

## Metal Fabrication and Installation

### 1. SCOPE

The work shall consist of furnishing, fabricating and erecting metalwork, including the metal parts and fasteners of the composite structures.

### 2. MATERIALS

Steel shall be of structural quality unless otherwise specified. Castings shall be thoroughly cleaned and subjected to careful inspection before installation. Finished surfaces shall be smooth and true to assure proper fit.

#### Structural Steel

Structural steel shall conform to the requirements of ASTM Standard A 36.

High-strength low-alloy structural steel shall conform to ASTM Standard A 242 or A 588.

Carbon steel plates of structural quality to be bent or formed cold shall conform to ASTM Standard A 283, Grade C.

Carbon steel sheets of structural quality shall conform to ASTM Standard A 1011, Grade 40 or A 1008, Grade 40.

Carbon steel strip of structural quality shall conform to ASTM Standard 1011, Grade 36.

#### Commercial or Merchant Quality Steel

Commercial or merchant quality steel shall conform to the requirements of the applicable ASTM Standard listed below:

ASTM A 526 or A 924 Zinc-Coated Carbon Steel Sheets

ASTM A 1011 Carbon Steel Sheets

ASTM A 1011 Carbon Steel Strip

ASTM A 575 Carbon Steel Bars Grade M 1015 to Grade M 1031

#### Aluminum Alloy

Aluminum alloy products shall conform to the requirements of the applicable ASTM Specifications listed below. Unless otherwise specified, alloy 6061-T6 shall be used.

ASTM B 209 Sheet and Plate

ASTM B 210 Drawn Seamless Tubes

ASTM B 211 Rolled or Cold-Finished Bars, Rods and Wire

ASTM B 221 Extruded Bars, Rods, Shapes and Tube

ASTM B 308 Standard Structural Shape

ASTM B 429 Extruded Structural Pipe and Tube

#### Bolts

Steel bolts shall conform to the requirements of ASTM Specification A 307. If high-strength bolts are specified they shall conform to the requirements of ASTM Specification A 325.

When galvanized or zinc-coated bolts are specified, the zinc coating shall conform to the requirements of ASTM Specification A 153; except that bolts 1/2-inch or less in diameter may be coated with electro-deposited zinc or cadmium coating conforming to the requirements of ASTM Specification B 633, Service Condition SC 3, or ASTM Standard B 766, unless otherwise specified.

#### Rivets

Unless otherwise specified, steel rivets shall conform to the requirements of ASTM

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Standard A 31, Grade B. Unless otherwise specified, aluminum alloy rivets shall be Alloy 6061 conforming to the requirements of ASTM Standard B 316.

### Welding Electrodes

Steel welding electrodes shall conform to the requirements of American Welding Society Specification AWS A5.1.

"Specification for Mild Steel Covered Arc-Welding Electrodes," except that they shall be uniformly and heavily coated (not washed) and shall be of such a nature that the coating will not chip or peel while being used with the maximum amperage specified by the manufacturer.

Aluminum welding electrodes shall conform to the requirements of American Welding Society Specification AWS A5.10, "Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes."

### **3. FABRICATION**

Fabrication of structural steel shall conform to the requirements of Section 1.23 of the "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings (Riveted, Bolted and Arc-Welded Construction)," American Institute of Steel Construction.

Fabrication of structural aluminum shall conform to the requirements in the Aluminum Design Manual available from the Aluminum Association.

### **4. ERECTION**

The frame of metal structures shall be carried up true and plumb. Temporary bracing shall be placed wherever necessary to resist all loads to which the structure may be subjected, including those applied by the installation and operation of equipment. Such bracing shall be left in place as long as may be necessary for safety.

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As erection progresses the work shall be securely bolted up, or welded, to resist all dead loads, wind and erection stresses. The Contractor shall furnish such fitting up bolts, nuts and washers as may be required.

No riveting or welding shall be done until as much of the structure as will be stiffened thereby has been properly aligned.

Rivets driven in the field shall be heated and driven with the same care as those driven in the shop.

All field welding shall be done in conformance to the requirements for shop fabrication, except those that expressly apply to shop conditions only.

Galvanized items shall not be cut, welded or drilled after the zinc coating is applied.

### **5. PROTECTIVE COATINGS**

Items specified to be galvanized shall be completely fabricated for field assembly before the application of the zinc coatings.

Unless otherwise specified in the Special Provisions, items designated to be painted shall be painted with one of the following systems:

#### **Paint System E**

All surfaces that will not be submersed or subject to saturated soil conditions shall meet the following system requirements.

Surface Preparation. Surfaces to be painted shall be thoroughly cleaned prior to the application of paint. Surface preparation required by this specification is as designated by SSPC-SP7 (Steel Structures Painting Council). The procedure is summarized as follows:

Brush-Off Blast Cleaning. Surfaces to be coated shall be prepared by removing all visible oil, dirt, dust, loose mill scale,

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loose rust and loose paint by sand or grit air blasting. Tightly adherent mill scale, rust and paint may remain on the surface. Mill scale, rust and paint are considered highly adherent if they cannot be removed by lifting with a dull putty knife. Oils, grease or other soluble contaminants shall first be removed by solvent cleaning.

Primer Coat. One coat of primer consisting of a single package moisture cured urethane primer shall be applied. Urethane primer shall have a minimum of 50 percent solids by volume. Primer shall be able to be applied at 2.0 to 3.0 mils DFT in one coat. Color shall be metallic aluminum.

Final Coat. A minimum of one coat of Acrylic Polyurethane (semi-gloss or gloss) shall be applied. The color shall be as specified on the drawings or Special Provisions. Acrylic Polyurethane shall be lead free. Acrylic Polyurethane shall have a minimum of 58 percent solids by volume for semi-gloss or 74 percent solids for gloss. Acrylic Polyurethane shall be able to be applied at 3.0 to 5.0 mils dry-film-thickness in one coat.

### Paint System F

All surfaces that will be immersed or subjected to saturated soil conditions shall meet the following system requirements.

Surface Preparation. Surfaces to be painted shall be thoroughly cleaned using the Near White Blast (SSPC-SP10) method as designated by the SSPC (Steel Structures Painting Council) and as summarized below.

All surfaces to be coated shall be prepared by removing all grease and oil using steam cleaning or solvent methods. After degreasing is completed, sand or

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grit blasting shall be performed to remove all dirt, rust, mill scale or other foreign material or residue. The cleaned, finished surface shall be at least 95 percent free of all visible foreign material or residue.

Paint. Paint type will be Coal Tar Epoxy. Coal tar epoxy shall have a minimum of 75 percent solids by volume and conform to the requirements of SSPC Paint Specification No. 16; Type I. Coal tar epoxy shall be able to be applied at 8.0 mils dry film thickness in one coat.

Paint Application. This system requires the application of two coats at a dry film thickness of 8.0 mils per coat. Total system shall provide a minimum dry film thickness of 16.0 mils.

### 6. MEASUREMENT AND PAYMENT (Used only if applicable)

For items of work for which specific unit prices are established, each item will be measured to the nearest unit applicable. Payment for each item will be made at the agreed-to unit price for that item. For items of work for which specific lump sum prices are established, payment will be made at the lump sum price.

Such payment will constitute full compensation for all materials, labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Compensation for any item of work shown on the drawings or described in the special provisions but not listed on the bid schedule will be considered incidental to and included in the pay items listed on the bid schedule.