

**SECTION 05500**  
**MISCELLANEOUS METAL**

1. **SCOPE:**

Under this heading shall be included the furnishing and installation of all miscellaneous steel and other metal work except as otherwise specified.

2. **APPLICABLE STANDARDS:**

Where any material or operation is specified by reference to published specifications or standards or the specifications or standards of any other organizations, the referenced specification or standard shall be as much a part of this Section as if quoted in full herein.

3. **SHOP DRAWINGS:**

Shop drawings and erection drawings shall be submitted in accordance with the General and Special Conditions. Shop Drawings shall show complete details, including fastenings and connections. The Contractor shall be responsible for all dimensions and relation to other work.

4. **MATERIALS:**

a) **Steel.**

Steel shall conform to ASTM A36 or similar suitable material subject to the Engineer's review and conforming to ASTM Specifications.

b) **Cast Iron.**

Cast Iron shall conform to ASTM A48.

c) **Aluminum.**

Aluminum shall be of the alloys as specified or if not specified, shall be suitable for the use required.

d) **Other Metals.**

Other metals shall be first quality, selected for the proper characteristics for the use intended and in conformance with ASTM Specifications.

e) **Galvanizing.**

Hot dipped galvanizing shall be in accordance with ASTM A123 as applicable. All galvanizing work shall be after complete fabrication of each item.

f) **Quality.**

Metals shall be free of defects impairing strength or durability and be of best commercial quality for use. For exposed work, where appearance is a factor, provide smooth unblemished metal, free of rust, scale, pitting, millmarks and similar markings.

5. WORKMANSHIP:

Steel and wrought iron shall be well-formed to shape and size, with sharp lines or angles. Shearing and punching shall leave clean, true lines and surfaces. Weld or rivet permanent connections. Where screws and bolts are used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening. Curved work shall be evenly sprung. All joints shall be accurately made and tightly fitted with adequate fastenings. Castings shall have exposed surfaces smooth finished and sharp with well-defined lines and arises. Machined joints, where required, shall be milled to a close fit. Provide necessary rabbets, lugs and brackets, so that work can be assembled in a neat and substantial manner. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for work of other trades.

6. ERECTION:

All of this work shall be set accurately in place and permanently fastened in a neat and workmanlike manner. The work shall be plumb, level, or to the slopes shown, as the case may be. The contractor shall furnish all sleeves, bolts, screws, anchors, and expansion shield, etc., and shall do all drilling, tapping, cutting, etc., as necessary for the complete installation.

7. WELDING:

a) General.

Conform to AWS D1.1, latest edition as applicable, using skilled welders. For structural type welds, use care to provide welds which will develop proper stresses in welds, using licensed welders, inspected by qualified welding inspectors. Conform to other requirements specified elsewhere herein.

b) Exposed Work.

Use plug-welding including field joints, where required or where welds will provide best possible joints. Provide other exposed welding by cutting and grinding a suitable "vee" to receive weld and insure rigid connection flush with original surface. Provide full length welds, generally. Grind and finish as previously specified.

c) Field Welding.

Welds made in the field are subject to the same requirements. Field weld where indicated on Plans or as required to provide positive connections, weather-tight joints and to provide neat joint connections.

8. PAINTING:

All steel work, except galvanized items, shall be cleaned and painted one coat in the

shop. The cleaning shall be in accordance with SSPC-PC-6 Commercial Blast Cleaning and shall remove all loose mill scale and loose rust and shall also remove any grease, oil and other foreign materials which may be on the surface to be painted. Surfaces to be embedded in concrete shall not be painted but shall be cleaned. Also omit paint within 2 inches of required field welding. Primer shall be Red Lead, Iron Oxide, Raw Linseed Oil, Alkyd Primer, Glidden Y-4570, or approved equal. The Contractor shall be responsible for the compatibility of the primer and the finish paints. The paint shall be carefully strained before using and shall be applied in a workmanlike manner by skilled painters. The work shall be carefully protected to prevent dust and other particles settling on the paint before it is dry.

Wire brush clean and touch-up field welded areas with same paint as was used for the shop coat. Finished erected painted work shall show no bare metal or scratched paint.

9. PROTECTIVE COATINGS FOR ALUMINUM:

Before shipment, aluminum work which is not color anodized shall be given a coating on all surfaces which will protect the metal against stain, discoloration and other surface injuries. Color anodized aluminum shall not be coated but shall be handled with care to prevent damage.

Aluminum surfaces to be placed in contact with concrete, mortar or masonry construction or dissimilar metals or plaster shall be given a heavy coat of suitable zinc chromate paint or bituminous paint.

Protective coatings on exposed surfaces shall be removed just prior to the final acceptance of the building, unless such coatings are transparent and colorless and not visible.

Clear water-white methacrylate type lacquer may be used for protective coating on exposed surfaces and, if so used, need not be removed.

10. DELIVERY:

Deliver items to be installed by other trades in a timely manner so not to delay progress of the work. Coordinate all delivery schedules with Contractor and insure that materials delivered are adequately protected until installation.

11. PIPE RAILINGS AND HANDRAILS:

Pipe railings and handrails shall be provided and installed as shown on the Plans. Railings and handrails shall be aluminum construction as follows:

Pipe for railings and handrails shall be extruded aluminum, standard 1-1/4 inches nominal Schedule 80 pipe size with actual outside diameter of 1.66 inches and wall thickness of 0.191 inch and weight of not less than 1.037 pounds per foot. Aluminum shall be Alloy 6061-T6.

Joints shall be welded, using either cast aluminum flush type fittings as made for pipe handrail or mitering the pipe, welding and grinding smooth. In either case, joints shall be rigid, completely welded all around and sightly. Rails and railings shall be shop fabricated in sections as long as is practicable. Provide field joints and expansion joints as shown and as required, using stainless steel and/or aluminum parts as shown and as suitable. At expansion joints, include threaded lugs for grounding jumpers to be attached as specified in the Electrical Division of these Specifications. Coordinate with nuts, etc., to be furnished under the Electrical Division.

Provide chain closures as shown. Chain shall be welded steel. Chain shall be hot-dipped galvanized (not zinc plated) coil chain, 1/4 inch size. Chain shall have a rated working load of not less than 1,175 pounds and shall weigh not less than 76 pounds per 100 feet. Provide fasteners at each end of each chain using stainless steel shackles with captive pins, as made for yacht and/or marine usage, 3/4 inch x 1-1/2 inches inside dimensions (minimum) and with 7/32 inch (minimum) diameter pin. Provide stainless steel eyes fastened securely to the posts to attach the chain closures.

Provide gates and removable sections of railings, as shown, fabricated of aluminum pipe, same as railings. Fittings for hinges, latches, and lift-off sections shall be standard fittings made for chain link fence construction. Cyclone, Anchor, or equal, or custom fabricated fittings suitable for the use intended. Fittings shall be stainless steel, aluminum, or hot-dipped galvanized; if standard fittings are electro-galvanized as standard, they shall also be hot-dipped galvanized by this supplier in order to resist the corrosive conditions to be encountered.

All aluminum work provided under this heading shall be mill finish, all welds shall be ground smooth, and all work shall be protected with suitable lacquer as specified hereinbefore.

Railings shall be set in place in concrete using Hollaender Speed Rail No. 43 Base Flanges or approved equal. Railings shall be attached to metal walkways as shown on the Plans.

12. ALUMINUM GRATING:

Aluminum gratings shall be provided and installed as shown. Aluminum gratings shall be Kerrigan Rectangular Bar Type, Borden Type B, Aluminum, or equal. I-Bar Type Gratings of equivalent load carrying capacity and equal workmanship and which conform to applicable requirements here will be accepted. Gratings shall have bearing bars of the size and spacing indicated; if not indicated on the Plans, bearing bars shall be spaced at 1-3/16 inches on centers and shall be of such size that deflections will be less than 1/4 inch at mid-span with a uniform load of 100 pounds per square foot. Aluminum gratings shall be made by punching the bearing bars to receive the cross bars, and the cross bars shall be secured by a swagging process which secures the bars together firmly and such that the cross

bars will not turn or loosen. Special methods of fastening shall be provided at end bearing bars, such as welded on and/or loose anchors. Furnish gratings in sections as shown, or if not shown, in sections convenient to handle. End balding on aluminum gratings is not required, except where noted, but openings and the like shall be securely reinforced. Aluminum shall be Alloy 6063-T6 for bearings bars and 6063-T5 for cross bars, or other suitable alloy. All work shall be standard mill finish.

Frames shall be aluminum angles or zee sections rolled or extruded, anchored as shown and sized as required. provide cutouts as necessary to fit pipes and equipment as necessary.

13. STEEL LADDERS:

Provide and install ladders as shown. Ladder configuration shall conform to OSHA Minimum Standards. Ladder Stringers shall be punched and rungs inserted into the holes before being welded. All steel ladders shall be hot-dipped galvanized after fabrication. If not otherwise shown, stringers shall be 2-1/4" x 3/8" steel bars spaced 16 inches apart, and rungs shall be spaced 12 inches on centers and shall be 3/4 inch diameter round steel bars. Stringers shall be punched and drilled, the rungs inserted in the holes and then welded in place. Ladders shall be secured to floor and walls and/or columns with suitable brackets not more than 6 feet apart and so that the centerline of the ladders will be 7 inches or slightly more from the wall, unless otherwise shown. Use suitable anchor bolts or suitable heavy duty anchor devices. Attach all work securely. Coordinate all dimensions and details.

14. SLOTTED AND STRAIGHT WEIR PLATES:

Slotted and straight weir plates, frames and bolts shall be provided and installed, as shown and as required. Weir plates shall have slotted holes for adjustment. Weir plates and frames shall be fabricated from aluminum shapes and plates of 6061-T6 Alloy or other suitable alloy. Minimum thickness of materials shall be 3/8 inch unless otherwise shown. Bolts and fastenings shall be of the material shown; stainless steel shall be 18-8 grade; galvanized bolts shall be hot-dip galvanized with nuts and washers also hot-dip galvanized. Bolts and nuts shall be threaded so as to be suitable for the galvanizing. Provide washers under all nuts and also under bolt heads in contact with aluminum. Washers shall be of the same materials as the respective bolts with which they are used.

Assemble and install this material as shown. Aluminum surfaces in contact with grout and/or concrete shall be coated with bituminous paint as specified hereinbefore. Grout for use under aluminum angles shall be same as used for setting aluminum railing posts as specified in this Section. Joints at ends and corners or weir plates shall be tight. Weir plates shall be adjusted to be level and at the proper elevation plus or minus 0.01 foot; set with surveyor's level, keep records and submit records to the Engineer. Weir plates shall be set so that the maximum plus and minus tolerances do not occur at ends of the same plate and also so that the average deviation from design elevation does not exceed 0.005 foot.

15. ALUMINUM ACCESS COVER:

The aluminum access cover must have a 300 lb. live load rating. The frame shall be an aluminum extrusion with a continuous door stop and grout lip integral to it. The size, as shown on plans, shall be the clear frame opening.

The hinged door shall be aluminum tread plate, a minimum 1/4" thick, with reinforcing aluminum flat bar to provide the 300 lb. per square foot live load rating. The door must have a positive open door latch to prevent accidental closing. The hinges shall be 316 stainless steel attached with stainless steel bolts, nuts and washers. The hinges must be tamper proof from the outside.

An exterior retractable door lifting handle shall be provided for opening and closing. Padlocking provisions must be provided to allow the access cover to be securely locked.

The access cover shall be fabricated using good assembly and welding techniques and be manufactured by Electric Specialty, Inc. or an approved equal.

16. ANCHORS:

Furnish and build in anchors, dowels, inserts and the like as shown, and if not specified in other sections.

**SECTION 05501**  
**THREADED FASTENERS**

1. **SCOPE:**

Under this heading shall be included threaded fasteners and accessories, complete.

2. **APPLICABLE STANDARDS:**

Where any material or operation is specified by reference to the specifications or standards of any other organizations, the latest edition of the referenced specification or standard shall be as much a part of this section as if quoted in full herein.

3. **GENERAL:**

Bolts and nuts shall be American National Coarse Thread Series, unless otherwise specified.

Load indicating washers shall be used on all bolted connections where high strength bolts and nuts are used.

4. **FASTENERS-STRUCTURAL:**

a) **Regular Bolts and Nuts.**

Regular bolts and nuts shall conform to ASTM A307 and shall be the standard hexagon bolt head types.

b) **Anchor Bolts and Nuts.**

Anchor bolts, turned bolts and nuts shall conform to ASTM A307 and shall be regular semi-finished types, except the tolerances for the diameter of the unthreaded portion of the body shall be 0.0 over the nominal diameter to 0.006 inch under the nominal diameter.

c) **High Strength Bolts and Nuts.**

High strength bolts and nuts shall conform to ASTM A325. All high strength bolts shall be new. Existing or previously torqued high strength bolts removed from any connection for any purpose shall not be reused in any portion of the job. Loosened bolts, not removed, may be retorqued in the same hole where so detailed on the plans.

5. **WASHERS:**

Provide washers for all regular bolts, anchor bolts and turned bolts. Round washers, other than those in contact with high strength heads and nuts, shall conform to ANSI B27.2, Type B.

Provide beveled washers for all sloping surfaces. Washers shall be square, smooth and sloped so that contact surfaces of bolt head and nut are parallel. The diameter of hole of square beveled washers shall be 1/16 inch greater than the bolt size for bolts not larger than

one inch.

6. FASTENERS-MISCELLANEOUS:

Provide zinc-coated fasteners, with galvanizing complying with ASTM A153, for exterior use, where built into exterior walls or masonry, or where noted on Contract Plans.

Select fasteners for the type, grade and class required for the installation of miscellaneous metal items.

Furnish inserts and anchoring devices which must be set in concrete or built into masonry for the installation of miscellaneous metal work. Coordinate delivery with other work to avoid delay.

Fasteners shall be compatible with materials to be fastened.

7. INSTALLATION:

a) General.

Structural fasteners shall be installed in accordance with the AISC specifications.

8. MEASUREMENT AND PAYMENT:

No separate payment will be made for any work covered by this section of the specifications and all cost in connection therewith shall be included in the Contract price for the applicable item to which it relates.