

## SECTION 08 11 13

### HOLLOW METAL DOORS AND FRAMES

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

###### A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install hollow metal doors and frames.
2. Extent of hollow metal doors and frames is shown.
3. Types of products required include the following:
  - a. Seamless, galvanized steel, paper honeycomb core, internally reinforced, flush doors.
  - b. Seamless, galvanized steel, paper honeycomb core, internally reinforced, fire rated-, flush doors.
  - c. Fully welded, galvanized steel, internally reinforced, door frames.
  - d. Fully welded, galvanized steel, fire-rated, internally reinforced, door frames.
  - e. Miscellaneous supports; special, supplemental and standard finish hardware reinforcements and preparation items; fasteners and accessories; all for high frequency, high-endurance use.

###### B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the hollow metal doors and frames Work.
2. Notify other contractors in advance of the installation of the hollow metal doors and frames to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the hollow metal doors and frames Work.

###### C. Related Sections:

1. Section 04 00 05, Masonry .
2. Section 06 10 53, Miscellaneous Rough Carpentry.
3. Section 07 92 00, Joint Sealants.
4. Section 08 71 00, Door Hardware.
5. Section 08 81 00, Glass Glazing.
6. Section 08 90 00, Louvers and Vents.
7. Section 09 91 00, Painting.

## 1.2 REFERENCES

- A. Standards referenced in this Section are listed below:
1. American National Standards Institute, (ANSI).
    - a. ANSI in association with Steel Door Institute, ANSI/SDI 100, Steel Doors and Frames.
    - b. ANSI in association with Door and Hardware Institute, ANSI/A115.1-A115.17/DHI, Specifications for Steel Door and Frame Preparation for Hardware.
    - c. ANSI A224.1, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
    - d. ANSI A250.3, Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
    - e. ANSI A250.4, Test Procedures and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
    - f. ANSI A250.5, Accelerated Physical Endurance Test Procedure for Steel Doors, Frames, and Frame Anchors.
    - g. ANSI/NFPA 252, Fire Tests of Door Assemblies.
  2. American Society for Testing and Materials, (ASTM).
    - a. ASTM A 153/A 153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - b. ASTM A 366, Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
    - c. ASTM A 653/A 653M, Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by The Hot-Dip Process.
    - d. ASTM B 117, Practice for Operating Salt Spray (Fog) Apparatus.
    - e. ASTM E 1408, Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems.
  3. Door and Hardware Institute, (DHI).
    - a. DHI, Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
  4. National Fire Protection Association, (NFPA).
    - a. NFPA 80, Fire Doors and Fire Windows.
  5. Steel Door Institute, (SDI/Door).
    - a. SDI/Door 105, Erection Instructions for Steel Frames.
    - b. SDI/Door 106, Standard Door Type Nomenclature.
    - c. SDI/Door 112, Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames.
    - d. SDI/Door 117, Manufacturing Tolerances Standard Steel Doors and Frames.
    - e. SDI/Door 122, Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
    - f. SDI/Door 128, Guidelines for Acoustical Performance of Standard Steel Doors and Frames.
  6. The Society for Protective Coatings, (SSPC).
    - a. SSPC Paint 2, Cold Phosphate Surface Treatment.

- b. SSPC Paint 27, Basic Zinc Chromate-Vinyl Butyral Wash Primer.
7. Underwriters' Laboratories Inc., (UL).
  - a. UL 10B, Fire Tests of Door Assemblies.

### 1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  1. Manufacturer shall have a minimum of five years experience producing substantially similar equipment and shall be able to show evidence of at least five installations in satisfactory operation for at least five years.
  2. Provide hollow metal doors, frames, and accessories manufactured by a single firm specializing in the production of this type of Work and complying with specified standards of ANSI, NFPA, SDI and UL.
  3. Provide hollow metal doors and frames from a manufacturer who is a member of SDI.
- B. Component Supply and Compatibility:
  1. Obtain all equipment included in this Section regardless of the component manufacturer from a single hollow metal doors and frames manufacturer.
  2. The hollow metal doors and frames equipment manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
  3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the hollow metal doors and frames manufacturer.
- C. Regulatory Requirements:
  1. -Fire Resistance-Rated Assemblies: Wherever a fire resistance- classification is shown or scheduled for hollow metal doors and frames (3-hour, 1-1/2-hour, and similar designations), provide fire resistance--rated hollow metal doors and frames tested as a fire door assembly, complete with type of fire door hardware to be used.
  2. Door and frame assemblies shall comply with NFPA 80, and as specified. Modify specified hollow metal door and frame system components to comply with requirements of governing jurisdictions for fire-resistance-rated construction.

### 1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
  1. Shop Drawings:
    - a. Fabrication and installation drawings of hollow metal doors and frames. Include details of each frame type, elevations of each door type, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints, connections and every composite member. Show all door and frame reinforcements, including welds, plate lengths,

locations and gauges, identified for each component of finish hardware specified in Section 08 71 00, Door Hardware.

- b. Provide a schedule of doors and frames using same reference numbers for details and openings as those shown.

2. Samples:

- a. Pressed metal corner section of frame, 12-inches by 12-inches minimum, showing all special, supplemental and standard reinforcements, attachments, supports and anchors specified. Provide corner sample for each type of frame specified.
- b. Stick system components showing corner detail and glazing stops of all types specified, 12-inches by 12-inches, minimum.
- c. Cut-away section of all door types specified, showing internal construction, edge details and reinforcements for butts, closers and similar items of finished hardware, 2 foot-0 inches by 2 foot-0 inches minimum. Include louver sections, vision panel and glazing stops.
- d. ENGINEER reserves the right to require samples showing fabrication techniques and workmanships of all component parts, and the detailing and fabrication of accessories and auxiliary items for all door and frame Work, before fabrication of the Work proceeds.

B. Informational Submittals: Submit the following:

1. Certificates:

- a. Certification of Labeled Construction for fire-resistance-rated doors and frames.
- b. Oversize Fire resistance--rated Doors and Frames: Submit for approval UL certification for oversized fire resistance-rated doors and frames verifying that each assembly has been constructed with materials and methods equivalent to requirements for labeled construction.

2. Test and Evaluation Reports:

- a. Laboratory test report for required performance and specified feature verification for doors and frames selected at random by ENGINEER for testing.
- b. Sound Retardant Doors and Frames: Laboratory test reports, verifying performance requirements for each type of unit required.
- c. Test reports indicating compliance with ANSI A250.4 and ANSI A250.5.

## 1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work.
2. Deliver hollow metal doors and frames cartoned or crated to provide protection during transit and job storage.

- B. Storage and Protection:
1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
  2. Store doors and frames at the Site under cover.
  3. Place units up off floors in a manner that will prevent rust and damage.
  4. Avoid the use of non-vented plastic or canvas shelters, which could create a humidity chamber. If cardboard wrapper on the door becomes wet, remove the carton immediately.
  5. Provide a 1/4-inch space between stacked doors to promote air circulation.
- C. Acceptance at Site:
1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

## PART 2 - PRODUCTS

### 2.1 SYSTEM PERFORMANCE

- A. Design Criteria:
1. Door Classification: Provide hollow metal doors of Grades and Models in accordance with ANSI/SDI 100, and ANSI A250.5 as follows:
    - a. Grade 1, Standard Duty. 1-3/4" thick .
- B. Details of Construction:
1. Provide doors of two outer stretcher leveled sheets, 16 ga- minimum. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or edges, except around glazed or louvered panel inserts. No fillers shall be used. Provide weep hole openings in the bottom of exterior doors to permit the escape of entrapped moisture.
  2. Reinforce inside of doors with honeycomb core completely filling the inside of the door and laminated to the inside of both face panels with an adhesive. The honeycomb material shall have a crushing strength not less than 6,000 pounds per square foot and the lamination shall withstand not less than 1,100 pounds per square foot in shear.
- C. Frame Construction:
1. Form frames of cold-rolled sheet material, 16 ga minimum. Provide seamless frames for all Work, unless specifically specified and shown as permitting exposed fasteners.
  2. Provide hollow metal frames for doors, transoms, side-lights, borrowed lights, and other openings of size and profile as shown or specified.

## 2.2 MANUFACTURERS

- A. Products and Manufacturers: Provide one of the following:
  - 1. Steelcraft
  - 2. Ceko
  - 3. Or equal.

## 2.3 MATERIALS

- A. Door Faces and Frames: Zinc coated-, cold-rolled carbon steel sheets of commercial quality, complying with ASTM A 366, and ASTM A 653/A 653M, G 60 zinc coating, mill-phosphatized.
- B. Honeycomb Core: Phenolic resin-impregnated, nominal 1-inch hexagonal cell size, one piece, Kraft fiber core board, with 42 psi minimum crushing strength.
- C. Supports and Anchors: Formed sheet metal, hot dip- galvanized after fabrication complying with ASTM A 153/A 153M, Class B, and in compliance with requirements of ANSI A250.5. Provide supports and anchors as follows:
  - 1. Jamb Anchors: 16-gauge minimum, and of the following types:
    - a. Masonry Construction: Adjustable, corrugated or perforated, T-shaped- to suit frame size with leg not less than 2-inches wide by 10-inches long.
  - 2. Floor and Head Anchors: 14-gauge minimum, and of the following types:
    - a. Monolithic Concrete Slabs: Clip-type, with two holes to receive fasteners, welded to bottom of jambs and mullions.
    - b. Separate Topping Concrete Slabs: Adjustable-type with extension clips, allowing not less than 2-inches height adjustment. Terminate bottom of frames at finish floor surface.
- D. Inserts, Bolts and Fasteners: Sheet metal hot-dip galvanized complying with ASTM A 153/A 153M, Class C or D as applicable.
- E. Miscellaneous Accessories:
  - 1. Head Strut Supports: 3/8-inch by 2-inch hot-dipped galvanized steel.
  - 2. Structural Reinforcing Members: Provide structural reinforcing members as part of frame assembly, where shown at mullions, transoms, or other locations that are to be built into frame.
  - 3. Head Reinforcing: For frames over 4 feet-0 inch wide, in masonry openings, provide continuous steel channel or angle stiffener, not less than 12-gauge for full width of opening, welded to back of frame at head.
  - 4. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.
  - 5. Louvers, Stops and Moldings: 16-gauge minimum, cold-rolled, hot-dipped galvanized, formed sheet metal.
  - 7. Insect Screen: 14 by 18 bronze wire mesh in a rigid, formed metal frame.

## 2.4 FABRICATION

### A. General:

1. Fabricate hollow metal units to be rigid, neat in appearance and free for defects, warp or buckle. Accurately form metal to required sizes and profiles.
2. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify Work that cannot be permanently factory assembled- before shipment, to assure proper assembly at the Site. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible. Filler to conceal manufacturing defects shall not be acceptable.
3. Exposed Fasteners: Unless otherwise shown or specified, do not use exposed fasteners in the Work. Where exposed fasteners are shown or specified, provide countersunk flat Phillips or Jackson heads for exposed screws and bolts.

### B. Doors:

1. Fabricate all hollow metal doors and panels in compliance with ANSI A250.5.
2. Fabricate all doors with flush top and bottom closing channel, without exposed fasteners. Reinforce tops and bottoms of doors with inverted, flush-mounted, minimum 20-gauge, horizontal steel channels fastened to internal reinforcement channel and with 20-gauge closing plate spot-welded to closure channel. Close top and bottom edges to provide weather seal, as integral part of door construction or by addition of inverted steel channels and plates.
3. Hollow Metal Panels:
  - a. Fabricate hollow metal panels of the same materials, construction, and finish as specified for hollow metal doors.
  - b. Provide astragal integral with top of door where shown.
4. Edge profiles shall be provided on both stiles of doors beveled 1/8-inch in 2-inches.

### C. Frame Construction:

1. Fabricate all hollow metal frames in compliance with ANSI A250.5 and as specified.
2. Fabricate frames with reinforced, mitered corners that are continuously arc-welded for the full depth and width of the frame, with bottom spreader bar; except provide drywall frames as specified.
3. Grind all exposed welds flush and smooth.
4. Knock-down-type frames shall be used for drywall construction only and shall provide the following additional features:
  - a. Specifically designed for drywall construction.
  - b. Frames shall be knocked down, designed to be securely installed in the rough opening after the wallboard is applied.
  - c. Jamb and head connection shall be a neat, flush, miter with head securely locked to top of jamb.

- d. Mitered corners shall be reinforced with a concealed corner cup to provide a firm interlock of jamb to head.
  - e. Provide two anchors at head of frames exceeding 3 foot-6 inches wide.
  - f. Provide vertical steel head support struts extending from top of frame at each jamb to supporting construction above. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable bolted anchorage to frame jamb members.
5. Mullions and Transom Bars:
    - a. Provide closed mullions and transom bars where shown. Fasten mullions and transom bars at crossings and to jambs by butt-welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.
  6. Head Reinforcing: Where installed in masonry, leave vertical mullions in frames open at the top so they can be filled with grout.
  7. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
  8. Head Anchors: Provide two anchors at head of frames exceeding 3 foot-6 inches wide for frames mounted in drywall partitions.
  9. Head Strut Supports: Provide vertical steel struts extending from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable bolted anchorage to frame jamb members.
  10. Rubber Door Silencers: Drill stop to receive three silencers on single door frames and four silencers on double door- frames. Install plastic plugs to keep holes clear during construction.
- D. Finish Hardware Preparation:
1. General:
    - a. Prepare hollow metal units to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with approved Finish Hardware Schedule and templates provided by finish hardware supplier and as specified. Comply with applicable requirements of ANSI/DHI A115.1 to A115.17 and ANSI A250.4. Refer to Section 08 71 00, Door Hardware.
    - b. Obtain approved hardware schedule, hardware templates, and samples of finish hardware where necessary to ensure correct detailing and fabrication of the hollow metal doors and frames, from finish hardware supplier.
  2. Doors:
    - a. Preparation includes sinkages, and cut-outs for mortised and concealed finish hardware and reinforcements for both concealed and surface-applied finish hardware.
    - b. Drill and tap mortise reinforcements at factory, using templates.
    - c. Detail and fabricate reinforcements with concealed connections designed to develop full strength of reinforcements for high-frequency applications.



- d. Reinforce doors for required finish hardware, with minimum gauges of reinforcements provided as follows:
  - 1) Hinges: Steel plate 3/16-inches thick by 1-1/2-inches wide by 6-inches longer than hinge and secured by not less than six spot or projection welds with top hinge further reinforced with a high-frequency back-up reinforcement.
  - 2) Mortise Locksets and Dead Bolts: 12-gauge steel sheet, secured with not less than four spot or projection welds.
  - 3) Cylinder Locks: 12-gauge steel sheet, secured with not less than two spot or projection welds.
  - 4) Flush Bolts: 12-gauge steel sheet, secured with not less than two spot or projection welds.
  - 5) Surface Applied- Closers and Overhead Stops: 3/16-inch steel plate, not less than 10-inches long, secured with not less than six spot or projection welds.
  - 6) Push Plates and Bars: 16-gauge steel sheet secured with not less than two spot or projection welds.
  - 7) Surface Panic Devices: 16-gauge sheet steel secured with not less than two spot or projection welds.
  - 8) Automatic Door Bottoms: Reinforce for mortise type- units with 14-gauge steel, and 16-gauge for surface applied- units.

3. Frames:

- a. Reinforce frames for required finish hardware with minimum gauges as follows:
  - 1) Hinges and Pivots: Special full width of frame, 3/16-inch thick steel plate by 8-inches longer than hinge, secured to both rabbets by not less than twelve spot or projection welds.
  - 2) Strike Plate Clips: 10-gauge steel plate by 1-1/2-inches wide by 3-inches long with mortar guard boxout secured with not less than six spot or projection welds.
  - 3) Surface Applied- Closers: 3/16-inch steel plate, secured with not less than six spot or projection welds. Coordinate closer function and presence of overhead stops and weather-stripping, with location of reinforcement plate.
  - 4) Concealed Closers: Removable steel access plate, 12-gauge internal reinforcement of size and shape required, and enclosing housing to keep closer pocket free of mortar or other materials.

E. Door Louvers:

- 1. Fabricate louvers and mount flush into doors without overlapping moldings on surface of door facing- sheets. Provide internal support as recommended by louver manufacturer. Provide profile as shown.
- 2. Exterior Louvers: Fabricate units with stationary, weatherproof Z-shaped blades and U-shaped- frames, not less than 1-3/8-inch thick. Space louver blades not more than 1-1/2-inches on center. Assemble units by welding. Provide removable insect screens on the interior side of the frame.

3. Louvers for Fire-Resistance-Rated Openings: Provide tightly fitted automatic closing, operable blades, equipped with fusible links, arranged so that metal overlaps metal at every joint, UL approved.
- F. Stops and Moldings:
1. Provide stops and moldings around solid, glazed and louvered panels in hollow metal units and in frames to receive glass.
  2. Fabricate fixed stops and moldings integral with frame. Provide fixed stops on inside of hollow metal units exposed to exterior and on corridor side of interior units.
  3. Provide removable stops and molds at other locations, formed of not less than galvanized 20-gauge steel sheets. Secure with countersunk machine screws spaced uniformly not more than 12-inches on center. Form corners with butted hairline joints.
  4. Coordinate width of rabbet between fixed and removable stops with type of glass or panel and type of installation indicated. Refer to Section 08 81 00, Glass Glazing.

## 2.5 SHOP PAINTING

- A. Clean, treat and paint exposed surfaces of fabricated hollow metal units, including galvanized surfaces.
- B. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before the application of the shop coat of paint.
- C. Apply pretreatment to cleaned metal surfaces, using cold phosphate solution (SSPC Paint 2), or basic zinc chromate-vinyl butyral solution (SSPC Paint 27).
- D. Refer to Section 09 91 00, Painting, for field-applied primer and finish paint for exterior or interior exposed ferrous, non-ferrous, or galvanized surfaces.
- E. Apply shop-coat of prime paint within time limits recommended by pretreatment manufacturer. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 1.5-mils.
- F. Finish shall be rust inhibitive primer capable of passing a 500-hour salt spray and a 1,000-hour humidity test in accordance with ASTM B 117 as certified by an independent laboratory.

## 2.6 SOURCE QUALITY CONTROL

- A. After Shop Drawings approval, manufacturer shall not make any further detailing, fabrication or changes to approved methods of support and anchorage, nor shall doors and frames be brought to the Site, which do not conform, in all ways, to performance criteria specified.

- B. Allowable Tolerances: Provide door and frame manufacturing tolerances in compliance with SDI 117 and as follows:
  - 1. Nominal Clearance between Door and Frame Head and Jamb: 1/8-inch.
  - 2. Nominal Clearance between Meeting Edges of Pairs of Doors: 1/8-inch.
  - 3. Nominal Clearance at Bottom of Door: 3/4-inch.
  - 4. Nominal Clearance between Face of Door and Door Stop: 1/16-inch.
  - 5. Provide all Work plumb and true to adjoining surfaces with all miters and copes accurately formed.
  - 6. Provide completely water and vapor tight joints.

### PART 3 - EXECUTION

#### 3.1 INSPECTION

- A. CONTRACTOR shall examine the substrate and conditions under which hollow metal doors and frames are to be installed and notify ENGINEER, in writing, of any conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.
- B. Frames that are bowed, twisted or otherwise unacceptable shall be removed from the Site and replaced with properly constructed frames.

#### 3.2 PREPARATION

- A. Drilling and tapping for surface-applied, finish hardware may be done at Site.
- B. Protective Coating: Protect inside, concealed, faces of door frames in plaster or masonry construction using fibered asphalt emulsion coating. Apply over shop primer approximately 1/8-inches thick and allow to dry before installation.

#### 3.3 INSTALLATION

- A. Install hollow metal units and accessories in accordance with approved Shop Drawings and as shown and specified.
  - 1. Do not install doors and frames until all the Work, which could damage doors and frames, has been completed.
  - 2. Provide temporary doors until construction sequencing allows installation of permanent doors and frames.
  - 3. Do not proceed with the installation of permanent hollow metal doors until CONTRACTOR can provide finished Work complying with all requirements of these Specifications.
  - 4. Protect built-in frame Work with temporary wood protection.

- B. Placing Frames:
1. Place frames at fire rated- openings in accordance with NFPA 80.
  2. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged. Remove spreader bars only after frames have been properly set and secured.
  3. Make field splices in frames as detailed on approved Shop Drawings, welded and finished to match factory work.
- C. Setting Masonry Anchorage Devices:
1. In masonry construction, building in of anchors and grouting of frames is included in Section 04 00 05, Masonry.
  2. Set anchorage devices opposite each anchor location, in accordance with details on approved Shop Drawings and anchorage device manufacturer's instructions as follows:
    - a. Masonry Walls: Install at least three jamb anchors per jamb up to 7 feet-6 inches height; four anchors up to 8 feet-0 inch jamb height; one additional anchor for each 2 foot-0 inch or fraction thereof over 8 feet-0 inch height.
    - b. Cast-In-Place Concrete and Existing Rough Openings: Anchor frame jambs with concealed bolts into expansion shields or inserts at 6-inches from top and bottom and 2 foot-0 inches on center. Apply removable stop to cover anchor bolts.
    - c. Structural Steel: Secure frames to structural steel framing using machine bolts inserted through tubular steel pipe sleeves reinforcement concealed in hollow metal frames at 6-inches from top and bottom and 2 foot-0 inches on center. Apply removable stop to cover anchor bolts.
  3. Floor anchors may be set with powder actuated fasteners instead of masonry anchorage devices and machine screws, if so- indicated on approved Shop Drawings.
- D. Door Installation:
1. Fit hollow metal doors accurately in their respective frames, with the following clearances:
    - a. Jambs and Head: 3/32-inch.
    - b. Meeting Edges, Pairs of Doors: 1/8-inch.
    - c. Bottom: 3/4-inch, where no threshold or carpet.
    - d. Bottom: At threshold or carpet, 1/8-inch.
  2. Place fire resistance--rated doors with clearances as specified in NFPA 80.
  3. Finish hardware installation is specified under Section 08 71 00, Door Hardware. Locate finish hardware as shown on approved Shop Drawings, in accordance with hardware templates provided by finish hardware manufacturers and in accordance with Door and Hardware Institute, Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.

### 3.4 ADJUSTMENT AND CLEANING

- A. Check and readjust operating finish hardware items in hollow metal door and frame Work just prior to final inspection. Leave Work in complete and proper operating conditions.
- B. Where problems of installation or damage are cause for rejection of hollow metal door and frame Work, consult SDI 122 and the recommendations of the hollow metal door and frame manufacturer, for suggestions concerning required adjustments in the Work. Submit recommendations to ENGINEER for approval. Replace and repair unacceptable Work, as directed by ENGINEER, so that there will be no doubt as to the acceptability of the Work at the time of Substantial Completion.
- C. Prime Coat -Touchup: Immediately after installation, sand smooth all rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- D. Protection: Protect installed hollow metal doors and frames against damage from other construction activities.

++ END OF SECTION ++

## SECTION 08 22 00

### FIBERGLASS REINFORCED PLASTIC (FRP) DOORS AND (FIBERGLASS RESIN TRANSFER MOLDED DOOR & WINDOW) FRAMES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Fiberglass Reinforced Plastic (FRP) Doors
  - 2. Fiberglass Resin Transfer Molded Door & Window Frames

##### 1.2 RELATED SECTIONS

- A. Related Sections include the following:
  - 1. Section 08 71 00, Door Hardware
  - 3. Section 08 81 00, Glass Glazing

##### 1.3 QUALITY ASSURANCE

- A. Reference Standards
  - 1. Door Properties
    - a. Standard test method for steady state thermal transmission properties by means of the heat flow meter apparatus.
    - b. Successfully completed 1,000,000 cycles test in accordance with:
      - 1) AAMA 920-03 – Specification for Operating Cycle Performance of Side-Hinged
  - 2. Exterior Door Systems.
    - a. Additional Testing
      - 1) SFBC 3603.2 Forced Entry Test
      - 2) ASTM E 1886 Performance of Exterior Protective Systems
      - 3) ASTM E 1996 Impact Performance of Exterior Protective Systems
      - 4) ASTM C 518 Heat Transfer Properties of Materials
      - 5) ASTM D 1761 Mechanical Properties of Fasteners
  - 3. Laminate Properties
    - a. Door face plate is a minimum of 0.125 inch thick fiberglass reinforced plastic molded into one continuous sheet starting with a 25 mil resin gelcoat layer resin integrally molded with multiple layers of 1.5 oz. sq ft fiberglass mat and one layer of 18 oz per square yard fiberglass woven roving saturated with special resin. Door plate weight shall not be less than 0.97 lbs per square foot at a ratio of 30/70 glass resin.
      - 1) ASTM D 638 Tensile Strength Properties of Plastics
      - 2) ASTM D 790 Flexural Strength Properties of Plastics
      - 3) ASTM D 2583 Indentation Hardness of Plastics

- 4) ASTM D 256 Izod Pendulum Impact Resistance
  - 5) ASTM D 792 Density/Specific Gravity of Plastics
  - 6) ASTM D 1761 Mechanical Properties of Fasteners
  - 7) ASTM E 84 Surface Burning Characteristics of Materials
  - 8) ASTM G 155 Xenon Light Exposure of Non Metallic Materials
  - 9) ATSM D 635 Method For Rate of Burning
  - 10) ASTM D 2843 Smoke Density
  - 11) ASTM D 1929 Self Ignition Temperature Properties
  - 12) SFBC PA 201 Impact Procedures for Large Missile Impact
4. Core Properties
- a. ASTM C 177 Thermal Properties of Materials
  - b. ASTM D 1622 Density and Specific Gravity
  - c. ASTM E 84 Surface Burning Characteristics of Materials
  - d. ASTM E90-04- Sound Transmission Loss
  - e. ASTM E413-04 Classification for Rating Sound Insulation
  - f. ASTM E1332-90 Standard Classification for Determination of Outdoor-Indoor Transmission Class
  - g. ASTM E2235-04 Standard Test for Determination of Decay Rates for Use in Sound Insulation Methods

B. Qualifications

1. Manufacturer Qualifications: A company specialized in the manufacture of fiberglass reinforced plastic (FRP) doors and frames as specified herein with a minimum of 30 years documented experience and with a record of successful in-service performance for the applications as required for this project.
2. Installer Qualifications: An experienced installer who has completed fiberglass door and frame installations similar in material, design, and extent to those indicated and whose work has resulted in construction with a record of successful in-service performance.
3. Source limitations: Obtain fiberglass reinforced plastic doors and resin transfer molded fiberglass frames through one source fabricated from a single manufacturer, including fire rated fiberglass frames.
4. Source limitations: Hardware and accessories for all FRP doors as specified in Section 08 71 00 shall be provided and installed by the fiberglass door and frame manufacturer.
5. Source Limitations: Glass for windows in doors shall be furnished and installed by door and frame manufacturer in accordance with related section, Division 8, Glazing.

1.2 SUBMITTALS

A. Product Technical Data Including:

1. Acknowledgment that products submitted meet requirements of standards referenced.
2. Manufacturer shall provide certificate of compliance with current local and federal regulations as it applies to the manufacturing process.

3. Manufacturer's installation instructions.
4. Schedule of doors and frames indicating the specific reference numbers used on the owner's project documents, noting door type, frame type, size, handing and applicable hardware.
5. Details of core and edge construction. including factory construction specifications.
6. Certification of manufacturer's qualifications.
7. Submittal Drawings for Customer Approval shall be Submitted Prior to Manufacture and will include the following information and formatting:
7. Summary door schedule indicating the specific reference numbers as used on owner's drawings, with columns noting door type, frame type, size, handing, accessories and hardware.
8. A drawing depicting front and rear door elevations showing hardware with bill of material for each door.
9. Drawing showing dimensional location of each hardware item and size of each door.
10. Individual part drawing and specifications for each hardware item and FRP part or product.
11. Construction and mounting detail for each frame type

B. Samples:

1. Color to be selected from Manufacturer's complete color charts Operation and Maintenance Manual
2. Include recommended methods and frequency for maintaining optimum condition of fiberglass doors and frames under anticipated traffic and use condition.
3. Include one set of final as built drawings with the same requirements as mentioned in Section B above.
4. Include certificate of warranty for door and frame listing specific door registration numbers.
5. Include hardware data sheets and hardware manufacturer's warranties.

### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Each door and frame shall be delivered individually crated for protection from damage in cardboard containers, clearly marked with project information, door location, specific reference number as shown on drawings, and shipping information. Each crate shall contain all fasteners necessary for installation as well as complete installation instructions.
1. Doors shall be stored in the original container on edge, out of inclement weather for protection against the elements.
  2. Handle doors pursuant to the manufacturer's recommendations as posted on outside of crate.



## 1.4 WARRANTY

- A. Warranty all fiberglass doors and frames for a period of 25 years against failure due to corrosion. Additionally, warranty all fiberglass doors and frames on materials and workmanship for a period of 10 years, including warp, separation or delamination, and expansion of the core.
  - 1. On site assistance available.

## PART 2 – PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Chem-Pruf
  - 2. Edgewater FRP Doors
  - 3. Simon FRP Door
  - 4. Metropolitan Door Industries
  - 5. Chase Doors

### 2.2 FRP DOORS

- A. Doors shall be made of fiberglass reinforced plastic (FRP) using Class 1 premium resin with no fillers that is specifically tailored to resist chemicals and contaminants. Doors shall be 1 ¾ inch thick and of flush construction, having no seams or cracks. All doors up to 4'0 x 8'0 shall have equal diagonal measurements. All fiberglass components including face plates, stiles and rails and frames must be fabricated by the same manufacturer.
- B. Door Plates shall be 0.125 inch thick minimum, molded in one continuous piece, starting with 25 mil gelcoat of the color specified, integrally molded with multiple layers of 1.5 ounces per square foot fiberglass mat and one layer of 18 ounce per square yard fiberglass woven roving. Each layer shall be individually laminated with resin as mentioned above. Door plate weight shall not be less than 0.97 lbs. per square foot at a ratio of 30/70 glass to resin.
- C. Stiles and Rails shall be constructed starting from the outside toward the inside, with a matrix of at least three layers of 1.5 ounce per square foot of fiberglass mat. The stile and rail shall be molded in one continuous piece to a U-shaped configuration and to the exact dimensions of the door. There will be no miter joints and disparate materials used to form the one-piece stile and rail.
- D. Core material to be:
  - 1. Polypropylene plastic honeycomb core with a non-woven polyester veil for unparallelled plate bonding, 180 PSI typical compression range.

2. Internal Reinforcement shall be a dense matrix of cloth glass fibers and premium resin with a minimum hinge screw holding value of 1000 lbs. per screw.
3. Finish of door frame to be 25 mil resin gelcoat of the specified color integrally molded in at time of manufacture resulting in a fine pebble finish that is dense and non-porous. Gelcoat shall be cured within a temperature range of 120F to 170F creating an impermeable outer surface, uniform color throughout, and a permanent homogeneous bond with the resin/fiberglass substrate beneath. Paint and/or post application of gelcoat will be deemed unacceptable. The finish of the door and frame must be field repairable without compromising the integrity of the original uniform composite structure, function or physical strength. Color and gloss finish to be selected/ provide for custom color doors and frames
4. Window openings shall be provided for at time of manufacture and shall be completely sealed so that the interior of the door is not exposed to the environment. Fiberglass retainers, which hold the glass in place shall be resin transfer molded with a profile that drains away from glazing. The window and window retainer must match in color and finish with 25 mil of resin-rich gelcoat integrally molded at time of manufacture. Mechanical fasteners shall not be used to attach retainers. Glass, as specified herein, shall be furnished and installed by door and frame manufacturer. Window retainers fabricated from Metal, PVC or Vinyl will not be accepted.

### 2.3 FRP FRAMES

- A. Frames shall be fiberglass and manufactured using a resin transfer method creating one solid piece uniformity in color and size. Beginning with a minimum 25 mil gelcoat layer molded in and a minimum of two layers of continuous strand fiberglass mat saturated with resin, the frame will be of one-piece construction with molded stop. All frame profiles shall have a core material of 2 psf polyurethane foam. Metal frames or pultruded fiberglass frames will not be accepted.
- B. Finish of frame shall be identical to the door with 25 mil resin- gelcoat of the specified color integrally molded in at time of manufacture. To achieve optimum surface characteristics, the gelcoat shall be cured within a temperature range of 120F to 170F creating an impermeable outer surface, uniform color throughout, and a permanent homogeneous bond with the resin/fiberglass substrate beneath. Paint and/or post application of gelcoat will be deemed unacceptable. The finish of the door and frame must be field repairable without compromising the integrity of the original uniform composite structure, function or physical strength.
- C. Jamb/Header connection shall be mitered for tight fit.
- D. Internal Reinforcement shall be continuous within the structure to allow for mounting of specified hardware. Reinforcing material shall be a dense matrix of cloth glass fibers and premium resin with a minimum hinge screw holding value of 1000 lbs. per screw. All reinforcing materials shall be completely encapsulated.

Documented strength of frame screw holding value after third insert must be submitted. Dissimilar materials, such as steel, will be deemed unacceptable as reinforcement for hardware attachment.

- E. Mortises for hardware shall be accurately machined to hold dimensions to +/- 0.010 inch in all three axis.

## PART 3 - EXECUTION

### 3.1 INSTALLATION CONDITIONS

- A. Verification of Conditions
  1. Verify openings are correctly prepared to receive doors and frames.
  2. Verify openings are correct size and depth in accordance with submittal drawings.
- B. Installer's Examination
  3. Door installer shall examine conditions under which construction activities of this section are to be performed and submit a written report to general contractor if conditions are unacceptable.
  4. General Contractor shall submit two copies of the installer's report to the architect within 24 hours of receipt.
  5. Installer shall not proceed with installation until all unacceptable conditions have been corrected.

### 3.2 INSTALLATION

- A. Door shall be delivered at job site individually crated. Each crate to be clearly marked with the specific opening information for quick and easy identification.
- B. All single doors to be shipped completely assembled in the frame with hardware installed. Double doors to be prehung at the factory to ensure a proper fit and hardware functions properly, then broken down for shipping purposes. Install door opening assemblies in accordance with shop drawings and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.
- C. Field alteration of doors or frames to accommodate field conditions is strictly prohibited.
- D. Site tolerances: Maintain plumb and level tolerance specified in manufacturer's printed installation instructions.

### 3.3 ADJUSTING

- A. Adjust doors in accordance with the door manufacturer's maintenance instructions to swing open and shut without binding and to remain in place at any angle without being moved by gravitational influence.
- B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instruction.

### 3.4 CLEANING

- A. Clean surfaces of door opening assemblies and exposed door hardware in accordance with respective manufacturer's maintenance instructions.

### 3.5 PROTECTION OF INSTALLED PRODUCTS

- A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

++ END OF SECTION ++

## SECTION 08 33 23

### OVERHEAD COILING DOORS

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

###### A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install overhead coiling doors.
2. Extent of overhead coiling doors is shown.
3. Types of products required include:
  - a. Stainless steel, very high cycle, heavy-duty, overhead coiling doors with insulated slats and full perimeter weather-stripping.
  - b. Chain operators.
  - c. Angles, brackets, hoods and supports.
  - d. Inserts and anchoring devices.
  - e. Miscellaneous materials and accessories for complete, functional system.

###### B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with or before overhead coiling door Work.
2. Notify other contractors in advance of installation of overhead coiling doors to provide them with sufficient time to install items included in their contracts that must be installed with or before overhead coiling door Work.

##### 1.2 REFERENCES

###### A. Standards referenced in this Section are:

1. ASTM A36/A36M, Specification for Carbon Structural Steel.
2. ASTM A366/A366M, Specification for Commercial Steel Sheet, Carbon, (0.15 maximum percent) Cold-Rolled.
3. ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM E84, Test Method for Surface Burning Characteristics of Building Materials.
5. NEMA MG 1, Motors and Generators.
6. NFPA 70, National Electrical Code.
7. NFPA 80, Standard for Fire Doors and Fire Windows.

### 1.3 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Supplier Qualifications: Supplier shall have a minimum of five years experience producing substantially similar products to those required and shall be able to document at least five installations in satisfactory operation for at least five years.
  - 2. Installer Qualifications:
    - a. Retain a single installer for all overhead coiling door Work, with documented and successful experience in type of Work required, and who is authorized representative of overhead coiling door manufacturer for installing and maintaining products required. Installer shall employ only tradesmen with successful experience in type of Work required.
    - b. References: Provide names and telephone numbers of architects or engineers as applicable, and owner's representatives for at least three successful projects performed by proposed installer, similar to the Work required for this Project.
  
- B. Component Supply and Compatibility:
  - 1. Obtain all products included in this Section regardless of component Supplier from one overhead coiling door manufacturer.
  - 2. Overhead coiling door Supplier shall review and approve or to prepare all Shop Drawings and submittals for all products provided under this Section.
  - 3. Components shall be suitable for specified service conditions and be integrated into overall assembly by overhead coiling door Supplier.

### 1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
  - 1. Shop Drawings:
    - a. Drawings showing all components and their assembly, all with accurate dimensions. Include details at frames, elevations of each overhead coiling door design type, details of construction and conditions at openings.
  - 2. Product Data:
    - a. Manufacturer's specifications and data sheets, roughing-in diagrams, and installation instructions for each type and size of overhead coiling door.
    - b. Include manufacturer's data on operators, operating instructions and maintenance data. Indicate by transmittal form that installer has received a copy of diagrams and installation instructions.
  
- B. Informational Submittals: Submit the following:
  - 1. Design Data:
    - a. Calculations showing that detailing and fabrication of components complies with structural performance specified.

2. Supplier Instructions:
    - a. Provide manufacturer instructions for handling and installing specified products.
    - b. Setting drawings; summary of loads on walls, jambs and structural elements; templates; and instructions and directions for installation of inserts and anchorage devices, furnished by overhead coiling door Supplier and installed under other Sections of these Specifications.
  3. Site Quality Control Submittals:
    - a. Provide report of all operating tests, problems encountered, and corrective actions implemented. Document successful completion of field operating test for all products.
    - b. Provide report of each visit to Site by Supplier's representative.
  4. Qualifications Statements:
    - a. Supplier.
    - b. Installer.
- C. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data:
    - a. Provide complete operation and maintenance manuals, including test reports, maintenance data and schedules, description of operation, and information on recommended spare parts.
    - b. Provide operation and maintenance manuals per Section 01 78 23, Operation and Maintenance Data.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
1. Deliver products to Site to ensure uninterrupted progress of the Work. Deliver anchorage devices to be embedded in concrete in ample time to prevent delaying the Work.
  2. Deliver products to Site suitably crated, braced, and protected against distortion and damage during transit and unloading. Label all parts to comply with approved Shop Drawings and submittals.
  3. Upon delivery, inspect products for damage. Notify ENGINEER in writing of loss or damage to products. Replace loss and repair damage to new condition in accordance with manufacturer's instructions. Minor damage may be repaired provided finished items are equal in all respects to new items and acceptable to ENGINEER; otherwise, remove and replace damaged items.
- B. Storage and Protection:
1. Store materials to allow easy access for inspection and identification. Keep all material off ground using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
  2. Store doors and frames under cover.
  3. Place units up off floor in manner that prevents rust and damage.
  4. Avoid using non-vented plastic or canvas shelters.

5. Conform to Section 01 66 00, Product Storage and Handling Requirements.

## PART 2 - PRODUCTS

### 2.1 SYSTEM PERFORMANCE

#### A. Design Criteria:

1. Structural: Overhead coiling door components shall be capable of resistance to these loads:
  - a. Wind Loading: Provide resistance to both positive and negative wind pressure loading of 30 pounds per square foot acting over entire plane of door curtain slats.
  - b. Dead Loading: Provide resistance to deformation of door components caused by effects of gravity loads.
  - c. Applied loadings shall not cause short-term or permanent deformation of system components. Doors shall remain operable and undamaged during and after application of specified wind pressure loading.
2. Helically-Wound Torsion Springs: Provide Very-High-Cycle design capable of performing for 100,000 operational cycles. Provide non-resettable electric counters for overhead coiling doors.
3. Manual Push-Up Operation: Counterbalance mechanism shall function so that required lift or pull for door operation does not exceed 25 pounds.
4. Chain Hoist Operation: Reduction roller chain and sprocket drive or suitable gearing, mounted on counterbalance shaft, shall operate with a maximum 35 pounds of pulling force.

#### B. Definitions:

1. Operating Cycle: One complete cycle of an overhead coiling door or fire-resistance-rated overhead coiling door begins in closed position. Door is then moved to open position and back to closed position.
2. Listed and Labeled: Per NFPA 70, Article 100.

### 2.2 MANUFACTURERS

#### A. Overhead Coiling Doors:

1. Products and Manufacturers: Provide products of one of the following:
  - a. Wayne Dalton Corp.
  - b. Raynor Door Company.
  - c. Cornell Iron Works
  - d. Or equal.

### 2.3 MATERIALS

- #### A. Door Curtain: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of material



- thickness recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Exterior Door Slat Face- 20 Gauge 300 series stainless steel- #4 finish
    - a. Provide manufacturer's standard flat-profile slats.
  2. Insulation: Fill slat with manufacturer's standard rigid cellular polystyrene or polyurethane-foam-type thermal insulation complying with maximum flame-spread and smoke-developed indices of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within metal slat faces.
  3. Interior Curtain Slat Face: To be 20 gauge 300 series stainless steel- #4 finish
  4. All interior and exterior components to be stainless steel or otherwise indicated in the specification.
- B. Endlocks: Malleable-iron castings galvanized after fabrication, secured to curtain slats with galvanized rivets, or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Windlocks: Malleable-iron castings secured to curtain slats with galvanized rivets or high-strength nylon, as required to comply with wind load.
- D. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, stainless steel to suit type of curtain slats.
  1. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene, between angles or fitted to shape, as a cushion bumper for interior door.
  2. Provide motor-operated doors with combination bottom astragal and sensor edge.
- E. Curtain Jamb Guides: Fabricate curtain jamb guides of steel angles, or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Build up units with not less than 3/16-inch- (5-mm-) thick, stainless steel sections complying with ASTM A 36 (ASTM A 36M), and ASTM A 123. Slot bolt holes for guide adjustment.
- F. Provide removable stops on guides to prevent overtravel of curtain and a continuous bar for holding windlocks.
- G. Weather Seals:
  1. Provide replaceable, compressible, and adjustable natural rubber or neoprene rubber weather-stripping for exterior doors. Secure weather seals with continuous metal pressure bars. At door heads, use a 1/8-inch thick replaceable, continuous sheet secured to inside of curtain coil hood. At door jambs, use a 1/8-inch thick continuous strip secured to exterior side of jamb guide.

2. Provide double guide weather-stripping that, when tested at 1.30 pounds per square foot pressure differential, allows maximum of 3.75 cubic feet per minute air infiltration per linear foot of overhead coiling door perimeter.
  3. Provide weather-stripping continuously around all perimeter edges of door including hood baffle, astragal and guide weather-stripping.
- H. Counterbalancing Mechanism:
1. Counterbalance doors by an adjustable-tension, steel helical torsion spring, mounted around steel shaft, mounted in spring barrel, and connected to door curtain with required barrel rings. Use grease-sealed ball bearings or self-lubricating graphite bearings for rotating members.
  2. Counterbalance Barrel:
    - a. Fabricate spring barrel of hot-formed structural quality carbon-steel, welded or seamless pipe, of sufficient diameter and wall thickness to support roll-up of curtain without distorting slats and limiting barrel deflection to no more than 0.03-inch per foot of span under full load.
    - b. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance the weight of curtain with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to barrel and shaft.
    - c. Fabricate torsion rod for counterbalance shaft of case-hardened steel, of required size to hold fixed spring ends and carry torsional load.
  3. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain.
- I. Weather and Waterproof Hoods:
1. Form to entirely enclose coiled curtain and operating mechanism at opening head, and act as weather seal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.
  2. Fabricate steel hoods from 22-gauge hot-dip galvanized steel coating, complying with ASTM A653/A653M, phosphate-treat before fabrication.

## 2.4 ACCESSORIES

- A. Manual Door Operators:
1. Provide manual operators, except where electric door operators are shown. When not shown, provide chain hoist operator units.
- B. Chain Hoist Operator:
1. Provide manual direct drive chain hoist side-mounted operator consisting of endless stainless steel hand chain, chain cast-iron pocket wheel, and chain guard.

2. Provide chain hoist with self-locking mechanism allowing curtain to be stopped at all points in its travel and remain in position until movement is reactivated. Furnish hand chain with chain holder secured to operator guide.
  3. Provide endless chain length that extends to 3.0 feet above floor.
  4. Gears shall be high grade gray cast-iron.
- C. Safety Stop Lock Bearings: Provide overhead coiling doors with safety stop lock bearings that will stop downward travel of overhead coiling door upon sensing a sudden, rapid acceleration of pipe shaft.

## 2.5 FINISHES

- A. Stainless Steel, Finish 300 series #4 finish

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine substrates and conditions under which overhead coiling doors are to be installed and notify ENGINEER of conditions detrimental to proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

### 3.2 INSTALLATION

- A. Install, and adjust doors, , per manufacturer's written instructions, approved Shop Drawings and submittals, and the Contract Documents.
- B. Lubricate bearings and sliding parts and adjust mechanism so moving parts operate smoothly and are free of warp, twist, or distortion and fit watertight for door's entire perimeter.
- C. Repair damaged products and restore finish to match manufacturer's original finish.

### 3.3 FIELD QUALITY CONTROL

- A. Tests:
1. Perform operating tests on all products at the Site following installation of products, including controls. Should tests indicate malfunction, make necessary repairs and adjustments. Repeat tests and adjustments until, in opinion of ENGINEER, installation is complete and products are functioning properly and are ready for permanent operation.

B. Supplier's Services:

1. Provide services of factory-trained representative of Supplier for installation supervision, start-up, operation testing, and training of OWNER's operating and maintenance personnel.

++ END OF SECTION ++

## SECTION 08 36 00

### SECTIONAL OVERHEAD DOORS

#### PART 1 - GENERAL

##### 1.1 SECTION INCLUDES

- A. Insulated Sectional Overhead Doors.
- B. Electric Operators and Controls.
- C. Operating Hardware, tracks, and support.

##### 1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.
- B. Section 04 00 05 - Masonry: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.
- C. Section 05 50 13 - Miscellaneous Metal Fabrications: Steel frame and supports.
- D. Section 06 10 53 - Miscellaneous Rough Carpentry
- E. Section 07 92 00 - Joint Sealants.
- F. Section 08 71 00 - Door Hardware: Cylinder locks.
- G. Section 09 90 00 - Painting.

##### 1.3 REFERENCES

- A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

##### 1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
  - 1. Design pressure of 25 lb/sq ft.
- B. Wiring Connections: Requirements for electrical characteristics.
  - 1. 460 volts, three phase, 60 Hz.

- C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Motor wiring diagrams and all pertinent information.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with a minimum of five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.
- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weathertight location.

## 1.8 WARRANTY

- A. Warranty: Manufacturer's limited door and operators System warranty for 10 year against delamination of polyurethane foam from steel face and all other components for 3 years or 20,000 cycles, whichever comes first.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Overhead Door Corp.
  - 2. Clopay
  - 3. Or Equal

### 2.2 INSULATED SECTIONAL OVERHEAD DOORS

- A. Insulated Steel Sectional Overhead Doors: Specification based on 592 Series Thermacore Insulated Steel Doors by Overhead Door Corporation. Units shall have the following characteristics:
  - 1. Door Assembly: Metal/foam/metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.
    - a. Panel Thickness: 2 inches (51 mm).
    - b. Exterior Surface: Ribbed, textured.
    - c. Exterior Steel: .015 inch (.38 mm), hot-dipped galvanized.
    - d. End Stiles: 16 gauge with thermal break.
    - e. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
      - 1) Standard cycle spring: 10,000 cycles.
    - f. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
    - g. Thermal Values: R-value of 17.50; U-value of 0.057.
    - h. Air Infiltration: 0.08 cfm at 15 mph; 0.08 cfm at 25 mph.
    - i. Partial Glazing of Steel Panels:
      - 1) 1/2 inch (12.5 mm) Tempered Insulating glass.
  - 2. Finish and Color:
    - a. Two coat baked-on polyester:
      - 1) Color to be selected
  - 3. Wind load Design: Provide to meet the Design/Performance requirements specified.
  - 4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
  - 5. Lock:
    - a. Keyed lock with interlock switch for automatic operator.
  - 6. Weatherstripping:
    - a. EPDM bulb-type strip at bottom section.

- b. Flexible Jamb seals.
- c. Flexible Header seal.
- 7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
  - a. Size:
    - 1) 2 inch (51 mm).
  - b. Type:
    - 1) Standard lift.
    - 2) Low headroom.
- 8. Electric Motor Operation: Provide UL listed Class 1 Division 2 electric 480V, 3 phase operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
  - a. Entrapment Protection: Required for momentary contact, includes radio control operation.
    - 1) Photoelectric sensors monitored to meet UL 325/2010.
    - 2) Provide bottom sensing edge that stops and reverses the door upon contact with an obstruction.
  - b. Operator Controls:
    - 1) Push-button operated control stations with open, close, and stop buttons. NEMA 7
    - 2) Surface mounting.
    - 3) Both interior and exterior location.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify electric power is available and of correct characteristics.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.



### 3.3 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.
- F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

### 3.4 CLEANING AND ADJUSTING

- A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
- B. Clean doors, frames and glass.
- C. Remove temporary labels and visible markings.

### 3.5 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

++ END OF SECTION ++

## SECTION 08 45 20

### INSULATED TRANSLUCENT FIBERGLASS SANDWICH PANEL

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. Scope:
  - 1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified and required to furnish insulated translucent fiberglass sandwich panels.
  
- B. Coordination:
  - 1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the insulated translucent fiberglass sandwich panels Work.
  - 2. Notify other contractors in advance of the installation of the insulated translucent fiberglass sandwich panels to provide them with sufficient time for the installation of items included in their contracts that must be installed with, or before, the insulated translucent fiberglass sandwich panels Work.
  
- C. Related Sections:
  - 1. Section 04 00 05, Masonry.

##### 1.2 REFERENCES

- A. Standards referenced within this Section include:
  - 1. American Society for Testing and Materials, (ASTM):
    - a. ASTM D623, Standard Test Methods for Rubber Property—Heat Generation and Flexing Fatigue in Compression.
    - b. ASTM D2244, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
    - c. ASTM C297, Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.
    - d. ASTM D1037, Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
    - e. ASTM D1002, Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).
    - f. ASTM E72, Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
    - g. ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

- h. ASTM 330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- i. ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- 2. Underwriters Laboratories, Inc. (UL):
  - a. UL 723, Standard for Test for Surface Burning Characteristics of Building Materials.
  - b. UL 972, Safety Burglary Resisting Glazing Material.
- 3. International Code Council Evaluation Report, (ICC-ES).
- 4. National Fenestration Rating Council
  - a. NFRC 100, Procedure for Determining Fenestration Product U-factors.
  - b. NFRC 700, Product Certification Program.
- 5. American Architectural Manufacturer's Association (AAMA).
  - a. AAMA 1503, Thermal Performance Test Report.
  - b. AAMA 2604, Performance of Powder Coat Finishes.
- 6. Southwest Research Institute, (SWRI).
- 7. Leadership in Energy and Environmental Design, (LEED).
- 8. Occupational Safety and Health Administration, (OSHA).
  - a. CFR 29 1910.23, Guarding floor and wall openings and holes.

### 1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  - 1. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten consecutive years and which can show evidence of those materials being satisfactorily used on at least six projects of similar size, scope and location. At least three of the projects shall have been in successful use for ten years or longer.
  - 2. Panel system must be listed by the International Code Council – Evaluation Service which requires quality control inspections and fire, structural and water infiltration testing of sandwich panel systems by an approved agency.
  - 3. Quality control inspections shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with AC04 “Sandwich Panels” AC177 “Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems” as regulated by the ICC-ES.
- B. Installer's Qualifications: Installation shall be by an experienced installer, which has been in the business of installing specified panel systems for at least two consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

## 1.4 SUBMITTALS

### A. Action Submittals: Submit the Following:

1. Shop Drawings:
  - a. Elevations and details.
  - b. Manufacturer's color charts showing the full range of colors available for factory finished aluminum. When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated below. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.
    1. Sandwich panels: 14" x 28" units
    2. Factory finished aluminum: 5" long sections
2. Product Data:
  - a. Include construction details, material descriptions, profiles and finishes of components.
3. Samples:
  - a. When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated (Sandwich panels: 14" x 28" units, Factory finished aluminum: 5" long sections). If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.

### B. Informational Submittals: Submit the following:

1. Installer Certificate, signed by installer, certifying compliance with project qualification requirements.
2. Structural Analysis
  - a. Submit for record purposes only, calculations for the structural analysis of the insulated fiberglass sandwich panel to meet this specification. Calculations shall include certification by a Professional Engineer licensed in the State of New York.
3. Shop Testing: Product reports from a qualified independent testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed reports will be acceptable for current manufacturer and indicative of products used on this project. Reports required are:
  - a. International Code Council Evaluation Report (ICC-ES)
  - b. Flame Spread and Smoke Developed (UL 723) – Submit UL Card
  - c. Burn Extent (ASTM D 635)
  - d. Color Difference (ASTM D 2244)
  - e. Impact Strength (UL 972)
  - f. Bond Tensile Strength (ASTM C 297 after aging by ASTM D 1037)
  - g. Bond Shear Strength (ASTM D 1002)
  - h. Beam Bending Strength (ASTM E 72)
  - i. Insulation U-Factor (NFRC 100)
  - j. NFRC System U-Factor Certification (NFRC 700)

- k. Solar Heat Gain Coefficient (NFRC or Calculations)
- l. Condensation Resistance Factor (AAMA 1503)
- m. Air Leakage (ASTM E 283)
- n. Structural Performance (ASTM E 330)
- o. Water Penetration (ASTM E 331)
- p. 1200°F Fire Resistance (SWRI)
- q. LEED Credits
- r. Daylight Autonomy
- s. OSHA Certificate of compliance of Regulation 1910.23

- C. Closeout Submittals: Submit the following:
  - 1. See Section 1.6 of this Specification.

### 1.5 DELIVERY STORAGE AND HANDLING

- A. Deliver panel system, components and materials in manufacturer's standard protective packaging.
- B. Store panels on the long edge; several inches above the ground, blocked and under cover in accordance with manufacturer's storage and handling instructions.

### 1.6 WARRANTY

- A. The insulated translucent sandwich panels shall be warranted in accordance with the General Provisions.
- B. In addition to the CONTRACTOR's warranty period identified in the General Provisions, the insulated translucent sandwich panels shall be warranted by the manufacturer for five years for materials and workmanship and twenty-five years against fiber blooming and corrosion.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Provide insulated translucent sandwich panels from one of the following:
  - 1. Kalwall Corporation, Inc.
  - 2. Structures Unlimited, Inc.
  - 3. Or equal.

### 2.2 PANEL COMPONENTS

- A. Face Sheets
  - 1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.
    - a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.

- b. Face sheets shall not deform, deflect or drip when subjected to fire or flame.
  - 2. Interior face sheets:
    - a. Flame spread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flame spread rating no greater than 25 and smoke developed no greater than 250 when tested in accordance with UL 723.
    - b. Burn extent by ASTM D 635 shall be no greater than 1 inch.
  - 3. Exterior face sheets:
    - a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D 2244 after 5 years outdoor South Florida weathering at 5 degrees facing south, determined by the average of at least three white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
    - b. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact minimum of 70 foot pounds. Without fracture or tear when impacted by a 3-1/4 inch diameter, 5 pound free-falling ball per UL 972.
  - 4. Appearance:
    - a. Exterior face sheets: Smooth, 0.70 inch thick and manufacturers full range of colors
    - b. Interior face sheets: Smooth, 0.45 inch thick and White or Crystal in color.
    - c. Face sheets shall not vary more than +/- 10% in thickness and be uniform in color.
- B. Grid Core
  - 1. Thermally broken I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I- beam shall be no less than 7/16 inches.
  - 2. I-beam Thermal break: Minimum 2 inches, thermoset fiberglass composite. Poured and debridge urethane isobar is unacceptable.
- C. Laminate Adhesive
  - 1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives."
  - 2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C 297 after two exposures to six cycles each of the aging conditions prescribed by ASTM D 1037.
  - 3. Minimum shear strength of the panel adhesive by ASTM D 1002 after exposure to four separate conditions:
    - a. 50% Relative Humidity at 68° F: 540 PSI
    - b. 182° F: 100 PSI
    - c. Accelerated Aging by ASTM D 1037 at room temperature: 800 PSI
    - d. Accelerated Aging by ASTM D 1037 at 182° F: 250 PSI

### 2.3 PANEL CONSTRUCTION

- A. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking thermally I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.
  - 1. Thickness: 2-3/4 inches.
  - 2. Light transmission: As recommended by Manufacturer.
  - 3. Solar heat gain coefficient: As recommended by Manufacturer.
  - 4. Panel U -factor by NFRC certified laboratory: .23 thermally broken grid
  - 5. Complete insulated panel system shall have NFRC certified U- factor of .29
  - 6. Grid pattern: Wall panels per architectural drawings. Skylight shall be 12"x24" nominal
- B. Standard panels shall deflect no more than 1.9 inches at 30 PSF in 10-foot 0-inch span without a supporting frame by ASTM E 72. Maximum deflection over area is L/60.
- C. Standard panels shall withstand 1200°F fire for minimum one hour without collapse or exterior flaming.
- D. Thermally broken panels:
  - 1. Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.

### 2.4 BATTENS AND PERIMETER CLOSURE SYSTEM

- A. Closure system: Thermally broken extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite screw type closure system.
- B. Sealing tape: Manufacturer's standard, pre-applied to closure system at the factory under controlled conditions.
- C. Fasteners: 300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.
- D. Finish
  - 1. Manufacturer's factory applied finish which meets the performance requirements of AAMA 2604 shall be chemical corrosion resistant. Color to be selected from manufacturer's standards and custom colors by ENGINEER.
- E. Provide vapor barrier construction
- F. Provide sill channel to prevent condensation back-up.

## 2.5 PERFORMANCE REQUIREMENTS

- A. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.
- B. Structural analysis calculations signed and sealed by a qualified professional engineer licensed in the State of New York responsible for their preparation.
- C. Standard panel system shall have less than 0.01cfm/ft<sup>2</sup> air leakage by ASTM E 283 at 6.24 PSF (50 mph) and no water penetration by ASTM E 331 at 15 PSF; and, structural testing by ASTM E 330.
- D. Structural Loads: Provide system capable of handling a minimum of the following loads:
  - 1. Positive Wind Load: Per Local Building Code.
  - 2. Negative Wind Load: Per Local Building Code.
  - 3. Seismic Load: Per Local Building Code.
  - 4. Live Load: None.
  - 5. Drift Load: Per Local Building Code.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, supporting structure and installation conditions. Do not proceed with panel erection until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Metal Protection:
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
  - 2. Where aluminum will contact concrete, masonry or pressure treated wood, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by manufacturer.

### 3.3 INSTALLATION

- A. Install the panel system in accordance with the manufacturer's installation recommendations and approved shop drawings.
  - 1. Anchor component parts securely in place by permanent mechanical attachment system.
  - 2. Accommodate thermal and mechanical movements.
  - 3. Set perimeter framing in a full bed of sealant compound, or with joint fillers or gaskets to provide weather-tight construction.



- B. Install joint sealants at perimeter joints and within the panel system in accordance with manufacturer's installation instructions.

#### 3.4 CLEANING

- A. Clean the panel system inside and outside, immediately after installation, according to manufacturer's written recommendations.

++ END OF SECTION ++

## SECTION 08 71 00

### DOOR HARDWARE

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Section 08 11 13 Hollow Metal Doors and Frames
  - 2. Section 08 22 00 Fiberglass Doors
- 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.

### 1.3 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. 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.
  
- D. 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.

- E. 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.

#### 1.4 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.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced 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 to manufacturer's instructions and recommendations and according to approved schedule.

#### 1.5 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".

#### 1.6 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.

## 1.7 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. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
  - 1. Ten years for mortise locks and latches.
  - 2. Five years for exit hardware.
  - 3. Twenty five years for manual overhead door closer bodies.

## 1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

## PART 2 - PRODUCTS

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

## 2.2 HANGING DEVICES

- A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified 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. Hager Companies (HA).
    - b. Pemko (PE).
    - c. Or equal

## 2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
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. Door Controls International (DC).
    - b. Rockwood (RO).
    - c. Or equal
- B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.
1. Manufacturers:
    - a. Door Controls International (DC).
    - b. Rockwood (RO).
    - c. Or equal

## 2.4 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.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
  - 1. Manufacturers:
    - a. Match Existing, Field Verify.
- C. 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.
  - 6. Keyway: Match Facility Standard.
- D. Interchangeable Cores: Provide small format interchangeable cores as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- E. Provide a keyed core for all locking devices on this project.
- F. 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. Existing System: Field verify and key cylinders to match Owner's existing BEST system.
- G. Key Quantity: Provide the following minimum number of keys:
  - 1. Change Keys per Cylinder: Two (2)
  - 2. Master Keys (per Master Key Level/Group): Five (5).
  - 3. Construction Keys (where required): Ten (10).
  - 4. Construction Control Keys (where required): Two (2).
  - 5. Permanent Control Keys (where required): Two (2).
- H. Construction Keying: Provide construction master keyed cylinders.
- I. Construction Keying: Provide temporary keyed construction cores.
- J. 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.

## 2.5 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. Manufacturers:
    - a. Lund Equipment (LU).
    - b. MMF Industries (MM).
    - c. Telkee (TK).

## 2.6 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
  1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - ML2000 Series.
    - b. Sargent Manufacturing (SA) - 8200 Series.
    - c. Or equal

## 2.7 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. Short-lipped strikes: For locks at double doors.
- 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.

## 2.8 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 keyed cylinder dogging device to hold the pushbar and latch in a retracted position.
  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. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
  6. 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.
  7. 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.
  8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  10. Extended cycle test: Devices to have been cycle tested to 9 million cycles.
  11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  12. 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 panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.

- b. Sargent Manufacturing (SA) - 80 Series.
- c. dormakaba Precision (PR) - Apex 2000 Series.
- d. Or equal

## 2.9 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. Cycle Testing: Provide closers which have surpassed 15 million cycles.
  - 4. 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.
  - 5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  - 6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  - 7. 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 (Heavy Duty, where indicated in HW Sets): 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 or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
  - 1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - DC8000 Series.
    - b. Norton Rixson (NO) - 7500 Series.
    - c. Sargent Manufacturing (SA) - 351 Series.
    - d. Or equal
  
- C. Door Closers, Surface Mounted (Commercial Duty, where indicated in HW Sets): 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:
  - a. Corbin Russwin Hardware (RU) - DC6000 Series.
  - b. Norton Rixson (NO) - 8500 Series.
  - c. Sargent Manufacturing (SA) - 1431 Series.
  - d. Or equal

## 2.10 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 certified 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. Hiawatha, Inc. (HI).
    - b. Rockwood (RO).
    - c. Or equal

## 2.11 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 certified 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. Hiawatha, Inc. (HI).
    - b. Rockwood (RO).
    - c. Or equal.
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket

to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
  - a. Norton Rixson (RF).
  - b. Rockwood (RO).
  - c. Sargent Manufacturing (SA).
  - d. Or Equal

## 2.12 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 NPFA 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.
  1. Manufacturers:
    - a. Pemko (PE).
    - b. Or Equal

## 2.13 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.

## 2.14 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

### 3.1 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.

### 3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

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

#### 3.4 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.

#### 3.5 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.

#### 3.6 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

#### 3.7 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. PE - Pemko
2. RO - Rockwood
3. SA - SARGENT
4. RF - Rixson
5. NO - Norton

**Hardware Sets**

**Set: 1.0**

Doors: 01-01, 01-03, 01-05, 01-06, 01-08, 10-01, 10-04, 10-05, 10-06, 11-08, 15-01, 31-01, 41-01, 44-02, 44-03, 82-01, 87-01, 87-04, 87-06, 87-07, 87-08, 87-12, 87-14, 87-15, 87-16, 87-17, 87-18, 87-22, 87-25

1 Continuous Hinge	CFM-HD1 Series		PE
1 Rim Exit Device, Storeroom	16 72 8806 ETL	US32D	SA
1 Surf Overhead Hold Open	8-X26	630	RF
1 Surface Closer (offset)	PRO 7500 (2018S)	689	NO
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Threshold (coord w/ details)	1715A FHSL14SS		PE
1 Head & Jamb Gasketing	2891APK x (2)290APK		PE
1 Sweep	18061CNB		PE
3 Silencer	608-RKW		RO

**Set: 2.0**

Doors: 01-02, 01-04, 10-07, 11-07, 11-09, 15-02, 31-02, 41-02, 44-01, 82-02, 87-05, 87-09, 87-23

Description: Exterior Double - Panic

2 Continuous Hinge	CFM-HD1 Series		PE
1 Dust Proof Strike	570	US26D	RO
2 Flush Bolt (manual)	555	US26D	RO
1 Mortise Exit Device, Storeroom	16 72 8906 ETL	US32D	SA
2 Surf Overhead Hold Open	8-X26	630	RF
2 Surface Closer (offset)	PRO 7500 (2018S)	689	NO
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Threshold (coord w/ details)	1715A FHSL14SS		PE
1 Head & Jamb Gasketing	2891APK x (2)290APK		PE



2 Sweep	18061CNB		PE
1 Astragal	355CPK		PE
2 Silencer	608-RKW		RO

**Set: 3.0**

Doors: 10-03, 11-04

Description: Exterior Double, Fire Rated - Panic

2 Continuous Hinge	CFM-HD1 Series		PE
1 Dust Proof Strike	570	US26D	RO
1 Flush Bolt Set (self-latching)	2845; 2945	US26D	RO
1 Mortise Exit Device, Storeroom	12 72 8906 ETL	US32D	SA
1 Coordinator	1700	Black	RO
2 Surf Overhead Stop	8-X36	630	RF
2 Surface Closer (offset)	PRO 7500 (2018S)	689	NO
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Threshold (coord w/ details)	1715A FHSL14SS		PE
1 Head & Jamb Gasketing	2891APK x (2)290APK		PE
2 Sweep	18061CNB		PE
1 Astragal	355CPK		PE
2 Silencer	608-RKW		RO

**Set: 4.0**

Doors: 11-03, 11-06, 11-10

Description: Exterior Single

1 Continuous Hinge	CFM-HD1 Series		PE
1 Storeroom Lock	72 8204 LNL	US32D	SA
1 Surf Overhead Hold Open	8-X26	630	RF
1 Surface Closer (offset)	PRO 8501 (2018S)	689	NO
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Threshold (coord w/ details)	1715A FHSL14SS		PE
1 Head & Jamb Gasketing	2891APK x (2)290APK		PE
1 Sweep	18061CNB		PE
3 Silencer	608-RKW		RO

**Set: 5.0**

Doors: 87-26, 87-27

Description: Interior Double, Fire Rated - Panic; Passage

2 Continuous Hinge	CFM-HD1 Series		PE
1 Dust Proof Strike	570	US26D	RO
1 Flush Bolt Set (self-latching)	2845; 2945	US26D	RO
1 Mortise Exit Device, Passage	12 8915 ETL	US32D	SA
1 Coordinator	1700	Black	RO
2 Surf Overhead Stop	8-X36	630	RF
2 Surface Closer (offset)	PRO 7500 (2018S)	689	NO
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO

1 Threshold (coord w/ details)	1715A FHSL14SS		PE
1 Head & Jamb Gasketing	2891APK x (2)290APK		PE
2 Sweep	18061CNB		PE
1 Astragal	355CPK		PE
2 Silencer	608-RKW		RO

**Set: 6.0**

Doors: 11-05, 82-03, 87-21

Description: Interior Single - Panic

1 Continuous Hinge	CFM-HD1 Series		PE
1 Rim Exit Device, Storeroom	16 72 8806 ETL	US32D	SA
1 Surf Overhead Hold Open	8-X26	630	RF
1 Surface Closer (offset)	PRO 8501 (2018S)	689	NO
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
3 Silencer	608-RKW		RO

Notes: Locking functions to be determined by Architect during submittal review process (typ).

**Set: 7.0**

Doors: 87-02, 87-20

Description: Interior Single - Panic; Passage

1 Continuous Hinge	CFM-HD1 Series		PE
1 Rim Exit Device, Passage	8815 ETL	US32D	SA
1 Surf Overhead Hold Open	8-X26	630	RF
1 Surface Closer (offset)	PRO 8501 (2018S)	689	NO
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
3 Silencer	608-RKW		RO

**Set: 8.0**

Doors: 01-09, 82-04, 87-03

Description: Interior Single

1 Continuous Hinge	CFM-HD1 Series		PE
1 Storeroom Lock	72 8204 LNL	US32D	SA
1 Surf Overhead Hold Open	8-X26	630	RF
1 Surface Closer (offset)	PRO 8501 (2018S)	689	NO
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
3 Silencer	608-RKW		RO

**Set: 9.0**

Doors: 01-07

Description: Interior Single, Fire Rated

1 Continuous Hinge	CFM-HD1 Series		PE
1 Storeroom Lock	72 8204 LNL	US32D	SA

1 Surf Overhead Stop	8-X36	630	RF
1 Surface Closer (offset)	PRO 8501 (2018S)	689	NO
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Head & Jamb Gasketing	2891APK x (2)290APK		PE
3 Silencer	608-RKW		RO

**Set: 11.0**

Doors: 10-02, 87-19

Description: Overhead Door

1 Hardware	Supplied with door assembly		00
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++ END OF SECTION ++

## SECTION 08 81 00

### GLASS GLAZING

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. Scope:
1. CONTRACTOR shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install glass glazing.
  2. Extent of glass glazing is shown.
  3. Types of products required include the following.
    - a. Clear, fully tempered, float glass.
    - b. Clear, insulating, tempered float glass.
    - c. Miscellaneous glazing, spacers, tapes and other materials.
- B. Coordination:
1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the glass glazing Work.
- C. Related Sections:
1. Section 07 92 00, Joint Sealants.
  2. Section 08 22 00, Fiberglass Reinforced Plastic (FRP) Doors and Frames.

##### 1.2 REFERENCES

- A. Standards referenced in this Section are listed below:
1. American Architectural Manufacturers Association, (AAMA).
    - a. AAMA 800, Voluntary Specifications and Test Methods for Sealants.
  2. American National Standards Institute, (ANSI).
    - a. ANSI Z97.1, Safety Glazing Materials Used in Buildings.
    - b. ANSI/ASTM E 774, Specification for Classification of the Durability of Sealed Insulating Glass Units.
    - c. ANSI/ASTM E 1300, Practice for Determining Load Resistance of Glass in Buildings.
  3. American Society of Civil Engineers, (ASCE).
    - a. ASCE 7, Minimum Design Loads for Buildings and Other Structures.
    4. American Society for Testing and Materials, (ASTM).
      - b. ASTM C 509, Specification for Elastomeric Cellular Performance Gasket and Sealing Material.
      - c. ASTM C 719, Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement (Hockman Cycle).
      - d. ASTM C 793, Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants.

- e. ASTM C 794, Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
  - f. ASTM C 864, Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
  - g. ASTM C 920, Specification for Elastomeric Joint Sealants.
  - h. ASTM C 1021, Practice for Laboratories Engaged in Testing of Building Sealants.
  - i. ASTM C 1036, Specification for Flat Glass.
  - j. ASTM C 1048, Specification for Heat-Treated Flat Glass-Kinds HS, Kind FT Coated and Uncoated Glass.
  - k. ASTM C 1115, Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
  - l. ASTM C 1172, Specification for Laminated Architectural Flat Glass.
  - m. ASTM C 1249, Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazed Applications.
  - n. ASTM C 1281, Specification for Preformed Tape Sealants for Glazing Applications.
  - o. ASTM C 1330, Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
  - p. ASTM D 412, Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
  - q. ASTM D 2240, Test Method for Rubber Property-Durometer Hardness.
  - r. ASTM E 548, Guide for General Criteria Use for Evaluating Laboratory Competence.
5. Code of Federal Regulations, (CRF).
    - a. 16 CFR, Consumer Product Safety Commission, CPSC Part 1201, Safety Standard for Architectural Glazing Materials.
  6. Glass Association of North America, (GANA).
    - a. GANA, Glazing Manual.
    - b. GANA, Laminated Glass Design Guide.
    - c. GANA, Glass Tempering Division, GTA 95-1-31, Specification for Decorative Architectural Flat Glass.
  7. Lawrence Berkeley National Laboratory National Technical Information Service, (LBL).
    - a. LBL-35298 Window 4.1, "A PC Program for Analyzing the Thermal Performance of Fenestration Products."
  8. National Fenestration Rating Council, (NFRC).
    - a. NFRC 100, Procedure for Determining Fenestration Product U-Factors.
    - b. NFRC 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
    - c. NFRC 300, Procedures for Determining Solar Optical Properties of Simple Fenestration Products.
  9. National Glass Association, (NGA).
    - a. NGA, Glazier Certification Program.
  10. Primary Glass Manufacturers Council, (PGMC).
    - a. PGMC Specifiers' Guide to Architectural Glass.
  11. Sealed Insulating Glass Manufacturers Association, (SIGMA).

- a. SIGMA TM-3000-90, Vertical Glazing Guidelines and TB-3001-90, Sloped Glazing Guidelines.
12. Underwriters' Laboratories, Inc., (UL).
    - a. UL Building Materials Directory.

### 1.3 QUALITY ASSURANCE

- A. Primary Glass Manufacturer and Glazing Materials Manufacturer Qualifications:
  1. Provide glass glazing materials manufactured by firms specializing in the production of the types of glass glazing products specified, in compliance with specified standards.
  2. Provide glass from manufacturers who are members of GANA and PGMC and participate in certification programs.
  3. Obtain glass glazing materials from manufacturers who will send a qualified technical representative to the Site, for the purpose of advising the installer of proper procedures and precautions for the use of the materials and who will assist ENGINEER with opinions on the acceptability of materials and Work.
- B. Fabricator Qualifications:
  1. Provide laminated and insulating glass fabrications from fabricators who are licensed by primary glass manufacturer to produce specified units and with documented skill and successful experience in this type of Work and who agree to employ only tradesmen who are trained, skilled and have successful experience in this type of Work.
  2. Provide laminated and insulating glass fabrications from fabricators who are members of GANA or SIGMA and participate in certification programs.
  3. Obtain laminated and insulating glass fabrications from fabricators who will, if required, send a qualified technical representative to the Site, for the purpose of assisting ENGINEER with opinions on the acceptability of materials and installation methods.
- C. Installer's Qualifications:
  1. The installer of the glass glazing materials shall be a firm with documented skill and successful experience in the installation of the types of materials required.
  2. Submit records of experience and certifications to ENGINEER.
- D. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing specified, as documented according to ASTM E 548.
- E. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct testing specified, as documented according to ASTM E 548.
- F. Source Limitation: All materials provided under this Section shall be obtained from a single supplier or manufacturer who, with CONTRACTOR, shall assume

full responsibility for the completeness of the Work. The supplier or manufacturer shall be the source of information on all material furnished regardless of the manufacturing source of that material.

G. Regulatory Requirements:

1. Safety Glass: Comply with ANSI Z97.1, with label on each piece of glass as required by governing authorities having jurisdiction.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
  - a. Plans and elevations showing location of each type and kind of glass specified and details of glazing system. Include manufacturer's recommendations for glazing.
  - b. Dimensions and details of manufacturer's glue line thickness and bite dimensions and verifications.
2. Product Data:
  - a. Copies of manufacturers' specifications, "Spec-Data" sheets, installation instructions for each type of glass, glazing sealant or compound, gasket and associated miscellaneous material and all recommended installation precautions for required materials and components, which are not included in other submittals, specified in other Sections. Coordinate the submittal of such other data with this submittal, and with the submittal of samples required by other Sections.
  - b. Structural performance calculations indicating that detailing and fabrication have been based on the results of the required analysis and performance criteria specified.

B. Informational Submittals: Submit the following:

1. Certificates:
  - a. Certification that all glass materials subject to the applicable standards of the CPSC are in compliance. The certification shall be issued in conformance with procedures stated in the standard.
  - b. Include primary glass manufacturer's and fabricator's published data, and letters of certification, based on certified test laboratory reports, indicating that each material complies with specified requirements and is acceptable for the applications shown.
  - c. Certification that fabricated products comply with manufacturer's published performance.
  - d. Age of silicone sealant.
2. Test Reports:
  - a. Certified laboratory test reports for required performance tests in compliance with ASTM E 548.
3. Qualifications Statements:
  - a. Fabricator.
  - b. Installer.

C. Closeout Submittals: Submit the following:

1. Warranty Documentation:
  - a. Manufacturer's and fabricator's guarantees, as specified.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work.

B. Storage and Protection:

1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
2. Protect glass glazing materials according to manufacturer's and fabricator's written instructions to prevent damage to glass glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
3. For insulating glass that will be exposed to substantial altitude changes, comply with insulating glass fabricator's written recommendations for venting and sealing to avoid hermetic seal ruptures.

C. Acceptance at Site:

1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Design Criteria: For glass performance, manufacture, size, type, construction and thickness, comply with the following:

1. Provide glass glazing systems capable of withstanding normal thermal movements and wind and impact loads without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants (both structural and weather-resisting) to remain watertight, airtight and to maintain structural performance characteristics specified; deterioration of glazing materials; or other defects in construction.
2. Normal Thermal Movement: Provide glass that allows for thermal movements resulting from a maximum temperature range of 120°F in ambient and 180°F surface temperature acting on glass framing members and glazing components. Base structural performance calculations on surface



temperatures of materials caused by both solar heat gain and nighttime-sky loss.

3. Comply with requirements of Consumer Product Safety Commission, Part 1201, Safety Standards for Architectural Glazing Materials, for all the Work.
4. Glass thicknesses shown are minimums. Where manufacturer's load tables indicate acceptability of lesser thickness material than required by performance criteria specified, provide specified thicknesses and features as a minimum. Where load tables indicate the need for greater thickness, or additional features, than specified, provide greater thicknesses and features at no additional cost to OWNER. Comply with practice for determining minimum thickness and types of glass, to resist loadings required by governing authorities having jurisdiction at the Site, according to ANSI/ASTM E 1300.
5. Glazing Sealant System Compatibility:
  - a. Glazing sealants shall be compatible with the channel surfaces, joint fillers, insulating glass sealing system, laminated glass interlayer material and other materials in contact with the glazing channel in compliance with ASTM C 1087.
  - b. Provide insulating glass secondary sealant system compatible with structural silicone glazing system and in compliance with ASTM C 1249.
  - c. Provide only materials and manufacturer's recommended variation of the specified materials, which are known to be fully compatible with the actual installation conditions, as shown by manufacturer's published data or certification submitted to ENGINEER for approval.
6. Adhesion of Elastomeric Joint Sealants: Comply with ASTM C 793 and ASTM C 794.
7. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer-aided software design, expressed as Btu/square foot by height by degree F.
8. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer-aided software design.
9. Solar Optical Properties: NFRC 300.

B. Definitions:

1. Interspace: The space between lites of an insulating glass unit that contains dehydrated air or a specified gas.
2. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the fabricating process or incompatibility of sealants or mishandling during installation, and not to causes other than glass breakage and practices for maintaining and cleaning glass contrary to manufacturer's written instructions. Evidence of failure shall include the obstruction of vision by dust, moisture, or film on interior surfaces of insulating glass.

## 2.2 GLASS

- A. Clear, Fully Tempered, Float Glass:
1. Uncoated, Monolithic, Clear, Fully Tempered, Float Glass: Provide clear glass, with roll-wave distortion parallel to bottom edge of glass, in compliance with ASTM C 1048, Type I (transparent glass, flat), Class 1 (clear), Quality q<sup>3</sup> (glazing select), Kind FT.
  2. Provide heat-strengthened glass that has been heat-strengthened by manufacturer's special process (after cutting to final size,) to achieve a flexural strength of up to five times that of annealed glass strength; 1/4-inch thick, minimum.
  3. Products and Manufacturers: Provide one of the following:
    - a. Herculite Clear by PPG Industries, Incorporated.
    - b. Fully Tempered Clear Glass by Guardian Industries, Corporation.
    - c. Or equal.
- B. Clear, Insulating, Tempered Float Glass Units:
1. Uncoated, Monolithic, Clear, Float Glass: Provide clear glass in compliance with ASTM C 1036, Type I (transparent glass, flat), Class 1 (clear), Quality q<sup>3</sup> (glazing select).
  2. Insulating Glass Units: Provide preassembled units consisting of two lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class C units, permanently and hermetically sealed together at edges with spacers and sealant.
  3. System Sealing: Dual seal with polyisobutylene primary sealant and silicone secondary sealant, complying with ASTM C 1249.
  4. Overall Unit Thickness and Thickness of Each Lite:
    - a. Overall Thickness: 1-inch.
    - b. Each Lite: 1/4-inch.
  5. Physical Properties:
    - a. Exterior Appearance: Clear.
    - b. Visible Light Transmittance: 78 percent, minimum.
    - c. Solar Heat Gain Coefficient: 0.70.
    - d. Outdoor Visible Light Reflectance: 15 percent.
    - e. Shading Coefficient: 0.81.
    - f. Winter Nighttime U-value: 0.48.
    - g. Summer Daytime U-value: 0.55.
  6. Products and Manufacturers: Provide one of the following:
    - a. Clear Twindow by PPG Industries, Incorporated.
    - b. Clear Thermopane by Pilkington Libbey-Owens-Ford Company.
    - c. Or equal.

## 2.3 GLAZING SEALANTS, TAPES AND GASKETS

- A. General:
1. Colors: Provide black or other natural color wherever no other color is available. Wherever material is not exposed-to-view, provide manufacturer's

standard color, which has the best overall performance characteristics for the application shown.

- a. Provide manufacturer's standard colors as shown or, if not shown, provide color selected by ENGINEER from manufacturer's standard colors to either blend or contrast with adjoining surfaces.
  2. Hardness specified is intended to indicate the general range necessary for overall performance. Submit glazing and sealant manufacturer's recommendations for actual hardness for each condition of installation and use. Except as shown or specified, provide glazing materials within the following ranges of hardness (Shore A, fully cured, at 75°F):
    - a. 15 to 35 for elastomeric compounds and tapes used with rigid stops and frames for large glass sizes (in excess of 100 united inches). Provide material sufficiently hard to withstand exposure to abrasion and vandalism.
    - b. 25 to 50 for rubber-like curing compounds used with rigid stops and frames for medium and small glass sizes (less than 100 united inches). Provide materials sufficiently hard to withstand impact of moving sash and doors.
    - c. 35 to 60 for molded gaskets used with rigid stops and frames, depending upon strength needed for application or insertion of units.
  3. Provide size and shape of gaskets and preformed glazing units as recommended by the manufacturer and as indicated on approved Shop Drawings.
- B. Preformed Butyl Rubber Back-Bedding Mastic Glazing Tape:
1. Preformed tape of polymerized butyl or mixture of butyl and polyisobutylene with inert fillers with built-in spacer of synthetic rubber, solvent-based with minimum 95 percent solids, non-sag consistency, tack-free time of 24 hours or less, paintable, non-staining, complying with AAMA 806.3.
  2. Products and Manufacturers: Provide one of the following:
    - a. Polyshim II Glazing Tape by Tremco, Incorporated.
    - b. Or equal.
- C. Dense Compression Wedge Gaskets:
1. Provide molded or extruded, closed-cell silicone wedge gaskets in compliance with ASTM C 1115, Type C.
  2. Products and Manufacturers: Provide one of the following:
    - a. Dense Silicone Wedge Gaskets SCR-900 by Tremco, Incorporated.
    - b. Or equal.

## 2.4 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standards, requirements of manufacturers of glass glazing materials for applications shown, and approved Shop Drawings. Provide materials with a proven record of compatibility with surfaces shown and specified.

- B. Setting Blocks: Elastomeric material, 80 to 90 Shore A durometer hardness, with proven compatibility with sealants used in the Work and as recommended by the glass manufacturer.
- C. Spacers and Edge Blocks: Elastomeric blocks or continuous extrusions, with a Shore A durometer hardness recommended by glass manufacturer to maintain lites in place and to limit lateral movement for installation shown, and with proven compatibility with sealants used in the Work.
- D. Cylindrical Glazing Sealant Backing: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam complying with ASTM C 1330, Type O (open-cell material), proven to be compatible with sealants used, flexible and resilient, with 5 to 10 psi compression strength for 25 percent deflection.
- E. Cleaners, Primers and Sealers: Type recommended by sealant, gasket and glass manufacturer.

## 2.5 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Glass manufacturer's recommended glazing channel dimensions are intended to provide for necessary minimum bite on the glass, minimum edge clearance and adequate sealant thicknesses, with reasonable tolerances. CONTRACTOR shall be responsible for correct glass size for each opening, within the tolerances and necessary dimensions established on approved Shop Drawings.

## 2.6 TOLERANCES

- A. Allowable Tolerances: Provide fully tempered and heat-strengthened glass, formed by horizontal roller-hearth process, free of tong marks, and not exceeding the following flatness tolerances (either face, any direction, any location) based on 1/4-inch glass thickness with inversely proportionate tolerances for other thicknesses:
  1. For 12-inch Run: 1/16-inch bow.
  2. For 3-foot Run: 1/8-inch bow.
  3. For 7-foot Run: 1/4-inch bow.
  4. For 10-foot Run: 3/8-inch bow.

## 2.7 SOURCE QUALITY CONTROL

- A. To the greatest extent possible, provide each type of glass glazing materials from one manufacturer.
- B. Providing insulating glass with a certified Class A rating according to SIGMA.
- C. Obtain glass and sealant test results for product test reports from qualified testing agencies regularly engaged in the business of testing glass and sealant products.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. CONTRACTOR shall examine the framing and glazing channel surfaces, backing, removable stop design, and the conditions under which the glass glazing is to be performed, and notify ENGINEER, in writing, of any conditions detrimental to the proper and timely completion of the Work. Do not proceed with the glazing until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

### 3.2 PREPARATION

- A. Clean the glazing channel, or other framing members to receive glass, immediately before glazing. Remove coatings, which are not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used.
- B. Apply primer or sealer to joint surfaces wherever recommended by sealant and glass manufacturer.

### 3.3 INSTALLATION

- A. General:
  - 1. Comply with combined recommendations of glass, window and glazing products manufacturers and other materials used in glazing, except where more stringent requirements are shown or specified, and as shown on approved Shop Drawings.
  - 2. Comply with GANA, Glazing Manual, except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the glass glazing materials, as accepted by ENGINEER on approved Shop Drawings.
  - 3. Inspect each piece of glass immediately before installation, and remove from Site all that have observable edge damage or face imperfections.
  - 4. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.
  - 5. Cut and install tinted and reflective glass as recommended in manufacturer's technical bulletin as provided on approved Shop Drawings.
  - 6. Install sealants as recommended by sealant manufacturers, and as recommended on approved Shop Drawings.
  - 7. Do not attempt to cut, seam, nip or abrade glass on Site, which is tempered, heat strengthened, or coated.
  - 8. Do not proceed with installation of liquid glazing sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.
  - 9. Proceed with glazing only when forecasted weather conditions are favorable to proper cure and development of high early bond strength. Wherever

channel action is affected by ambient temperature variations, install glazing sealants only when temperatures are in the middle third of manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation or compression, and bond stress will not be excessive at extremely low or high temperatures.

10. Coordinate the installation of the glass glazing Work with the Progress Schedule in order to avoid delay of Project.

B. Tape and Sealant Glazing:

1. Place setting blocks in sill rabbets, sized and located to comply with referenced glazing publications. Set blocks in thin course of compatible sealant for heel bead. Position glass on setting blocks and press against tape for full contact.
2. Provide spacers for glass lites where the length plus width is larger than 4 foot-2 inches. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
3. Provide 1/8-inch minimum bite for spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
4. Provide edge spacers as shown on approved Shop Drawings and as required to prevent glass lites from moving sideways in glazing channel.
5. Cut glazing tape to length and set against permanent stops. Install horizontal strips first, extending over width of opening, before applying vertical strips.
6. Remove paper backing from tape. Place glazing tape on free perimeter of glass. Install tapes continuously. Do not stretch tape to make them fit openings. Place joints in tapes at corners of openings with adjoining lengths butted together, not lapped. Seal butt joints of tape with joint sealant.
7. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
8. Install removable stop, avoiding displacement of tape, and exert pressure on tape for full continuous contact. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Calk space above glazing tape to top of glazing stop. Tool exposed surfaces of sealant compounds to provide a substantial "wash" away from the glass.
9. Clean and trim excess glazing materials from the installation, and eliminate stains and discolorations.
10. Where wedge-shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when subjected to dynamic movement. Anchor gasket to stop with matching ribs, or by proven adhesives, including embedment of gasket tail in cured heel bead. Do not

exceed edge pressures stipulated by glass manufacturers for installing glass lites.

11. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended on approved Shop Drawings and to prevent corners from pulling away; seal corner joints and butt joints with sealant as recommended by gasket manufacturer and as shown on approved Shop Drawings.
- C. The installer shall advise CONTRACTOR of procedures required for the protection of glass glazing sealants and compounds during the construction period, so that they will be without deterioration or damage, other than normal weathering, at the time of Substantial Completion.
- D. Furnish specific instructions on the precautions and provisions required to prevent glass damage resulting from the alkaline wash from concrete surfaces and similar sources of possible damage.
- E. Protect exterior glass from breakage immediately upon installation, by attachment of crossed streamers to framing held away from glass. Do not apply markers of any type to surfaces of glass.
- F. Remove and replace glass, which is broken, chipped, cracked, abraded or damaged in other ways during the construction period, including natural causes, accidents and vandalism.
- G. Maintain glass in a reasonably clean condition during construction, so that it will not be damaged by corrosive action and will not contribute (by wash-off) to the deterioration of glazing materials and other work.
- H. Remove non-permanent labels and wash and polish glass on both faces not more than four days prior to Substantial Completion. Comply with glass manufacturer's recommendations for cleaning.

#### 3.4 FIELD QUALITY CONTROL

- A. Watertight and airtight installation of each piece of glass is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and doors) without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and air-tight, deterioration of glazing materials and other defects in the Work.
- B. After nominal cure of exterior glazing sealants, which are exposed to the weather, test for water leaks. Flood the joint exposure with water directed from a 3/4-inch hose held perpendicular to wall face, 2 feet from joint, connected to a water system with 30 psi minimum normal water pressure. Move stream of water along joint at an approximate rate of 20 foot-0 inches per minute.

- C. Test approximately five percent of total glazing system, in locations which are typical of every joint condition, and which can be inspected easily for leakage on opposite face. Conduct tests in the presence of ENGINEER, who will determine the actual percentage of joints to be tested and the actual period of exposure to water from the hose, based upon the extent of observed leakage, or lack thereof.
- D. Repair glazing installation at leaks or, if leakage is excessive, replace glazing sealants as directed by ENGINEER.
- E. Wherever nature of observed leakage indicates the possibility of inadequate glazing joint bond strength, ENGINEER may direct that additional testing be performed at a time when joints have been fully cured, followed by natural exposure through both extreme temperatures, and returned to the range of temperature in which it is feasible to conduct testing. Repair or replace Work as required and directed by the ENGINEER.

+ + END OF SECTION + +



## SECTION 08 90 00

### LOUVERS AND VENTS

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

###### A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all louvers and vents Work.
2. Extent of louvers and vents Work is shown.
3. Types of products required include the following:
  - a. 6-inch fixed, extruded-aluminum louvers.
  - b. 6-inch wall vents (brick vents).
  - c. Sill extensions, bird screens,, and other miscellaneous trim, fasteners, , supports and other accessories.
  - d. Polyvinylidene fluoride finish.

###### B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the louvers and vents Work.
2. Verify size, location and placement of louver and vents prior to fabrication, wherever possible. Coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments, splicing, mechanical joints and field assembly of units. Preassemble units in as large sections as practicable.
3. Coordinate louver selections with Section 23 09 00, Instrumentation and Control for HVAC.

###### C. Related Sections:

1. Section 07 92 00, Joint Sealants.
2. Section 08 11 13, Hollow Metal Doors and Frames.
3. Section 08 22 00, FRP Doors and Frames
4. Section 23 09 00, Instrumentation and Control for HVAC.

##### 1.2 REFERENCES

###### A. Standards referenced in this Section are listed below:

1. American Society for Testing and Materials, (ASTM).
  - a. ASTM B 117, Practice for Operating Salt Spray Apparatus.
  - b. ASTM D 522, Test Methods for Mandrel Bond Test of Attached Organic Coatings.
  - c. ASTM D 523, Test Method for Specular Gloss.

- d. ASTM D 1308, Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
- e. ASTM D 2244, Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- f. ASTM D 2247, Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
- g. ASTM D 3363, Test Method for Film Hardness by Pencil Test.
- h. ASTM D 4214, Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

### 1.3 QUALITY ASSURANCE

- A. Performance Criteria: Comply with Sheet Metal and Air Conditioning Contractor's National Association, Architectural Sheet Metal Manual, recommendations for fabrication, construction details, and installation procedures, except as otherwise shown on the Drawings or specified.
- B. Component Supply and Compatibility:
  - 1. Obtain each separate type of louver and vents from a single supplier and from a single manufacturer.

### 1.4 SUBMITTALS

- A. Action Submittals: Submit the following
  - 1. Shop Drawings:
    - a. Include plans, elevations, sections, details and attachments to other work. Show blade profiles, angles and spacing.
  - 2. Product Data:
    - a. Copies of manufacturer's material specifications, recommended written installation instructions and manufacturer's specifications.
  - 3. Samples: For units with factory-applied color finishes.
    - a. Provide polyvinylidene fluoride coating manufacturer's complete color charts showing all colors and finishes, including custom, special and premium colors, available from the manufacturer.
    - b. Samples will be reviewed by ENGINEER for materials, fabrication techniques, proposed system components, workmanship and color. Compliance with other requirements is the responsibility of CONTRACTOR.
- B. Informational Submittals: Submit the following:
  - 1. Source Quality Control Submittals:
    - a. Comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

## 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

## 1.6 WARRANTY

- A. Provide written warranty agreeing to replace louver and vent Work which fails in materials or workmanship within three years of the date of Final Acceptance. Failure of materials or workmanship shall include, but is not limited to, excessive leakage or air infiltration, excessive deflections, deterioration of finish or metal in excess of normal weathering, and defects in accessories, weatherstripping, and other components of the Work.
- B. Guarantee that the polyvinylidene fluoride-based coating meets all criteria specified and will not spall, check, craze, peel or otherwise lose adhesion for a period of twenty years from the date of Final Acceptance, to the extent that such shall create unsightly conditions or otherwise impair the intended architectural qualities of the building.
- C. In the event that the polyvinylidene fluoride-based coating fails to meet the specified standards, the manufacturer shall, at his own expense, replace or field paint, as directed by ENGINEER, all areas affected by the failure. In the event that repainting is selected, it shall be done at mutually agreeable intervals throughout the term of the warranty.
- D. The warranty does not apply where failure is caused by accidents, or external conditions or forces beyond the control of the manufacturer.

## PART 2 - PRODUCTS

### 2.1 LOUVER AND VENTS PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide louvers and vents capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.
  - 1. Wind Loads: Determine loads based on ASCE 7, Chapter 30 for components and cladding. Basic design wind speed (V) of 125 mph shall be used to calculate the uniform pressure acting normal to the surface in both an inward or outward direction. Design pressure shall not be less than 16 psf.

- C. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 20°F, ambient; 120°F, material surfaces.

## 2.2 MATERIALS

- A. Aluminum Sheet: ASTM B 209, Alloy 5005 with temper as required for forming or as otherwise recommended by the metal producer to provide the required finish.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T52.
- C. Fastenings: Use same material as items fabricated. Provide types, gages and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise specified. Use continuous aluminum closure angles on the inside perimeter frame of all louver and vents Work, finished to match louvers and vents.
- D. Post-installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to four times the loads imposed, for concrete, or six times the loads imposed, for masonry, as determined by testing conforming to ASTM E 488, conducted by a qualified independent testing agency.
- E. Protection of aluminum from dissimilar materials shall conform to Section 09 91 00, Painting.

## 2.3 FABRICATION, GENERAL

- A. Assemble louvers and vents in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes as shown, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
  - 1. Frame Type: Channel, unless otherwise shown and as specified.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacing shown, but not more than recommended by manufacturer, or 72-inches on centers, whichever is less.

1. Exposed Mullions: Where shown, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
- F. Where shown, provide subsills made of same material as louvers.
- G. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise shown or size of louver assembly makes bolted connections between frame members necessary.

#### 2.4 FIXED, EXTRUDED ALUMINUM LOUVERS

- A. Furnish 6-inch fixed louvers where shown or scheduled. Drainable blades shall incorporate a front lip gutter and recessed second gutter, both of which direct water to jamb and mullion drains.
- B. Free Area Velocity: Maximum 1046 feet per minute free area velocity at a pressure drop of not more than 0.17 inches water gage carrying less than 0.01 ounces of water per square foot of free area.
- C. All blades shall be 0.081-inch thick. Provide all blades with integral drainage trough along edge of blades. Frame shall be 0.125-inches thick. Mullions shall be of the sliding interlock type.
- D. Free Area: Not less than 9.22 square feet for a 48-inch by 48-inch high louver.
- E. Provide louver supports designed to carry the wind pressure/load calculated in section 2.1, A, 1.
- F. Products and Manufacturers: Provide one of the following:
1. No. DC-6174 by Construction Specialties, Incorporated.
  3. Or equal.

#### 2.5 FINISHES

- A. Exposed Aluminum Polyvinylidene Fluoride Based Coating: Apply full strength polyvinylidene fluoride-based coatings at the factory by coil coating for sheet material and spray coating for extruded material. Provide the following four coat finish system complying with the following:
1. Alkali clean and hot water rinse all surfaces to receive polyvinylidene fluoride-based finish.
  2. Prepare a chemical conversion coating on the surface, using phosphates or chromates followed by a cold-water rinse. Seal with a chromic acid rinse and

- dry, except where manufacturer recommends another method to achieve greater coating reliability.
3. Apply a base prime coat of epoxy paint to the prepared surface in its coil form, by reverse roller coating. Fully cure in a gas-fired oven to a dry film thickness of 0.2 to 0.4-mils. Follow with a barrier coat, 1.0-mils thick.
  4. Apply color coat containing mica pearlescent or metallic flakes over the barrier coat by roller coating for coil material and airless or Ransburg Elastostatic Hand Spray for extrusions and fuse at a peak metal temperature of 440°F for a dry film thickness of 0.7-mils for coil coating and 1.2-mils for spray coating so that the total dry film is approximately 1.0-mil thick for coil material and 1.5-mils thick for extruded material.
  5. Apply clear fluoropolymer topcoat to provide a dry film thickness of 0.4 to 0.8-mils. The entire four coat system shall have a dry film thickness of 2.6-mils, minimum.
  6. Provide the following physical properties, as proven by appropriate and recognized laboratory test methods acceptable to ENGINEER:
    - a. Weathering, ASTM D 4214: Chalking, not more than No. 8, after exposure for 5,000 hours in Sunshine Arc Weatherometer XWR using 60/60 cycle.
    - b. Color Change, ASTM D 2244: No greater than 5 N.B.S units after removal of external deposits and after exposure for 5,000 hours in Sunshine Arc Weatherometer XWR using 60/60 cycle.
    - c. Humidity Resistance, ASTM D 2247: No blisters after 3,000 hours.
    - d. Salt Spray, ASTM B 117: Few scattered blisters no larger than ASTM No. 4, and no more than 1/16-inch creep from areas scribed to bare metal after 3,000 hours.
    - e. Dry Adhesion: No pick-off when tape tested over 1/16-inch cross hatch.
    - f. Wet Adhesion: No pick-off when tape tested over 1/16-inch cross hatch; extruded material only.
    - g. Boiling Water Adhesion: No pick-off when tape tested over cross hatch area after one hour immersion in distilled boiling water.
    - h. Water Immersion: No pick-off when tape tested over cross hatch area after immersion in aerated distilled water 80±10°F after 500 hours.
    - i. Abrasion Resistance, ASTM D 968: Coefficient of abrasion of 67, minimum.
    - j. Glass, ASTM D 523: 30±5 reflectivity at 60°F.
    - k. Pencil Hardness, ASTM D 3363: HB-H minimum.
    - l. Dry Film Thickness: Primer, 0.2 to 0.4-mils; barrier coat, 1.0-mils; color coating, 0.7 to 1.5-mils; clear top coat, 0.4 to 0.8-mils.
    - m. Solvent Resistance: 100 Double MEK rubs, minimum.
    - n. Flexibility, ASTM D 522: No cracking prior to metal fracture.
    - o. Acid Resistance, ASTM D 1308: 16 hour spot test with five percent hydrochloric acid - no effect.
    - p. Alkali Resistance, ASTM D 1308: 16 hour spot test with five percent sodium hydroxide - no effect.

7. Provide the following colors:
  - a. Full selection of manufacturer's standard, custom and premium colors for final selection by ENGINEER.

## 2.8 LOUVER SCREENS

- A. Provide removable screens for all louvers.
- B. Fabricate screen frames of the same metal and finish as the louver units to which secured. Provide frames consisting of extra heavy duty extruded 0.090-inch aluminum for permanently securing screen mesh. Frames shall be rewirable.
- C. Provide bird screen, 1/2-inch square stainless steel wire, 0.063-inch diameter wire.
- D. Locate screens on inside face of louvers. Secure screens to louver frames with machine screws, spaced at each corner and at 12-inches on centers.
- E. Provide minimum No. 8 stainless steel metal screws, unless larger screws are required by screen size.
- F. Provide cross bar screen reinforcement of same material and finish as louver which subdivides screens into maximum area of 50 square feet.

## 2.09 WALL VENTS (BRICK VENTS)

- A. Extruded-Aluminum Wall Vents: Extruded-aluminum louvers and frames, not less than 0.125-inch nominal thickness, assembled by welding; with 18-by-14-mesh, aluminum insect screening on inside face; incorporating weep holes, continuous drip at sill, and integral waterstop on inside edge of sill; of load-bearing design and construction.
- B. Size: - as indicated on the Schedule
- C. Products and Manufacturers: Provide one of the following:
  1. Construction Specialties, Incorporated.
  3. Or equal.

## 2.10 SILL EXTENSION

- A. Gage and Finish: Same as louver.

## 2.11 ATTACHMENT FRAME

- A. Gage and Finish: Same as louver.
- B. Size: As shown on the Drawings.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. CONTRACTOR and his installer must examine the areas and conditions under which louvers and vents Work and associated items are to be installed and notify ENGINEER, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

### 3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions and directions for the installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate the delivery of such items to the Site.

### 3.3 INSTALLATION

- A. Locate and place louver units plumb, level, and in proper alignment with adjacent work.
- B. Use stainless steel expansion bolt anchors with stainless steel washers and neoprene gaskets. Use spring clips at all anchors to stop deflection of the louver frame. Provide anchors spaced 2 feet-0 inches on centers. Provide continuous aluminum angles for anchoring all operable louvers.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers, as shown.
- D. Repair finishes damaged by cutting, welding, soldering and grinding operations required for fitting and jointing. Restore finishes and prime coats of paint so that there is no evidence of corrective Work. Return items which cannot be refinished in the field to the shop, make the required alterations, and refinish the entire unit, or provide new units, as determined by ENGINEER.
- E. Protection of Aluminum from Dissimilar Materials: Coat all aluminum surfaces in contact with dissimilar materials such as concrete, masonry, steel and other metals as specified in Section 09 91 00, Painting.

### 3.5 ADJUSTMENT AND CLEANING

- A. Louvers with dents, warps, gouges, or scratches shall be replaced with new louvers, at no additional cost to OWNER.

++ END OF SECTION ++