

## SECTION 720 OVERHEAD SIGN STRUCTURES

This Section establishes the requirements for materials for overhead sign structures in Section 852.

### 720.01. ALUMINUM.

- (a) **Aluminum Alloy Extruded Tube.** Aluminum alloy extruded tube shall conform to ASTM B 221, alloy 6061 T6.
- (b) **Aluminum Alloy Permanent Mold Castings.** Aluminum alloy permanent mold castings shall conform to ASTM B 108, alloy SC 70A, F or T 71.
- (c) **Aluminum Alloy Sand Castings.** Aluminum alloy sand castings shall conform to ASTM B 26, alloy SC 70A, F or T7.
- (d) **Aluminum Alloy Plate.** Aluminum alloy plate shall conform to ASTM B 209, alloy 6061 T6.
- (e) **Aluminum Alloy Bolts.** Aluminum alloy bolts shall be made from rod conforming to ASTM B 211, alloy 2024 T4. Bolt heads shall conform to American Standard Regular Hexagon, ASA B18.2. Threads shall conform to standards of Class 2 or 2A. The finished bolt shall be given an anodic coating conforming to a no. 204 aluminite finish. Stainless steel bolts conforming to ASTM F 593 may be used.
- (f) **Nuts.** Nuts shall be of the self-locking type and shall conform to the requirements of the Air Force-Navy Aeronautical Specification; Nuts, Self-Locking, AN-N-5b, or approved equivalent. Stainless steel nuts conforming to ASTM F 593 may be used.
- (g) **Aluminum Alloy Washers.** Aluminum alloy washers shall be made from sheet conforming to the ASTM B 209, alloy, 2024 T4. Stainless steel washers conforming to ASTM F 593 may be used.
- (h) **Aluminum and Aluminum Alloy Welding Rods and Bare Electrodes.** Filler wire for welding shall conform to AWS A5.10.
- (i) **Aluminum Extruded Shapes.** Aluminum extruded structural shapes shall conform to ASTM B 221, alloy 6061 T6.
- (j) **Aluminum Alloy Pipe.** Aluminum alloy pipe for handrail shall conform to ASTM B 241, schedule 40, alloy 6063 T6.
- (k) **Anchor Bolts, Nuts and Washers.** Anchor bolts, nuts, and washers shall conform to the requirements of the current Specifications for steel machine bolts, nuts, and tap bolts, ASTM A 307. The exposed portion plus 6 inches (152 mm) of all steel anchor bolts, nuts, and washers shall be zinc plated. Stainless steel bolts, nuts, and washers conforming to ASTM F594 may be used.

### 720.02. STEEL.

- (a) **Tube or Pipe Members.** All round tube or pipe members shall be in conformance with ASTM A 53, Grade B. After all welding has been completed and all required holes have been punched or drilled on both the horizontal truss units and the vertical end support unit, they shall be galvanized in accordance with AASHTO M 111.
- (b) **Bolts, Nuts, and Plain Washers.** All bolts, nuts, and plain washers shall be of the size shown on the Plans and shall conform to AASHTO M 164 unless otherwise noted. All bolts, nuts, and plain washers shall be galvanized in accordance with AASHTO M 232.

**720.03. WELDING REQUIREMENT.****(a) Welding Requirements for Aluminum.**

1. **Aluminum Alloy.** These Specifications apply to the welding of aluminum alloys used in sign structures, bridge rails, lamp posts, etc., when shown on the Plans or permitted by the Engineer.

The welding terms used in these Specifications shall be interpreted in accordance with the definitions given in the latest edition of AWS Definitions-Welding and Cutting (AWS A3.0) of the American Welding Society.

The welding symbols used on the Plans shall be those shown in the latest edition of Standard Welding Symbols (AWS A2.1) of the American Welding Society. Special conditions shall be fully explained by added notes or details.

- 1.1. **General.** All welding shall be in compliance with ANSI/AWS D1.2.

- 1.2. **Qualification of procedures, welders, and welding operators.**

- (a) Joint welding procedures shall be previously qualified by tests prescribed in ANSI/AWS D1.2 Aluminum Structural Welding Code. The Engineer may accept evidence of previous qualification of the joint welding procedures to be employed.
- (b) All welders and welding operators shall be previously qualified by tests as prescribed in ANSI/AWS D1.2 Aluminum Structural Welding Code. The Engineer may accept evidence of previous qualification of the operators to be employed. The same process and type of equipment required for execution of the work shall be used in qualifying welders and welding operators.

- 1.3. **Identification Marks.** All identification marks shall be made using low- stress stencils. The Fabricator's mark shall be on each structure adjacent to the item number. The welder shall place his permanent identification with steel dies having figures not less than 1/2 inch (12.5 mm) in height; the area to be placed shall be adjacent to all primary member welds and shall also be highlighted to facilitate the inspection.

- 1.4. **Weld Quality.** All welds shall meet the requirements set forth in ANSI/AWS D1.2. Defective welds may be repaired if permitted by the Engineer.

- 1.5. **Inspection.** To determine compliance for weld quality, all welds shall be visually inspected; in addition, all welds subjected to computed stress shall be inspected by the dye penetrant method except as specified herein.

For highway sign structures, the dye penetrant method shall be used on the following: fillet welds connecting columns to bases and main chord members, including the associated flanges, gussets, or main load- carrying brackets or members; and on fillet welds connecting flanges to the main truss chord members.

The dye penetrant tests shall be performed in accordance with the requirements of ASTM E 165, Standard Methods for Liquid Penetrant Inspection, Method B, Procedures B-2 or B-3.

Dye penetrant inspection may be omitted provided that the inspector examines each layer of weld metal with a magnifier of 3X minimum before the next successive layer is deposited.

1.6. **Corrections.** In lieu of rejection of an entire piece or member containing welding which is unacceptable, defective welds shall be corrected as required in ANSI/AWS D1.2.

(b) **Welding Requirements for Steel.** All welding material and methods, including qualification of welders, shall conform to the requirements of ANSI/AWS D1.1.

#### **720.04. FABRICATION.**

A type A certification covering all component parts of the structure shall be submitted prior to fabrication. The structure shall be free from all sharp edges and irregularities and shall be free from any misfits or structural deficiencies. All members must fit and make for any easy and quick erection. Prior to shipment, the completed structure will be inspected at the place of fabrication.

#### **720.05. SHIPPING AND ERECTION.**

The structures must be protected on all surfaces so that no injury or defacement takes place during transportation or handling to point of destination.

The structure will be visually inspected when delivered to the project. Any defects shall be repaired or replaced in a manner approved by the Engineer.

*NOTE: The use of metal tie-downs in direct contact with the structure will not be permitted.*

For galvanized steel structures, such injury or defacement shall be cause for rejection unless in the opinion of the Engineer such injury or defacement is so slight that it may be quickly and efficiently regalvanized or metalized in accordance with “American Welding Society Standard C2.2 Recommended Practices for Metalizing.”

#### **720.06. ELECTRICAL REQUIREMENTS.**

All electrical equipment, materials, and installation methods shall conform to the latest requirements of the National Electrical Code and to the Electrical Code in the area having jurisdiction.

In the event provision has not been made for furnishing electrical power at the site, then Contractor shall be responsible for furnishing temporary power to demonstrate that all fixtures and equipment are properly installed.

### **SECTION 721 GALVANIZED STEEL SIGN POSTS**

**Description.** This Section establishes the requirements for galvanized steel sign posts in Section 851. A type A or type B certification will be required for posts greater than 2 inches (50mm) in diameter. Samples and a type D certification will be required for posts 2 inches (50 mm) or less in diameter. Galvanized specimens shall be submitted for testing in accordance with Section 8, ASHTO M 111.

#### **721.01. PIPE POSTS.**

Galvanized steel pipe posts shall be made from new galvanized steel pipe of the size shown on the Plans and shall conform to ASTM A 53 or F 1083. When the wall thickness or mass is not designated,