

SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies aluminum entrance work including storefront construction, hung doors, and other components to make a complete assembly.

1.2 RELATED WORK:

- A. Sustainable Design Requirements: Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS.
- B. Glass and Glazing: Section 08 80 00, GLAZING.
- C. Hardware: Section 08 71 00, DOOR HARDWARE.
- D. Automatic Door Actuators: Section 08 71 13, AUTOMATIC DOOR OPERATORS.
- E. Sliding Automatic Entrances: Section 08 42 29, SLIDING AUTOMATIC ENTRANCES.
- F. Texture and color of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
 - 1. Volatile organic compounds per volume as specified in
PART 2 - PRODUCTS.
- C. Shop Drawings: 1:2 (half size) scale showing construction, anchorage, reinforcement, and installation details. Show interfaces and relationships to work of other trades and continuity with adjacent thermal, weather, air and vapor barriers.
- D. Manufacturer's Literature and Data:
 - 1. Doors, each type.
 - 2. Entrance and Storefront construction.
- E. Calculations: Submit calculations and certification of performance of this work signed and sealed by Professional Engineer registered in the state where the work is located. Indicate how design requirements for loading and other performance criteria have been satisfied.
- F. Samples:
 - 1. Door corner section, 450 mm x 450 mm (18 x 18 inches), of each door type specified, showing vertical and top hinge edges, door closer reinforcement, internal reinforcement and insulation, of flush panel door.

2. Two (2) samples of anodized aluminum of each color showing finish and maximum shade range.
 3. Two (2) samples of organic finish of each color specified.
- G. Test Reports: Submit certified test reports for specified tests.
- H. Manufacturer's Certificates:
1. Stating that aluminum has been given specified thickness of anodizing.
 2. Indicating manufacturer's qualifications specified.

1.4 QUALITY ASSURANCE:

- A. Contracting Officer Representative (COR) approval is required of products of proposed manufacturer, suppliers, and installers.
- B. Certify manufacturer regularly and presently manufactures aluminum entrances and storefronts as one of their principal products.
- C. Source: When aluminum entrances are part of a building enclosure system, including storefront framing, windows, curtain wall system and related products, provide building enclosure system products from a single source manufacturer. Provision of products from numerous sources for site assembly without complete single source design and supply responsibility is not acceptable.
- D. Installer: A firm with a minimum of three (3) years' experience in type of work required by this Section and which is acceptable to manufacturers of primary materials.
- E. Design Criteria: Drawings indicate sizes, member spacings, profiles, and dimensional requirements of work of this Section. Minor deviations will be accepted in order to utilize manufacturer's standard products when, in the CORs sole judgment, such deviations do not materially detract from the design concept or intended performances.
- F. Engineering: Furnish services of a Professional Engineer, registered in the State of Minnesota, to design and certify that work of this Section conforms to performance requirements specified.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Deliver aluminum entrance and storefront material to the site in packages or containers; labeled for identification with the manufacturer's name, brand and contents.
- B. Store aluminum entrance and storefront material in a weather-tight and dry storage facility.
- C. Protect from damage from handling, weather and construction operations before, during and after installation.

1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Civil Engineers (ASCE)
ASCE 7-10Minimum Design Loads for Buildings and Other Structures
- C. ASTM International (ASTM):
 - B209-14Aluminum and Aluminum-Alloy Sheet and Plate
 - B209M-14Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
 - B221-14Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - B221M-13Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
 - D1187/D1187M-97(R2011) .Asphalt-Base Emulsions for Use as Protective Coatings for Metal
 - E1886-13aStandard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missiles(s) and Exposed to Cyclic Pressure Differentials
 - E1996-14aPerformance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
 - E283-04(R2012)Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - E330/E330M-14Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
 - E331-00(R2009)Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 - F1642-12Test Method for Glazing and Glazing Systems Subject to Airblast Loadings

- F468-13.....Nonferrous Bolts, Hex Cap Screws, and Studs for
General Use
- F593-13a.....Stainless Steel Bolts, Hex Cap Screws, and
Studs
- D. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06 Series.....Metal Finishes Manual
- E. American Architectural Manufacturer's Association (AAMA):
611-14.....Voluntary Specification for Anodized
Architectural Aluminum
- 1503-09.....Voluntary Test Method for Thermal Transmittance
and Condensation Resistance of Windows, Doors
and Glazed Wall Sections
- 2604-13.....High Performance Organic Coatings on
Architectural Aluminum Extrusions and Panels
- 2605-13.....Voluntary Specification, Performance
Requirements and Test Procedures for Superior
Performing Organic Coatings on Aluminum
Extrusions and Panels
- F. American Welding Society (AWS):
D1.2/D1.2M-08.....Structural Welding Code Aluminum
- G. U.S. Veterans Administration:
Physical Security Design Manual for VA Facilities (VAPSDG); Life Safety
Protected
- Physical Security Design Manual for VA Facilities (VAPSDG); Mission
Critical Facilities
- Architectural Design Manual for VA Facilities (VASDM)
- H. Environmental Protection Agency (EPA):
40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

1.7 PERFORMANCE REQUIREMENTS:

- A. When tested in accordance with ASTM E330/E330M, shapes and thickness of framing members to be sufficient to withstand a design wind load of not less than 1.4 kilopascals (30 pounds per square foot) of supported area with a deflection of not more than 1/175 times the length of the member and a safety factor of not less than 1.65 (applied to overall load failure of the unit). Provide glazing beads, moldings, and trim of not less than 1.25 mm (0.050 inch) thickness.

- B. Fixed Framing and Glass Area Air Infiltration: When tested in accordance with ASTM E283, maximum air infiltration of 0.0017 cubic meter per minute/square meter (0.06 cubic feet per minute/square foot) of fixed area at a test pressure of 299 Pa (6.24 pounds per square foot). Submit certified test reports.
- C. Entrance Doors Air Infiltration: Do not exceed the following when tested in accordance with ASTM E283, air infiltration. Submit certified test results.
 - 1. Pair of Doors: Maximum air leakage of 0.034 cubic meters per minute/sq. meter (1.2 cubic feet per minute/square foot) at a static-air-pressure differential of 75 Pa (1.57 lbf/square foot).
- D. Water Penetration: No water penetration when tested in accordance with ASTM E331, at a pressure of 0.38 kPa (8 pounds per square foot) of fixed area. Submit certified test reports.
- E. Condensation Resistant Factor: Not less than 45 for fixed storefront units, and not less than 48 for doors; per AAMA 1503. Submit certified test reports.
- F. Thermal Movement: Provide storefront systems that allow for expansion and contraction of members throughout an ambient temperature range of 67 degrees C (120 degrees F).
- G. Blast Resistance:
 - 1. Physical Security Life Safety Protected Facilities:
 - a. Aluminum framed entrances and storefronts to meet or exceed the design and construction standards as provided in the Physical Security Design Manual for VA Facilities: Life Safety Protected.
 - 1) Blast Resistance: Design level threat (W1) located at the standoff distance, but not greater than GP1.
 - 2. Physical Security Mission Critical Facilities:
 - a. Aluminum framed entrances and storefronts to meet or exceed the design and construction standards as provided in the Physical Security Design Manual for VA Facilities: Mission Critical Facilities.
 - 1) Blast Resistance: Design level vehicle threat (W2) located at the standoff distance, but not greater than GP2.
- H. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E1886 and testing information in ASTM E1996 for Wind Zone.

1. Large-Missile Test: For glazed openings located within 9.14 m (30 feet of grade).

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aluminum, ASTM B209M (B209) and B221M (B221):
 1. Alloy 6063 temper T5 for doors, door frames, fixed glass sidelights storefronts and transoms.
 2. Alloy 6061 temper T6 for guide tracks for sliding doors and other extruded structural members.
 3. For color anodized finish, use aluminum alloy as required to produce specified color.
- B. Thermal Break: Manufacturer standard low conductive material retarding heat flow in the framework, where insulating glass is scheduled.
- C. Fasteners:
 1. Aluminum: ASTM F468, Alloy 2024.
 2. Stainless Steel: ASTM F593, Alloy Groups 1, 2 and 3.
- D. Non-Absorptive Dielectric Tape:
 1. A vinyl plastic tape, 0.18 to 0.25 mm (7 - 10 mils) thick, pressure-sensitive adhesive.
- E. Bituminous Coating: ASTM D1187/D1187M; Cold-applied asphalt mastic, compounded for 0.4 mm (15 mil) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- F. Sealants are to have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

2.2 FABRICATION:

- A. Fabricate doors, of extruded aluminum sections not less than 3 mm (0.125 inch) thick. Fabricate glazing beads of aluminum not less than 1.0 mm (0.050 inch) thick.
- B. Form metal parts and fit and assemble joints, except those joints designed to accommodate movement. Seal joints to prevent leakage of both air and water.
- C. Use electrodes and method to make welds in aluminum in accordance with the recommended practice AWS D1.2/D1.2M.
 1. Make welds behind finished surfaces so as to cause no distortion or discoloration of the exposed side.

2. Clean welded joints of welding flux and dress exposed and contact surfaces.
- D. Make provisions in doors and frames to receive the specified hardware and accessories.
 1. Coordinate schedule and template for hardware specified under Section 08 71 00, DOOR HARDWARE.
 2. Where concealed closers or other mechanisms are required, provide the necessary space, cutouts, and reinforcement for secure fastening.
- E. Fit and assemble the work at the manufacturer's plant. Mark work that cannot be permanently plant-assembled to assure proper assembly in the field.

2.3 PROTECTION OF ALUMINUM:

- A. Isolate aluminum from contact with dissimilar metals other than stainless steel, white bronze, or zinc by one of the following:
 1. Coat the dissimilar metal with a protective bituminous coating.
 2. Place caulking compound, non-absorptive tape, or gasket between the aluminum and the dissimilar metal.
 3. Paint aluminum in contact with mortar, concrete and plaster, with a coat of aluminum paint primer.

2.4 FRAMES:

- A. Fabricate doors, frames, mullions, transoms, frames for fixed glass and similar members from extruded aluminum not less than 3 mm (0.125 inch) thick.
- B. Provide integral stops and glass rebates and applied snap-on type trim.
- C. Provide concealed screws, bolts and other fasteners.
- D. Secure cover boxes to frames in back of lock strike cutouts.
- E. Fabricate framework with thermal breaks in frames where insulating glass is scheduled and specified under Section 08 80 00, GLAZING.

2.5 STILE AND RAIL DOORS:

- A. Nominal 45 mm (1-3/4 inch) thick, with stile and head rail 90 mm (3-1/2 inches) wide, and bottom rail 254 mm (10 inches) wide.
- B. Bevel single-acting doors 3 mm (1/8 inch) at lock, hinge and meeting stile edges.
 1. Provide clearances of 2 mm (1/16 inch) at hinge stiles, 3 mm (1/8 inch) at lock stiles and top rails, and 5 mm (3/16 inch) at floors and thresholds.
 2. Form glass rebates integrally with stiles and rails.

3. Glazing beads may be formed integrally with stiles and rails or applied type secured with fasteners at 152 mm (6 inches) on centers.
- C. Construct doors with a system of welded joints or interlocking dovetail joints between stiles and rails. Clamp door together through top and bottom rails with 9 mm (3/8 inch) primed steel rod extending into the stiles, and having a self-locking nut and washer at each end. Reinforce stiles and rails to prevent door distortion when tie rods are tightened. Provide a compensating spring-type washer under each nut to take up any stresses that may develop. Construct joints between rails and stiles to remain rigid and tight when door is operated.
- D. Weather-stripping: Provide removable, woven pile type (silicone-treated) weather-stripping attached to aluminum or vinyl holder. Make slots for applying weather-stripping integral with doors and door frame stops. Apply continuous weather-stripping to heads, jambs, bottom, and meeting stiles of doors and frames. Install weather-stripping so doors can swing freely and close positively.

2.6 FLUSH PANEL DOORS:

- A. Nominal 45 mm (1-3/4 inches) thick. Form from aluminum face sheets not less than 1.5 mm (0.060 inch) thick with internal impact reinforcement, laminated to the door edges and the core.
- B. Provide extruded aluminum tubular members to form the perimeter of the door. Reinforce doors internally with extruded tubular members welded in place, and extending full width of door at top, bottom, and intermediate points.
- C. Fill voids between tubular members with noncombustible mineral insulation.

2.7 REINFORCEMENT FOR BUILDERS HARDWARE:

- A. Fabricate from stainless steel plates.
 1. Hinge and pivot reinforcing: 4.55 mm (0.1793 inch) thick.
 2. Reinforcing for lock face, flush bolts, concealed holders, concealed or surface mounted closers: 2.66 mm (0.1046 inch) thick.
 3. Reinforcing for all other surface mounted hardware: 1.5 mm (0.0598 inch) thick.

2.8 TRIM:

- A. Fabricate trim shown from 1.5 mm (0.0625 inch) thick sheet aluminum of longest available lengths.
- B. Provide concealed fasteners.

- C. Provide aluminum stiffener and other supporting members shown or as required to maintain the integrity of the components.

2.9 FINISH:

- A. In accordance with NAAMM AMP 500 series.
- B. Anodized Aluminum:
 - 1. Clear Finish: AAMA 611 (AA-M12C22A41) Chemically etched medium matte, with clear anodic coating, Class I Architectural, 0.18 mm (7 mils) thick.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Allowable Installation Tolerances: Install work plumb and true, in alignment and in relation to lines and grades shown. Variation of 3 mm (1/8 inch) in 2438 mm (8 feet), non-accumulative, is maximum permissible for plumb, level, warp, bow and alignment.
- B. Anchor aluminum frames to adjoining construction at heads, jambs and bottom and to steel supports, and bracing. Anchor frames with stainless steel or aluminum countersunk flathead, expansion bolts or machine screws, as applicable. Provide aluminum clips for internal connections of adjoining frame sections.
- C. Provide protection against galvanic action. Isolate dissimilar materials with bituminous coating or non-absorptive dielectric tape.
- D. Where work is installed within masonry or concrete openings, place no parts other than built-in anchors and provision for operating devices located in the floor, until after the masonry or concrete work is completed.
- E. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances.
 - 1. Variation from Plane: Limit variation from plane or location shown to 32 mm in 3.65 m (1/8 inch in 12 feet); 6.3 mm (1/4 inch) over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 2 mm (1/16 inch). Where surfaces meet at corners, limit offset from true alignment to 8 mm (1/32 inch).
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 3 mm (1/8 inch).
- F. Install hardware specified under Section 08 71 00, DOOR HARDWARE.

- G. Install hung door operators specified under Section 08 71 13, AUTOMATIC DOOR OPERATORS.

3.2 ADJUSTING:

- A. After installation of entrance and storefront work is completed, adjust and lubricate operating mechanisms to ensure proper performance.

3.3 PROTECTION, CLEANING AND REPAIRING:

- A. Remove all mastic smears and other unsightly marks, and repair any damaged or disfiguration of the work. Protect the installed work against damage or abuse. Protect aluminum surfaces from contact with lime, mortar, cement, acids, plaster, and other harmful contaminants.

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