

## SECTION 05500 - METAL FABRICATIONS

### PART 1 - GENERAL

#### RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

#### SUMMARY

This section includes the following metal fabrications:

- Loose steel lintels.
- Miscellaneous framing and supports for applications not specified in other sections.
- Miscellaneous steel trim.
- Suspension rods, connectors, straps and uni-strut.
- Steel angle fabrications for counter top supports

**Note to Steel Fabricators and Erectors: Miscellaneous steel angles and steel subframing is utilized as support work through out the wall sections of the Architectural drawings. These miscellaneous steel pieces may or may not show up on the structural drawings. Estimators must look through both Architectural and Structural drawings to see the full extent of the work.**

Related Sections: The following sections contain requirements that relate to this section:

Division 5 Section "Structural Steel" for structural steel framing system components.

#### DEFINITIONS

Definition: Metal fabrications include items made from iron, and stel shapes, plates, bars, strips, tubes, pipes, and castings which are not part of a structural steel or other metal system specified elsewhere.

Definitions in ASTM E 935 for railing-related terms apply to this section.

#### SYSTEM PERFORMANCE REQUIREMENTS

Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

Countertop Support Brackets: Capable of withstanding the following loads applied as indicated:

Concentrated load of 250 lbs/ft applied at any point nonconcurrently, vertically downward, or horizontally.

Uniform load of 75 lbs/ft per linear ft. applied nonconcurrently, vertically downward or horizontally.

Concentrated and uniform loads above need not be assumed to act concurrently.

## SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product data for products used in miscellaneous metal fabrications, including paint products and grout.

Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

Samples representative of materials and finished products as may be requested by Architect.

Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.

Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project name, addresses, names of Architects and Owners, and other information specified.

## QUALITY ASSURANCE

Fabricator Qualifications: Firms experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

## PROJECT CONDITIONS

Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

## PART 2 - PRODUCTS

### FERROUS METALS

Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

Steel Plates, Shapes, and Bars: ASTM A 36.

Rolled Steel Floor Plates: ASTM A 786.

Steel Tubing: Product type (manufacturing method) and as follows:

Cold-Formed Steel Tubing: ASTM A 500, grade as indicated below:

Grade A, unless otherwise indicated or required for design loading.

Hot-Formed Steel Tubing: ASTM A 501.

For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

Uncoated Structural Steel Sheet: Product type (manufacturing method), quality, and grade, as follows:

Cold-Rolled Structural Steel Sheet: ASTM A 611, grade as follows:

Grade A, unless otherwise indicated or required by design loading.

Hot-Rolled Structural Steel Sheet: ASTM A 570, grade as follows:

Grade 30, unless otherwise indicated or required by design loading.

Uncoated Steel Sheet: Commercial quality, product type (method of manufacture) as follows:

Cold-Rolled Steel Sheet: ASTM A 366.

Hot-Rolled Steel Sheet: ASTM A 569.

Galvanized Steel Sheet: Quality as follows:

Structural Quality: ASTM A 446; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.

Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

Black finish, unless otherwise indicated.

Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

Brass Tubing: I-1/2" o.d. Alloy 230, thickness .150, wt.3.13 pounds per linear foot, drawn red brass suitable for bending that is smooth, unmarked and free of blemishes. Final finish shall be bright polished with clear weather resistive protective coating.

Malleable Iron Castings: ASTM A 47, grade 32510.

Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

Extruded Aluminum: ASTM B221, Alloy 6063 temper T-6.

## GROUT AND ANCHORING CEMENT

Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

Erosion-Resistant Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include but are not limited to the following:

### Nonshrink Nonmetallic Grouts:

"Euco N-S Grout"; Euclid Chemical Co.  
"Kemset"; Chem-Masters Corp.  
"Masterflow 713"; Master Builders.  
"SonogROUT"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.  
"Stoncrete NM1"; Stonhard, Inc.  
"Five Star Grout"; U.S. Grout Corp.

### Erosion-Resistant Anchoring Cement:

"Super Por-Rok"; Minwax Construction Products Division.

## FASTENERS

General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.

Lag Bolts: Square head type, FS FF-B-561.

Machine Screws: Cadmium plated steel, FS FF-S-92.

Wood Screws: Flat head carbon steel, FS FF-S-111.

Plain Washers: Round, carbon steel, FS FF-W-92.

Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [nondrilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5.

Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.

Lock Washers: Helical spring type carbon steel, FS FF-W-84.

## PAINT

Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility

with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

Zinc Chromate Primer: FS TT-P-645.

## FABRICATION, GENERAL

Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

Temperature Change (Range): 100 deg F (55.5 deg C).

Shear and punch metals cleanly and accurately. Remove burrs.

Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Remove sharp or rough areas on exposed traffic surfaces.

Weld corners and seams continuously to comply with AWS recommendations and the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

#### LOOSE BEARING AND LEVELING PLATES

Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required.

#### LOOSE STEEL LINTELS

Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

Weld adjoining members together to form a single unit where indicated.

Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

#### MISCELLANEOUS FRAMING AND SUPPORTS

General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide x 1/4 inch x 8 inches long.

#### MISCELLANEOUS STEEL TRIM

Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.

#### FINISHES, GENERAL

Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

Finish metal fabrications after assembly.

## STEEL FINISHES

Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning."

Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

## PART 3 - EXECUTION

### PREPARATION

Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

Center nosings on tread widths with nose flush with riser faces and tread surfaces.

Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

### INSTALLATION, GENERAL

Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

### SETTING LOOSE PLATES

Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### ADJUSTING AND CLEANING

Touch-Up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting" of these specifications.

Protect Brass railing finish from damage. Marred or dented rails will not be accepted and will have to be replaced by contractor.

For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05500