

## SECTION 081113.13 – STANDARD HOLLOW METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Building Envelope Requirements

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Standard hollow metal doors frames.
- B. Related Sections:
  - 1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
  - 2. Division 08 Section "Flush Wood Doors" for wood doors in hollow metal frames.
  - 3. Division 08 Section for door hardware for hollow metal doors.
  - 4. Division 09 Section "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
  - 5. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

#### 1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work to comply with the following Steel Door Institute Performance Standards:
  - 1. Hollow metal work fabricated according to ANSI/SDI A250.8 (R2008).
  - 2. ANSI/SDI A250.4 (2001) - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
  - 3. ANSI/SDI A250.6 (R2009) - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
  - 4. ANSI/SDI A250.10 (R2004) - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
  - 5. ANSI/SDI A250.11 (2001) - Recommended Erection Instructions for Steel Frames.
  - 6. ANSI/SDI A250.13 (2008) – Testing and Rating of Severe windstorm Resistant Components for Swinging Door Assemblies.
  - 7. SDI 111 (2008 – Recommendations for Selection and Usage Guide for Standard Steel Doors and Frames.
  - 8. SDI 117 (2009) – Manufacturing Tolerances Standard Steel Doors and Frames.
  - 9. SDI 122 (2007) - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
  - 10. SDI 124 (1998) - Maintenance of Standard Steel Doors and Frames.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.
- B. Sustainable Submittals:
  - 1. Provide product cost and pre-and post-consumer recycled content.
- C. Shop Drawings: Include the following:
  - 1. Elevations of each door design.
  - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 4. Locations of reinforcement and preparations for hardware.
  - 5. Details of each different wall opening condition.
  - 6. Details of anchorages, joints, field splices, and connections.
  - 7. Details of accessories.
  - 8. Details of moldings, removable stops, and glazing.
  - 9. Details of conduit and preparations for power, signal, and control systems.
- D. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
  2. Supplier to submit shop drawing schedules with in two weeks of written notification from Contractor in the event to expedite the process of frames to jobsite.
  3. Certificate: current certificate stating the manufacture is a member of SDI.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames from single source manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 and UL10C, embossed labels are acceptable on standard 3 sided door frames.
  1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
  2. Temperature-Rise Limit At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105.
- E. Preinstallation Conference: Conduct conference at Project site to review anchor methods, electrical conduit connections and custom installation of unusual openings such as pocket frames, single rabbet double egress frames and recessed doors flush with walls.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
  1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Do not store in a manner that traps excess humidity.
  1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.
  2. Any scratches or disfigurements caused in shipping or handling are promptly cleaned and touched up with a rust-inhibitive primer to new conditions

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

#### 1.8 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Manufacturers of current SDI membership:
  1. Amweld Building Products, LLC.
  2. Benchmark; a division of Therma-Tru Corporation.
  3. Ceco Door Products; an Assa Abloy Group company.
  4. Curries Company; an Assa Abloy Group company.
  5. Steelcraft; an Ingersoll-Rand company.

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Frame Anchors: ASTM A 591, Commercial Steel (CS), 40Z 12G coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.
- F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- G. Glazing: Comply with requirements in Division 08 Section "Glazing."

## 2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
    - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
    - b. Steel-stiffened door at interior and exterior shipping and receiving locations.
    - c. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 11 when tested to ASTM C518 calculated and 3.0 when tested to ASTM C1363 operable.
      - 1) Locations: All exterior doors, and as indicated on Door Schedule..
  - 3. Vertical Edges for Single-Acting Doors:
    - a. Beveled Edges: 1/8 inch in 2 inches.
      - 1) At meeting edges of pairs of doors bevel edge at active leaf, square edge at inactive leaf.
      - 2) Universal hinge preps for reverse swinging of doors are not acceptable.
  - 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
  - 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
  - 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
  - 7. Provide hollow metal doors with at least 30 percent total recycled; 10 percent post-consumer content.
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush)).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 3 and Physical Performance Level B (Heavy Duty), Model 2 (Full Flush).
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

## 2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
  - 1. Fabricate frames with mitered or coped corners.
  - 2. Fabricate frames as face welded joints and back weld joints continuously, unless otherwise indicated.

3. Frames for Level 3 Steel Doors: (14 gage) thick steel sheet.
  - C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
    1. Fabricate frames with mitered or coped corners.
    2. Fabricate frames as full profile and face welded unless otherwise indicated.
    3. Frames for Level 3 Steel Doors: (16 gage) - thick steel sheet.
    4. Frames 48-inches and wider in opening width are required to be min. 14 gage thick steel sheet.
    5. Frames for Wood Doors: (16 gage) thick steel sheet.
    6. Frames for Borrowed Lights: (16 gage) thick steel sheet.
  - D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
  - E. Provide knock down, pre-finished frames where indicated.
- 2.5 FRAME ANCHORS
- A. Jamb Anchors:
    1. Stud Anchors: Welded frames for installation in stud partitions shall be provided with welded in steel anchors of suitable design, not less than 18 gage thickness, secured inside each jamb as follows:
      - a. Frames up to 60" height: 2 anchors.
      - b. Frames greater than 60" up to 90" 4 anchors.
      - c. Frames greater than 90" up to 96" 5 anchors.
      - d. Frames greater than 96": 5 anchors plus one for each 24" or fraction thereof over 96" spaced at 24" maximum between anchors.
    2. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location. 3" minimum, embedment.
    3. Hot-dip galvanize all anchors in exterior walls.
  - B. Floor Anchors: Formed from same material as frames, not less than 0.067 inch thick, and as follows:
    1. Monolithic Concrete Slabs: Floor anchors shall be provided with two holes for fasteners and shall be fastened inside jambs with at least four (4) spot welds per anchor
- 2.6 STOPS AND MOLDINGS
- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
  - B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
  - C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed. Field cuts are not acceptable.
- 2.7 LOUVERS
- A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.
- 2.8 ACCESSORIES
- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
  - B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.
- 2.9 FABRICATION
- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
  - B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
  - C. Hollow Metal Doors:
    1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
    2. Glazed Lites: Factory cut openings in doors.
    3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (beyond edge of door on which astragal is mounted).

4. Continuous Hinge Reinforcement: Provide continuous 12 gage strap tack welded to door edge for continuous hinges specified in hardware sets in Div. 8 Door hardware, unless door has continuous steel channel for hinge reinforcement.
  5. Electrical Raceways: Provide raceways to accommodate up to twelve (12) wires as required for electrified door hardware specified in hardware sets in Div. 8 Door Hardware.
  6. Seamless Edge (Model 2): Provide seamless edge on hollow metal doors by intermittently tack welding seam, grinding smooth and finishing edge free from defects and blemishes.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
  3. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops require wider dimension on glass side of frame.
  4. Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 42-inch and wider with mortise/butt type hinges at top hinge location to deter against hinge reinforcement sag; required at all openings with automatic openers.
  5. Continuous Hinge Reinforcement: Provide continuous 12 gage strap tack welded to frame stop for continuous hinges specified in hardware sets in Div. 8 Door hardware.
  6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  7. Provide A60 Galvannealed coating at frames in restrooms with showers/Jacuzzi, clean areas such as surgery rooms and surgical suites, clean rooms, and soil rooms.
  8. Electrical Knock Out Boxes: Factory weld 18 gage electrical knock out boxes to frame for electrical hardware preps; included to electrical thru wire hinges, electrical raceways, door position switches, electric strikes, jamb mount card readers, and magnet locks as noted in door hardware sets in Division 8 Door Hardware and security prints.
    - a. Electrical knock out boxes are required at door position switches, electric strikes, card readers, and middle hinge locations for all exterior locations regardless of electrical hardware specified in Division 8 Door Hardware and security prints.
    - b. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    - c. Conduit to be factory installed for electric hardware preps. Frames with factory installed conduit to have weld in place anchors.
    - d. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 8 Door Hardware and security prints.
    - e. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb, coordinate with hardware supplier
    - f. Provide conduit for standardized plug connectors to accommodate up to (12) wires for electrified door hardware specified in hardware sets in Division 8 Door Hardware and security prints.
  9. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers as follows. Keep holes clear during construction. Silencers to be supplied by frame manufacturer regardless if specified in Div. 8 Door Hardware.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
  2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
  3. Provide loose stops and moldings on inside of hollow metal work.
  4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
  5. Gap for butted or mitered joints in glass stop should not exceed .0625-inch.

## 2.10 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Remove welded-in shipping spreaders installed at factory after installation of frame in wall. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
  1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

#### **3.3 INSTALLATION**

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
  1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install frames with removable glazing stops located on secure side of opening.
    - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    - e. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
    - a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
  3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
  4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
  5. Field Supplied Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame 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. Provide adjustable wedged or bolted anchorage to frame jamb members. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

6. In-Place Gypsum Board Partitions: Secure frames in place with post-installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  7. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch ( ) plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch (plus or minus 1/16 inch).
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.
  2. Secure exterior removable stops with security head stainless steel screws.
- 3.4 ADJUSTING AND CLEANING
- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
  - B. Adjust frames and doors per SDI 122 Installation for trouble shooting openings.
  - C. Remove grout and other bonding material from hollow metal work immediately after installation.
  - D. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
  - E. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

**END OF SECTION 081113.13**





## SECTION 081416 - FLUSH WOOD DOORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  1. Solid-core doors with wood-veneer faces.
  2. Factory finishing flush wood doors.
  3. Factory fitting flush wood doors to frames and factory machining for hardware.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.
- B. Sustainable Documentation Submittals:
  1. Recycled Content:
    - a. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
    - b. Include statement indicating costs for each product having recycled content.
  2. Regional Material:
    - a. Product data for regional materials (within 500 miles of construction site) indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
    - b. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
  3. VOC content data. Provide for any adhesives, sealants, paints, or coatings used on the interior of the building.
    - a. Product information or statement from manufacturer indicating the VOC content of the product in grams per liter (g/L).
- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
  1. Dimensions and locations of blocking.
  2. Dimensions and locations of mortises and holes for hardware.
  3. Dimensions and locations of cutouts.
  4. Undercuts.
  5. Requirements for veneer matching.
  6. Doors to be factory finished and finish requirements.
  7. Fire-protection ratings for fire-rated doors.
- D. Samples for Verification:
  1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
  2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
    - a. Provide Samples for each species of veneer and solid lumber required.
    - b. Provide Samples for each color, texture, and pattern of plastic laminate required.
    - c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
  3. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Comply with requirements of referenced standard and manufacturer's written instructions.
  - B. Package doors individually in plastic bags or cardboard cartons.
  - C. Mark each door on top and bottom rail with opening number used on Shop Drawings.
- 1.7 FIELD CONDITIONS
- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.
- 1.8 WARRANTY
- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
    - 1. Failures include, but are not limited to, the following:
      - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
      - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
    - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
    - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

## PART 2 - PRODUCTS

- 2.1 PRODUCTS, GENERAL
- A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits indicated in Section 018113 "Sustainable Design Requirements."
- 2.2 MANUFACTURERS
- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - 1. Algoma Hardwoods, Inc.
    - 2. Ampco.
    - 3. Eggers Industries.
    - 4. Graham Wood Doors; an Assa Abloy Group company.
    - 5. Marshfield Door Systems, Inc.
    - 6. Mohawk Doors; a Masonite company.
    - 7. VT Industries, Inc.
  - B. Source Limitations: Obtain flush wood doors and wood paneling from single manufacturer.
- 2.3 FLUSH WOOD DOORS, GENERAL
- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards WDMA I.S.1-A, "Architectural Wood Flush Doors."
    - 1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
    - 2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
  - B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
  - C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
    - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
    - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
    - 3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
    - 4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

5. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
6. Pairs: Provide formed-steel edges and astragals with intumescent seals.
  - a. Finish steel edges and astragals with baked enamel[**same color as doors**].
  - b. Finish steel edges and astragals to match door hardware (locksets or exit devices).
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Particleboard-Core Doors:
  1. Particleboard: ANSI A208.1, Grade LD-1.
  2. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade LD-2 or M-2, except for density.
  3. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
  4. Provide doors with cores instead of particleboard cores for doors indicated to receive exit devices.
- F. Mineral-Core Doors:
  1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
  2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
    - a. 5-inch top-rail blocking.
    - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
    - c. 5-inch midrail blocking, in doors indicated to have armor plates.
    - d. 4-1/2-by-10-inch lock blocks, in doors indicated to have exit devices.
  3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
    - a. Screw-Holding Capability: [550 lbf] [475 lbf] [400 lbf] per WDMA T.M.-10.

## 2.4 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
  1. Grade: Custom (Grade A faces).
  2. Species: As scheduled.
  3. Cut: As scheduled.
  4. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet or more.
  5. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
  6. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A.
  7. Core: Particleboard.
  8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
  9. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

## 2.5 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
  1. Wood Species: Same species as door faces.
  2. Profile: Manufacturer's standard shape.
  3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Metal Louvers:
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Air Louvers, Inc.
    - b. Anemostat; a Mestek company.
    - c. Hiawatha Incorporated.
    - d. McGill Architectural Products.
  2. Blade Type: Vision-proof, inverted V.
  3. Metal and Finish: Extruded aluminum with medium bronze, Class II, color anodic finish, AA-M12C22A32/A34.

## 2.6 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
  - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  - 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
  - 1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
  - 3. Louvers: Factory install louvers in prepared openings.

## 2.7 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors that are indicated to receive transparent finish.
- C. Transparent Finish:
  - 1. Grade: Custom.
  - 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish or System 11, catalyzed polyurethane.
  - 3. Staining: As scheduled.
  - 4. Effect: Open-grain finish.
  - 5. Sheen: Semigloss.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
  - 1. Install fire-rated doors according to NFPA 80.
  - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### 3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

**END OF SECTION 081416**



## **SECTION 081423 - PREHUNG WOOD DOOR AND FRAME UNITS**

### **PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS
  - A. Provisions established in General and Supplementary Conditions of the Contract, Division 01 - General Requirements, and the Drawings are collectively applicable to this Section.
- 1.2 SECTION INCLUDES
  - A. Solid core wood doors.
  - B. Wood frames and hardware.
- 1.3 SUBMITTALS
  - A. Provide product data indicating door core materials and construction, veneer species, type and characteristics.
  - B. Provide shop drawings showing each door type in elevation and section, including hardware reinforcement locations.
- 1.4 QUALITY ASSURANCE
  - A. Perform work in accordance with AWI Quality Standard Section 1300, Custom Grade.
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - A. Package, deliver, store, and protect doors in accordance with AWI Section 1300. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week. Break seal on-site to permit ventilation.
  - B. Store doors as recommended by manufacturer.
- 1.6 COORDINATION
  - A. Coordinate the work with door opening construction, door frame and door hardware installation.
- 1.7 WARRANTY
  - A. Provide warranty under provisions of Section 017000 "Closeout Procedures" to the following term:
    - 1. Interior Doors: Two years.

### **PART 2 - PRODUCTS**

- 2.1 PRODUCTS, GENERAL
  - A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits indicated in Section 018113 "Sustainable Design Requirements."
- 2.2 MANUFACTURERS
  - A. Acceptable Manufacturers: Subject to compliance with requirements, provide products from one of the following:
    - 1. Weyerhaeuser Company.
    - 2. Crown Doors.
    - 3. Masonite Corporation.
- 2.3 DOOR TYPES
  - A. Solid Core Doors: AWI Section 1300, type PC - (particleboard core); flush design, with masonite hardboard face.
  - B. Provide all doors pre-hung in opaque grade wood frame with casing to match adjacent base.
- 2.4 ACCESSORIES
  - A. Facing Adhesive: Type II - water resistant for interior; Type I - waterproof for exterior.
  - B. Glazing Stops: Wood of same species as door facing.

2.5 FABRICATION

- A. Fabricate doors in accordance with AWI Custom Quality Standards requirements.
- B. Vertical Exposed Edge of Stiles: Of same species as veneer facing for wood doors.
- C. Fit door edge trim to edge of stiles after applying veneer facing.
- D. Bond edge banding to cores.
- E. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- F. Factory pre-fit doors for frame opening dimensions identified on shop drawings.

2.6 FINISH

- A. Finish in accordance with door schedule and requirements of Section 099100.

**PART 3 - EXECUTION**

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions.
- B. Trim door width by cutting equally on both jamb edges.
- C. Trim door height by cutting bottom edges to a maximum of 3/4 inch.
- D. Pilot drill screw and bolt holes.
- E. Machine cut for hardware. Core for handsets and cylinders.
- F. Coordinate installation of doors with installation of frames.

3.3 INSTALLATION TOLERANCES

- A. Conform to AWI requirements for fit and clearance tolerances.
- B. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taught string, corner to corner, over an imaginary 36 by 84 inch surface area.
- C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taught string, top to bottom, over an imaginary 36 by 84 inch surface area.
- D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taught string, edge to edge, over an imaginary 36 by 84 inch surface area.

3.4 ADJUSTING

- A. Adjust work under provisions of Section 017700.
- B. Adjust door for smooth and balanced door movement.

**END OF SECTION 081423**



## **SECTION 081425 - INSULATED STEEL DOOR AND FRAME UNITS**

### **PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS
  - A. Provisions established in General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.
- 1.2 WORK INCLUDED
  - A. Pre-finished, steel faced, insulated, door and wood frame units.
- 1.3 SUBMITTALS
  - A. Submit shop drawings and product data under provisions of Section 013300.
  - B. Indicate door elevations, stile and rail reinforcement, and internal blocking for hardware attachment.
  - C. Submit manufacturer's installation instructions under provisions of Section 013300.
- 1.4 DELIVERY, STORAGE, AND PROTECTION
  - A. Protect products under provisions of Section 016100.
  - B. Protect doors with resilient packaging.
- 1.5 WARRANTY
  - A. Provide five year manufacturer's warranty under provisions of Section 017839.

### **PART 2 - PRODUCTS**

- 2.1 MANUFACTURERS
  - A. Basis-of-Design Product: Masonite; Wood Edge Steel Door.
  - B. Substitutions: Under provisions of Section 01256100.
- 2.2 DOOR TYPES AND CONSTRUCTION
  - A. Insulated Steel Exterior Doors: Minimum 24 gage galvanized steel pre-finished face panels, 18 gage channel perimeter and hinge reinforcement, 1-3/4 inch thick with high density urethane foam core. Provide complete in wood frame (metal frame required at fire rated doors) with magnetic or compressible weatherstripping, threshold, 1-1/2 pair of butt hinges (US4 finish), double bore for 2-3/8 inch backset, and door sweep. Provide in the following styles:
    - 1. Metal clad insulated full glass (with simulated divided lights) at balconies.
    - 2. Refer to drawings for details.
  - B. Maximum "U" value of door not to exceed 0.60.
- 2.3 FABRICATION
  - A. Prepare doors to receive hardware. Machine cut relief for hinges, closers, and coring for handsets and cylinders.
  - B. Fire rated doors are to have label attached to door and frame and to have smoke seal gaskets as approved by authorities having jurisdiction.
- 2.4 FINISH
  - A. Finish: Prime painted for field finishing.

### **PART 3 - EXECUTION**

- 3.1 INSTALLATION
  - A. Install doors and frames in accordance with manufacturer's instructions.
  - B. Pilot drill screw and bolt holes.
  - C. Prepare doors to receive finish hardware.
  - D. Install hardware in accordance with manufacturer's instructions.
  - E. Conform to manufacturer's recommendations for fit tolerances.

- F. Set door threshold in bed of mastic.
- 3.2 INSTALLATION TOLERANCES
  - A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.
- 3.3 ADJUSTING/CLEANING/REPAIR/REPLACEMENT
  - A. Adjust for smooth and balanced door movement.
  - B. Do not install doors with dents or scratches.
  - C. Clean doors prior to field painting.

**END OF SECTION**

## SECTION 081433 - STILE AND RAIL WOOD DOORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior stile and rail wood doors.
  - 2. Interior fire-rated, stile and rail wood doors.
  - 3. Interior fire-rated, wood door frames.
  - 4. Finishing stile and rail wood doors.
  - 5. Fitting stile and rail wood doors to frames and machining for hardware.
  - 6. Pre-hanging doors in frames.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. Include details of construction and glazing.
  - 2. Include factory finishing specifications.
- B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:
  - 1. Dimensions of doors for factory fitting.
  - 2. Locations and dimensions of mortises and holes for hardware.
  - 3. Requirements for veneer matching.
  - 4. Doors to be factory finished, and finish requirements.
  - 5. Fire ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification: Corner sections of doors, approximately 8 x 10 inch, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish Sample with same materials proposed for factory-finished doors.
- E. Product Certificates: For each type of door, from manufacturer.
- F. Warranty: Sample of special warranty.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Source Limitations: Obtain stile and rail wood doors from single manufacturer.
- C. Source Limitations: Obtain custom stile and rail wood doors from same fabricator as work in Division 06 Section " Wood Paneling."
- D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL10C.
  - 1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- E. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's written instructions and requirements of quality standard referenced in Part 2.
- B. Package doors individually in opaque plastic bags or cardboard cartons.
- C. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
  - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  - 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
    - a. Interior Doors: Life of installation.
    - b. Insulating Glass Vision Panels: Five years.

**PART 2 - PRODUCTS**

2.1 MATERIALS

- A. General: Use only materials that comply with referenced standards and other requirements specified.
  - 1. Assemble interior doors, frames, and sidelites, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.
- B. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea-formaldehyde resins.
- C. Panel Products: Any of the following:
  - 1. Particleboard made from wood particles, with binder containing no urea-formaldehyde resin, complying with ANSI A208.1, Grade M-2.
  - 2. Particleboard made from straw, complying with ANSI A208.1, Grade M-2, except for density.
  - 3. Medium-density fiberboard made from wood fiber, with binder containing no urea-formaldehyde resin, complying with ANSI A208.2, Grade 130.
  - 4. Hardboard, complying with AHA A135.4.
  - 5. Veneer core plywood, made with adhesive containing no urea-formaldehyde resin.

2.2 ACCEPTABLE MANUFACTURER

- A. Doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Trustile.

2.3 INTERIOR STILE AND RAIL WOOD DOORS

- A. Interior Stile and Rail Wood Doors: Stock interior doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.
  - 1. Basis-of-Design Product: Trustile; TS3140.
  - 2. Panel Designs: Per selected product. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
  - 3. Grade: Custom.
  - 4. Finish:
    - a. Transparent.
  - 5. Wood Species and Cut for Transparent Finish: As scheduled.
  - 6. Door Construction for Transparent Finish:
    - a. Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
  - 7. Stile and Rail Widths: Manufacturer's standard, but not less than the following:
    - a. Stiles, Top and Intermediate Rails: Per selected product.

- b. Bottom Rails: Per selected product.
      - 8. Raised-Panel Thickness: [Per selected product][ inches].
      - 9. Flat-Panel Thickness: Per selected product.
      - 10. Molding Profile (Sticking): Per selected product.
      - 11. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick, complying with Division 08 Section "Glazing."
      - 12. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
    - B. Interior Stile and Rail Wood Doors: Fire-rated (20-minute rating) doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.
      - 1. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
      - 2. Grade: Custom.
      - 3. Finish: Transparent.
      - 4. Wood Species and Cut for Transparent Finish: As scheduled.
      - 5. Door Construction for Transparent Finish: 1-3/4-inch-thick stiles and rails and veneered raised panels not less than 1-1/8 inchesthick.
        - a. Stile and Rail Construction: Veneered, structural composite lumber or veneered, edge- and end-glued clear lumber. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces. Use veneers not less than 1/16 inchthick.
      - 6. Stile and Rail Widths: Manufacturer's standard, but not less than the following:
        - a. Stiles, Top and Intermediate Rails: Per selected product.
        - b. Bottom Rails: Per selected product.
      - 7. Molding Profile (Sticking): Per selected product.
      - ?. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
- 2.4 INTERIOR FIRE-RATED WOOD DOOR FRAMES
- A. Interior Fire-Rated Wood Door Frames: Frames, complete with sidelite frames and casings, fabricated from solid fire-retardant-treated wood or from veneered fire-retardant particleboard, fire-retardant medium-density fiberboard, or mineral board. Species to match door.
- 2.5 STILE AND RAIL WOOD DOOR FABRICATION
- A. Fabricate stile and rail wood doors in sizes indicated for field fitting.
  - B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:
    - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold.
      - a. Comply with NFPA 80 for fire-rated doors.
    - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
    - 3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.
  - C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.
    - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  - D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.
  - E. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 08 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.
  - F. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.
    - 1. FINISHING
  - G. Finish wood doors at factory that are indicated to receive transparent finish. Wood doors that are indicated to receive opaque finish may be field finished.

- H. For doors indicated to be factory finished, comply with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.
  - 1. Finish faces and all four edges of doors, including mortises and cutouts. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- I. Transparent Finish:
  - 1. Grade: Custom.
  - 2. Finish: AWI conversion varnish or AWI catalyzed polyurethane system.
  - 3. Staining: Match Architect's sample.
  - 4. Effect: Open-grain finish.
  - 5. Sheen: Satin.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors and fire-rated wood door frames will be installed.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION**

- A. Install fire-rated wood door frames level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
  - 1. Countersink fasteners, fill surface flush, and sand smooth.
- B. Hardware: For installation, see Division 08 Section "Door Hardware."
- C. Install wood doors to comply with manufacturer's written instructions, WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," AWI's "Architectural Woodwork Quality Standards," and other requirements specified.
  - 1. Provide WI-Certified Compliance Certificate for Installation.
  - 2. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- D. Field-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
  - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 3/8 inch] from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch] from bottom of door to top of threshold.
  - 2. Comply with NFPA 80 for fire-rated doors.
  - 3. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
  - 4. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.
- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- F. Restore finish before installation if fitting or machining is required at Project site.

#### **3.3 ADJUSTING**

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

**END OF SECTION**

## SECTION 081613 - FIBERGLASS DOORS

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. Fiberglass balcony doors.
  - B. Transoms.
- 1.2 REFERENCES
  - A. American Architectural Manufacturer Association (AAMA).
    - 1. ANSI/AAMA/NWDA 101/I.S.2 /NAFS; Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
  - B. National Fenestration Rating Council (NFRC).
    - 1. NFRC 100: Procedure for Determining Fenestration Thermal Properties.
    - 2. NFRC 200: Solar Heat Gain Coefficient and Visible Transmittance.
    - 3. NFRC 500: Condensation Resistance Values.
- 1.3 DESIGN REQUIREMENTS
  - A. Patio doors shall be in compliance with requirements indicated, based on manufacturer's testing of patio doors that are representative of those specified and meet the test size requirements of ANSI/AAMA/NWDA 101 I.S.2/NAFS.
  - B. Structural Requirements – Provide patio doors capable of complying with requirements indicated:
    - 1. Design pressure: As indicated on Drawings.
- 1.4 SUBMITTALS
  - A. Refer to Section 013300 Submittal Procedures.
  - B. Product Data: Submit patio door manufacturer current product literature, including installation instruction.
  - C. Samples: Provide finish samples for all products.
  - D. Quality Assurance Submittals.
    - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
    - 2. Manufacturer Instructions: Provide manufacturer's written installation instructions.
- 1.5 QUALITY ASSURANCE
  - A. Qualifications.
    - 1. Installer shall have received manufacturer's training.
  - B. Mock-ups.
    - 1. Patio door mock-up shall incorporate surrounding construction, including wall assembly fasteners, flashing, and other related accessories installed in accordance with patio door manufacturer's approved installation methods.
      - a. Mock-up may remain as part of the work.
  - C. Pre-installation Meeting.
    - 1. Refer to Section 013100 Project Management and Coordination.
- 1.6 DELIVERY, STORAGE AND HANDLING
  - A. Refer to Section 016000 Product Requirements.
  - B. Deliver and store patio door systems and components in manufacturer's original, unopened, undamaged containers with identification labels intact until ready for installation.
  - C. Store patio doors as recommended by manufacturer in a clean and dry environment.
  - D. Handle doors with care.
- 1.7 WARRANTY
  - A. Refer to Section 017700 Closeout Procedures.
  - B. Manufacturer standard warranty indicating that the patio door will be free from material and workmanship defects from the date of substantial completion for the time periods indicated, when installed as outlined in the official warranty:
    - 1. Door frames
      - a. Commercial: 10 years from date of installation.
      - b. Single Family Residential: Lifetime for original purchaser as long as

- 1) purchaser owns home.
2. Mullions
  - a. Commercial: 10 years from date of installation.
  - b. Single Family Residential: Lifetime for original purchaser as long as purchaser owns home.
  - c. purchaser owns home.
3. Astragals
  - a. Commercial: 10 years from date of installation.
  - b. Single Family Residential: Lifetime for original purchaser as long as purchaser owns home.
  - c. purchaser owns home.
4. Door Panels
  - a. Commercial: 10 years from date of installation.
  - b. Single Family Residential: Lifetime for original purchaser as long as purchaser owns home.
  - c. purchaser owns home.
5. Transom Frames
  - a. Commercial: 10 years from date of installation.
  - b. Single Family Residential: 10 years for original purchaser as long as purchaser owns home.
6. Locking Mechanism
  - a. Commercial: 10 years form date of installation, excludes trim finish.
  - b. Single Family Residential: 10 years for original purchaser as long as purchaser owns home.
7. Glazing:
  - a. Non-Impact Glass
    - 1) Commercial: 5 year pro-rated limited warranty against seal failure.
    - 2) Single Family Residential: 20 year pro-rated limited warranty against seal failure.

## PART 2 - PRODUCTS

- 2.1 MANUFACTURER
  - A. Nan Ya Plastics USA, D.B.A. Neuma Doors; 8989 North Loop East; Houston, TX 77029, USA; Phone 716.674.7822, Toll free 866.366.7715; Fax 713.554.5581; website www.neumadoors.com
- 2.2 MATERIALS
  - A. Frame.
    1. Full Composite frame.
    2. Jamb Width: As selected by Architect.
  - B. Panels.
    1. Extruded Composite panel with CFC free polyurethane foam core and fiberglass skin.
    2. Thickness: 1 3/4inch.
    3. Layout: As selected by Architect.
  - C. Weatherstripping: Continuous Q-lon seal compressed between exterior of panel and top and sides of frame. Door bottom sill has co-extruded pvc bulb seal. Manufacturer's standard dual astragal on double door units.
  - D. Hardware.
    1. Hinge Material: Stainless Steel.
    2. Hinge Finish: As selected by Architect.
  - E. Glazing.
    1. Strength: Standard Insulated Glass.
    2. Insulated Glass.
      - a. Two panes of tempered glass utilizing a continuous extruded aluminum spacer, Argon gas fill and dual seal sealant.
      - b. Overall Nominal Thickness: As selected by Architect.
      - c. Type: Standard LowE.
      - d. Coatings: Low E on surface 2.
- 2.3 PATIO DOOR ACCESSORIES
  - A. Simulated Divided Lights (SDL).
    1. Material: Made of composite materials and permanently adhered to the exterior of the glass.
    2. Pattern: As selected by design professional.
    3. Size: 7/8 inch.



- 2.4 CONSTRUCTION ACCESSORIES
  - A. Sealants: Use silicone sealant according to manufacturer instructions to maintain watertight installation.
- 2.5 FABRICATION
  - A. Door panel and frames are constructed from CFC free extruded composite materials.
  - B. Glass: Mounted with co-extruded glazing bead.
- 2.6 FINISH
  - A. Texture.
    - 1. Interior: As selected by Architect.
    - 2. Exterior: As selected by Architect.
  - B. Color Options:
    - 1. Interior: As selected by Architect.
    - 2. Exterior: As selected by Architect.

### **PART 3 - EXECUTION**

- 3.1 GENERAL
  - A. Install patio doors in accordance with manufacturer's installation guidelines and recommendations.
- 3.2 EXAMINATION
  - A. Inspect patio door prior to installation.
  - B. Verify that all substrates have been properly prepared.
  - C. Inspect rough opening for compliance with patio door manufacturer recommendations and verify that rough opening conditions are within recommended tolerances.
- 3.3 INSTALLATION
  - A. Install doors in accordance with manufacturers written directions and local building code requirements.
  - B. Install door sill in full bed of sealant.
- 3.4 ADJUSTING AND CLEANING
  - A. Adjust locksets and hardware as necessary to ensure smooth operation.
  - B. Clean the exterior surface and glass with mild soap and water.
  - C. Remove all packaging materials and recycle if appropriate.
- 3.5 PROTECTION
  - A. Protect installed patio doors from damage.

**END OF SECTION**



## SECTION 083113 - ACCESS DOORS AND FRAMES

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
  - A. Section Includes:
    - 1. Access doors and frames for walls and ceilings.
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
    - 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
  - B. Sustainable Documentation Submittals:
    - 1. Recycled Content:
      - a. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
      - b. Include statement indicating costs for each product having recycled content.
    - 2. Regional Material:
      - a. Product data for regional materials (within 500 miles of construction site) indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
      - b. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
      - c. For metal products, provide statement from manufacturer indicating location for scrap collection and other recycled materials include in the product and its distance from the project site.
  - C. Shop Drawings:
    - 1. Include plans, elevations, sections, details, and attachments to other work.
    - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
  - D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

### PART 2 - PRODUCTS

- 2.1 PRODUCTS, GENERAL
  - A. Recycled Content: Provide products with an average recycled content so that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 35 percent.
  - B. Regional Content: Products shall be extracted or recovered, as well as manufactured, within 500 miles of project site.
- 2.2 PERFORMANCE REQUIREMENTS
  - A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
    - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
    - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.
- 2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS
  - A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - 1. Acudor Products, Inc.
    - 2. Babcock-Davis.
    - 3. Jensen Industries; Div. of Broan-Nutone, LLC.
    - 4. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
    - 5. Karp Associates, Inc.

6. Larsen's Manufacturing Company.
7. Milcor Inc.
8. Nystrom, Inc.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Flush Access Doors with Concealed Flanges:
  1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with beads for concealed flange installation.
  2. Locations: .
  3. Door Size: As indicated.
  4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
    - a. Finish: Factory prime.
  5. Frame Material: Same material and thickness as door.
  6. Hinges: Manufacturer's standard.
  7. Hardware: Latch.
- D. Recessed Access Doors:
  1. Assembly Description: Fabricate door in the form of a pan recessed for infill. Provide frame with gypsum board bead for concealed flange installation.
  2. Locations: Ceiling.
  3. Door Size: As indicated.
  4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
    - a. Finish: Factory prime.
  5. Frame Material: Same material and thickness as door.
  6. Hinges: Manufacturer's standard.
  7. Hardware: Latch.
- E. Fire-Rated, Flush Access Doors with Concealed Flanges:
  1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide frame with gypsum board beads for concealed flange installation.
  2. Locations: .
  3. Fire-Resistance Rating: Not less than that of adjacent construction.
  4. Temperature-Rise Rating: 250 deg F at the end of 30 minutes.
  5. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
    - a. Finish: Factory prime.
  6. Frame Material: Same material, thickness, and finish as door.
  7. Hinges: Manufacturer's standard.
  8. Hardware: Latch.
- F. Hardware:
  1. Latch: Cam latch operated by flush key with interior release.

#### 2.4 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

#### 2.5 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
  1. For concealed flanges with drywall bead, provide edge trim for securely attached to perimeter of frames.
  2. Provide mounting holes in frames for attachment of units to metal or wood framing.
  3. Provide mounting holes in frame for attachment of masonry anchors.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
  - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

**END OF SECTION 083113**



## **SECTION 083323 - OVERHEAD COILING DOORS**

### **PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
  - A. Section Includes:
    - 1. Service doors.
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each type and size of overhead coiling door and accessory.
    - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
    - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
  - B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
    - 1. Include plans, elevations, sections, and mounting details.
    - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
    - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
    - 4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
    - 5. Include diagrams for power, signal, and control wiring.
  - C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
    - 1. Include similar Samples of accessories involving color selection.
- 1.4 INFORMATIONAL SUBMITTALS
  - A. Qualification Data: For Installer.
  - B. Oversize Construction Certification: For door assemblies required to be fire-rated and that exceed size limitations of labeled assemblies.
- 1.5 CLOSEOUT SUBMITTALS
  - A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.
- 1.6 QUALITY ASSURANCE
  - A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
    - 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
  - B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and Texas Accessibility Standards (TAS).

### **PART 2 - PRODUCTS**

- 2.1 MANUFACTURERS, GENERAL
  - A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
    - 1. Obtain operators and controls from overhead coiling door manufacturer.
- 2.2 PERFORMANCE REQUIREMENTS
  - A. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
    - 1. Design Wind Load: As indicated on Drawings.
    - 2. Testing: According to ASTM E 330.

3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
4. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

### 2.3 DOOR ASSEMBLY

- A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Cookson Company.
    - b. Cornell Iron Works, Inc.
    - c. Raynor.
    - d. Wayne-Dalton Corp.
- B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
  1. Include tamperproof cycle counter.
- C. Door Curtain Material: Galvanized steel.
- D. Door Curtain Slats: Flat profile slats of 2-5/8-inch center-to-center height.
  1. Gasket Seal. Manufacturer's standard continuous gaskets between slats.
- E. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from hot-dip galvanized steel and finished to match door.
- F. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- G. Hood: Galvanized steel.
  1. Shape: As shown on Drawings.
  2. Mounting: As shown on Drawings.
- H. Locking Devices: Equip door with locking device assembly.
  1. Locking Device Assembly: Cremona type, both jamb sides locking bars, operable from inside and outside with cylinders.
- I. Manual Door Operator: Chain-hoist operator.
- J. Curtain Accessories: Equip door with push/pull handles.
- K. Door Finish:
  1. Factory Prime Finish: Manufacturer's standard color.

### 2.4 MATERIALS, GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### 2.5 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
  1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 zinc coating; nominal sheet thickness (coated) of 0.028 inch; and as required.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

### 2.6 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
  1. Galvanized Steel: Nominal 0.028-inch-thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653/A 653M.
  2. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.



## 2.7 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
  - 1. Lock Cylinders: Cylinders specified in Section 087100 "Door Hardware" standard with manufacturer.
  - 2. Keys: Two for each cylinder.
- B. Chain Lock Keeper: Suitable for padlock.

## 2.8 CURTAIN ACCESSORIES

- A. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

## 2.9 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
  - 1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic closing device operates.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

## 2.10 MANUAL DOOR OPERATORS

- A. General: Equip door with manual door operator by door manufacturer.
- B. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25-lbf force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

## 2.11 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.12 STEEL AND GALVANIZED-STEEL FINISHES

- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

### 3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Perform installation and startup checks according to manufacturer's written instructions.
  - 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

### 3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
  - 1. Adjust exterior doors and components to be weather-resistant.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

### 3.5 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 1. Perform maintenance, including emergency callback service, during normal working hours.
  - 2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

### 3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

**END OF SECTION 083323**

## SECITON 083324 - HIGH SPEED ROLL-UP DOORS

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SECTION INCLUDES
  - A. High Speed Roll-Up doors and accessories for complete installation.
- 1.3 RELATED SECTIONS
  - A. Division 26 - Electrical
- 1.4 SUBMITTALS
  - A. Product Data: Completely describing components.
  - B. Shop Drawings: Showing details of fabrication, installation and accommodation to connecting work.
  - C. Installation Instructions: For door, operator and accessories.
  - D. Operating and Maintenance Data: For door, operator and accessories.
- 1.5 QUALITY ASSURANCE
  - A. Installer Qualification: Door manufacturer, or trained, approved and licensed door installer.
- 1.6 WARRANTIES
  - A. One year on door and hardware.

### PART 2 - PRODUCT

- 2.1 MANUFACTURERS
  - A. Spiral FV High Speed Roll-Up Door as manufactured by Rytec Corporation, One Cedar Parkway, W223N16601 Cedar Pkwy, Jackson, WI 53037-0403.
  - B. Substitutions: No substitution will be considered unless written request for approval has been submitted by the bidder and has been received by the architect at least ten (10) days prior to the date for receipt of bids.
- 2.2 HIGH SPEED ROLL-UP ROLLS
  - A. Rytec Corporation Spiral VT High Speed Roll-Up Door.
    - 1. Door size to fit door opening as shown on architectural drawings.
    - 2. Door Panel: aluminum perforated slat frames with are 9" high. Thickness of slats ranges from 1.2" – 2.4", depending on overall size of door. Integral rubber weather seal between each slat. Door slats are connected by hinge system to provide additional rigidity and security to door panel. Door curtain does not require a tensioning system for additional wind/pressure resistance. Doors which require the use of a tensioning system for additional wind/pressure resistance will not be accepted.
    - 3. Side Frames: Galvanized steel side frames with full height weatherseal on both sides to seal against door panel. Dual thru-beam photo-eyes mounted within door jamb. Doors using an external coil cord will not be accepted.
    - 4. Bottom Bar: Extruded aluminum bottom bar with electric, reversing edge that reverses the door upon contacting an object.
    - 5. Counterbalance: Up to six extension springs in each side column, depending on the size of the door. Springs assist the motor in opening the door. Mechanical release lever on side column allows door to be easily opened in the event of a power failure. Doors using torsion springs for counterbalance or doors with springs located within a barrel will not be accepted.
    - 6. Drive system: Minimum 2 HP motor with variable speed AC drive which allows for soft acceleration and braking. Doors using a motor with a clutch or pump will not be accepted.
    - 7. Travel Speed: Opens at up to 100 inches per second and closes at lower speed.
    - 8. Electrical Controls
      - a. Rytec controller housed in a UL/cUL Listed NEMA 4X-rated enclosure with factory set parameters.

- b. Parameter changes and all door configurations can be made from the face of the control box, no exposure to high voltage. Control panels that require opening of the control box and reaching inside to make parameter changes will not be accepted.
  - c. Controls include a variable speed AC drive system capable of infinitely variable speed control in both directions.
  - d. Programmable inputs and outputs accommodate special control applications (traffic lights, horns, actuation devices, timing sequences, etc.) without the need for additional electrical components.
  - e. Self-diagnostic scrolling two-line vacuum fluorescent display provides expanded informational messages for straightforward installation, control adjustments and error reporting.
  - f. Complete history of door, at least two years, is logged and encrypted onto a USB flash drive. All errors have a time and date stamp for reference. Control panels not logging up to two years of door history will not be accepted.
- 9. Door to use rotary encoder to regulate door travel limits. Limits to be self-adjusting, without the use of tools, from floor level at the control panel. Doors using mechanical limits switches or doors that require tools to set the limits will not be accepted.
  - 10. Door Track: Spiral rollup design features not metal-to-metal contact which results in whisper-quiet, low maintenance operation and eliminates wear on panel slats. Doors that roll up on a barrel or whose track design allows metal-to-metal contact will not be accepted.
  - 11. Windload: Door testing indicates the door is capable of withstanding winds up to and exceeding 75 mph (14 psf).
  - 12. All components factory finished.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.
- B. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

#### **3.2 EXAMINATION**

- A. Examine substrate areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Verify opening size, dimensions and tolerances.

#### **3.3 PREPARATION**

- A. Protect surrounding areas and surfaces to prevent damage during work of this section.

#### **3.4 INSTALLATION**

- A. Install the work in accordance with manufacturer instructions.
- B. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

#### **3.5 CLEANING**

- A. Leave the premises clean and free of residue of work of this section.

**END OF SECTION**

## SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
  - A. Section Includes:
    - 1. Exterior and interior storefront framing.
    - 2. Exterior and interior manual-swing entrance doors and door-frame units.
- 1.3 PREINSTALLATION MEETINGS
  - A. Preinstallation Conference: Conduct conference at Project site.
- 1.4 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
    - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - B. Sustainable Documentation Submittals:
    - 1. Recycled Content:
      - a. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
      - b. Include statement indicating costs for each product having recycled content.
    - 2. Regional Material:
      - a. Product data for regional materials (within 500 miles of construction site) indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
      - b. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
      - c. For metal products, provide statement from manufacturer indicating location for scrap collection and other recycled materials include in the product and its distance from the project site.
  - C. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
    - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
    - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
      - a. Joinery, including concealed welds.
      - b. Anchorage.
      - c. Expansion provisions.
      - d. Glazing.
      - e. Flashing and drainage.
    - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
  - D. Samples for Initial Selection: For units with factory-applied color finishes.
  - E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
    - 1. Joinery, including concealed welds.
    - 2. Anchorage.
    - 3. Expansion provisions.
    - 4. Glazing.
    - 5. Flashing and drainage.
  - F. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Preconstruction Laboratory Mockup Testing Submittals:
  - 1. Testing Program: Developed specifically for Project.
  - 2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
  - 3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.
- B. Qualification Data: For Installer.
- C. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
  - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- D. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
- E. Sample Warranties: For special warranties.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

## 1.8 MOCKUPS

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Build mockup of typical wall area as shown on Drawings or, if not shown on Drawings, as directed by Architect.
  - 2. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
  - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.
  - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS, GENERAL

- A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits indicated in Section 018113 "Sustainable Design Requirements."

### 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
  - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
  - 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
    - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.
- E. Structural: Test according to ASTM E 330 as follows:
  - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
  - 1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
  - 2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
    - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
- H. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- I. Energy Performance: Certify and label energy performance according to NFRC as follows:
    1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.57 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
    2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 as determined according to NFRC 200.
    3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than as determined according to NFRC 500.
  - J. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
    1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
    2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
      - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
      - b. Low Exterior Ambient-Air Temperature: 0 deg F.
      - c. Interior Ambient-Air Temperature: 75 deg F.
- 2.3 MANUFACTURERS
- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    1. EFCO Corporation.
    2. Kawneer North America.
    3. Oldcastle BuildingEnvelope.
    4. United States Aluminum.
    5. YKK AP America Inc.
- 2.4 FRAMING
- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
    1. Construction: Thermally broken.
    2. Glazing System: Retained mechanically with gaskets on four sides.
    3. Glazing Plane: Front.
    4. Finish: Color anodic finish.
    5. Fabrication Method: Field-fabricated stick system.
  - B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
  - C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
  - D. Materials:
    1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
      - a. Sheet and Plate: ASTM B 209.
      - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
      - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
      - d. Structural Profiles: ASTM B 308/B 308M.
    2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
      - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
      - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
      - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
- 2.5 ENTRANCE DOOR SYSTEMS
- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.



1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
  2. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
    - a. Provide nonremovable glazing stops on outside of door.
- 2.6 ENTRANCE DOOR HARDWARE
- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."
  - B. General: Provide entrance door hardware and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.
    1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
    2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
    3. Opening-Force Requirements:
      - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbfto set the door in motion and not more than 15 lbf to open the door to its minimum required width.
      - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
  - C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
    1. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
  - D. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.
- 2.7 GLAZING
- A. Glazing: Comply with Section 088000 "Glazing."
  - B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
  - C. Glazing Sealants: As recommended by manufacturer.
  - D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.
    1. Color: Match structural sealant.
- 2.8 ACCESSORIES
- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
    1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
    2. Reinforce members as required to receive fastener threads.
    3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel.
  - B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
    1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
  - C. Concealed Flashing: Dead-soft, 0.018-inch- thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
    1. Include subsill flashing compatible with framing and wall construction.
  - D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-milthickness per coat.
- 2.9 FABRICATION
- A. Form or extrude aluminum shapes before finishing.
  - B. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
  2. Accurately fitted joints with ends coped or mitered.
  3. Physical and thermal isolation of glazing from framing members.
  4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  5. Provisions for field replacement of glazing from .
  6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
  - D. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
  - E. Storefront Framing: Fabricate components for assembly using screw-spline system.
  - F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
    1. At exterior doors, provide compression weather stripping at fixed stops.
    2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
  - G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
    1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
    2. At exterior doors, provide weather sweeps applied to door bottoms.
  - H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
  - I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- 2.10 ALUMINUM FINISHES
- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
    1. Color: As selected by Architect from manufacturer's full range.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION**

- A. General:
  1. Comply with manufacturer's written instructions.
  2. Do not install damaged components.
  3. Fit joints to produce hairline joints free of burrs and distortion.
  4. Rigidly secure nonmovement joints.
  5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
  1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 088000 "Glazing."
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
  1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
  4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
  1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
    - a. Perform a minimum of two tests in areas as directed by Architect.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

### 3.5 MAINTENANCE SERVICE

- A. Entrance Door Hardware:
  1. 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 entrance door hardware.
  2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

### 3.6 ENTRANCE DOOR HARDWARE SETS

- A. Refer to Section 087100 "Door Hardware."

**END OF SECTION 084113**



## SECTION 085313 - VINYL WINDOWS

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. Vinyl-framed, factory-glazed windows.
  - B. Operating hardware.
  - C. Insect screens.
  - D. Perimeter sealant.
  
- 1.2 PERFORMANCE REQUIREMENTS
  - A. Performance Requirements: As specified in PART 2, with the following additional requirements:
  - B. System Design: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of window.
    - 1. Calculate design pressures in accordance with applicable code
    - 2. Measure performance of units by testing in accordance with ASTM E330, using test pressure equal to 1.5 times the design wind pressure and 10 second duration of maximum load.
  - C. Deflection: Limit member deflection to 1/200 of the longer dimension with full recovery of glazing materials.
  - D. Air Infiltration: Limit air infiltration through assembly to 0.3 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.
  - E. Water Leakage: None, when measured in accordance with ASTM E331.
  - F. Design Temperature Range: 120 F degrees.
  
- 1.3 ADMINISTRATIVE REQUIREMENTS
  - A. Preinstallation Meeting: Convene one week week before starting work of this section.
  
- 1.4 SUBMITTALS
  - A. See Section 013000 - Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide component dimensions, anchorage and fasteners, glass, internal drainage details.
  - C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements.
  - D. Samples: Submit two samples in size illustrating window frame section.
  - E. Submit two samples of operating hardware.
  - F. Manufacturer's Certificate: Certify that products of this section meet or exceed specified requirements.
  - G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
  
- 1.5 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
  - B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.
  
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.
  - B. Jig, brace, and box the window frame assemblies for transport to minimize flexing of members or joints.
  
- 1.7 FIELD CONDITIONS
  - A. Do not install sealants when ambient temperature is less than 40 degrees F.
  - B. Maintain this minimum temperature during and after installation of sealants.
  
- 1.8 WARRANTY
  - A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
  - B. Correct defective Work within a five year period after Date of Substantial Completion.
  - C. Provide five year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same. Include coverage for degradation of color finish.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Vinyl Windows:
  - 1. Alside, Inc: [www.alside.com](http://www.alside.com).
  - 2. Atrium Companies, Inc: [www.atriumcompanies.com](http://www.atriumcompanies.com).
  - 3. Pella Corporation: [www.pellacommercial.com](http://www.pellacommercial.com).
  - 4. Ply Gem: [www.plygem.com](http://www.plygem.com).
  - 5. Substitutions: See Section 016000 - Product Requirements.

### 2.2 VINYL WINDOWS

- A. Vinyl Windows: Factory fabricated frame and sash members of extruded hollow ultra-violet-resistant polyvinyl chloride (PVC) with integral color; with factory-installed glazing, hardware, related flashings, and anchorage and attachment devices.
  - 1. Configuration: As indicated on drawings, with single hung sash.
  - 2. Color: Sandtone.
  - 3. Size to fit openings with minimum clearance around perimeter of assembly but still providing adequate space for perimeter seals.
  - 4. Framing Members: Fusion welded corners and joints, with internal reinforcement where required for structural rigidity; concealed fasteners.
  - 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system.
  - 6. Glazing Stops, Trim, Flashings, and Accessory Pieces: Formed of extruded PVC, fitting tightly into frame assembly.
- B. Performance Requirements: Provide products that comply with the following:
  - 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 Class R Performance Grade 15.
  - 2. Grade Substantiation: Either AAMA Certification Label or independent test report itemizing compliance will constitute acceptable evidence of compliance.

### 2.3 COMPONENTS

- A. Glazing: Double glazed, clear, low-E coated, manufacturer's standard fill, with glass thicknesses as recommended by manufacturer for specified wind conditions.
- B. Windows: Extruded, hollow, tubular, ultra-violet resistant polyvinyl chloride (PVC) with integral color; factory fabricated; with vision glass, related flashings, anchorage and attachment devices.
  - 1. Performance Requirements: AAMA/WDMA/CSA 101/I.S.2/A440 R15.
    - a. Solar Heat Gain Coefficient: 0.25 maximum.
    - b. U-Factor: 0.29 maximum.
  - 2. Configuration: Fixed, non-operable and single-hung with either operable top or bottom sash as indicated sash.
  - 3. Color: White.
- C. Frames: Standard frame as selected by Architect, with flush glass stops of screw fastened type.
- D. Sills: Extruded aluminum; sloped for positive wash; fit under sash to 1/2 inch beyond wall face; one piece full width of opening.
- E. Insect Screen Frame: Rolled aluminum frame of rectangular sections; fit with adjustable hardware; nominal size similar to operable glazed unit.
- F. Insect Screens: Woven aluminum mesh; 14/18 mesh size.
  - 1. Color: As selected by Architect from manufacturer's full range.
- G. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to effect weather seal.
- H. Fasteners: Stainless steel.

### 2.4 SEALANT MATERIALS

- A. Perimeter Sealant and Backing Materials: As specified in Section 079200.
- B. Glazing Sealant: Type as specified in Section 088000.

### 2.5 HARDWARE

- A. Single Hung Sash: Metal and nylon spiral friction slide cylinder, each sash, each jamb.

1. All operable windows shall be limited to a maximum opening of 4 inches, regardless of location or type of window. This limitation shall be by means of an applied stop, factory installed, capable of being removed by end user.

## 2.6 FABRICATION

- A. Fabricate framing, mullions and sash members with fusion welded corners and joints, in a rigid jig. Supplement frame sections with internal reinforcement where required for structural rigidity.
- B. Form sills in one piece. Slope sills for wash.
- C. Form snap-in glass stops, closure molds, weather stops, and flashings of extruded PVC for tight fit into window frame section.
- D. Form weather stop flange to perimeter of unit.
- E. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- F. Arrange fasteners to be concealed from view.
- G. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.
- H. Assemble insect screen frame, miter and reinforced frame corners. Fit mesh taut into frame and secure. Fit frame with four spring loaded steel pin retainers.
- I. Double weatherstrip operable units.
- J. Factory glaze window units.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

### 3.2 INSTALLATION

- A. Install window units in accordance with manufacturers instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- G. Install operating hardware.
- H. Install glass in accordance with Section 088000, to glazing method required to achieve performance criteria.
- I. Install perimeter sealant and backing materials in accordance with Section 079005.

### 3.3 TOLERANCES

- A. Maximum Variation from Level or Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.

### 3.4 FIELD QUALITY CONTROL

- A. Test installed windows for compliance with performance requirements for water penetration, in accordance with ASTM E1105 using uniform pressure and same pressure difference as specified for laboratory tests.
  1. Test 5 percent of installed windows.
  2. If any window fails, test additional windows at Contractor's expense.
- B. Replace windows that have failed field testing and retest until performance is satisfactory.

### 3.5 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

### 3.6 CLEANING

- A. Remove protective material from pre-finished surfaces.
- B. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.

- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

**END OF SECTION**



## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes:
  1. Glass for storefront framing.
  2. Glazing sealants and accessories.

#### 1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

#### 1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

#### 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  2. Review temporary protection requirements for glazing during and after installation.

#### 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Documentation Submittals:
  1. Regional Material:
    - a. Product data for regional materials (within 500 miles of construction site) indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
    - b. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
    - c. For metal products, provide statement from manufacturer indicating location for scrap collection and other recycled materials include in the product and its distance from the project site.
  2. VOC content data. Provide for any adhesives, sealants, paints, or coatings used on the interior of the building.
    - a. Product information or statement from manufacturer indicating the VOC content of the product in grams per liter (g/L).
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
  1. Tinted glass.
  2. Coated glass.
  3. Insulating glass.
- D. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer manufacturers of insulating-glass units with sputter-coated, low-E coatings glass testing agency and sealant testing agency.
- B. Product Certificates: For glass.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

#### 1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
  - 1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" and Section 085313b "Vinyl Windows" to match glazing systems required for Project, including glazing methods.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
  - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
  - 2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
  - 3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
  - 4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
  - 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

#### 1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

#### 1.12 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCTS, GENERAL**

- A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits indicated in Section 018113.

### **2.2 MANUFACTURERS**

- A. Basis-of-Design Glass Product: Subject to compliance with requirements, provide product indicated in glass schedules or comparable product by one of the following:
  - 1. Cardinal Glass Industries.
  - 2. Guardian Industries Corp.
  - 3. Oldcastle BuildingEnvelope.
  - 4. Pilkington North America Inc.
  - 5. PPG Industries, Inc.
  - 6. Viracon, Inc.
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
  - 1. Obtain tinted glass from single source from single manufacturer.
  - 2. Obtain reflective-coated glass from single source from single manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
  - 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
    - a. Wind Design Data: As indicated on Drawings.
  - 2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
  - 3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
  - 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  - 1. For monolithic-glass lites, properties are based on units with lites .
  - 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  - 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
  - 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  - 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

## 2.4 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: "Glazing Manual."
  - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
  - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
  - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.5 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- D. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.

## 2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
  - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
  - 2. Spacer: Manufacturer's standard spacer material and construction.
  - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

## 2.7 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dow Corning Corporation; 790.
    - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
    - c. Pecora Corporation; 890NST.
    - d. Tremco Incorporated; Spectrem 1.

- C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dow Corning Corporation; 795.
    - b. GE Advanced Materials - Silicones; .
    - c. Pecora Corporation; 864.
    - d. Polymeric Systems, Inc.; PSI-641.
    - e. Tremco Incorporated; Spectrem 2.

## 2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 804.3 tape, where indicated.
  - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

## 2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## 2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
  - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
    - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
  - E. Install gaskets so they protrude past face of glazing stops.
- 3.6 SEALANT GLAZING (WET)
- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
  - B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
  - C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
- 3.7 CLEANING AND PROTECTION
- A. Immediately after installation remove nonpermanent labels and clean surfaces.
  - B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
    - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
  - C. Remove and replace glass that is damaged during construction period.
  - D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.
- 3.8 MONOLITHIC GLASS SCHEDULE
- A. Clear fully tempered float glass.
    - 1. Minimum Thickness: 6 mm.
    - 2. Safety glazing required.
  - B. Clear heat-strengthened float glass.
    - 1. Minimum Thickness: 6 mm.
  - C. Clear annealed float glass.
    - 1. Minimum Thickness: 6 mm.
- 3.9 INSULATING GLASS SCHEDULE
- A. Low-E-coated, clear insulating glass.
    - 1. Overall Unit Thickness: 1 inch.
    - 2. Minimum Thickness of Each Glass Lite: 6 mm.
    - 3. Outdoor Lite: Heat-strengthened or Fully tempered float glass as required by code.
    - 4. Interspace Content: Air.
    - 5. Indoor Lite: Heat-strengthened or Fully tempered float glass as required by code.
    - 6. Low-E Coating: Sputtered on second surface.
    - 7. U-Factor: 0.29 maximum.
    - 8. Solar Heat Gain Coefficient: 0.25 maximum.
    - 9. Safety glazing required.

**END OF SECTION 088000**





## **SECTION 088300 - MIRRORS**

### **PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
  - A. Section includes the following types of silvered flat glass mirrors:
    - 1. Annealed monolithic glass mirrors.
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
    - 1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
  - B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
- 1.4 INFORMATIONAL SUBMITTALS
  - A. Product Certificates: For each type of mirror and mirror mastic.
  - B. Sample Warranty: For special warranty.
- 1.5 CLOSEOUT SUBMITTALS
  - A. Maintenance Data: For mirrors to include in maintenance manuals.
- 1.6 QUALITY ASSURANCE
  - A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- 1.7 PRECONSTRUCTION TESTING
  - A. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing.
    - 1. Testing is not required if data are submitted based on previous testing of mirror mastic products and mirror backing matching those submitted.
- 1.8 DELIVERY, STORAGE, AND HANDLING
  - A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
  - B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.
- 1.9 FIELD CONDITIONS
  - A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.
- 1.10 WARRANTY
  - A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
    - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS, GENERAL

- A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits indicated in Section 018113.

### 2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Avalon Glass and Mirror Company.
  - 2. Binswanger Glass.
  - 3. Guardian Industries Corp.
  - 4. Virginia Mirror Company, Inc.
- B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
- C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

### 2.3 SILVERED FLAT GLASS MIRRORS

- A. Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
- B. Annealed Monolithic Glass Mirrors: Mirror Select Quality, clear.
  - 1. Nominal Thickness: As indicated.
- C. Safety Glazing Products: For tempered mirrors, provide products that comply with 16 CFR 1201, Category II.

### 2.4 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- B. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Palmer Products Corporation.
    - b. Pecora Corporation.

### 2.5 MIRROR HARDWARE

- A. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.
  - 1. Bottom[ **and Side**] Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Andscot Company, Inc.
      - 2) Laurence, C. R. Co., Inc.
      - 3) Stylmark, Inc.
  - 2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Andscot Company, Inc.
      - 2) Laurence, C. R. Co., Inc.
      - 3) Stylmark, Inc.
  - 3. Finish: Clear bright anodized.
- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

## 2.6 FABRICATION

- A. Fabricate mirrors in the shop to greatest extent possible.
- B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat polished.
  - 1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
  - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

### 3.2 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

### 3.3 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
  - 1. GANA Publications: "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- B. Provide a minimum airspace of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
  - 1. Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
  - 2. Install mastic as follows:
    - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
    - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
    - c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of 1/8 inch between back of mirrors and mounting surface.

### 3.4 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

**END OF SECTION 088300**



## SECTION 089119 - FIXED LOUVERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- D. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
  - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
  - 2. Show mullion profiles and locations.
- C. Delegated-Design Submittal: For louvers indicated to comply with structural[ **and seismic**] performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

#### 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
  - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

#### 1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.1 PRODUCTS, GENERAL

- A. VOC Limits: any adhesives, sealants, paints, or coatings shall meet the VOC limits indicated in Section 018113 "Sustainable Design Requirements."

#### 2.2 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

#### 2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural[ **and seismic**] performance requirements and design criteria indicated.

- B. Structural Performance: Louvers shall withstand 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 normal to the face of the building.
  - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- E. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

#### 2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Drainable-Blade Louver:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Air Flow Company, Inc.
    - b. Airolite Company, LLC (The).
    - c. American Warming and Ventilating; a Mestek company.
    - d. Arrow United Industries; a division of Mestek, Inc.
    - e. Construction Specialties, Inc.
    - f. Greenheck Fan Corporation.
    - g. Industrial Louvers, Inc.
    - h. Nystrom, Inc.
    - i. Ruskin Company; Tomkins PLC.
  - 2. Louver Depth: 6 inches.
  - 3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
  - 4. Mullion Type: Exposed.
  - 5. Louver Performance Ratings: Coordinate with mechanical requirements
  - 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

#### 2.5 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
  - 1. Screen Location for Fixed Louvers: Interior face.
  - 2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
  - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
  - 2. Finish: Same finish as louver frames to which louver screens are attached.
  - 3. Type: Non-rewirable, U-shaped frames.
- D. Louver Screening for Aluminum Louvers:
  - 1. Bird Screening: Aluminum, 1/2-inch- square mesh, 0.063-inchwire.

#### 2.6 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Fasteners: Use types and sizes to suit unit installation conditions.
  - 1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
  - 2. For color-finished louvers, use fasteners with heads that match color of louvers.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

#### 2.7 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
  - 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern unless horizontal mullions are indicated.

- 2. Horizontal Mullions: Provide horizontal mullions at joints unless continuous vertical assemblies are indicated.
  - C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
  - D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
    - 1. Frame Type: Channel unless otherwise indicated.
  - E. Include supports, anchorages, and accessories required for complete assembly.
  - F. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.
    - 1. Exposed Mullions: Where indicated, 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.
    - 2. Exterior Corners: Prefabricated corner units with mitered and welded blades and with fully recessed mullions at corners.
  - G. Provide subsills made of same material as louvers for recessed louvers.
  - H. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.
- 2.8 ALUMINUM FINISHES
- A. Finish louvers after assembly.
  - B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

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

#### **3.3 INSTALLATION**

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

#### **3.4 ADJUSTING AND CLEANING**

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

**END OF SECTION 089119**