**SECTION 00 91 02**

**ADDENDUM 002**

DATE: November 5, 2024

RE: Public Works – Maintenance and Operations Building
City of Sherwood
Sherwood, Arkansas

Architect Engineer Project No. 2023-249_20

FROM: CROMWELL ARCHITECT ENGINEERS, INC.
1300 East 6th Street
Little Rock, Arkansas 72202

TO: BIDDERS OF RECORD

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated September 23, 2024, as noted below. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

Each item in Contract Documents complements each of the other Contract Documents. No sheet, section, or document is to be followed without referring to all sheets, sections, and parts of the Contract Documents.

This Addendum consists of the following Documents and Revisions.

**CHANGES TO PROCUREMENT AND CONTRACTING REQUIREMENTS:**

1: Replace Section 00 01 10 - Table of Contents with revised Section issued with this Addendum.

2: Insert (this) Section 00 91 02 - Addendum 002 issued with this Addendum.

**CHANGES TO SPECIFICATIONS:**

3: Replace Section 08 11 13 - Hollow Metal Doors and Frames with revised Section issued with this Addendum.

4: Replace Section 08 36 13 - Sectional Doors with revised Section issued with this Addendum.

5: Replace Section 08 43 13 - Aluminum-Framed Storefronts with revised Section issued with this Addendum.

6: Replace Section 08 80 00 - Glazing with revised Section issued with this Addendum.

7: Replace Section 08 71 00 - Door Hardware with revised Section issued with this Addendum.

8: Replace Door Hardware Sets Attachment with revised issued with this Addendum.

9: Replace Section 13 34 19 - Metal Building Systems issued with this Addendum.

10: Replace Section 23 62 13 - Package Roof Top Air Conditioning Units with revised Section issued with this Addendum.

11: Replace Section 23 74 13 – Packaged Outdoor Central-Station Air-Handling Units with revised Section issued with this Addendum.

**CHANGES TO DRAWINGS:**

12: Insert the attached revised and/or new Drawings issued with this Addendum dated with original issue date:

| Sheet | Title/Description | Issue Date | Revision No. |
|---|---|---|---|
| **GENERAL INFORMATION** | | | |
| G-002-B | INDEX, SYMBOLS & ABBREV | 09/23/2024 | 1 |
| **LIFE SAFETY** | | | |
| GI001-B | LIFE SAFETY CODE ANALYSIS | 09/23/2024 | 1 |
| GI101-B | LIFE SAFETY FLOOR PLAN | 09/23/2024 | 1 |
| **STRUCTURAL** | | | |
| S-001-B | DESIGN CRITERIA AND GENERAL NOTES | 09/23/2024 | 1 |
| **ARCHITECTURAL** | | | |
| A-620-B | DOOR & WINDOW SCHEDULE | 09/23/2024 | 1 |
| **PLUMBING** | | | |
| P-101-B | OVERALL PRESSURE PIPE PLAN | 09/23/2024 | 1 |
| P-102-B | OVERALL DRAIN, WASTE & VENT PLAN | 09/23/2024 | 1 |
| P-401-B | ENLARGED PLUMBING PLAN | 09/23/2024 | 1 |
| P-501-B | PLUMBING DETAILS | 09/23/2024 | 1 |
| P-601-B | PLUMBING SCHEDULES | 09/23/2024 | 1 |
| P-901-B | PRESSURE PIPE RISER - MAINTENANCE SHOP AREA | 09/23/2024 | 1 |
| P-902-B | PRESSURE PIPE RISER - STAFF AREA | 09/23/2024 | 1 |
| P-904-B | DRAIN, WASTE & VENT RISER - MAINTENANCE SHOP AREA | 09/23/2024 | 1 |
| P-906-B | DRAIN, WASTE & VENT RISER – STREET DRAINAGE AREA | 09/23/2024 | 1 |
| **MECHANICAL** | | | |
| M-101-B | MAINTENANCE AND OPERATIONS BUILDING MECHANICAL PLAN | 09/23/2024 | 2 |
| M-502-B | MECHANICAL DETAILS | 09/23/2024 | 1 |
| M-601-B | MECHANICAL SCHEDULES | 09/23/2024 | 2 |
| M-702-B | MECHANICAL CONTROLS | 09/23/2024 | 1 |
| M-703-B | MECHANICAL CONTROLS | 09/23/2024 | 1 |
| M-901-B | MECHANICAL ISOMETRIC | 09/23/2024 | 1 |
| **ELECTRICAL** | | | |
| E-601-B | ELECTRICAL SINGLE-LINE DIAGRAM & LIGHT FIXTURE SCHEDULE | 09/23/2024 | 1 |
| E-602-B | ELECTRICAL SCHEDULES | 09/23/2024 | 1 |

**END OF SECTION**

**SECTION 00 01 10**

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**MODIFICATIONS**

New sections indicated by [*Addm00X], bold print and underline.

Modified sections indicated by [*Addm00X] and underline.

Deleted sections indicated by [*Addm00X] and strikethrough.

**PROCUREMENT AND CONTRACTING REQUIREMENTS**

**DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS**



**SPECIFICATIONS**

**DIVISION 01 -- GENERAL REQUIREMENTS**

**END OF SECTION**

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# SECTION 08 11 13
# HOLLOW METAL DOORS AND FRAMES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Fire-rated hollow metal doors and frames.

D. Thermally insulated hollow metal doors with frames.

E. Stainless-steel hollow metal doors and frames.

F. Hollow metal borrowed lites glazing frames.

G. Accessories, including glazing, louvers, and matching panels.

### 1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

### 1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2018.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

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; 2018a.

H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

I. ASTM C476 - Standard Specification for Grout for Masonry; 2020.

J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.

K. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

L. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2007.

M. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

N. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.

O. UL (DIR) - Online Certifications Directory; Current Edition.

P. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Samples: Submit two samples of metal, 2 by 2 inches in size, showing factory finishes, colors, and surface texture.

E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

**1.05 QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Maintain at project site copies of reference standards relating to installation of products specified.

**1.06 DELIVERY, STORAGE, AND HANDLING**

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

A. Hollow Metal Doors and Frames:
1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
2. Republic Doors, an Allegion brand: www.republicdoor.com.
3. Steelcraft, an Allegion brand: www.allegion.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 PERFORMANCE REQUIREMENTS**

A. Requirements for Hollow Metal Doors and Frames:
1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
2. Accessibility: Comply with ICC A117.1 and ADA Standards.
3. Door Top Closures: Flush end closure channel, with top and door faces aligned.
4. Door Edge Profile: Beveled, both sides.
5. Typical Door Face Sheets: Flush.
6. Door Texture: Smooth faces.
7. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
8. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
9. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.

B. Finish: Factory primed, for field finishing.

C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

**2.03 HOLLOW METAL DOORS**

A. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model ~~2 - Seamless.~~1 - Full Flush.
      d. Door Face Metal Thickness: ~~16~~ 18 gauge, 0.~~053~~ 042 inch, minimum.
      e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
   2. Door Thickness: 1-3/4 inches, nominal.

B. Interior Doors, Non-Fire Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gauge, 0.032 inch, minimum.
      e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
   2. Door Thickness: 1-3/4 inches, nominal.

C. Fire-Rated Doors:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
   2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
   3. Provide units listed and labeled by UL (DIR).
      a. Attach fire rating label to each fire rated unit.
   4. Door Thickness: 1-3/4 inches, nominal.

**2.04 HOLLOW METAL FRAMES**

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
   1. Frame Finish: Same as hollow metal door.
   2. ANSI A250.8 - SDI-100, Level 1 Door Frames: 16 gage, 0.053 inch, minimum thickness.
   3. ANSI A250.8 - SDI-100, Level 2 ~~and 3~~ Door Frames: 14 gage, 0.067 inch, minimum thickness.
   4. ANSI A250.8 - SDI-100, Level 3 Door Frames: 16 gage, 0.053 inch, minimum thickness.
   5. ~~4.~~ANSI A250.8 - SDI-100, Level 4 Door Frames: 12 gage, 0.093 inch, minimum thickness.
   6. ~~5.~~Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 - SDI-100, Level 1, 18 gage, 0.042 inch.
   7. ~~6.~~Frames for Sound-Rated Wood Doors: Comply with frame requirements specified in ANSI A250.8 - SDI-100, Level 1; 16 gage, 0.053 inch.

B. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

C. Exterior Door Frames: Face welded type.

1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
2. Weatherstripping: Separate, see Section 08 71 00.

D. Interior Door Frames, Non-Fire Rated: Face welded type. Back-seal remaining joints with joint sealant.

E. Door Frames, Fire-Rated: Face welded type. Back-seal remaining joints with joint sealant.
1. Fire Rating: Same as door, labeled.

F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

**2.05 FINISHES**

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

**2.06 ACCESSORIES**

A. Glazing: As specified in Section 08 80 00, factory installed.

B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Manufacturer to provide butts and gasketing as needed for sound rated doors.

D. Astragals for Double Doors: Specified in Section 08 71 00.
1. Exterior Doors: Steel, Z-shaped.
2. Fire-Rated Doors: Steel, shape as required for fire rating.

E. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

F. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

**3.02 INSTALLATION**

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 08 71 00.

F. Comply with glazing installation requirements of Section 08 80 00.

**3.03 TOLERANCES**

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

### 3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

**END OF SECTION**

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# SECTION 08 14 16
# FLUSH WOOD DOORS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire-rated, non-rated, and acoustical.

### 1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing.

### 1.03 REFERENCE STANDARDS

A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

B. ASTM E413 - Classification for Rating Sound Insulation; 2016.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 4.0; 2021.

E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

F. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

G. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

D. Samples: Submit three samples of door veneer, 8 by 10 inches in size illustrating wood grain, stain color, and sheen. Samples should reflect typical range of color and grain to be expected in finished Work

E. Test Reports: Show compliance with specified requirements for the following:
   1. Sound-retardant doors and frames; sealed panel tests are not acceptable.

F. Manufacturer's Installation Instructions: Indicate special installation instructions.

G. Specimen warranty.

H. Warranty, executed in Owner's name.

### 1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging, and inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

### 1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
1. Haley Brothers: www.haleybros.com.
2. Masonite Architectural: www.architectural.masonite.com.
3. Oregon Door: www.oregondoor.com.
4. VT Industries, Inc: www.vtindustries.com.
5. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 DOORS

A. Doors: See drawings for locations and additional requirements.
1. Quality Standard: Custom Grade, Standard Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated. Veneer thickness shall not be less 1/50 inch.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
1. Provide solid core doors at each location.
2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
3. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch wg pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.
4. Sound Retardant Doors: Minimum STC as indicated on drawings, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.
5. Wood veneer facing with factory transparent finish.

### 2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

C. Sound-Rated Doors: Equivalent to type, with particleboard core (PC) construction as required to achieve STC rating specified; plies and faces as indicated above.

### 2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: White ~~birch,~~ Maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face; unless otherwise indicated.
1. Vertical Edges: Same species as face veneer.

2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.

**2.05 DOOR CONSTRUCTION**

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other throughbolted hardware.

C. Fit door edge trim to edge of stiles after applying veneer facing.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

F. Provide edge clearances in accordance with the quality standard specified.

**2.06 FINISHES - WOOD VENEER DOORS**

A. Factory finish doors in accordance with approved sample, as indicated on drawings.

B. Seal door top edge with color sealer to match door facing.

**2.07 ACCESSORIES**

A. Glazing: See Section 08 80 00.

B. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

C. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.

D. Door Hardware: See Section 08 71 00.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

**3.02 INSTALLATION**

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

**3.03 TOLERANCES**

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

**3.04 ADJUSTING**

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

**END OF SECTION**

# SECTION 08 36 13
# SECTIONAL DOORS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Overhead sectional doors, electrically and manually operated.

B. Operating hardware and supports.

C. Electrical controls.

### 1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.

B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 26 05 83 - Wiring Connections.

### 1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. ASTM C1036 - Standard Specification for Flat Glass; 2021.

C. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

D. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

E. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 2011.

F. ITS (DIR) - Directory of Listed Products; current edition.

G. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).

H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL (DIR) - Online Certifications Directory; Current Edition.

K. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Product Data: Show component construction, anchorage method, and hardware.

D. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.

E. Manufacturer's qualification statement.

F. Installer's qualification statement.

G. Operation Data: Include normal operation, troubleshooting, and adjusting.

H. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

I. Specimen warranty.

**1.05 QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

C. Comply with applicable code for motor and motor control requirements.

D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

**1.06 WARRANTY**

A. Extended Correction Period: Correct defective work within a 2-year period commencing on Date of Substantial Completion.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

A. Basis of Design Products: To establish standards of manufacturer, operation, performance and appearance, drawings and specifications are based on products of the manufacturer(s) listed herein. Provided compliance with requirements, products of other manufacturers may also be acceptable.

B. Basis of Design Sectional Doors:
   1. Overhead Door Corporation; 418: www.overheaddoor.com/#sle.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 PERFORMANCE REQUIREMENTS**

A. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

B. Air Leakage Rate: Less than 0.40 cfm/sq ft when tested in accordance with ASTM E283/E283M at test pressure difference of 1.57 psf.

C. Thermal Transmittance: U-factor of 0.31 Btu/hr sq ft degrees F, maximum, in accordance with DASMA 102.

**2.03 STEEL DOORS**

A. Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
   1. Door Panels: Steel construction; outer steel sheet of 16 gauge, 0.0598 inch minimum thickness, flush profile; inner steel sheet of 26 gauge, 0.0217 inch minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; expanded polystyrene (EPS) insulation.
   2. Door Nominal Thickness: 2 inches thick.
   3. Exterior Finish:
      a. Factory finished with acrylic baked enamel; color as selected by Architect.
   4. Interior Finish:
      a. Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
   5. Glazed Lites: Full panel width, one row; set in place with resilient glazing channel.
      a. Glazing: Annealed float glass; single pane; clear; 1/8 inch nominal overall thickness.
   6. Manual Operation: Chain hoist for doors 10'-0" or less in height.
   7. ~~6.~~ Electric Operation: Electric control station for doors over 10'-0" in height.

**2.04 COMPONENTS**

A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.

B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
   1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.

D. ~~C.~~ Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.

E. ~~D.~~ Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

F. ~~E.~~ Head Weatherstripping: EPDM rubber seal, one piece full length.

G. ~~F.~~ Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

H. ~~G.~~ Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

**2.05 MATERIALS**

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.

B. Float Glass: Provide float glass glazing, unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).

C. Insulation: Expanded polystyrene (EPS), bonded to facing.

**2.06 ELECTRIC OPERATION**

A. Electric Operators:
   1. Mounting: Side mounted on cross head shaft.
   2. Motor Enclosure:
   3. Motor Rating: 1/3 hp; continuous duty.
   4. Motor Voltage: 120 volts, single phase, 60 Hz.
   5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
   6. Controller Enclosure: NEMA 250, Type 1.
   7. Opening Speed: 12 inches per second.
   8. Brake: Adjustable friction clutch type, activated by motor controller.
   9. Manual override in case of power failure.
   10. See Section 26 05 83 for electrical connections.

B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.

C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at interior door jamb.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

D. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

E. Safety Edge: Electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

### 3.02 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

### 3.03 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

### 3.04 CLEANING

A. Clean doors and frames.

B. Remove temporary labels and visible markings.

### 3.05 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

**END OF SECTION**

**SECTION 08 43 13**

**ALUMINUM-FRAMED STOREFRONTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Door hardware.

### 1.02 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: Steel attachment members.

B. Section 05 50 00 - Metal Fabrications: Steel attachment devices.

C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

~~D. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.~~

D. ~~E.~~ Section 08 80 00 - Glazing: Glass and glazing accessories.

### 1.03 REFERENCE STANDARDS

A. AAMA 501.4 - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts; 2018.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

C. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

E. AAMA 612 - Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum; 2017a.

F. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

G. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

J. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2018, with Editorial Revision.

K. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

L. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

### 1.05 PERFORMANCE REQUIREMENTS

A. General Performance:

1. Product to comply with the specified performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction, as determined by testing of aluminum storefront systems representing those indicated for this project.
2. Aluminum storefront systems shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

**1.06 SUBMITTALS**

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

C. Shop Drawings: Indicate system dimensions, plans, elevations, sections, details, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 12 inches in size illustrating finished aluminum surface, glass, glazing materials.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

G. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

H. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

I. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.07 QUALITY ASSURANCE**

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and 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. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.

**1.08 DELIVERY, STORAGE, AND HANDLING**

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

**1.09 FIELD CONDITIONS**

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

**1.10 WARRANTY**

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Basis of Design: Kawneer North America: www.kawneer.com.

B. Other Acceptable - Aluminum-Framed Storefronts Manufacturers:
   1. EFCO Corporation: www.efcocorp.com.
   2. Oldcastle BuildingEnvelope: www.oldcastlebe.com.
   3. YKK AP America Inc.: www.ykkap.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 ALUMINUM-FRAMED STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices. Including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
   1. Product: Kawneer; Trifab VersaGlaze 451 Non-Thermal / 451T Thermal Framing System.
   2. Glazing Position: Centered (front to back).
   3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
   4. Front, center, back, multi-plane, structural silicone or weatherseal.
   5. Screw spline.
   6. Finish Color: As indicated on drawings.
   7. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   8. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   10. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
   11. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   12. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements
   1. Wind Load: Static air design load of 35 psf shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member. Structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
      a. Design Wind Loads: Comply with requirements of ASCE 7.
   2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf as defined in AAMA 501.
   3. Air Infiltration: Air leakage rate shall not exceed 0.06 cfm/ft2 at a static air pressure differential of 6.2 psf with interior seal, or, rate shall not exceed 0.06 cfm/ft2 at a static air

pressure differential of 1.6 psf without interior seal, when tested in accordance with ASTM E 283.

4. System Internal Drainage: Drain to the exterior by means of a weep drainage network using subsill, any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
5. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
6. Uniform Load: A static air design load of 35 psf shall be applied in the positive and negative direction in accordance with ASTM E 330.
    a. There shall be no deflection in excess of L/175 of the span of any framing member.
    b. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
7. Seismic:
    a. When tested to AAMA 501.4, system must meet design displacement (elastic) of 0.010 x the story height and ultimate displacement (inelastic) of 1.5 x the design displacement.
8. Thermal Movements:
    a. Allow for thermal movements resulting from the following:
        1) 0°F (-18 C) to 180°F (82 C) maximum change (range) in ambient and surface temperatures
        2) 75°F (24 C) test interior ambient air temperature
    b. Test performance shows no buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum 3 cycles.

**2.03 COMPONENTS**

A. Aluminum Framing System: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
    1. Thermal Barrier: Thermal break with dual nominal 1/4 inch (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
        a. Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
    2. Framing members for interior applications need not be thermally broken.

B. Glazing System: See Section 08 80 00.
    1. For Exterior Framing: Type Low-e.
    2. For Interior Framing: Type tempered.
    3. Glazing Gaskets:
        a. Manufacturer's standard compression types.
        b. Replaceable, extruded EPDM rubber.
    4. Spacers and Setting Blocks:
        a. Manufacturer's standard elastomeric type.
    5. Bond-Breaker Tape:
        a. Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
    6. Glazing Sealants: For structural-sealant-glazed systems as recommended by manufacturer for joint type, and as follows:
        a. Structural Sealant per ASTM C1184:
            1) Single-component neutral-curing silicone formulation that is compatible with the system components with which it comes in contact.

2) Specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in the aluminum-framed systems indicated.
3) Color: Black

b. Weatherseal Sealant: ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O.
1) Single-component neutral-curing formulation that is compatible with the structural sealant and other system components with which it comes in contact
2) Recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
3) Color: Matching structural sealant.

C. Entrance Swing Doors: Glazed aluminum.
1. Door stile and rail face dimensions:
a. Medium Stile: 3-1/2 inch vertical face dimension, 1-3/4 inch depth, 6-1/2 inch bottom rail, high traffic applications.
2. Major portions of the door members to be 0.125 inch (3.2) nominal in thickness and glazing molding to be 0.05 inch (1.3) thick.
3. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
4. Provide adjustable glass jacks to help center the glass in the door opening.
5. Entrance System Fabrication:
a. Door corner construction shall consist of mechanical clip fastening, SIGMA 1-1/8 inch long fillet welds along top and bottom of rail extrusion at stile and rail intersection, and deep penetration plug weld at all four corners of door.
1) Must be full penetration plug weld to leg of clip, 1-1/8-inch long fillet welds along top and bottom or rails at vertical stile intersection. No tie-rod construction of any type or partial design allowed. Meeting rail to still joint fillet weld “only” is not acceptable.
2) Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable chord.
6. Entrance Performance Requirements:
a. Structural: Corner strength shall be tested per dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity.
7. Finish: Same as storefront.

**2.04 MATERIALS**

A. Extruded Aluminum: ASTM B221 (ASTM B221M) 6063-T6 alloy and temper; not less than 0.070 inch (1.8 mm) wall thickness at any location for the main frame.

B. Fasteners: Stainless steel.

C. Glazing Accessories: As specified in Section 088000.

**2.05 FINISHES**

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick.

B. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

**2.06 HARDWARE**

A. For each door, include weatherstripping, sill sweep strip, and threshold.

B. Other Door Hardware: Storefront manufacturer's standard type to suit application.

1. Finish on Hand-Contacted Items: Polished stainless steel.
2. For each door, include butt hinges, pivots, push handle, pull handle, exit device, narrow stile handle latch, and closer.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

### 3.02 INSTALLATION

A. Comply with drawings and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Set sill members in bed of sealant or with gaskets, as indicated, for weather-tight construction.

G. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront system to the exterior.

H. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

I. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

J. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

K. Coordinate attachment and seal of perimeter air and vapor barrier materials.

L. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

M. Set thresholds in bed of sealant and secure.

N. Install hardware using templates provided.

O. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

### 3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

### 3.04 FIELD QUALITY CONTROL

A. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

B. Field Tests:
   1. Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured.

2. Tests that do not meet the specified performance requirements and units that have deficiencies shall be corrected as part of the contract amount.
3. Testing shall be performed per AAMA 501.2 Hose Test using proper water pressure and nozzele per test standard.

**3.05 ADJUSTING**

A. Adjust operating hardware for smooth operation.

**3.06 CLEANING**

A. Remove protective material from pre-finished aluminum surfaces.

B. Clean glass immediately after installation.
   1. Comply with glass manufacturer's written recommendations for final cleaning and maintenance.
   2. Remove non-permanent labels and clean surfaces.

C. Clean aluminum surfaces.

D. Avoid damaging protective coatings and finishes.

E. Remove excess sealants, glazing materials, dirt, and other substances.

F. Repair or replace damaged installed products.

G. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.

H. Remove construction debris from project site and legally dispose of debris.

I. Remove excess sealant by method acceptable to sealant manufacturer.

**3.07 PROTECTION**

A. Protect installed products from damage until Date of Substantial Completion.

**END OF SECTION**

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# SECTION 08 71 00
# DOOR HARDWARE

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.02 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.
   2. Sliding doors.
   3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.

C. Related Sections:
   1. Division 08 Section “Hollow Metal Doors and Frames”.
   2. Division 08 Section “Flush Wood Doors”.
   3. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
   1. ANSI/BHMA Certified Product Standards - A156 Series.
   2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
   3. ANSI/UL 294 - Access Control System Units.
   4. UL 305 - Panic Hardware.
   5. ANSI/UL 437- Key Locks.

### 1.03 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3.

Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. 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 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.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
   1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
      a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
      b. Complete (risers, point-to-point) access control system block wiring diagrams.
      c. Wiring instructions for each electronic component scheduled herein.
   2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:
   1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

## 1.04 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

## 1.05 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified 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.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

**1.06 DELIVERY, STORAGE AND HANDLING**

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. 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.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

**1.07 COORDINATION**

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

**1.08 WARRANTY**

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

**PART 2 PRODUCTS**

**2.01 BUTT HINGES**

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
   4. Hinge Options: Comply with the following:

a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:
   a. McKinney (MK) - TA/T4A Series, 5-knuckle.

**2.02 CONTINUOUS HINGES**

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
   1. Manufacturers:.
      a. Pemko (PE).

**2.03 POWER TRANSFER DEVICES**

A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets with a 1-year warranty. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
   1. Manufacturers:
      a. McKinney (MK) - QC (# wires) Option.

B. Electrified Quick Connect Continuous Geared Transfer Hinges: Provide electrified transfer continuous geared hinges with a removable service panel cutout accessible without de-mounting door from the frame. Furnish with Molex™ standardized plug connectors with sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
   1. Manufacturers:
      a. Pemko (PE) - SER-QC (# wires) Option.

C. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
   1. Provide one each of the following tools as part of the base bid contract:
      a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
      b. McKinney (MK) - Connector Hand Tool: QC-R003.
   2. Manufacturers:
      a. McKinney (MK) - QC-C Series.

**2.04 DOOR OPERATING TRIM**

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
   1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
   2. Furnish dust proof strikes for bottom bolts.
   3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.

4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
   a. Rockwood (RO).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:
   a. Rockwood (RO).

## 2.05 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
1. Manufacturers:
   ~~a. Corbin Russwin Hardware (RU).~~

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents.
1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
2. Manufacturers:
   a. ~~D~~ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - Keymark.

E. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

EF. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Three (3).
2. Master Keys (per Master Key Level/Group): Five (5).

FG. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

## 2.06 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
1.CYLINDRICAL Manufacturers:
a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

## 2.07 MORTISE LOCKS AND LATCHING DEVICES

A. MortiseCylindrical Locksets, Grade 1 (HeavyCommercial Duty): Provide ANSI/BHMA A156.132, Series 10004000, Operational Grade 1 Certified Products Directory (CPD) listed mortisecylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.
1. Manufacturers:
a. Corbin Russwin Hardware (RU) - ML2000ASSA ABLOY ACCENTRA, formerly known as Yale (YA) 4700LN Series.

## 2.0807 DEADLOCKS AND LATCHES

A. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8" throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8” diameter bolts.
1. Manufacturers:
a. Adams Rite Manufacturing (AD) - MS1850S / MS1950 Series.

## 2.0908 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

**2.~~10~~09 CONVENTIONAL EXIT DEVICES**

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
   b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

C. Conventional Push Rail Exit Devices (Commercial Duty): ANSI/BHMA A156.3, Grade 1. ~~Provide~~ Certified Products Directory (CPD) listed exit devices ~~with~~. Listed manufacturers shall meet all functions and features as ~~follows:~~ specified herein. Listed manufacturers shall meet~~a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.~~
~~b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.~~
~~c. No catch points: addition of applied deflectors or other added components are not allowed.~~
~~d. No visible plastic.~~
~~e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.~~
~~f. Constructed of~~ all ~~stainless steel.~~
~~g. Stainless steel pullman type latch with deadlock feature.~~

~~h. Narrow or wide style exterior trim~~functions and features as specified ~~in the hardware sets~~herein.
~~i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.~~

~~j. Ten-year limited warranty for mechanical features.~~

~~2~~1. Electromechanical ~~exit devices~~locksets shall have the following functions and features:

a. Where ~~a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail-safe or fail-secure and operate from 12vdc to 24vdc regulated.~~

~~b. Wire routing for all non-access control electromechanical functions and EcoFlex trim to be contained within the carrier of the device eliminating the need for cavities in doors to be drilled. Include a protective film so that wires don't get damaged if the rail needs to be removed.~~

~~c. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.~~

~~d. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.~~

~~e. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.~~

~~3~~conventional power supplies are not sufficient, include any specific controllers required to provide the proper inrush current.

b. Two-year limited warranty for Electromechanical features.

2. Manufacturers:

a. ~~Corbin Russwin Hardware (RU) - PED4000 / PED5000 Series.~~

b. ~~Sargent Manufacturing (SA) - PE80~~ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 6000 Series.

## 2.~~11~~10 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

~~B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.~~

B~~1. Manufacturers:~~

~~a. Corbin Russwin Hardware (RU) - DC8000 Series.~~

~~b. Norton Rixson (NO) - 9500 Series.~~

~~c. Sargent Manufacturing (SA) - 281 Series.~~

~~C. Door Closers, Surface Mounted (Unitrol): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted closers with door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to~~

~~shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.~~

~~1. Manufacturers:~~

~~a. Corbin Russwin Hardware (RU) - Unitrol Series.~~

~~b. Norton Rixson (NO) - Unitrol Series.~~

~~D~~. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, high efficiency door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.

1. Manufacturers:

~~a. Corbin Russwin (RU) - DC5000 Series.~~

~~b~~a. Norton Rixson (NO) - 2800ST Series.

C. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:

~~c. Sargent Manufacturing (SA) - 422 Series.~~

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 5800 Series.

## 2.~~12~~11 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
   a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
   a. Rockwood (RO).

## 2.~~13~~12 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:
   a. Rockwood (RO).

## 2.~~14~~13 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: 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 UL-10C.
   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
   1. Pemko (PE).

## 2.~~15~~14 ELECTRONIC ACCESSORIES

A. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.
   1. Manufacturers:
   a. ~~1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.~~
   ~~2. Manufacturers:~~
      ~~2.16~~Securitron (SU) - AQL Series.

## 2.15 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

## 2.~~17~~16 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.02 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

### 3.03 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.04 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### 3.05 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

**3.06 DOOR HARDWARE SETS**

A. Door Hardware Sets follow this section.

**END OF SECTION**

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DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. ~~4.~~ 4. YA - ASSA ABLOY ACCENTRA~~RU - Corbin Russwin~~
5. AD - Adams Rite
6. RU - Corbin Russwin
7. ~~6~~. NO - Norton
8. ~~7~~. SU - Securitron
9. ~~8~~. OT - Other

**Hardware Sets**

**Set: 1.0**

Doors: B115A

| | | | |
|---|---|---|---|
| ~~1 Continuous Hinge~~ | ~~BSPFM(Per Dr Hgt) SLI or F-HD1~~ | | ~~PE~~ |
| ~~1 Continuous Hinge~~ | ~~BSPFM(Per Dr Hgt) SLI or F-HD1 SER~~ | | ~~PE~~ |
| ~~1 Concealed Vert Rod Exit~~ | ~~PED4850T P13~~ | ~~BSP~~ | ~~RU~~ |
| ~~1 Concealed Vert Rod Exit~~ | ~~PED4850T MELR P13 M92~~ | ~~BSP~~ | ~~RU~~ |
| ~~2 Locking Trim~~ | ~~PED355 C6~~ | ~~BSP~~ | ~~RU~~ |
| ~~2 Surface Closer~~ | ~~UNI9500~~ | ~~BSP~~ | ~~NO~~ |

| | | | |
|---|---|---|---|
| ~~1 ElectroLynx Harness~~ | ~~QC-C*** As Req'd~~ | | ~~MK~~ |
| ~~1 ElectroLynx Harness~~ | ~~QC-C***P Per Door Size~~ | | ~~MK~~ |
| ~~1 Power Supply~~ | ~~AQL as Req'd~~ | | ~~SU~~ |

1. All hardware by the Storefront Manufacturer (OT).

Notes: Exit device with electric latch retraction for access control. Credential reader, door position switch, request to exit by security contractor. Door is normally closed, latched and secured. Valid credential for ingress, free egress at all times. Co-ordinate with security and electrical.

**Set: 2.0**

Doors: B114D

| | | | | |
|---|---|---|---|---|
| 1 | Continuous Hinge | ~~BSPFM(Per Dr Hgt) SLI or F-HD1 SER~~BSPFM(Per Dr Hgt) SLI or F-HD1 SER | | PE |
| 1 | Rim Exit Device, ~~Exit Only~~Classroom | ~~PED4201 MELR EO M926~~200 B MELR 503F K840 | BSP | ~~RU~~YA |
| 1 | Pull | ~~P13~~RM201 Mtg-Type 1XHD | BSP | ~~RU~~RO |
| 1 | Surface Closer | ~~UNI9500~~5831 | BSP | ~~NO~~YA |
| 1 | ElectroLynx Harness | QC-C*** As Req'd | | MK |
| 1 | ElectroLynx Harness | QC-C***P Per Door Size | | MK |
| 1 | Power Supply | AQL as Req'd | | SU |

Notes: Exit device with electric latch retraction for access control. Credential reader, door position switch, request to exit by security contractor. Door is normally closed, latched and secured. Valid credential for ingress, free egress at all times. Co-ordinate with security and electrical. Threshold and weatherstrip by the aluminum door supplier.

**Set: 3.0**

Doors: B119B

| | | | | |
|---|---|---|---|---|
| 1 | Continuous Hinge | ~~BSPFM(Per Dr Hgt) SLI or F-HD1~~BSPFM(Per Dr Hgt) SLI or F-HD1 | | PE |
| 1 | Rim Exit Device, Exit Only | ~~PED4201 EO~~6200 EO | BSP | ~~RU~~YA |

| | | | | |
|---|---|---|---|---|
| 1 | Surface Closer | ~~UNI9500~~5831 | BSP | ~~NO~~YA |

Notes: Threshold and weatherstrip by the aluminum door supplier.

**Set: 4.0**

~~Doors: B101~~Doors: B101

| | | | | |
|---|---|---|---|---|
| 2 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Hinge, Full Mortise | TA2714 QC 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Fail Secure Lock | ~~ML20906-SEC NSA M92xM105 C6~~AU 4791LN K800 | 626 | ~~RU~~YA |
| 1 | Surface Closer | ~~9500~~5801 | 689 | ~~NO~~YA |
| 1 | Wall Stop | 409 | US32D | RO |
| 1 | Gasketing | ~~319CS~~319CS | | PE |
| 1 | Rain Guard | ~~346C~~346C | | PE |
| 1 | Sweep | ~~315CN~~315CN | | PE |
| 1 | Threshold | ~~171A~~171A | | PE |
| 1 | ElectroLynx Harness | QC-C*** As Req'd | | MK |
| 1 | ElectroLynx Harness | QC-C***P Per Door Size | | MK |
| 1 | Power Supply | AQL as Req'd | | SU |

Notes: Electrified lock for access control. Credential reader, door position switch, request to exit by security contractor. Door is normally closed, latched and secured. Valid credential for ingress, free egress at all times. Co-ordinate with security and electrical.

**Set: 5.0**

Doors: B100L, B106, ~~B115C~~B115C

| | | | | |
|---|---|---|---|---|
| 2 | Hinge, Full Mortise | TA2314 NRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 | Hinge, Full Mortise | TA2314 QC 4-1/2" x 4-1/2" | US32D | MK |
| 1 | Rim Exit Device, Classroom | ~~PED5245 MELR N945PT M92 C6~~6200 B MELR 503F K840 | 630 | ~~RU~~YA |
| 1 | Surface Closer | ~~UNI9500~~5831 | 689 | ~~NO~~YA |
| 1 | Gasketing | ~~319CS~~319CS | | PE |
| 1 | Rain Guard | ~~346C~~346C | | PE |
| 1 | Sweep | ~~315CN~~315CN | | PE |
| 1 | Threshold | ~~171A~~171A | | PE |
| 1 | ElectroLynx Harness | QC-C*** As Req'd | | MK |

| | | | | |
|---|---|---|---|---|
| 1 | ElectroLynx Harness | QC-C***P Per Door Size | | MK |
| 1 | Power Supply | AQL as Req'd | | SU |

Notes: Exit device with electric latch retraction for access control. Credential reader, door position switch, request to exit by security contractor. Door is normally closed, latched and secured. Valid credential for ingress, free egress at all times. Co-ordinate with security and electrical.

**Set: 6.0**

Doors: B100F, B105

| | | | | |
|---|---|---|---|---|
| 2 | Hinge, Full Mortise | TA2314 NRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 | Hinge, Full Mortise | TA2314 QC 4-1/2" x 4-1/2" | US32D | MK |
| 1 | Fail Secure Lock | ~~ML20906-SEC NSA M92xM105 C6~~AU 4791LN K800 | 626 | ~~RU~~YA |
| 1 | Surface Closer | ~~UNI9500~~5831 | 689 | ~~NO~~YA |
| 1 | Gasketing | ~~319CS~~319CS | | PE |
| 1 | Rain Guard | ~~346C~~346C | | PE |
| 1 | Sweep | ~~315CN~~315CN | | PE |
| 1 | Threshold | ~~171A~~171A | | PE |
| 1 | ElectroLynx Harness | QC-C*** As Req'd | | MK |
| 1 | ElectroLynx Harness | QC-C***P Per Door Size | | MK |
| 1 | Power Supply | AQL as Req'd | | SU |

Notes: Electrified lock for access control. Credential reader, door position switch, request to exit by security contractor. Door is normally closed, latched and secured. Valid credential for ingress, free egress at all times. Co-ordinate with security and electrical.

**Set: 7.0**

Doors: B113B, B114b

| | | | | |
|---|---|---|---|---|
| 1 | Continuous Hinge | ~~BSPFM(Per Dr Hgt) SLI or F-HD1~~BSPFM(Per Dr Hgt) SLI or F-HD1 | | PE |
| 1 | Mortise Deadlock | MS1850S | 335 | AD |
| 1 | Thumb Turn Cylinder | 4066-01 | 335 | AD |

| | | | | |
|---|---|---|---|---|
| 1 | Mortise Cylinder Cylinder | CR x AR Cam C6 | BSP | RU |
| 1 | Surface Closer | 2800ST | ~~689~~BSP | NO |

**Set: 8.0**

~~Doors: B114A, B115B~~Doors: B114A, B115B

| | | | | |
|---|---|---|---|---|
| 6 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 | Surface Vert Rod Exit, Classroom | ~~PED5445FE A9M45PT C66~~170ED AU626F K840 | 630 | ~~RU~~YA |
| 2 | Surface Closer | ~~9500~~5801 | 689 | ~~NO~~YA |
| 2 | Kick Plate | K1050 10" CSK BEV | US32D | RO |
| 2 | Wall Stop | 409 | US32D | RO |
| 2 | Silencer | 608-RKW | | RO |

**Set: 9.0**

Doors: B104A

| | | | | |
|---|---|---|---|---|
| 6 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 | Flush Bolt | 555 | US26D | RO |
| 1 | Dust Proof Strike | 570 | US26D | RO |
| 1 | Storeroom or Closet Lock | ~~ML2057 NSA C6~~AU 4705LN K800 | 626 | ~~RU~~YA |
| 2 | Wall Stop | 409 | US32D | RO |
| 2 | Silencer | 608-RKW | | RO |

**Set: 10.0**

~~Doors: B112A~~Doors: B112A, B114G

| | | | | |
|---|---|---|---|---|
| 2 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Hinge, Full Mortise | TA2714 QC 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Fail Secure Lock | ~~ML20906-SEC NSA M92xM105 C6~~AU 4791LN K800 | 626 | ~~RU~~YA |
| 1 | Surface Closer | ~~9500~~5801 | 689 | ~~NO~~YA |
| 1 | Wall Stop | 409 | US32D | RO |
| 1 | ElectroLynx Harness | QC-C*** As Req'd | | MK |
| 1 | ElectroLynx Harness | QC-C***P Per Door Size | | MK |
| 1 | Power Supply | AQL as Req'd | | SU |

Notes: Electrified lock for access control. Credential reader, door position switch, request to exit by security contractor. Door is normally closed, latched and secured. Valid credential for ingress, free egress at all times. Co-ordinate with security and electrical.

**Set: 11.0**

Doors: B107, ~~B117, B118~~B117, B118

| | | | | |
|---|---|---|---|---|
| 3 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Storeroom or Closet Lock | ~~ML2057 NSA C6~~AU 4705LN K800 | 626 | ~~RU~~YA |
| 1 | Wall Stop | 409 | US32D | RO |
| 3 | Silencer | 608-RKW | | RO |

**Set: 12.0**

~~Doors: B113A, B121~~Doors: B113A, B121

| | | | | |
|---|---|---|---|---|
| 3 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 | ~~Entrance~~Entry Lock | ~~ML2054 NSA C6~~AU 4707LN K800 | 626 | ~~RU~~YA |
| 1 | Wall Stop | 409 | US32D | RO |
| 3 | Silencer | 608-RKW | | RO |
| 1 | Coat Hook | RM801 | US26D | RO |

**Set: 13.0**

~~Doors: B119A~~Doors: B119A

| | | | | |
|---|---|---|---|---|
| 3 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Rim Exit Device, Classroom | ~~PED5245 N945PT C66~~100ED AU626F | 630 | ~~RU~~YA |
| 1 | Surface Closer | ~~9500~~5801 | 689 | ~~NO~~YA |
| 1 | Kick Plate | K1050 10" CSK BEV | US32D | RO |
| 1 | Wall Stop | 409 | US32D | RO |
| 3 | Silencer | 608-RKW | | RO |

**Set: 14.0**

~~Doors: B116A~~Doors: B116A

| | | | | |
|---|---|---|---|---|
| 3 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Classroom Lock | ~~ML2055 NSA C6~~AU 4708LN K800 | 626 | ~~RU~~YA |

| | | | | |
|---|---|---|---|---|
| 1 | Surface Closer | ~~9500~~5801 | 689 | ~~NO~~YA |
| 1 | Kick Plate | K1050 10" CSK BEV | US32D | RO |
| 1 | Wall Stop | 409 | US32D | RO |
| 3 | Silencer | 608-RKW | | RO |

**Set: 15.0**

~~Doors: B109, B110~~Doors: B109, B110

| | | | | |
|---|---|---|---|---|
| 3 | Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Pull | RM301 Mtg-Type 1XHD | US32D | RO |
| 1 | Push Plate | 70E | US32D | RO |
| 1 | Surface Closer | 2800ST | 689 | NO |
| 1 | Kick Plate | K1050 10" CSK BEV | US32D | RO |
| 1 | Wall Stop | 409 | US32D | RO |
| 3 | Silencer | 608-RKW | | RO |

**Set: 16.0**

Doors: B100A, B100B, B100C, B100D, B100E, B100G, B100H, B100J, B100K, B104B, B114B, B114C, B114E, B114F, B116B

| | | | |
|---|---|---|---|
| 1 | All hardware by the | Overhead door supplier | OT |

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# SECTION 08 80 00
# GLAZING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Glazing compounds.

### 1.02 RELATED REQUIREMENTS

A. Section 07 25 00 - Weather Barriers.

B. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.

C. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

D. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.

E. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly.

### 1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM C1036 - Standard Specification for Flat Glass; 2021.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

I. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

J. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

K. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

L. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

M. GANA (GM) - GANA Glazing Manual; 2008.

N. GANA (SM) - GANA Sealant Manual; 2008.

O. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2017.

P. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014, with Errata (2017).

Q. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2017.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

### 1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, indicate joint design, sealant contact width and depth dimensions, special application requirements, and applicable information on gaskets, spacers, setting blocks and any other accessories.

D. Samples: Submit two samples 12 by 12 inch in size of glass units, showing coloration.

E. Certificate: Certify that products of this section meet or exceed specified requirements.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Warranty Documentation: Submit manufacturer warranty and ensure that 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 01 60 00 - Product Requirements, for additional provisions.

### 1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

### 1.07 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

### 1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Glass Fabricators: Certified or accepted by approved Glass Manufacturer.

B. Glass Manufacturers:
   1. AGC Glass North America, Inc: www.agcglass.com.
   2. Guardian Glass, LLC: www.guardianglass.com.
   3. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with ASCE 7.

2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
4. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
5. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
1. In conjunction with weather barrier related materials described in other sections, as follows:
a. Water-Resistive Barriers: See Section 07 25 00.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

## 2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048; where resistance to thermal stresses is indicated or required.
3. Kind FT - Fully Tempered Type: Complies with ASTM C1048; where safety glass is indicated or required.
4. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality - Q3, with color and performance characteristics as indicated.
5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category II impact test requirements.
2. Polyvinyl Butyral (PVB) Interlayer: 0.060 inch thick, minimum.

C. Fire-Protection Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.
1. IBC Fire Protection Rating: As indicated on drawings.
2. Provide products listed by UL or Intertek Warnock Hersey.
3. Labeling: Provide permanent label on each peice giving the IBC rating and other information required by the applicable code.

## 2.04 INSULATING GLASS UNITS

A. Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
4. Spacer Color: Black.
5. Edge Seal:

a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
b. Color: Black.

6. Purge interpane space with dry air, hermetically sealed.

**2.05 INSULATING GLASS UNITS - SCHEDULE**

A. Vision Glass: Type Low-E Tinted Insulating Glass - Light-gray, low-reflective glass outdoor appearance.
1. Product: Solarban R60 (2) "Optigray" Fully Tempered, HT + Clear HT by Vitro Architectural Glass.
a. Insulating Unit Construction: 1/4 inch "Optigray" glass, Solarban R60 Solar Control (sputtered) on surface (2) + 1/2 inch air space + 1/4 inch Clear Float Glass.
2. Product: SunGuard SuperNeutral SN68 (2) "Crystal Gray" Fully Tempered, HT + Clear HT by Guardian Glass.
a. Insulating Unit Construction: 1/4 inch "Crystal Gray" glass, SunGuard SuperNeutral SN 68 (sputtered) on surface (2) + 1/2 inch air space + 1/4 inch Clear Float Glass.
3. Performance Values: Visible Light Transmission (VLT) 48-50 percent; SHGC 0.30-0.35; Light to Solar Gain (LSG) 1.43 - 1.64; Visible Light Reflectance – Exterior 8 percent, Interior 9-11 percent; Heat Transfer Coefficient U-Value Winter – 0.29.
4. Manufacturer's Certified Fabricator only.
5. Substitutions: Refer to Section 01 60 00 - Product Requirements.

**2.06 GLAZING UNITS**

A. Monolithic Interior Vision Glazing:
1. Applications: Interior glazing unless otherwise indicated.
2. Glass Type: Annealed float glass.
3. Tint: Clear.
4. Thickness: 3/8 inch, nominal.
5. Manufacturers:
a. Solarban R60 by Vitro Architectural Glass.
b. Substitutions: See Section 01 60 00 - Product Requirements.

**2.07 GLAZING COMPOUNDS**

A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Polyurethane Sealant: Single component, chemical curing, nonstaining, nonbleeding; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.

C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

**2.08 ACCESSORIES**

A. Setting Blocks: Neoprene, with 80 to 90 Shore A durometer hardness; ASTM C864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option I. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; color black.

E. Glazing Clips: Manufacturer's standard type.

## PART 3 EXECUTION

### 3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

### 3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

### 3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

### 3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

### 3.05 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

E. Place glazing tape on free perimeter of glazing in same manner described above.

F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

G. Carefully trim protruding tape with knife.

### 3.06 INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Place setting blocks at 1/4 points and install glazing pane or unit.

C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.

D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

### 3.07 INSTALLATION - WET GLAZING METHOD (COMPOUND AND COMPOUND)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24 inch centers, kept 1/4 inch below sight line.

C. Locate and secure glazing pane using glazers' clips.

D. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

### 3.08 INSTALLATION - WET/DRY GLAZING METHOD (PREFORMED TAPE AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

D. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

F. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

G. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

H. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

### 3.09 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

### 3.10 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

### 3.11 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

**END OF SECTION**

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# SECTION 13 34 19
# METAL BUILDING SYSTEMS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Manufacturer-engineered, shop-fabricated structural steel building frame.

B. Metal roof panels including soffits, gutters and downspouts, and roof mounted equipment curbs.

### 1.02 RELATED REQUIREMENTS

A. Section 01 45 33 - Special Inspections: Code required special tests and inspections.

B. Section 05 50 00 - Metal Fabrications.

C. Section 07 92 00 - Joint Sealants: Sealing joints between accessory components and wall system.

D. Section 08 11 13 - Hollow Metal Doors and Frames.

E. Section 08 33 23 - Overhead Coiling Doors.

F. Section 08 36 13 - Sectional Doors.

### 1.03 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings; 2016 (Revised 2021).

B. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.

F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

G. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2019.

H. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.

I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

J. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2020.

K. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2017.

L. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2019, with Editorial Revision (2020).

M. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; 2016.

N. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

O. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.

P. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2018.

~~Q. FM DS 1-28 - Property Loss Prevention Data Sheets 1-28, Wind Design; FM Global; 2024.~~

~~R. FM DS 1-29 - Property Loss Prevention Data Sheets 1-29, Roof Deck Securement and Above Deck Roof Components; FM Global; 2022~~

Q. ~~S.~~MBMA (MBSM) - Metal Building Systems Manual; 2019.

R. ~~T.~~NRCA (ML 104) - NRCA Roofing and Waterproofing Manual; Current Edition.

S. ~~U.~~UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

A. Preinstallation Meeting: Convene one week before starting work of this section.

**1.05 SUBMITTALS**

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on profiles, component dimensions, thermal blocks, insulation, metal panels, and fasteners.

C. Design Information: Submit a copy (For Information Only) of the Design Information portion of the Metal Building Manufacturer contract prior to preparation of shop drawings.

D. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation, and structural calculations; framing anchor bolt settings, sizes, and locations from datum, foundation loads including allowable stress design load combinations; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths. Shop drawings shall be signed and sealed by a professional engineer licensed to practice in the state where the project is located.

E. Structural Calculations: Include design criteria, loads, deflection, building drift, foundation loads, and loads on lateral load resisting system. Calculations shall be signed and sealed by a professional engineer licensed to practice in the state where the project is located.

F. Samples: Submit two samples of precoated metal panels for each color selected, 24 by 24 inch in size illustrating color and texture of finish.

G. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement.

H. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

I. Manufacturer's Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.
   1. Include statement that manufacturer designs and fabricates metal building system as integrated components and assemblies, including but not limited to primary structural members, secondary members, joints, roof, and wall cladding components specifically designed to support and transfer loads and properly assembled components form a complete or partial building shell.

J. Submit manufacturer specimen warranty that meets specified project requirements.

K. Project Record Documents: Record actual locations of concealed components and utilities.

**1.06 QUALITY ASSURANCE**

A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.
   1. Design Engineer Qualifications: Licensed in the state where the project occurs.
   2. Comply with applicable code for submission of design calculations and reviewed shop and erection drawings as required for acquiring permits.

3. Cooperate with regulatory agency or authorities having jurisdiction (AHJ), and provide data as requested.

B. Perform work in accordance with NRCA (ML 104), AISC 360 and MBMA (MBSM).

C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
   1. Not less than five years of documented experience.
   2. Accredited by IAS in accordance with IAS AC472.

D. Erector Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

E. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

**1.07 WARRANTY**

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Manufacturer’s Finish Warranty for Prefinished Roof, Soffit, and Wall Panels: Manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finished within specified warranty period
   1. Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof and wall panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling.
   2. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   3. Warranty Period: 20 years from date of Substantial Completion, system warranty shall not be prorated over the life of the warranty.

D. Roof Waterproofing Warranty: Manufacturer agrees to repair or stop any roof leaks attributable to defects in the metal roofing assembly which includes workmanship, roof panels, fasteners, connectors, eaves, ridge, valley, equipment curbs, roof securement components and assemblies, and roof flashings, penetration flashings, mastic, closures, and sealants. The manufacturer's limit of liability shall be NO DOLLAR LIMIT.
   1. Warranty Period: 20 years from date of Substantial Completion, system warranty shall not be prorated over the life of the warranty.

E. The General Contractor shall warrant the complete roofing, soffit, and wall system workmanship and materials for a period of 5 years after date of Substantial Completion. During warranty period, Contractor shall, at Contractor’s own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain the said work in watertight conditions.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

A. Metal Building Systems:
   1. American Buildings Company: www.americanbuildings.com
   2. Kirby Building Systems, a Nucor Company: www.kirbybuildingsystems.com.
   3. Nucor Building Systems: www.nucorbuildingsystems.com.
   4. VP Buildings: www.vp.com.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 METAL BUILDING SYSTEMS COMPONENTS**

A. Single span rigid frame and continuous beam rigid frame buildings.

B. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, intermediate columns, braced end frames, and end wall columns, and wind bracing.

C. Secondary Framing: Purlins, girts, eave struts, flange bracing, sill supports, clips, and other items detailed.

D. Wall System: Preformed metal panels of vertical profile, with sub-girt framing/anchorage assembly, insulation, and liner sheets, and accessory components.

E. Roof System: Steel deck and preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly and insulation, and accessory components.

**2.03 PERFORMANCE REQUIREMENTS**

A. Design structural members to withstand dead loads, snow loads, seismic loads, and wind loads calculated in accordance with ASCE 7 and as indicated in the drawings.
1. Wind loads for strength design shall be calculated using the basic wind speed (ultimate) determined in accordance with ASCE 7 or as indicated on the drawings.
2. Wind loads for serviceability requirements shall be calculated using 0.42 times the components and cladding loads calculated from the basic wind speed or directly from the 10-year mean return interval wind speed.

B. Component deflections shall be limited as follows:
1. Primary Framing:
a. ~~L/240~~ L/180 for roof live load or snow load not supporting ceilings
b. L/240 for roof live load or snow load supporting celilings
c. ~~b.~~ ~~L/180~~ L/120 for roof live load (or snow load) plus dead load not supporting ceilings.
d. L/180 for roof live load (or snow load) plus dead load supporting ceilings
e. L/180 for wind load on roofs not supporting ceilings.
f. ~~c.~~ L/240 for wind load on ~~walls and~~ roofs supporting ceilings.
2. Secondary Framing:
a. ~~L/240~~ L/150 for roof live load or roof snow load not supporting ceilings.
b. L/240 for roof live load or roof snow load supporting ceilings
c. L/120 for roof live load (or snow load) plus dead load not supporting ceilings
d. ~~b.~~ L/180 for roof live load (or snow load) plus dead supporting ceilings.
e. ~~c.~~ ~~L/240~~ L/90 for wind load on walls ~~and roofs.~~not supporting finishes.
f. L/240 for wind load on walls supporting brittle finishes.
g. ~~d.~~Roof framing deflection shall not be less than that required to maintain positive drainage for the greater of dead load plus 1/2 roof snow load or dead load plus 5 psf.
~~3. Wall and Roof Panels:~~
~~a. L/180 for roof live load or roof snow load.~~
~~b. L/90 for wind load.~~
3. Total deflection of wall panels, secondary framing, and primary framing shall not exceed L/60.

C. Design the building structure for a maximum allowable drift of ~~H/200 under the nominal (allowable) wind speed determined in accordance with ASCE~~ H/100 under the nominal (allowable) wind speed determined in accordance with ASCE 7 or as indicated on the drawings. Wind forces used to calculate drift shall not be reduced. Seismic drift shall be limited based on ASCE 7 assuming accommodations for story drift have not been incorporated into the design. Drift calculations shall be based on pinned column bases.

~~D. Building components shall be Factory Mutual approved. Design and install building components in accordance with the following requirements.~~
~~1. Design and install building components and cladding, opening protection, and anchorage of roof-mounted equipment in accordance with FM DS 1-28.~~

~~2. Steel roof deck securement and above-deck roof components shall be designed and installed in accordance with FM DS 1-29.~~

~~3. Panel roof systems shall be designed and installed in accordance with FM DS 1-31~~

~~4. Roofing systems shall be identical to systems that have been tested by a qualified testing and inspection agency to either resist uplift pressures calculated in accordance with ASCE 7 or with the membrane manufacture's written fastening density instructions, whichever is more restrictive. Submit licensed Engineer's wind uplift calculations and substantiating data to validate complete roof system.~~

D. ~~E.~~Roof panels to have a "fixed" ridge with a "floating" eave. Provide for lateral thermal movement in panel configuration or with clip designed for lateral and longitudinal movement.

E. ~~F.~~Installed Thermal Resistance of Wall System: R-value of 19 minimum, unless noted otherwise on drawings.

F. ~~G.~~Installed Thermal Resistance of Roof System: R-value of 28 minimum, unless notes otherwise on drawings.

G. ~~H.~~Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

H. ~~I.~~Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 100 degrees F.

I. ~~J.~~Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

J. ~~K.~~For structural steel design, comply with AISC 360.

K. ~~L.~~For cold formed steel design, comply with AISI S100.

L. ~~M.~~For welded connections, comply with AWS D1.1/D1.1M and AWS A2.4.

M. ~~N.~~ Fire and uplift ratings to comply with Underwriters Laboratories, Inc. and ~~Factory Mutual tests and~~ ratings as specified.

N. ~~O.~~Comply with applicable American Society for Testing Materials (ASTM) Standards as referenced.

O. ~~P.~~Comply with Structural Steel Painting Council (SSPC) Standards as referenced.

**2.04 MATERIALS - FRAMING**

A. Structural Steel Members: ASTM ASTM A992/A992M, A36 or A572.

B. Structural Tubing: ASTM A500/A500M, Grade B cold-formed.

C. Plate or Bar Stock: ASTM A 529/A 529M, Grade 50 or A36 or A572 Grade 50.

D. Anchor Rods: ASTM A 36 or F 1554 Grade 36, unprimed.

E. Bolts, Nuts, and Washers: ASTM F3125.

F. Welding Materials: Perform in accordance with AWS D1.1/D1.1M.

G. Wind Bracing: Adjustable, threaded steel rods, 1/2 inch diameter minimum; ASTM A36 or A572, Grade D.

H. Primer: Manufacturer's standard lead and chromate free primer meeting VOC requirements of authorities having jurisdiction.

I. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,400 pounds per square inch.
   2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

**2.05 MATERIALS - WALLS AND ROOF**

A. General: Provide roofing and siding sheets formed to general profile or configuration as indicated. Provide flashings, closers, fillers, metal expansion joints, ridge covers, fascias, and other sheet metal accessories, factory formed of same material and finish as roofing and siding.

B. Roof Covering and Supports: The roof construction shall carry an Underwriters Laboratories Construction (Uplift) classification of not less than Class 1-90, roof system shall meet wind uplift pressure indicated herein and on the drawings.

1. Roof Panels:
   a. Exposed metal roof covering to be configured to provide the specified load carrying capabilities and deflection requirements of this specification. Roof panels shall be of "standing-seam interlocking" design and secured to purlins with concealed structural fastening system. Concealed system to provide minimal through penetration of exposed roofing surface and allow roof covering to move independently of any differential thermal movement by the structural framing system. Except at the concealed fasteners, there shall be no thermal contact of the roof panels with supporting purlin. Standing seams shall have a factory-applied, non-hardening sealant, and seams shall be continuously locked or crimped together by mechanical means during erection. Roof panels with lap-type side (longitudinal) joints and exposed structural fasteners are not acceptable. Panels to have a “fixed” ridge with a “floating” eave. Provide for lateral thermal movement in panel configuration or with clip designed for lateral and longitudinal movement. Panels shall be of continuous length for application, splicing of panels shall not be considered acceptable.
      1) Steel Panels: Factory-formed panels with factory-applied finish.
         (a) Zinc-coated steel conforming to ASTM A 653/A 653M; minimum Z180 (G90) galvanizing.
         (b) Steel Thickness: ~~22~~ 24 gauge minimum.
      2) Profile: Standing seam, with minimum 2.0 inch seam height; concealed fastener system, lapped seam with integral factory installed sealant bead, for field seaming with special tool.
      3) Texture: Smooth, with striations.
      4) Length: Full length of roof slope, without lapped horizontal joints.
      5) Width: Maximum panel width of 18 inches.
   b. Roof panels to be fastened to purlins with concealed clip or backing device of steel having a protective metallic coating. Through penetration of roofing surface by exposed fasteners shall occur only at terminal locations of roof panels. Such fasteners shall be stainless steel or aluminum screws, bolts or rivets, with weather-seal washers. Carbon steel shank fasteners with vinyl or stainless steel-capped heads are acceptable also.
2. Purlins:
   a. Purlin's configuration, thickness and spacing to be the building manufacturer's standard for the condition provided all design criteria, including deflection, is met or exceeded. Purlin bracing system to comply with AISI or AISC Specification as applicable.
3. Roof Jacks and Curbs:
   a. Openings, 8 inch or smaller, may be flashed and sealed to the roof panel by jacks, providing complete structural support and weathertightness is maintained. Material shall be either of metal with a protective metallic coating or of an EPDM material with an aluminum sealing ring base.
   b. Openings, larger than 8 inch, round or square, shall be framed with a welded metal base fabricated from 0.07 inch minimum thick aluminum or 16 gauge minimum galvanized steel. The base and its appurtenance shall be supported by the roof purlins and header framing. The base shall have a minimum projection or 8 inch

above the weather surface of the roof, and the configuration of the flanges shall match the roof panel. The flange-to-panel joint shall be sealed with a non-hardening sealant and fastened in such a manner to provide complete support and weathertightness.

c. All curbs or jacks shall be integral component of the roofing system, designed and supplied by the metal building manufacturer.

C. Wall Coverings and Supports

1. Wall Panels:
   a. Wall panels to be exterior type to which the thermal qualities and various interior finishes are field applied. Metal faces to be aluminum or zinc coated steel and shall be supplied with a factory applied color coating. Color to be selected from building manufacturer standard offerings. Color coated metal panels to have a fire hazard rating equal to a Class 1 material as classified by Factory Mutual System.
   b. The covering width and configuration of the panel to be building manufacturer's standard provided all design criteria including deflection is met or exceeded. Side seams to be interlocking concealed or tongue-and-groove. Lap seams are not acceptable.
   c. Wall panel to be fastened to supports with clips, screws, or bolts located on the inside of the panel or concealed in the joint, eliminating exposed primary fasteners. Exposed (non-load-bearing) stainless steel or aluminum screws, bolts and/or rivets are acceptable for securing trim, fascias, gutters and miscellaneous flashings to either the wall or roof panels.
   d. Top, bottom, and intermediate panel closures, flashings, fascias, gutters and trim to be building manufacturer's standard, compatible with the material furnished as wall panels.
   e. Steel Panels: Factory-formed panels with factory-applied finish.
      1) Zinc-coated steel conforming to ASTM A 653/A 653M; minimum Z180 (G90) galvanizing.
      2) Steel Thickness: 26 gauge minimum
2. Eave Beam:
   a. Beam configuration and thickness to be the building manufacturer's standard provided all design criteria, including deflection and beam spacing, is met.
   b. Based on a simple span, the deflection of the eave beams (supporting the concrete masonry walls) to be proportioned with due regard to that produced by the previously prescribed design (wind) load and its effect on the type of interior finish specified hereafter.
3. Soffit Panels:
   a. Profile: Style as indicated, with venting provided.
   b. Material: Precoated steel sheet, ~~22~~ 24 gauge ~~0.0299 inch~~ minimum thickness.
   c. Color: As selected by Architect Engineer from manufacturer's standard line.

D. Finishes

1. Fluoropolymer Coating System: Manufacturer’s standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil; color and gloss as selected from manufacturer’s standards.

E. Steel Sheet for Metal Decking: Hot-dipped galvanized steel sheet, ASTM A 653/A 653M, SS Grade 33/230, with G90/Z275 coating. Metal decking shall be Type B, 1-1/2 inch metal deck, minimum 22 gauge thickness.

## 2.06 SHEET METAL ACCESSORIES

A. General: Unless otherwise indicated, provide coated steel accessories with coated steel roofing; aluminum accessories with aluminum roofing.

B. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A 153/A 153M, finish to match adjacent surfaces when exterior exposed.

C. Sealant: Manufacturer's standard type.

D. Gutter and Downspouts: Meet requirements of SMACNA (ASMM), Architectural Sheet Metal Manuals and NRCA, Architectural Sheet Metal Manual. Gutter system to meet requirements of ANSI/SPRI GT-1 stand for gutter systems
   1. Gutters: Formed in sections not less than 8 feet lengths, complete with end pieces, outlet tubes, and special pieces that may be required. Join sections with riveted and soldered or sealed joints. Unless otherwise indicated, provide expansion type slip joint at center of runs. Furnish gutter supports spaced at 36 inch o.c., constructed of same metal as gutters. Provide standard bronze, copper, or aluminum wire ball strainers at each outlet. Finish to match roof fascia and rake.
   2. Downspouts: Formed in sections approximately 10 feet long, complete with elbows and offsets. Join sections with minimum 1-1/2 inch telescoping joints. Provide fasteners for top, bottom, and 5 feet o.c. intermediately between, designed to securely hold downspouts not less than 1 inch away from walls. Finish to match wall panels.

E. Ice and Snow Guards: Aluminum bar type with aluminum clamps for mounting to standing seam roof, of the type that will accept a 2 inch strip pf prefinished metal to match the roof color, including all components. Include all accessories by same manufacturer.
   1. Basis of Design: S-5! Attachment Solutions; ColorGard Rail System: www.s-5.com.
   2. Furnish aluminum snow and ice clips designed to retard the migration of snow and ice.
      a. Basis of Design: S-5! Attachment Solutions; SnoClip II: www.s-5.com.

## 2.07 THERMAL INSULATION

A. Roof
   1. Providing an overall heat transfer (U) value or R-value as indicated on drawings, the insulation system shall be applied under the exposed metal roofing panels.
   2. With blanket-type insulation, a thermal spacer (break) should separate roof support member from roof panel, except at each concealed structural fastener. Spacer to be of material having a R-value of not less than 8, a density of not less than 2 pcf and, if of a combustible material, shall be classified by ASTM E84 as having a flame spread rating no greater than 25. Blanket type insulation, of required thickness and density, should be placed over roof support member. Vapor membrane should always be placed nearest the interior of building, whether it be exposed or non-exposed. Joints to be lapped, taped or folded and stapled in accordance with building manufacturer's standard. Vapor membrane shall have a perm rating of not more than 0.03.
   3. Blanket Insulation: Roof insulation to be flexible, noncombustible fiberglass blankets vapor resistant membrane, unless otherwise indicated. Vapor resistant membrane shall be a foil scrim type and may be laminated to insulation as a composite unit or added as a separate component of the insulation system. Above ceiling space is used as a return air plenum. Insulation and vapor membrane, if supplied as a laminated composite unit, should carry an Underwriters Laboratories, Inc., (UL) Label fire hazard classification indicating a flame spread rating of 25 or less and a smoke developed rating of 50 or less, as a tested assembly. If supplied as separate components, each (tested separately) shall carry the previously specified fire hazard classification.
      a. Basis of Design: Johns Manville; Simple Saver System: www.jm.com
   4. Rigid Insulation: Where roof insulation is exposed provide polyisocyanurate board insulation consisting of rigid, glass fiber reinforced, cellular polyisocyanurate thermal insulation with core formed by using hydrochlorofluorocarbons as blowing agent. Insulation and facing shall carry an Underwriters Laboratories, Inc., (UL) Label fire hazard classification indicating a flame spread rating of 25 or less and a smoke developed rating of 150 or less, as a tested assembly. Comply with referenced standards and with other requirements indicated below:
      a. ASTM Standard: ASTM C1289, Type I, Class 1 or 2.
      b. Thermal Resistivity: 7.2 deg F x h x sq. ft./Btu x in. at 75 deg F.
      c. Permeance: 0.03 perms, or less.

d. Facing: Impact resistant 16.5 mil embossed white acrylic coated aluminum laminated to aluminum foil on one side and 1 mil aluminum foil on the opposite side.
e. Basis of Design: Dupont; Thermax Heavy Duty Plus Insulation: www.dupont.com.

B. Wall
1. Wall insulation to be batts, blankets, and/or rigid material of required thickness and density to provide an overall tested heat transfer U value or R-value as indicated on drawing. Where no interior wall finish is indicated on the drawings, the exposed insulation, if any, shall be faced with a vapor barrier, placed towards and nearest the interior of the building. Wall insulation need not be faced with a vapor barrier if the interior finish material is of steel or aluminum - coated or uncoated.
2. See drawings for interior wall finish.
3. Fire hazard ratings of insulation, its vapor barrier (if any) and interior finish material shall be considered noncombustible or shall carry an Underwriters Laboratories, Inc (UL) classification indicating a flame spread rating of 25 or less, or a Factory Mutual System classification as a Class 1 material. Both ratings shall apply to any factory assembled cellular foam cored sandwich panel. Otherwise, ratings shall apply to each individual component if field assembled, or to the composite interior unit if supplied factory assembled.

**2.08 FABRICATION - FRAMING**

A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.

B. Anchor Bolts: Formed with straight shank with a head or nut tack welded to the rod at the end to be embedded in concrete, assembled with template for casting into concrete.

**2.09 FINISHES**

A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.

B. Exterior Surfaces of Wall Components and Accessories: Precoated enamel on steel of 70% fluoropolymer finish, color as indicated or as selected from manufacturer's standard range.

C. Interior Surfaces of Wall Components and Accessories: Precoated enamel on steel of fluoropolymer finish, color as indicated or as selected from manufacturer's standard range.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

**3.02 ERECTION**

A. Framing: Erect structural framing true to line, level and plumb, rigid and secure. Level base plates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use a non-shrinking grout to obtain uniform bearing and to maintain a level base line elevation. Moist cure grout for not less than 7 days after placement.

B. Eave Beams And Purlins: Provide rake or gable purlins with tight fitting closure channels and fascias. Locate and space eave beams to suit door and window arrangements and heights.

C. Bracing: Provide diagonal rod or angle bracing in both roof and sidewalls as required.
1. Moment resisting frames may be used in lieu of sidewall rod bracing, to suit manufacturer's standards.
2. Where diaphragm strength of roof covering is adequate to resist wind forces, rod or other forms of bracing will not be required.

D. Framed Openings: Provide shapes of proper design and size to reinforce opening and to carry loads and vibrations imposed, including equipment furnished under mechanical or electrical work. Securely attach to building structural frame.

**3.03 ERECTION - FRAMING**

A. Erect framing in accordance with AISC 360.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

**3.04 ERECTION - WALL AND ROOF PANELS**

A. General: Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line. Protect factory finishes from damage. Apply all roofing in strict accordance with the manufacturer's written instructions.

B. Install in accordance with manufacturer's instructions.

C. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

D. Fasten cladding system to structural supports, aligned level and plumb.

E. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.

F. Provide expansion joints where indicated.

G. Use concealed fasteners.

H. Install sealant and gaskets, providing weather tight installation.

**3.05 ERECTION - GUTTERS AND DOWNSPOUTS**

A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.

**3.06 INSTALLATION - ACCESSORY COMPONENTS IN WALL SYSTEM**

A. Sheet Metal Accessories: Install gutters, downspouts, ventilators, louvers, and other sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight mounting. Adjust operating mechanism for precise operation.

B. Thermal Insulation: Install in accordance with manufacturer's published directions, performed concurrently with installation of roof panels.

**3.07 TOLERANCES**

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

C. Structural frame shall be erected plumb, level and aligned, within the tolerances stipulated in the MBMA Metal Buildings Systems Manual

**3.08 QUALITY CONTROL**

A. An independent testing and inspection agency acceptable to the Architect Engineer shall perform field quality control inspections and tests, as specified in Section 01 45 33 - Special Inspections.

B. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

C. Visual Inspection of Field Welding: Testing agency shall visually inspect field welding while the operators are making the welds and again after the work is completed. The welder or welding operator's identification mark shall be stamped on the steel so that the full and complete identity and history of the welding operation will be known. After the welding is completed, hand or power wire brush welds and thoroughly clean them before the inspector makes the check

inspection. Inspect welds with magnifiers under strong, adequate light for surface cracking, porosity, and slag inclusions; excessive roughness, unfilled craters, gas pockets, undercuts, overlaps, size, and insufficient throat and concavity. Inspect the preparation of groove welds for adequate throat opening and for snug positioning of back up bars.

D. Field Bolted Connections: All connections including rod bracing shall be visually inspected to insure quantity and tested per AISC.

E. Field Welding: Inspect and test during erection of structural steel as follows:
   1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
   2. Perform visual inspection of all field welds.
   3. Perform tests on welds not passing visual inspection as follows:
      a. Liquid Penetrant Inspection: ASTM E165.
      b. Magnetic Particle Inspection: ASTM E109; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

F. All column anchor bolts shall be visually inspected for size, quantity and completeness.

G. Copy of the laboratory report shall be submitted to the Architect Engineer for review.

H. Connections that are found unsatisfactory by the inspecting laboratory, shall be corrected as directed, at the Contractor's expense, and to the satisfaction of the inspector. A copy of the final report shall be submitted to the Architect Engineer for approval.
   1. Correction of Defective Welds: Weld areas containing defects exceeding the standards of acceptance in AWS D1.1 shall be corrected in accordance with AWS D1.1 Section 3.7. Additional testing of the repaired areas shall be made at the Contractor's expense. If 20 percent or more of the tests of welds made by a given welder contain defects requiring repair, 100 percent radiographic inspection of that welder's work will be required at the Contractor's expense.
   2. Connections shall not be covered or made inaccessible until the final approval is obtained.

I. Metal Building Inspection Report: Metal building supplier’s professional engineer or delegated licensed engineer shall submit a report of inspection of the erected structure. The report shall indicate that all structural items have been erected and installed in conformance with the metal building drawings and specifications.

J. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories at the start, midpoint of installation, and final installation, minimum. Report results in writing to Architect Engineer.

**END OF SECTION**

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# SECTION 23 62 13

# PACKAGE ROOF TOP AIR CONDITIONING UNITS

## 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. Condensing unit package.

B. Charge of refrigerant and oil.

C. Controls and control connections.

D. Refrigerant piping connections.

### 1.03 RELATED REQUIREMENTS

A. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment: Placement of vibration isolators.

B. Section 23 05 13 - Common Motor Requirements for HVAC Equipment.

C. Section 23 23 00 - Refrigerant Piping.

D. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

### 1.04 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.

B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2019, with All Amendments and Errata.

C. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant; 2019.

D. 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.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

F. NEMA MG 1 - Motors and Generators; 2018.

### 1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Include equipment served by condensing units in submittal, or submit at same time, to ensure capacities are complementary.

C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.

D. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.

E. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.

F. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.

G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Lubricating Oil: One complete change.

**1.06 QUALITY ASSURANCE**

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.07 DELIVERY, STORAGE, AND HANDLING**

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

**1.08 WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide a five year warranty to include coverage for refrigerant compressors.

**PART 2 PRODUCTS**

**2.01 PERFORMANCE REQUIREMENTS**

A. Condenser: Refer to contract documents.

B. Compressor: Refer to contract documents.

C. Electrical Characteristics: Refer to contract documents.

**2.02 MANUFACTURED UNITS**

A. Construction and Ratings: In accordance with AHRI 210/240. Test in accordance with ASHRAE Std 23.1.

B. Performance Ratings: Energy Efficiency Rating (EER) and Coefficient of Performance (COP) not less than prescribed by ASHRAE Std 90.1 I-P.

**2.03 CASING**

A. House components in welded steel frame with galvanized steel panels with weather resistant, baked enamel finish.

~~B. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.~~

~~C. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.~~

~~D. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.~~

~~E. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel, and prevents exterior condensation on the panel.~~

B. ~~F.~~ Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.

C. ~~G.~~Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.

D. ~~H.~~Access to filters, dampers, cooling coils, reheat coil, heaters, exhaust fans, compressors, and electrical and controls components shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.

E. ~~I.~~Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.

F. ~~J.~~Units with cooling coils shall include double sloped 304 stainless steel drain pans.

G. ~~K.~~Unit shall be provided with base discharge and return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.

H. ~~L.~~Unit shall include lifting lugs on the top of the unit.

I. ~~M.~~Unit base pan shall be provided with 1/2 inch thick foam insulation.

**2.04 EVAPORATOR COILS**

A. Coils shall be designed for use with approved refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.

**2.05 CONDENSER COILS**

A. 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.

B. Coil Guard: Expanded metal with lint screens.

**2.06 FANS AND MOTORS**

A. 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.

B. Weatherproof 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 05 13.

C. Variable speed supply fan motor using electronically commutated motors. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

**2.07 COMPRESSORS**

A. Compressor: Refer to contract documents.

B. Mounting: Statically and dynamically balance rotating parts and mount on rubber-in-shear vibration isolators. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam injected panels to prevent the transmission of noise outside the cabinet.

C. Lubrication System: Reversible, positive displacement oil pump with oil charging valve, oil level sight glass, and magnetic plug or strainer.

D. Capacity Reduction Equipment: Suction valve unloaders, with lifting mechanism operated by electrically actuated solenoid valve, with unloaded compressor start; controlled from suction pressure. At least one compressor in the system must be digital scroll or variable speed.

E. Sump Oil Heater: Evaporates refrigerant returning to sump during shut down. Energize heater continuously when compressor is not operating.

## 2.08 GAS HEATING SECTION

A. Stainless steel heat exchanger furnace shall carry a 10 year non-prorated warranty, from the date of original equipment shipment from the factory.

B. Gas furnace shall consist of stainless steel heat exchangers with multiple concavities, an induced draft blower and an electronic pressure switch to lockout the gas valve until the combustion chamber is purged and combustion airflow is established.

C. Furnace shall include a gas ignition system consisting of an electronic igniter to a pilot system, which will be continuous when the heater is operating, but will shut off the pilot when heating is not required.

D. Unit shall include a single gas connection and have gas supply piping entrances in the unit base for through-the-curb gas piping and in the outside cabinet wall for across the roof gas piping.

E. Natural gas furnace shall be equipped with modulating gas valves, adjustable speed combustion blowers, stainless steel tubular heat exchangers, and electronic controller. Combustion blowers and gas valves shall be capable of modulation. Electronic controller includes a factory wired, field installed supply air temperature sensor. Sensor shall be field installed in the supply air ductwork. Supply air temperature setpoint shall be adjustable on the electronic controller within the controls compartment. 90 MBH, 150 MBH, 195 MBH, 210 MBH, 270 MBH, 292.5 MBH, 390 MBH, 540 MBH and 800MBH gas heating assemblies shall be capable of operating at any firing rate between 100% and 30% of their rated capacity. 405 MBH and 810 MBH gas heating assemblies shall be capable of operating at any firing rate between 100% and 20% of their rated capacity. 1080 MBH and 1600 MBH gas heating assembly shall be capable of operating at any firing rate between 100% and 15% of its rated capacity. 2400 MBH gas heating assembly shall be capable of operating at any firing rate between 100% and 10% of its rated capacity.

## 2.09 REFRIGERANT CIRCUIT

A. Provide each unit with one refrigerant circuit, factory supplied and piped. Refer to Section 23 23 00.

B. For each refrigerant circuit, provide:
1. Filter dryer replaceable core type.
2. Liquid line sight glass and moisture indicator.
3. Thermal expansion valve for maximum operating pressure.
4. Insulated suction line.
5. Suction and liquid line service valves and gauge ports.
6. Liquid line solenoid valve.
7. Charging valve.
8. Discharge line check valve.
9. Compressor discharge service valve.
10. Condenser pressure relief valve.
11. Hot-gas reheat coil

C. For heat pump units, provide reversing valve, suction line accumulator, discharge muffler, flow control check valve, and solid-state defrost control utilizing thermistors.

## 2.10 FILTERS

A. Refer to contract documents.

## 2.11 OUTSIDE AIR/ECONOMIZER

A. Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 15 cfm of leakage per sq. ft. of damper area when subjected to 2 inches w.g. air pressure differential across the damper. Damper assembly shall be controlled by spring

return actuator. Unit shall include outside air opening bird screen, outside air hood, and barometric relief dampers.

**2.12 CONTROLS**

~~**2.13**~~

A. 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.

B. 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.

C. Provide safety controls arranged so any one will shut down machine:
   1. High discharge pressure switch (manual reset) for each compressor.
   2. Low suction pressure switch (automatic reset) for each compressor.
   3. Oil Pressure switch (manual reset).

D. Variable Speed Drive Fan
   1. The supply fan shall have the capability of variable speed to be used to slow the fan in the cooling mode as the space nears room temperature setpoint in an effort to maximize dehumidification.

E. Provide the following operating controls:
   1. Thermostat located in room cycles compressors activates cylinder unloaders.
   2. One minute off timer prevents compressor from short cycling.
   3. Periodic pump-out timer to pump down on high evaporator refrigerant pressure.
   4. Low ambient temperature controls.
   5. Hot gas bypass sized for minimum compressor loading on one compressor only, bypasses hot refrigerant gas to evaporator.
   6. Lead-lag switch to alternate compressor operation.
   7. Low ambient thermostat to lock out compressor at low ambient temperatures.

F. Provide controls to permit operation down to 0 degrees F ambient temperature.
   1. Thermostat to cycle fan motors in response to outdoor ambient temperature.
   2. Head pressure switch to cycle fan motors in response to refrigerant condensing pressure.
   3. Solid state control to vary speed of one condenser fan motor in response to refrigerant condensing pressure.
   4. Electronic control consisting of mixing damper assembly, controlled to maintain constant refrigerant condensing pressure.

G. Gauges: Prepiped for suction and discharge refrigerant pressures and oil pressure for each compressor.

H. For multiple units, provide remote mounted sequence panel to allow operation with lead-lag switching and time delay timer.

I. Provide low voltage, adjustable thermostat to control heating stages in sequence with delay between stages, compressor stages, and supply fan to maintain temperature setting:
   1. Include:
      a. System selector switch (heat-off-cool).
      b. Fan control switch (auto-on).
   2. Provide double acting thermostat with minimum 2 stage heating and ~~1~~ 4 stage cooling.
   3. Locate thermostat in room as indicated.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

A. Install in accordance with manufacturer's installation instructions.

B. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.

C. Provide for connection to electrical service. Refer to Section 26 05 83.

D. Provide connection to refrigeration piping system and evaporators. Refer to Section 23 23 00. Comply with ASHRAE Std 15.

**3.02 SYSTEM STARTUP**

A. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.

B. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.

C. 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.

D. Provide cooling season start-up, and winter season shut-down for first year of operation.

E. Inspect and test for refrigerant leaks every 120 days during first year of operation.

**END OF SECTION**

# SECTION 23 74 13

# PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Packaged roof top unit.

B. Unit controls.

C. Maintenance service.

### 1.02 RELATED REQUIREMENTS

A. Section 23 05 48 - Vibration And Seismic Controls For HVAC Piping And Equipment.

B. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Control components, time clocks.

C. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Installation of thermostats and other controls components.

### 1.03 REFERENCE STANDARDS

A. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata and Amendments (2021).

B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.

### 1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

C. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.

D. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

E. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.

F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - 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. 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 units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

### 1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Provide a five year warranty to include coverage for refrigeration compressors.

## PART 2 PRODUCTS

### 2.01 MANUFACTURED UNITS

A. General: Ground mounted units having gas burner and electric refrigeration.

B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, return fan, heat exchanger and burner, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

### 2.02 EVAPORATOR COIL

A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.

B. Provide capillary tubes or thermostatic expansion valves for units of 6 Tons of refrigeration capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 Tons of refrigeration cooling capacity and larger.

### 2.03 COMPRESSOR

A. Refer to contract documents.

### 2.04 CONDENSER COIL

A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.

B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

C. Provide refrigerant pressure switches to cycle condenser fans.

### 2.05 MIXED AIR CASING

A. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fall to closed position. Relief dampers may be gravity balanced.

### 2.06 OPERATING CONTROLS

A. Provide low limit thermostat in supply air to close outside air damper and stop supply fan.

B. BAS, SCADA, or other Integrated Automation Link: ASHRAE Std 135, BACnet MS/TP.

C. Control Valves: Field-installed, modulating, ball type with position tracking; see Section 25 35 19.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that proper power supply is available.

### 3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 90A.

### 3.03 SYSTEM STARTUP

A. Prepare and start equipment. Adjust for proper operation.

### 3.04 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals for closeout submittals.

### ~~3.05 MAINTENANCE~~

~~A. Provide service and maintenance of packaged roof units for three years from Date of Substantial Completion.~~

~~B. Provide routine maintenance service with a two month interval as maximum time period between calls.~~

~~C. Include maintenance items as outlined in manufacturer's operating and maintenance data, including minimum of six filter replacements, minimum of one fan belt replacement, and controls check-out, adjustments, and recalibration.~~

~~D. After each service call, submit copy of service call work order or report that includes description of work performed.~~

**END OF SECTION**

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