

**SECTION 05 50 20**  
**ALUMINUM FABRICATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section includes:
1. Aluminum railings.
  2. Insect screening system

**1.2 PERFORMANCE REQUIREMENTS**

- A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Top Rails:
    - a. Uniform load of 50 lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  2. Infill:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
    - b. Uniform load of 25 lbf/sq.ft. applied horizontally.
    - c. Infill load and other loads need not be assumed to act concurrently.
  3. Limit deflection top rails to 1/4 inch, when tested per ASTM E 935.
- C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials, due to both solar heat-gain and nighttime-sky heat-loss.
1. Temperature Change (Range): 140 deg F, ambient; 200 deg F, material surfaces.

- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

### **1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: For each aluminum fabrication indicated, including installation instruction.
- C. Shop Drawings: Plans, elevations, sections, details, and attachments to other work.
- D. Samples: For finishes, in manufacturer's standard sizes.

### **1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain each type of aluminum fabrication through one source from a single manufacturer, with a minimum of three years experience in the manufacture of similar articles.
- B. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.2, "Structural Welding Code--Aluminum."

### **1.5 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

### **1.6 APPLICATION 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 Testing and Materials (ASTM):
  - ASTM B 26/B 26M.....Aluminum-Alloy Sand Castings
  - ASTM B 209.....Aluminum and Aluminum-Alloy Sheet and Plate
  - ASTM B 210.....Aluminum and Aluminum-Alloy Drawn Seamless Tubes
  - ASTM B 221.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
  - ASTM B 247.....Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings

ASTM E 935.....Performance of Permanent Metal Railing Systems  
and Rails for Buildings.

## **PART 2 - PRODUCTS**

### **2.1 METALS, GENERAL**

- A. Metal Surfaces: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

### **2.2 ALUMINUM**

- A. Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Bars and Tubing: ASTM B 221, Alloy 6063-T5/T52.
- C. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.
- D. Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- E. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.
- F. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

### **2.3 FASTENERS**

- A. Provide Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring Aluminum Fabrications to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring fabrications to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Components:
  - 1. Provide concealed fasteners for interconnecting components and for attaching them to other work, unless otherwise indicated.
  - 2. Provide square or hex socket flat-head machine screws for exposed fasteners, unless otherwise indicated.

### **2.4 MISCELLANEOUS MATERIALS**

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded. Provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Aluminum Wire Screen Fabric: 18-by-16 mesh of 0.011 inch diameter, coated aluminum wire.
  - 1. Wire-Fabric Finish: Charcoal gray.

- C. Hardware for Screen Door: Manufacturer's standard, ADA compliant.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## **2.5 FABRICATION**

- A. Manufacture aluminum fabrications to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble aluminum fabrications in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 0.8 mm (1/32 inch), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive hardware, screws, and similar items.
- G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- H. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
  - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is Manufacturer's standard splicing method.
- H. Close exposed ends of members with prefabricated end fittings.

- J. Brackets, Flanges, Fittings, and Anchors: Provide brackets, flanges, miscellaneous fittings, and anchors to interconnect aluminum fabrication members to other work, unless otherwise indicated.

## **2.6 ALUMINUM INSECT SCREEN FRAMES**

- A. Manufacturer's standard aluminum alloy extrusions complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed fasteners and removable PVC spline/anchor concealing edge of frame.
1. Provide manufacturer's standard aluminum framed screen door and door frame where indicated.
- B. Finish: Match aluminum window members.

## **2.7 FINISHES**

- A. Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
1. Color: White.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing aluminum fabrications. Set fabrications accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- C. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
- B. Set posts plumb within a tolerance of 1:500 (1/16 inch in 3 feet).
- E. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1:500 (1/4 inch in 12 feet).

- F. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- G. Adjust aluminum fabrications before anchoring to ensure matching alignment at abutting joints.
- H. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### **3.2 CONNECTIONS**

- A. Use mechanical or adhesive joints for permanently connecting `pre-finished components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 50 mm (2 inches) beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 150 mm (6 inches) of post.

### **3.3 ADJUSTING AND CLEANING**

- A. Clean aluminum: by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Immediately after erection, clean connections and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

### **3.4 PROTECTION**

- A. Protect finishes of aluminum fabrications from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of acceptance by VA.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

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