## Section 4187. Materials for Support Structures

**4187.01 GENERAL REQUIREMENTS.**
Furnish materials for aluminum alloy or galvanized overhead sign support structures meeting the following requirements:

**A. Material for Aluminum Alloy Superstructure.**

**1. Extruded Tubes.**
Apply ASTM B 221/B 221M, Alloy 6061-T6.

**2. Aluminum Plate.**
Apply ASTM B 209 B/209M, Alloy 6061-T6.

**3. Aluminum Casting Components.**
- **a.** Apply ASTM B 26/B 26M, Alloy 356.0-T7, for components in which welding is involved.
- **b.** Apply ASTM B 26/B 26M, Alloy B 514.0 Temper F, for handrail pipe fittings.
- **c.** Apply ASTM B 26/B 26M, Alloy 356.0-T7, or Alloy B 443.0 Temper F, to all other aluminum castings.

**4. Aluminum Structural Shapes.**
Apply ASTM B 308/B 308M, Alloy 6061-T6.

**5. Aluminum Catwalk Gratings.**
- **a. Longitudinal (Bearing) Elements.**
  Apply ASTM B 221/F 221M, Alloy 6061-T6. Other aluminum alloys will be considered for approval.
- **b. Transverse (Cross) Elements.**
  Apply ASTM B 221/B 221M, Alloy 6063-T5. Other aluminum alloys will be considered for approval.

**6. Aluminum Pipe.**
Apply ASTM B 241/B 241M, Alloy 6063-T5.

**7. Aluminum Weld Wire for Welding Electrodes.**
Use AWS A5.10 electrode ER5356 or ER5556 when welding aluminum alloy 6061.

**B. Materials for Galvanized Steel Superstructures.**
Use the type and quality specified in the contract documents.

**C. Fasteners for Aluminum Alloy and Galvanized Steel Superstructures and Anchor Bolts.**

**1. Material for Superstructure.**
- **a. Stainless Steel Bolts and Studs.**
  - **1)** Use the size specified in the contract documents. Meet the requirements of ASTM A 320/A 320M Type 304 or ASTM F 593 Alloy Group 1, 2, or 3 Condition A.
  - **2)** Use hexagonal bolt heads complying with ASTM A 320/A 320M. Threads are to comply with ANSI B1.1 for UNC thread series, Class 2A fit. Use the stress area to compute the tensile strength.
- **b. Stainless Steel Nuts.**
  - **1)** Use the size specified in the contract documents. Meet the requirements of ASTM F 594 Group 1, 2, or 3. Meet a minimum proof load of 75,000 psi (517 MPa).
  - **2)** Use hexagonal nuts and jam nuts complying with the requirements of ASTM F 594. Threads are to comply with UNC thread series, Class 2B fit. In lieu of jam nuts, stainless steel lockwashers may be used.
- **c. Stainless Steel Washers.**
  - **1)** Comply with ANSI B18.22.1 for the bolts specified.
  - **2)** The Engineer may approve washers with dimensions other than those specified.
- **d. Stainless Steel U-Bolts.**
  - **1)** Use the size specified in the contract documents.
  - **2)** Meet the requirements of ASTM A 320/A 320M, Type 304 or ASTM F 593 Alloy Group 1, 2, or 3 Condition A.

2. **Anchor Bolts, Nuts, and Washers.**
   Use bolts, nuts, and washers galvanized according to the requirements of ASTM ~~A 153, Class C~~ F 2329 or ASTM B 695, Class 50, Type I coating. Meet the following requirements:
   a. **Anchor Bolts.**
      1) Use full-length galvanized bolts.
      2) Comply with ASTM F 1554, Grade 105 (724 MPa).
      3) Use Unified Coarse Thread Series.
      4) Use Class 2A tolerance.
      5) The end of each anchor bolt intended to project from the concrete is to be color coded in red to identify the grade.
      6) Do not weld anchor bolts.
   b. **Nuts.**
      1) Comply with ASTM A 563, DH.
      2) Use heavy hex.
      3) Nuts may be over-tapped according to the allowance requirements of ASTM A 563.
   c. **Washers.**
      Comply with ASTM F 436.

D. **Material for Substructure.**

1. **Concrete Footings.**
   Use Class C concrete meeting applicable requirements of Section 2403.

2. **Reinforcing Steel.**
   Apply Section 4151.

E. **Conduit.**

1. **Substructure.**
   Use one of the following:
   - Rigid steel conduit meeting the requirements of Article 4185.10, B,
   - Rigid plastic conduit meeting the requirements of Article 4185.10, D, or
   - Bituminized fiber conduit meeting the requirements of FZS W-C-581, Type II.

2. **Superstructure.**
   a. Use rigid steel conduit meeting the requirements of Article 4185.10, B, when the structure is fabricated from steel.
   b. Use aluminum alloy conduit when the structure is fabricated from aluminum alloy.