xx)	Workstation/Care Team (13) C027	ED Expansion ED Expansion	Unassigned Unassigned	
	4							
HOK-COT TA-11	1		Hook, Coat/Robe, Wall Mount	Bobrick Washroom Equipment, Inc. (B-9542)	ED/1st Flr	Project	Draft (New)	Provide blocking as required.
	C/C	1	B-9542 Surface-Mounted Coat Hook	Bobrick Washroom Equipment, Inc. (B-9542)	Toilet/Public C328	ED Expansion ED Expansion	Unassigned Unassigned	
HOK-COT TA-11	4		Hook, Coat/Robe, Wall Mount	Bobrick Washroom Equipment, Inc. (B-9542)	ED/1st Flr	Project	Draft (New)	Provide blocking as required.
	C/C	1	B-9542 Surface-Mounted Coat Hook	Bobrick Washroom Equipment, Inc. (B-9542)	Toilet/Patient C024; C025; C035; C036	ED Expansion ED Expansion	Unassigned Unassigned	
HOK-COT TA-11	2		Hook, Coat/Robe, Wall Mount	Bobrick Washroom Equipment, Inc. (B-9542)	ED/1st Flr	Project	Draft (New)	Provide blocking as required.
	C/C	1	B-9542 Surface-Mounted Coat Hook	Bobrick Washroom Equipment, Inc. (B-9542)	Toilet/Patient - Isolation C007; C042	ED Expansion ED Expansion	Unassigned Unassigned	
HOK-COT TA-11	1		Hook, Coat/Robe, Wall Mount	Bobrick Washroom Equipment, Inc. (B-9542)	ED/1st Flr	Project	Draft (New)	Provide blocking as required.
	C/C	1	B-9542 Surface-Mounted Coat Hook	Bobrick Washroom Equipment, Inc. (B-9542)	Toilet/Staff C018	ED Expansion ED Expansion	Unassigned Unassigned	
	8							
HYP-GEN	2		Hypo-Hyperthermia Unit, General	Medivance, Inc. - Subsidiary of Bard Medical (5000-00-00e)	ED/1st Flr	Project	Draft (New)	
	O/O	2	Arctic Sun 5000e	Medivance, Inc. - Subsidiary of Bard Medical (5000-00-00e)	Storage/Equipment C023	ED Expansion ED Expansion	Unassigned Unassigned	
	2							
ICE-C12	1		Ice Machine, Dispenser, Nugget, Countertop	Follett LLC (12CI425A-S)	ED/1st Flr	Project	Draft (New)	
	C/C	1	Symphony Plus 12CI425A-S	Follett LLC (12CI425A-S)	Nourishment Rm C021	ED Expansion ED Expansion	Unassigned Unassigned	
ICE-C12	1		Ice Machine, Dispenser, Nugget, Countertop	Follett LLC (12CI425A-S)	ED/1st Flr	Project	Draft (New)	
	C/C	1	Symphony Plus 12CI425A-S	Follett LLC (12CI425A-S)	Break Rm/Radiology C305	ED Expansion ED Expansion	Unassigned Unassigned	

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	2							
ICE-7CT	1 C/C	1	Ice Machine, Dispenser, Nugget, Countertop 7 Series 7CI100A-IW-CF-ST-00	Follett LLC (7CI100A-IW-CF-ST-00) Follett LLC (7CI100A-IW-CF-ST-00)	ED/1st Flr Alcove/Beverage C329A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
ICE-7CT	1 C/C	1	Ice Machine, Dispenser, Nugget, Countertop 7 Series 7CI100A-IW-CF-ST-00	Follett LLC (7CI100A-IW-CF-ST-00) Follett LLC (7CI100A-IW-CF-ST-00)	ED/1st Flr Waiting Rm/Public C466	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
INS-SRG	1 O/O	4	Instruments, Surgical, TBD	Aesculap, Inc. ( ) Aesculap, Inc. ( )	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
LRY-SMB	1 O/O	2	Laryngoscope Set, Video GlideScope Core Single-Use Premium WS + BFlex	Verathon (0270-0991) Verathon (0270-0991)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
LFT-O1B EXISTING	1 O/V	1	Lift, Patient, Ceiling, 1-Bed MS 1000 4F ECS w/ Scale	Arjo Inc (LF21409 w/ 700-5441 w/ 700-05401-BOX w/ 700.00525) Arjo Inc (LF21409 w/ 700-5441 w/ 700-05401-BOX w/ 700.00525)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Existing (Reuse) ED Expansion ED Expansion	Draft (Existing) Unassigned Unassigned	
	1							
LOC-VEN	2 O/O	2	Locator, Vein AV500 Vein Viewing System	AccuVein (AV500) AccuVein (AV500)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
MIR-V24 TA-12	1 C/C	1	Mirror, Vanity B-166 - 2448	Bobrick Washroom Equipment, Inc. ( ) Bobrick Washroom Equipment, Inc. ( )	ED/1st Flr Toilet/Staff C018	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
MIR-V24 TA-12	2 C/C	 1	Mirror, Vanity B-166 - 2448	Bobrick Washroom Equipment, Inc. ( ) Bobrick Washroom Equipment, Inc. ( )	ED/1st Flr Toilet/Patient - Isolation C007; C042	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
MIR-V24 TA-12	4 C/C	 1	Mirror, Vanity B-166 - 2448	Bobrick Washroom Equipment, Inc. ( ) Bobrick Washroom Equipment, Inc. ( )	ED/1st Flr Toilet/Patient C024; C025; C035; C036	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
MIR-V24 TA-12	1 C/C	 1	Mirror, Vanity B-166 - 2448	Bobrick Washroom Equipment, Inc. ( ) Bobrick Washroom Equipment, Inc. ( )	ED/1st Flr Toilet/Public C328	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Provide blocking as required.
	8							
MON-GLC	1 O/O	 2	Monitor, Blood Glucose, Point-of-Care ACCU-CHEK Inform II Meter & Base Unit	Roche Diagnostics Corporation (05060311001/05060290001) Roche Diagnostics Corporation (05060311001/05060290001)	ED/1st Flr Soiled Work Rm C020	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
MON-CNS	1 O/O	 2	Monitor, Central Station, 9 - 15 Patient IntelliVue	Philips Healthcare - Monitoring Systems ( ) Philips Healthcare - Monitoring Systems ( )	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MON-CNS	1 O/O	 2	Monitor, Central Station, 9 - 15 Patient IntelliVue	Philips Healthcare - Monitoring Systems ( ) Philips Healthcare - Monitoring Systems ( )	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
MON-PHS	2 O/O	 2	Monitor, Physiologic, Bedside IntelliVue MP30	Philips Healthcare - Monitoring Systems (M8002A) Philips Healthcare - Monitoring Systems (M8002A)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MON-PHS	17 O/O	 2	Monitor, Physiologic, Bedside IntelliVue MP30	Philips Healthcare - Monitoring Systems (M8002A) Philips Healthcare - Monitoring Systems (M8002A)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
MON-PHS	9 O/O	2	Monitor, Physiologic, Bedside IntelliVue MP30	Philips Healthcare - Monitoring Systems (M8002A) Philips Healthcare - Monitoring Systems (M8002A)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MON-PHS	1 O/O	2	Monitor, Physiologic, Bedside IntelliVue MP30	Philips Healthcare - Monitoring Systems (M8002A) Philips Healthcare - Monitoring Systems (M8002A)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	29							
MON-BSM	2 O/O	2	Monitor, Physiologic, Bedside, With Mobile Stand Intellivue MP5 (4 wave w/stand)	Philips Healthcare - Monitoring Systems (M8105A/A04/B41/989803002531) Philips Healthcare - Monitoring Systems (M8105A/A04/B41/989803002531)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
MON-VSS	1 O/O	2	Monitor, Physiologic, Vital Signs, w/Stand Connex Spot 7500 Wireless (BP, Covidien SpO2, SureTemp)	Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3) Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MON-VSS	1 O/O	2	Monitor, Physiologic, Vital Signs, w/Stand Connex Spot 7500 Wireless (BP, Covidien SpO2, SureTemp)	Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3) Hillrom - Welch Allyn, Inc. (75CT-B/7000-MS3)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
MTP-RFZ	2 O/O	3	Monitor, Temperature, Refrigerator/Freezer Traceable Hi-Accuracy Refrigerator Thermometer	Fisher Scientific Company (15078215) Fisher Scientific Company (15078215)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
OVM-CTS	2 C/C	2	Oven, Domestic, Microwave, Countertop SCM853	Summit Appliance (SCM853) Summit Appliance (SCM853)	ED/1st Flr Break Rm/Radiology C305	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
	2							
PNU-STR	1		Pneumatic Tube System, Station	Swisslog Healthcare Solutions	ED/1st Flr	Project	Draft (New)	
	C/C	1	6" Recessed Station w/ IQ Panel	(56488101 + 56575103)	Workstation/Care Team (11)	ED Expansion	Unassigned	
				Swisslog Healthcare Solutions	C049	ED Expansion	Unassigned	
				(56488101 + 56575103)				
PNU-STR	1		Pneumatic Tube System, Station	Swisslog Healthcare Solutions	ED/1st Flr	Project	Draft (New)	
	C/C	1	6" Recessed Station w/ IQ Panel	(56488101 + 56575103)	Workstation/Care Team (13)	ED Expansion	Unassigned	
				Swisslog Healthcare Solutions	C027	ED Expansion	Unassigned	
				(56488101 + 56575103)				
	2							
PRT-LBL	5		Printer, Label, Barcode	Zebra Technologies Corp	ED/1st Flr	Project	Draft (New)	
	O/O	6	GK420t (Thermal Transfer)	(GK42-102510-000)	Workstation/Care Team (11)	ED Expansion	Unassigned	
				Zebra Technologies Corp	C049	ED Expansion	Unassigned	
				(GK42-102510-000)				
PRT-LBL	1		Printer, Label, Barcode	Zebra Technologies Corp	ED/1st Flr	Project	Draft (New)	
	O/O	6	GK420t (Thermal Transfer)	(GK42-102510-000)	Scheduling (3)	ED Expansion	Unassigned	
				Zebra Technologies Corp	C469	ED Expansion	Unassigned	
				(GK42-102510-000)				
PRT-LBL	5		Printer, Label, Barcode	Zebra Technologies Corp	ED/1st Flr	Project	Draft (New)	
	O/O	6	GK420t (Thermal Transfer)	(GK42-102510-000)	Workstation/Care Team (13)	ED Expansion	Unassigned	
				Zebra Technologies Corp	C027	ED Expansion	Unassigned	
				(GK42-102510-000)				
PRT-LBL	2		Printer, Label, Barcode	Zebra Technologies Corp	ED/1st Flr	Project	Draft (New)	
	O/O	6	GK420t (Thermal Transfer)	(GK42-102510-000)	Registration (5)	ED Expansion	Unassigned	
				Zebra Technologies Corp	C467	ED Expansion	Unassigned	
				(GK42-102510-000)				
	13							
PRT-MFC	1		Printer, Laser, Multifunction	Hewlett-Packard	ED/1st Flr	Project	Draft (New)	
	O/O	6	Color LaserJet Enterprise MFP	(B5L47A#BGJ)	Alcove/WOW-Registration	ED Expansion	Unassigned	
			M577f	Hewlett-Packard	C329	ED Expansion	Unassigned	
				(B5L47A#BGJ)				
PRT-MFC	1		Printer, Laser, Multifunction	Hewlett-Packard	ED/1st Flr	Project	Draft (New)	
	O/O	6	Color LaserJet Enterprise MFP	(B5L47A#BGJ)	Scheduling (3)	ED Expansion	Unassigned	
			M577f	Hewlett-Packard	C469	ED Expansion	Unassigned	
				(B5L47A#BGJ)				

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
PRT-MFC	2 O/O	6	Printer, Laser, Multifunction Color LaserJet Enterprise MFP M577f	Hewlett-Packard (B5L47A#BGJ) Hewlett-Packard (B5L47A#BGJ)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
PRT-MFC	2 O/O	6	Printer, Laser, Multifunction Color LaserJet Enterprise MFP M577f	Hewlett-Packard (B5L47A#BGJ) Hewlett-Packard (B5L47A#BGJ)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	6							
PRT-MFP	2 O/O	6	Printer, Laser, Multifunction HP LaserJet Pro MFP M479fdn	Hewlett-Packard (W1A79A#BGJ) Hewlett-Packard (W1A79A#BGJ)	ED/1st Flr Registration (5) C467	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
PRT-MFL	1 O/O	6	Printer, Laser, Multifunction bizhub 558e	Konica Business Machines ( ) Konica Business Machines ( )	ED/1st Flr Registration (5) C467	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
PRT-MFL	1 O/O	6	Printer, Laser, Multifunction bizhub 558e	Konica Business Machines ( ) Konica Business Machines ( )	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
PRT-MFL	1 O/O	6	Printer, Laser, Multifunction bizhub 558e	Konica Business Machines ( ) Konica Business Machines ( )	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
PRT-MFL	1 O/O	6	Printer, Laser, Multifunction bizhub 558e	Konica Business Machines ( ) Konica Business Machines ( )	ED/1st Flr Scheduling (3) C469	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	4							
PRT-LSN	1 O/O	6	Printer, Laser, Network LaserJet Enterprise M605dn	Hewlett-Packard (E6B70A#BGJ) Hewlett-Packard (E6B70A#BGJ)	ED/1st Flr Registration (5) C467	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
PRT-WRT	1 O/O	6	Printer, Wristband ZD510-HC (Healthcare, Direct Thermal)	Zebra Technologies Corp (DT ZD510-HC) Zebra Technologies Corp (DT ZD510-HC)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
PRT-WRT	1 O/O	6	Printer, Wristband ZD510-HC (Healthcare, Direct Thermal)	Zebra Technologies Corp (DT ZD510-HC) Zebra Technologies Corp (DT ZD510-HC)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
PRT-WRT	1 O/O	2	Printer, Wristband ZD510-HC (Healthcare, Direct Thermal)	Zebra Technologies Corp (DT ZD510-HC) Zebra Technologies Corp (DT ZD510-HC)	ED/1st Flr Alcove/WOW-Registration C329	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	3							
PMP-IFR	1 O/O	2	Pump, Infusion, Rapid Rapid Infuser RI-2 (750ml)	Belmont Medical Technologies (903-00039) Belmont Medical Technologies (903-00039)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
PMP-IF1	10 O/O	2	Pump, Infusion, Single Ivenix Large Volume Infusion Pump (LVP)	Fresenius Kabi USA (Ivenix Large Volume Infusion Pump (LVP)) Fresenius Kabi USA (Ivenix Large Volume Infusion Pump (LVP))	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	10							
PMP-SAG	1 O/O	2	Pump, Suction/Aspirator, General, Portable SSCOR VX-2	SSCOR, Inc. (2310V) SSCOR, Inc. (2310V)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Sits on Crash Cart;Sits on Crash Cart
PMP-SAG	1 O/O	2	Pump, Suction/Aspirator, General, Portable SSCOR VX-2	SSCOR, Inc. (2310V) SSCOR, Inc. (2310V)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Sits on Crash Cart;Sits on Crash Cart
	2							
RCK-CRU	1 C/C	1	Rack, Crutch/Cane/Walker RR32 Universal Wall Storage (Pair)	Ideal Medical Products Inc. (RR32) Ideal Medical Products Inc. (RR32)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							

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Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
RDC-CDD	1 O/O	2	Recorder, CD/DVD Discproducer PP-100III CD/DVD/Blu-ray	Epson America, Inc. (C11CH40001) Epson America, Inc. (C11CH40001)	ED/1st Flr Registration (5) C467	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
REF-19S	1 C/C	2	Refrigerator, Domestic FPRU19F8WF (19 cu.ft./Stainless Steel)	Frigidaire - Div. Electrolux (FPRU19F8WF) Frigidaire - Div. Electrolux (FPRU19F8WF)	ED/1st Flr Nourishment Rm C021	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
RFZ-10S	1 C/C	2	Refrigerator, Domestic with Freezer FF1159SS (10.3 cu.ft./Stainless Steel)	Summit Appliance (FF1159SS) Summit Appliance (FF1159SS)	ED/1st Flr Break Rm/Radiology C305	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
REF-USS	1 C/C	2	Refrigerator, Domestic, Undercounter AL752BKSSTB (ADA Compliant)	Summit Appliance (AL752BKSSTB) Summit Appliance (AL752BKSSTB)	ED/1st Flr Alcove/Beverage C329A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
REF-MDU	2 C/C	2	Refrigerator, Medical Grade, Undercounter Performance Plus REF4P-0R-00-00	Follett LLC (REF4P-0R-00-00) Follett LLC (REF4P-0R-00-00)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
REF-MDU	1 C/C	2	Refrigerator, Medical Grade, Undercounter Performance Plus REF4P-0R-00-00	Follett LLC (REF4P-0R-00-00) Follett LLC (REF4P-0R-00-00)	ED/1st Flr Soiled Work Rm C020	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	3							
MDG-SCI	34 O/O	3	Regulator, Suction, Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303) Precision Medical (PM3303)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
MDG-SCI	4 O/O	3	Regulator, Suction, Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303) Precision Medical (PM3303)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-SCI	2 O/O	3	Regulator, Suction, Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303) Precision Medical (PM3303)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-SCI	18 O/O	3	Regulator, Suction, Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303) Precision Medical (PM3303)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
MDG-SCI	6 O/O	3	Regulator, Suction, Intermittent/Continuous PM3303 (DISS HT/Tubing Npl)	Precision Medical (PM3303) Precision Medical (PM3303)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	64							
SCL-WHC	1 O/O	2	Scale, Clinical, Adult, Wheelchair 6702W Oversized Wheelchair w/Handrail,Ht Gauge,Pwr	Hillrom - Scale-Tronix (6702W/60224/845010/845233) Hillrom - Scale-Tronix (6702W/60224/845010/845233)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
SCL-WHC	1 O/O	2	Scale, Clinical, Adult, Wheelchair 6702W Oversized Wheelchair w/Handrail,Ht Gauge,Pwr	Hillrom - Scale-Tronix (6702W/60224/845010/845233) Hillrom - Scale-Tronix (6702W/60224/845010/845233)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
SCN-BCD	17 O/O	6	Scanner, Barcode DS8100 Series Corded and Cordless Handheld Imagers	Zebra Technologies Corp (DS8178-SR7U2100SFW) Zebra Technologies Corp (DS8178-SR7U2100SFW)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
SCN-BCD	1 O/O	6	Scanner, Barcode DS8100 Series Corded and Cordless Handheld Imagers	Zebra Technologies Corp (DS8178-SR7U2100SFW) Zebra Technologies Corp (DS8178-SR7U2100SFW)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
SCN-BCD	9		Scanner, Barcode	Zebra Technologies Corp	ED/1st Flr	Project	Draft (New)	
	O/O	6	DS8100 Series Corded and Cordless Handheld Imagers	(DS8178-SR7U2100SFW) Zebra Technologies Corp (DS8178-SR7U2100SFW)	Treatment Bay/Cubicle C013 - C040	ED Expansion ED Expansion	Unassigned Unassigned	
SCN-BCD	2		Scanner, Barcode	Zebra Technologies Corp	ED/1st Flr	Project	Draft (New)	
	O/O	6	DS8100 Series Corded and Cordless Handheld Imagers	(DS8178-SR7U2100SFW) Zebra Technologies Corp (DS8178-SR7U2100SFW)	Treatment Rm/Isolation C008; C043	ED Expansion ED Expansion	Unassigned Unassigned	
	29							
SCN-BCS	2		Scanner, Barcode	Zebra Technologies Corp	ED/1st Flr	Project	Draft (New)	
	O/O	6	Symbol LS2208 (USB Kit with Stand)	(LS2208-SR20007R-NA) Zebra Technologies Corp (LS2208-SR20007R-NA)	Registration (5) C467	ED Expansion ED Expansion	Unassigned Unassigned	
	2							
SCN-CTP	2		Scanner, Document, Countertop	Fujitsu (PA03750-B005)	ED/1st Flr	Project	Draft (New)	
	O/O	2	fi-7030	Fujitsu (PA03750-B005)	Workstation/Care Team (11) C049	ED Expansion ED Expansion	Unassigned Unassigned	
SCN-CTP	1		Scanner, Document, Countertop	Fujitsu (PA03750-B005)	ED/1st Flr	Project	Draft (New)	
	O/O	2	fi-7030	Fujitsu (PA03750-B005)	Scheduling (3) C469	ED Expansion ED Expansion	Unassigned Unassigned	
SCN-CTP	2		Scanner, Document, Countertop	Fujitsu (PA03750-B005)	ED/1st Flr	Project	Draft (New)	
	O/O	2	fi-7030	Fujitsu (PA03750-B005)	Workstation/Care Team (13) C027	ED Expansion ED Expansion	Unassigned Unassigned	
	5							
SVR-CWL	1		Server, Synchronized, Wireless	Primex, Inc ( )	ED/1st Flr	Project	Draft (New)	
	C/C	1	Clock System OneVue Sync Transmitter	Primex, Inc ( )	Miscellaneous Costs ZZZ	ED Expansion ED Expansion	Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
	1							
SPK-CLG	4 C/C	1	Speaker, Ceiling Mount - MUSIC BDV-CM-SPK (Electro-Voice EVID C8.2LP)	Black Diamond Video (BDV-CM-SPK) Black Diamond Video (BDV-CM-SPK)	ED/1st Flr Waiting Rm C329	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
SPK-CLG	6 C/C	1	Speaker, Ceiling Mount - MUSIC BDV-CM-SPK (Electro-Voice EVID C8.2LP)	Black Diamond Video (BDV-CM-SPK) Black Diamond Video (BDV-CM-SPK)	ED/1st Flr Waiting Rm/Public C466	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	10							
STD-IV4	10 O/O	3	Stand, IV, Chrome 1099 (5-leg, 4 hook)	Steelcraft, Inc. (1099) Steelcraft, Inc. (1099)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	10							
STL-CSN	2 O/O	3	Stool, Exam, Cusion-Seat w/ Glides Ritter 274 Classic Series	Midmark Corporation - Medical (274-001) Midmark Corporation - Medical (274-001)	ED/1st Flr Treatment Rm/Isolation C008; C043	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
STL-CSN	17 O/O	3	Stool, Exam, Cusion-Seat w/ Glides Ritter 274 Classic Series	Midmark Corporation - Medical (274-001) Midmark Corporation - Medical (274-001)	ED/1st Flr Treatment Rm - Private C001 - C047	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
STL-CSN	9 O/O	3	Stool, Exam, Cusion-Seat w/ Glides Ritter 274 Classic Series	Midmark Corporation - Medical (274-001) Midmark Corporation - Medical (274-001)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
STL-CSN	1 O/O	3	Stool, Exam, Cusion-Seat w/ Glides Ritter 274 Classic Series	Midmark Corporation - Medical (274-001) Midmark Corporation - Medical (274-001)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	29							
STL-SHR	1 O/O	3	Stool, Step, w/Handrail 1251 Chrome	Blickman Industries (1011251000) Blickman Industries (1011251000)	ED/1st Flr Clean Supply C019	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
STL-SHR	2 O/O	3	Stool, Step, w/Handrail 1251 Chrome	Blickman Industries (1011251000) Blickman Industries (1011251000)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	3							
STR-BRI	1 O/O	3	Stretcher, Bariatric w/ Scale 7500 Wide Trauma / Transport Special Package	Pedigo Products, Inc (7500-W-SPEC) Pedigo Products, Inc (7500-W-SPEC)	ED/1st Flr Treatment Rm/PersonOfSize (Bariatric) C033	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
STR-PRC	9 O/O	3	Stretcher, Procedure / Recovery w/ 30" Mattress w/ Scale Procedural Stretcher P8000	Hillrom - Bed & Stretcher Group (P8000) Hillrom - Bed & Stretcher Group (P8000)	ED/1st Flr Treatment Bay/Cubicle C013 - C040	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
STR-PRC	3 O/O	3	Stretcher, Procedure / Recovery w/ 30" Mattress w/ Scale Procedural Stretcher P8000	Hillrom - Bed & Stretcher Group (P8000) Hillrom - Bed & Stretcher Group (P8000)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

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Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
STR-PRC	2		Stretcher, Procedure / Recovery	Hillrom - Bed & Stretcher	ED/1st Flr	Project	Draft (New)	
	O/O	3	w/ 30" Mattress w/ Scale	Group (P8000)	Treatment Rm/Isolation	ED Expansion	Unassigned	
			Procedural Stretcher P8000	Hillrom - Bed & Stretcher	C008; C043	ED Expansion	Unassigned	
				Group (P8000)				
STR-PRC	17		Stretcher, Procedure / Recovery	Hillrom - Bed & Stretcher	ED/1st Flr	Project	Draft (New)	
	O/O	3	w/ 30" Mattress w/ Scale	Group (P8000)	Treatment Rm - Private	ED Expansion	Unassigned	
			Procedural Stretcher P8000	Hillrom - Bed & Stretcher	C001 - C047	ED Expansion	Unassigned	
				Group (P8000)				
	31							
STR-GYN	1		Stretcher, Procedure, OB/GYN	Hillrom - Bed & Stretcher	ED/1st Flr	Project	Draft (New)	
	O/O	3	OB-GYN P8050	Group (P8050)	Storage/Equipment	ED Expansion	Unassigned	
				Hillrom - Bed & Stretcher	C023	ED Expansion	Unassigned	
				Group (P8050)				
	1							
TBL-CGR	1		Table, Changing, Infant, Wall	Koala Kare Products (KB310-	ED/1st Flr	Project	Draft (New)	
TA-14	C/C	1	Mount	SSRE)	Toilet/Public	ED Expansion	Unassigned	
			Horizontal Recessed Stainless	Koala Kare Products (KB310-	C328	ED Expansion	Unassigned	
			Steel KB310-SSRE	SSRE)				
	1							
TEL-DSK	1		Telephone, Desktop	TBD ( )	ED/1st Flr	Project	Draft (New)	
	O/C	6	TBD	TBD ( )	Office	ED Expansion	Unassigned	
					C468	ED Expansion	Unassigned	
TEL-DSK	5		Telephone, Desktop	TBD ( )	ED/1st Flr	Project	Draft (New)	
	O/C	6	TBD	TBD ( )	Registration (5)	ED Expansion	Unassigned	
					C467	ED Expansion	Unassigned	
TEL-DSK	3		Telephone, Desktop	TBD ( )	ED/1st Flr	Project	Draft (New)	
	O/C	6	TBD	TBD ( )	Scheduling (3)	ED Expansion	Unassigned	
					C469	ED Expansion	Unassigned	
TEL-DSK	11		Telephone, Desktop	TBD ( )	ED/1st Flr	Project	Draft (New)	
	O/C	6	TBD	TBD ( )	Workstation/Care Team (11)	ED Expansion	Unassigned	
					C049	ED Expansion	Unassigned	
TEL-DSK	13		Telephone, Desktop	TBD ( )	ED/1st Flr	Project	Draft (New)	
	O/C	6	TBD	TBD ( )	Workstation/Care Team (13)	ED Expansion	Unassigned	
					C027	ED Expansion	Unassigned	
	33							

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TEL-DKE	2 O/C	6	Telephone, Desktop, Analog (EMERGENCY-YELLOW) TBD	TBD (TBD) TBD (TBD)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
TEL-DKE	2 O/C	6	Telephone, Desktop, Analog (EMERGENCY-YELLOW) TBD	TBD (TBD) TBD (TBD)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
TEL-DKE	1 O/C	6	Telephone, Desktop, Analog (EMERGENCY-YELLOW) TBD	TBD (TBD) TBD (TBD)	ED/1st Flr Scheduling (3) C469	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
TEL-DKE	1 O/C	6	Telephone, Desktop, Analog (EMERGENCY-YELLOW) TBD	TBD (TBD) TBD (TBD)	ED/1st Flr Registration (5) C467	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	6							
TEL-WMT	2 O/C	6	Telephone, Wall TBD	TBD ( ) TBD ( )	ED/1st Flr Alcove/WOW-Registration C329	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
TEL-WMT	1 O/C	6	Telephone, Wall TBD	TBD ( ) TBD ( )	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	3							
TV4-3CM	1 O/O	2	Television, 36-43 in., Flat Panel 43 in. UT672M Series 4K UHD Pro:Centric Smart	LG Commercial Products (43UT672M0UC) LG Commercial Products (43UT672M0UC)	ED/1st Flr Waiting Rm C329	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
TV4-3CM	2 O/O	2	Television, 36-43 in., Flat Panel 43 in. UT672M Series 4K UHD Pro:Centric Smart	LG Commercial Products (43UT672M0UC) LG Commercial Products (43UT672M0UC)	ED/1st Flr Alcove/Patient Tracking-Corridors C027; C050	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
TV4-3CM	1 O/O	2	Television, 36-43 in., Flat Panel 43 in. UT672M Series 4K UHD Pro:Centric Smart	LG Commercial Products (43UT672M0UC) LG Commercial Products (43UT672M0UC)	ED/1st Flr Waiting Rm/Public C466	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

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TV4-3CM	1		Television, 36-43 in., Flat Panel	LG Commercial Products	ED/1st Flr	Project	Draft (New)	
	O/V	2	43 in. UT672M Series 4K UHD	(43UT672M0UC)	Break Rm/Radiology	ED Expansion	Unassigned	
			Pro:Centric Smart	LG Commercial Products (43UT672M0UC)	C305	ED Expansion	Unassigned	
	5							
THM-STD	1		Thermometer, Digital	Hillrom - Welch Allyn, Inc.	ED/1st Flr	Project	Draft (New)	
	O/O	3	SureTemp Plus 692 w/ M690	(01692-700/08273-000)	Workstation/Care Team (11)	ED Expansion	Unassigned	
			Mobile Stand	Hillrom - Welch Allyn, Inc. (01692-700/08273-000)	C049	ED Expansion	Unassigned	
THM-STD	1		Thermometer, Digital	Hillrom - Welch Allyn, Inc.	ED/1st Flr	Project	Draft (New)	
	O/O	3	SureTemp Plus 692 w/ M690	(01692-700/08273-000)	Workstation/Care Team (13)	ED Expansion	Unassigned	
			Mobile Stand	Hillrom - Welch Allyn, Inc. (01692-700/08273-000)	C027	ED Expansion	Unassigned	
	2							
THM-TMP	3		Thermometer, Temporal Artery	Exergen Corp (124275)	ED/1st Flr	Project	Draft (New)	
	O/O	3	TAT 5000	Exergen Corp (124275)	Storage/Equipment	ED Expansion	Unassigned	
					C023	ED Expansion	Unassigned	
	3							
TKC-IVP	2		Track, Ceiling, IV, Straight	A.R. Nelson Co. (4000B)	ED/1st Flr	Project	Draft (New)	
	C/C	1	4000B Telescoping Bottle Holder	Medline Industries Inc.	Treatment Rm/Isolation	ED Expansion	Unassigned	
			(Straight)	(IV4000108A)	C008; C043	ED Expansion	Unassigned	
TKC-IVP	1		Track, Ceiling, IV, Straight	A.R. Nelson Co. (4000B)	ED/1st Flr	Project	Draft (New)	
	C/C	1	4000B Telescoping Bottle Holder	Medline Industries Inc.	Treatment Rm/PersonOfSize (Bariatric)	ED Expansion	Unassigned	
			(Straight)	(IV4000108A)	C033	ED Expansion	Unassigned	
TKC-IVP	9		Track, Ceiling, IV, Straight	A.R. Nelson Co. (4000B)	ED/1st Flr	Project	Draft (New)	
	C/C	1	4000B Telescoping Bottle Holder	Medline Industries Inc.	Treatment Bay/Cubicle	ED Expansion	Unassigned	
			(Straight)	(IV4000108A)	C013 - C040	ED Expansion	Unassigned	
TKC-IVP	17		Track, Ceiling, IV, Straight	A.R. Nelson Co. (4000B)	ED/1st Flr	Project	Draft (New)	
	C/C	1	4000B Telescoping Bottle Holder	Medline Industries Inc.	Treatment Rm - Private	ED Expansion	Unassigned	
			(Straight)	(IV4000108A)	C001 - C047	ED Expansion	Unassigned	
	29							

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TRY-OBS	1		Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	ED/1st Flr	Project	Draft (New)	
	O/O	0	P490B - Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	Treatment Rm/PersonOfSize (Bariatric)	ED Expansion	Unassigned	
					C033	ED Expansion	Unassigned	
TRY-OBS	9		Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	ED/1st Flr	Project	Draft (New)	
	O/O	0	P490B - Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	Treatment Bay/Cubicle	ED Expansion	Unassigned	
					C013 - C040	ED Expansion	Unassigned	
TRY-OBS	2		Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	ED/1st Flr	Project	Draft (New)	
	O/O	0	P490B - Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	Treatment Rm/Isolation	ED Expansion	Unassigned	
					C008; C043	ED Expansion	Unassigned	
TRY-OBS	17		Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	ED/1st Flr	Project	Draft (New)	
	O/O	0	P490B - Tray, Patient, Overbed, Stretcher Accessory	Hillrom - Bed & Stretcher Group ( )	Treatment Rm - Private	ED Expansion	Unassigned	
					C001 - C047	ED Expansion	Unassigned	
	29							
IMG-UMP	1		Ultrasound, Imaging, Multipurpose	GE Healthcare - Imaging Systems (H4918U)	ED/1st Flr	Project	Draft (New)	
	O/O	2	LOGIQ E10	GE Healthcare - Imaging Systems (H4918U)	Workstation/Care Team (13)	ED Expansion	Unassigned	
					C027	ED Expansion	Unassigned	
IMG-UMP	1		Ultrasound, Imaging, Multipurpose	GE Healthcare - Imaging Systems (H4918U)	ED/1st Flr	Project	Draft (New)	
	O/O	2	LOGIQ E10	GE Healthcare - Imaging Systems (H4918U)	Workstation/Care Team (11)	ED Expansion	Unassigned	
					C049	ED Expansion	Unassigned	
	2							
IMG-BLD	1		Ultrasound, Imaging, Urology	Verathon (0270-0870 / 0800-0532)	ED/1st Flr	Project	Draft (New)	
	O/O	3	BladderScan Prime w/Mobile Cart	Verathon (0270-0870 / 0800-0532)	Storage/Equipment	ED Expansion	Unassigned	
					C023	ED Expansion	Unassigned	
	1							
VNT-TRP	1		Ventilator, Adult / Pediatric / Neonatal	Hamilton Medical, Inc. (161006)	ED/1st Flr	Project	Draft (New)	
	O/O	2	Hamilton T1	Hamilton Medical, Inc. ( )	Storage/Equipment	ED Expansion	Unassigned	
					C023	ED Expansion	Unassigned	

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	1							
VNT-PTB	1 O/O	2	Ventilator, Portable Trilogy EV-300	Philips Healthcare - Respironics ( ) Philips Healthcare - Respironics ( )	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
WMR-FLU	2 O/O	2	Warmer, Fluid/ Blood, Portable Ranger Blood/Fluid Warming System Model 245	3M Health Care (24500) 3M Health Care (24500)	ED/1st Flr Storage/Equipment C023	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
WMR-HYP	1 O/O	2	Warmer, Patient, Hypothermia Bair Paws System Model 875	3M Infection Prevention Division (87500) 3M Infection Prevention Division (87500)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
WMR-HYP	1 O/O	2	Warmer, Patient, Hypothermia Bair Paws System Model 875	3M Infection Prevention Division (87500) 3M Infection Prevention Division (87500)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	2							
WST-32W	1 O/O	3	Waste Can, 32-40 Gallon 2632 BRUTE Gray w/2631 Lid & 2640 Dolly	Rubbermaid Commercial Products (FG263200GRAY/FG263100GRAY/FG264000BLA) Rubbermaid Commercial Products (FG263200GRAY/FG263100GRAY/FG264000BLA)	ED/1st Flr Soiled Work Rm C020	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
WST-23B	1 O/O	3	Waste Can, Bio-Hazardous 23RD Step-On	Continental Commercial Products (23RD) Continental Commercial Products (23RD)	ED/1st Flr Soiled Work Rm C020	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							

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WST-DLR	1 O/O	 3	Waste Can, Dolly Slim Jim Resin Trainable Dolly	Rubbermaid Commercial Products (1980602) Rubbermaid Commercial Products (1980602)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
WST-28Q	6 O/O	 3	Waste Can, Open Top 2818BK (28 qt.)	Continental Commercial Products (2818BK) Continental Commercial Products (2818BK)	ED/1st Flr Workstation/Care Team (13) C027	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
WST-28Q	6 O/O	 3	Waste Can, Open Top 2818BK (28 qt.)	Continental Commercial Products (2818BK) Continental Commercial Products (2818BK)	ED/1st Flr Workstation/Care Team (11) C049	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
WST-28Q	3 O/O	 3	Waste Can, Open Top 2818BK (28 qt.)	Continental Commercial Products (2818BK) Continental Commercial Products (2818BK)	ED/1st Flr Scheduling (3) C469	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
WST-28Q	5 O/O	 3	Waste Can, Open Top 2818BK (28 qt.)	Continental Commercial Products (2818BK) Continental Commercial Products (2818BK)	ED/1st Flr Registration (5) C467	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
WST-28Q	1 O/O	 3	Waste Can, Open Top 2818BK (28 qt.)	Continental Commercial Products (2818BK) Continental Commercial Products (2818BK)	ED/1st Flr Office C468	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	21							
WST-23R	1 O/O	 3	Waste Can, Recycle 8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1) Continental Commercial Products (8322-1)	ED/1st Flr Registration (5) C467	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
WST-23R	1 O/O	 3	Waste Can, Recycle 8322-1 Wall Hugger Blue (23 gal)	Continental Commercial Products (8322-1) Continental Commercial Products (8322-1)	ED/1st Flr Alcove/WOW-Registration C329	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

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WST-23R	1		Waste Can, Recycle	Continental Commercial	ED/1st Flr	Project	Draft (New)	
	O/O	3	8322-1 Wall Hugger Blue (23 gal)	Products (8322-1)	Scheduling (3)	ED Expansion	Unassigned	
				Continental Commercial Products (8322-1)	C469	ED Expansion	Unassigned	
WST-23R	1		Waste Can, Recycle	Continental Commercial	ED/1st Flr	Project	Draft (New)	
	O/O	3	8322-1 Wall Hugger Blue (23 gal)	Products (8322-1)	Workstation/Care Team (11)	ED Expansion	Unassigned	
				Continental Commercial Products (8322-1)	C049	ED Expansion	Unassigned	
WST-23R	1		Waste Can, Recycle	Continental Commercial	ED/1st Flr	Project	Draft (New)	
	O/O	3	8322-1 Wall Hugger Blue (23 gal)	Products (8322-1)	Workstation/Care Team (13)	ED Expansion	Unassigned	
				Continental Commercial Products (8322-1)	C027	ED Expansion	Unassigned	
WST-23R	1		Waste Can, Recycle	Continental Commercial	ED/1st Flr	Project	Draft (New)	
	O/O	3	8322-1 Wall Hugger Blue (23 gal)	Products (8322-1)	Nourishment Rm	ED Expansion	Unassigned	
				Continental Commercial Products (8322-1)	C021	ED Expansion	Unassigned	
	6							
WST-PLO	1		Waste Can, Roll Out/Pull Out w/	Hafele America Co. ( )	ED/1st Flr	Project	Draft (New)	
	O/O	3	Trash And Recycle Can Waste Bin/Pull Out-KessebohmerTrack And Can-(1) Grey/Trash-(1) Blue/Recycle	Hafele America Co. ( )	Break Rm/Radiology	ED Expansion	Unassigned	
					C305	ED Expansion	Unassigned	
WST-PLO	2		Waste Can, Roll Out/Pull Out w/	Hafele America Co. ( )	ED/1st Flr	Project	Draft (New)	
	O/O	3	Trash And Recycle Can Waste Bin/Pull Out-KessebohmerTrack And Can-(1) Grey/Trash-(1) Blue/Recycle	Hafele America Co. ( )	Waiting Rm/Public	ED Expansion	Unassigned	
					C466	ED Expansion	Unassigned	
WST-PLO	2		Waste Can, Roll Out/Pull Out w/	Hafele America Co. ( )	ED/1st Flr	Project	Draft (New)	
	O/O	3	Trash And Recycle Can Waste Bin/Pull Out-KessebohmerTrack And Can-(1) Grey/Trash-(1) Blue/Recycle	Hafele America Co. ( )	Alcove/Beverage	ED Expansion	Unassigned	
					C329A	ED Expansion	Unassigned	
	5							
WST-24W	1		Waste Can, Step-On	Rubbermaid Commercial	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883552 Slim Jim Resin Front Step 24 Gal Beige	Products (1883552)	Nourishment Rm	ED Expansion	Unassigned	
				Rubbermaid Commercial Products (1883552)	C021	ED Expansion	Unassigned	

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WST-24W	2		Waste Can, Step-On	Rubbermaid Commercial Products (1883552)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883552 Slim Jim Resin Front Step 24 Gal Beige	Rubbermaid Commercial Products (1883552)	Alcove/PPE	ED Expansion	Unassigned	
					C026A; C043A	ED Expansion	Unassigned	
WST-24W	2		Waste Can, Step-On	Rubbermaid Commercial Products (1883552)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883552 Slim Jim Resin Front Step 24 Gal Beige	Rubbermaid Commercial Products (1883552)	Alcove/Waste Can-Treatment Bay	ED Expansion	Unassigned	
					C013A; C017A	ED Expansion	Unassigned	
WST-24W	1		Waste Can, Step-On	Rubbermaid Commercial Products (1883552)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883552 Slim Jim Resin Front Step 24 Gal Beige	Rubbermaid Commercial Products (1883552)	Workstation/Care Team (13)	ED Expansion	Unassigned	
					C027	ED Expansion	Unassigned	
WST-24W	1		Waste Can, Step-On	Rubbermaid Commercial Products (1883552)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883552 Slim Jim Resin Front Step 24 Gal Beige	Rubbermaid Commercial Products (1883552)	Workstation/Care Team (11)	ED Expansion	Unassigned	
					C049	ED Expansion	Unassigned	
	7							
WST-18W	17		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Treatment Rm - Private	ED Expansion	Unassigned	
					C001 - C047	ED Expansion	Unassigned	
WST-18W	2		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Alcove/Sink-Handwash	ED Expansion	Unassigned	
					C049A; C049B	ED Expansion	Unassigned	
WST-18W	2		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Treatment Rm/Isolation	ED Expansion	Unassigned	
					C008; C043	ED Expansion	Unassigned	
WST-18W	1		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Treatment Rm/PersonOfSize (Bariatric)	ED Expansion	Unassigned	
					C033	ED Expansion	Unassigned	

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WST-18W	1		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Alcove/WOW-Registration	ED Expansion	Unassigned	
					C329	ED Expansion	Unassigned	
WST-18W	9		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Treatment Bay/Cubicle	ED Expansion	Unassigned	
					C013 - C040	ED Expansion	Unassigned	
WST-18W	1		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Toilet/Public	ED Expansion	Unassigned	
					C328	ED Expansion	Unassigned	
WST-18W	2		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Waiting Rm	ED Expansion	Unassigned	
					C329	ED Expansion	Unassigned	
WST-18W	1		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Toilet/Staff	ED Expansion	Unassigned	
					C018	ED Expansion	Unassigned	
WST-18W	2		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Toilet/Patient - Isolation	ED Expansion	Unassigned	
					C007; C042	ED Expansion	Unassigned	
WST-18W	4		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Toilet/Patient	ED Expansion	Unassigned	
					C024; C025; C035; C036	ED Expansion	Unassigned	
WST-18W	2		Waste Can, Step-On	Rubbermaid Commercial Products (1883460)	ED/1st Flr	Project	Draft (New)	
	O/O	3	1883460 Slim Jim Resin Front Step 18 Gal/Beige	Rubbermaid Commercial Products (1883460)	Waiting Rm/Public	ED Expansion	Unassigned	
					C466	ED Expansion	Unassigned	
	44							

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WST-SWG	1 O/O	3	Waste Can, Swing Top Slim Jim Vented 23 Gal/Gray w/Swing Lid	Rubbermaid Commercial Products (FG354060GRAY/FG267360GRAY) Rubbermaid Commercial Products (FG354060GRAY/FG267360GRAY)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	1							
WSL-PH8	4 O/O	2	Waste Disposal, Pharmaceutical, Container Sentinel 4008 050 (8 Gallon)	Bemis Manufacturing Company (4008050) Bemis Manufacturing Company (4008050)	ED/1st Flr Med-Prep Rm C022	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	Disposals: Black; Green; Purple; Blue
	4							
ICE-FLT	1 C/C	1	Water Treatment System, Ice Maker, Wall Mount Standard Capacity Filter System 00130229	Follett LLC (00130229) Follett LLC (00130229)	ED/1st Flr Nourishment Rm C021	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
ICE-FLT	1 C/C	1	Water Treatment System, Ice Maker, Wall Mount Standard Capacity Filter System 00130229	Follett LLC (00130229) Follett LLC (00130229)	ED/1st Flr Alcove/Beverage C329A	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
ICE-FLT	1 C/C	1	Water Treatment System, Ice Maker, Wall Mount Standard Capacity Filter System 00130229	Follett LLC (00130229) Follett LLC (00130229)	ED/1st Flr Waiting Rm/Public C466	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
ICE-FLT	1 C/C	1	Water Treatment System, Ice Maker, Wall Mount Standard Capacity Filter System 00130229	Follett LLC (00130229) Follett LLC (00130229)	ED/1st Flr Break Rm/Radiology C305	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	
	4							
WHC-ADB	2 O/O	3	Wheelchair, Adult, Transport Ranger Chair w/ Cushion [RA010-C]	STAXI Corporation Ltd. (RA010-C) STAXI Corporation Ltd. (RA010-C)	ED/1st Flr Storage/Wheelchair C305	Project ED Expansion ED Expansion	Draft (New) Unassigned Unassigned	

Medical Equipment Resources, Ltd.
University Hospital - ED Expansion Project
Item Detail Report

Alt ID / Item ID	Qty / F/I	AC	Description / Model	Manufacturer / Vendor	Department / Room / Room #	Funding Source / Cost Center / Budget	Item Status / Custom Code	Item Notes
WHC-ADB	1		Wheelchair, Adult, Transport	STAXI Corporation Ltd. (RA010-C)	ED/1st Flr	Project	Draft (New)	
	O/O	3	Ranger Chair w/ Cushion [RA010-C]	STAXI Corporation Ltd. (RA010-C)	Workstation/Care Team (13)	ED Expansion	Unassigned	
					C027	ED Expansion	Unassigned	
WHC-ADB	1		Wheelchair, Adult, Transport	STAXI Corporation Ltd. (RA010-C)	ED/1st Flr	Project	Draft (New)	
	O/O	3	Ranger Chair w/ Cushion [RA010-C]	STAXI Corporation Ltd. (RA010-C)	Workstation/Care Team (11)	ED Expansion	Unassigned	
					C049	ED Expansion	Unassigned	
	4							
WHL-ATR	1		Wheelchair, Adult, Transport	Stryker Medical (1460-000-000)	ED/1st Flr	Project	Draft (New)	
	O/O	3	Prime TC (Swing Away Flip-up Footrests)	Stryker Medical (1460-000-000)	Workstation/Care Team (11)	ED Expansion	Unassigned	
					C049	ED Expansion	Unassigned	
WHL-ATR	1		Wheelchair, Adult, Transport	Stryker Medical (1460-000-000)	ED/1st Flr	Project	Draft (New)	
	O/O	3	Prime TC (Swing Away Flip-up Footrests)	Stryker Medical (1460-000-000)	Workstation/Care Team (13)	ED Expansion	Unassigned	
					C027	ED Expansion	Unassigned	
WHL-ATR	2		Wheelchair, Adult, Transport	Stryker Medical (1460-000-000)	ED/1st Flr	Project	Draft (New)	
	O/O	3	Prime TC (Swing Away Flip-up Footrests)	Stryker Medical (1460-000-000)	Storage/Wheelchair	ED Expansion	Unassigned	
					C305	ED Expansion	Unassigned	
	4							
XRY-MBL	1		X-Ray Unit, Mobile, Digital	Carestream Health (1019397)	ED/1st Flr	Project	Draft (New)	
	O/V	2	DRX-Revolution	Carestream Health (1019397)	Alcove/XRay Portable	ED Expansion	Unassigned	
					C026	ED Expansion	Unassigned	
	1							