

## SECTION 05 50 13

MISCELLANEOUS METAL FABRICATIONS  
08/08

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ALUMINUM ASSOCIATION (AA)

- AA 46 (1978) Standards for Anodized Architectural Aluminum
- AA DAF-45 (2003) Designation System for Aluminum Finishes

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

- AISC 303 (2005) Code of Standard Practice for Steel Buildings and Bridges

## AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

- ASSE/SAFE A10.3 (2006) Operations - Safety Requirements for Powder Actuated Fastening Systems

## AMERICAN WELDING SOCIETY (AWS)

- AWS D1.1/D1.1M (2008) Structural Welding Code - Steel

## ASME INTERNATIONAL (ASME)

- ASME B18.2.1 (1996; Addenda A 1999; Errata 2003; R 2005) Square and Hex Bolts and Screws (Inch Series)
- ASME B18.2.2 (1987; R 2005) Standard for Square and Hex Nuts (Inch Series)
- ASME B18.21.1 (1999; R 2005) Lock Washers (Inch Series)
- ASME B18.22.1 (1965; R 2008) Plain Washers
- ASME B18.6.2 (1998; R 2005) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series
- ASME B18.6.3 (2003; R 2008) Machine Screws and Machine Screw Nuts

## ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2008) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(2007) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 467/A 467M	(2007) Standard Specification for Machine Coil and Chain
ASTM A 47/A 47M	(1999; R 2009) Standard Specification for Ferritic Malleable Iron Castings
ASTM A 48/A 48M	(2003) Standard Specification for Gray Iron Castings
ASTM A 500/A 500M	(2007) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 53/A 53M	(2007) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 653/A 653M	(2007) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 687	(1993) Standard Specification for High-Strength Nonheaded Steel Bolts and Studs
ASTM A 780	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 786/A 786M	(2005) Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
ASTM A 924/A 924M	(2007) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 108/B 108M	(2008) Standard Specification for Aluminum-Alloy Permanent Mold Castings

ASTM B 209	(2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2008) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 26/B 26M	(2005) Standard Specification for Aluminum-Alloy Sand Castings
ASTM D 1187	(1997; R 2002e1) Asphalt-Base Emulsions for Use as Protective Coatings for Metal
ASTM E 488	(1996; R 2003) Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
MASTER PAINTERS INSTITUTE (MPI)	
MPI 79	(Jan 2004) Alkyd Anti-Corrosive Metal Primer
NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)	
NAAMM MBG 531	(2000) Metal Bar Grating Manual
THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)	
SSPC SP 3	(2004; E 2004) Power Tool Cleaning
SSPC SP 6	(2000; E 2004) Commercial Blast Cleaning

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Access doors and panels, installation drawings; A/E

Cover plates and frames, installation drawings; A/E

Embedded angles and plates, installation drawings; A/E

Roof hatch; A/E

Floor mat frames; A/E

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation

with relation to the building construction.

#### SD-03 Product Data

Access doors and panels; A/E

Cover plates and frames; A/E

Roof hatch; A/E

Floor mat frames; A/E

### 1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

### 1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Structural Carbon Steel

ASTM A 36/A 36M.

#### 2.1.2 Structural Tubing

ASTM A 500/A 500M.

#### 2.1.3 Steel Pipe

ASTM A 53/A 53M, Type E or S, Grade B.

#### 2.1.4 Fittings for Steel Pipe

Standard malleable iron fittings ASTM A 47/A 47M.

#### 2.1.5 Gratings

- a. Gray cast iron ASTM A 48/A 48M, Class 40.
- b. Metal plank grating, non-slip requirement, aluminum ASTM B 209, 6061-T6; steel ASTM A 653/A 653M, G90.
- c. Metal bar type grating NAAMM MBG 531.

#### 2.1.6 Floor Plates, Patterned

Floor plate ASTM A 786/A 786M. Steel plate shall not be less than 14 gage.

### 2.1.7 Anchor Bolts

ASTM A 307. Where exposed, shall be of the same material, color, and finish as the metal to which applied.

#### 2.1.7.1 Expansion Anchors, Sleeve Anchors, and Adhesive Anchors

Provide expansion anchors, sleeve anchors, and adhesive anchors as shown on Drawings. Design values listed shall be as tested according to ASTM E 488.

#### 2.1.7.2 Bolts, Nuts, Studs and Rivets

ASME B18.2.2 and ASTM A 687 or ASTM A 307.

#### 2.1.7.3 Powder Driven Fasteners

Follow safety provisions of ASSE/SAFE A10.3.

#### 2.1.7.4 Screws

ASME B18.2.1, ASME B18.6.2, and ASME B18.6.3.

#### 2.1.7.5 Washers

Provide plain washers to conform to ASME B18.22.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME B18.21.1.

### 2.1.8 Aluminum Alloy Products

Conform to ASTM B 209 for sheet plate, ASTM B 221 for extrusions and ASTM B 26/B 26M or ASTM B 108/B 108M for castings, as applicable. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

## 2.2 FABRICATION FINISHES

### 2.2.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A 123/A 123M, ASTM A 153/A 153M, ASTM A 653/A 653M or ASTM A 924/A 924M, G90, as applicable.

### 2.2.2 Galvanize

Anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

### 2.2.3 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A 780 or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread molten material uniformly over surfaces to be coated and wipe off excess material.

## 2.2.4 Shop Cleaning and Painting

### 2.2.4.1 Surface Preparation

Blast clean surfaces in accordance with **SSPC SP 6**. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with **SSPC SP 3** in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete shall be free of dirt and grease. Do not paint or galvanize bearing surfaces, including contact surfaces within slip critical joints, but coat with rust preventative applied in the shop.

### 2.2.4.2 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of **1.0 mil**. Tint additional prime coat with a small amount of tinting pigment.

### 2.2.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

### 2.2.6 Aluminum Surfaces

#### 2.2.6.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

#### 2.2.6.2 Aluminum Finishes

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, **AA DAF-45**, or **AA 46**. Unless otherwise specified, provide all other aluminum items with a standard mill finish. Provide a coating thickness not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations in **AA DAF-45**. Provide a polished satin finish on items to be anodized.

## 2.3 ACCESS DOORS AND PANELS

Provide flush type access doors and panels unless otherwise indicated. Fabricate frames for access doors of steel not lighter than **14 gage** with welded joints and anchorage for securing into construction. Provide access doors with a minimum of **14 by 20 inches** and of not lighter than **14 gage** steel, with stiffened edges and welded attachments. Provide access doors hinged to frame and with a flush-face, turn-screw-operated latch. Provide exposed metal surfaces with a shop applied prime coat.

## 2.4 COVER PLATES AND FRAMES

Fabricate cover plates of **1/4 inch** thick rolled steel weighing not more than **100 pounds** per plate with a selected raised pattern nonslip top surface. Plate shall be galvanized. Reinforce to sustain a live load of **300 pounds**

per square foot. Frames shall be structural steel shapes and plates, securely fastened to the structure as indicated. Miter and weld all corners. Butt joint straight runs. Allow for expansion on straight runs over 15 feet. Provide holes for lifting tools. Remove sharp edges and burrs from cover plates and exposed edges of frames. Weld all connections and grind top surface smooth. Weld bar stops every six inches. Provide 1/8 inch clearance at edges and between cover plates.

## 2.5 ROOF HATCH

Furnish and install where indicated and in sizes shown on drawings. Entire hatch shall be weathertight with fully welded corner joints on cover and curb. Provide hatch completely assembled with heavy duty pintle hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles on inside and outside, and neoprene draft seal. Provide fasteners for padlocking on the inside. Equip the cover with an automatic hold-open arm complete with grip handle to permit one-hand release. Cover action shall be smooth through its entire range with an operating pressure of approximately 30 pounds.

### 2.5.1 Cover

Provide 11 gauge aluminum cover and reinforce to support a minimum live load of 40 psf with a maximum deflection of 1/150th the span or 20 psf wind uplift. Cover shall be insulated with 1" fiberglass thickness and have 18 gauge aluminum liner.

### 2.5.2 Curb

Provide 12 inch high curb of 11 gauge aluminum with flange for securing to roof deck. Curb shall be insulated and equipped with an integral metal capflashing.

### 2.5.3 Finish

Mill finish.

### 2.5.4 Prefabricated Roof Hatch Rail System

Furnish and install factory fabricated roof hatch rail system where indicated on drawings. Rail system shall attach to the capflashing of the roof hatch and not penetrate any roofing material. Rail system shall meet the requirements of OSHA 29 CFR 1910.23 and OSHA strength requirements with a factor of safety of two. Self-closing gate shall be provided with rail system. Assembly shall be UV and corrosion resistant with a twenty-five year warranty.

#### 2.5.4.1 Posts and Rails

Provide pultruded reinforced fire retardant fiberglass treated with a UV inhibitor.

#### 2.5.4.2 Hardware

Mounting brackets shall be 1/4-inch thick hot dip galvanized steel. Hinges and post guides shall be 6063T5 aluminum. Fasteners shall be Type 316 stainless steel.

## 2.6 FLOOR MAT FRAMES

Provide extruded aluminum 6063 T 5 recess mat frame, prefabricated at the factory to ensure fit of mat, furnished complete with corner pins of aluminum and anchor pins of strap steel. Size as indicated on drawings. Finish shall be clear anodized.

### 2.6.1 Floor Mats

Provide Floor Mats as specified in Section 12 48 13.13, Entrance Floor Mats.

## 2.7 GUARD POSTS (BOLLARDS/PIPE GUARDS)

Provide prime coated standard weight steel pipe as specified in ASTM A 53/A 53M and as indicated on the Drawings. Anchor posts in concrete as indicated and fill solidly with concrete with minimum compressive strength of 2500 psi.

## 2.8 MISCELLANEOUS PLATES AND SHAPES

Provide for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings and frames. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners. Construct to have at least 8 inches bearing on masonry at each end.

Provide angles and plates, ASTM A 36/A 36M, for embedment as indicated. Galvanize embedded items exposed to the elements according to ASTM A 123/A 123M.

## 2.9 SAFETY CHAINS

Construct safety chains of galvanized steel, straight link type, 3/16 inch diameter, with at least twelve links per foot, and with snap hooks on each end. Test safety chain in accordance with ASTM A 467/A 467M, Class CS. Provide snap hooks of boat type. Provide galvanized 3/8 inch bolt with 3/4 inch eye diameter for attachment of chain, anchored as indicated. Supply two chains, 4 inches longer than the anchorage spacing, for each guarded area. Locate safety chain where indicated.

## PART 3 EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, according to manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and harmonize with the material to which fastenings are applied. Include materials and parts necessary to complete each item, even though such work is not definitely shown or specified. Poor matching of holes for fasteners shall be cause for rejection. Conceal fastenings where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Form joints exposed to the weather shall be formed to exclude water. Items listed below require additional procedures.

### 3.2 WORKMANSHIP

Provide miscellaneous metalwork that is well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Provide continuous welding along the entire area of contact except where tack welding is permitted. Do not tack weld exposed connections of work in place and ground smooth. Provide a smooth finish on exposed surfaces of work in place and unless otherwise approved, flush exposed riveting. Mill joints where tight fits are required. Corner joints shall be coped or mitered, well formed, and in true alignment. Accurately set work to established lines and elevations and securely fastened in place. Install in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

### 3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

### 3.4 BUILT-IN WORK

Form for anchorage metal work built-in with concrete or masonry, or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

### 3.5 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with [AWS D1.1/D1.1M](#). Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

### 3.6 FINISHES

#### 3.6.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to [MPI 79](#) to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect with [ASTM D 1187](#), asphalt-base emulsion.

#### 3.6.2 Field Preparation

Refer to Section [09 90 00.00 40](#), PAINTING AND COATING.

### 3.7 ACCESS PANELS

Install a removable access panel not less than [12 by 12 inches](#) directly below each valve, flow indicator, damper, or air splitter that is located above the ceiling, other than an acoustical ceiling, and that would otherwise not be accessible.

### 3.8 COVER PLATES AND FRAMES

Install the tops of cover plates and frames flush with floor.

3.9 INSTALLATION OF ROOF HATCH

Install to operate freely and not rattle when closed or open.

3.10 INSTALLATION OF FLOOR MAT FRAMES

Assemble frame to suit mat thickness and securely anchor in place following manufacturer's instructions. Place cement grout base below the floor level, screeded into the interior frame area, using the edge of frame as a guide. Install mat in frame recess as recommended by manufacturer, flat and without curls or humps.

3.11 INSTALLATION OF GUARD POSTS (BOLLARDS/PIPE GUARDS)

Set pipe guards vertically in concrete piers. Construct piers of, and the hollow cores of the pipe filled with, concrete having a compressive strength of 2500 psi.

3.12 MOUNTING OF SAFETY CHAINS

Mount safety chains as indicated on the Drawings.

-- End of Section --