

DIVISION

5

METALS



## SECTION 05120

### STRUCTURAL STEEL

#### PART 1 - GENERAL

##### RELATED DOCUMENTS

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

##### SUMMARY

This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

##### SUBMITTALS

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

Shop drawings prepared under supervision of a Engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.

Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.

Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.

##### QUALITY ASSURANCE

Codes and Standards: Comply with provisions of following, except as otherwise indicated:

American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."

Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:

"This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings."

AISC "Specifications for Structural Steel Buildings," including "Commentary."  
"Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved  
by the Research Council on Structural Connections.

American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."  
ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes,  
Sheet Piling and Bars for Structural Use."

Qualifications for Welding Work: Qualify welding procedures and welding operators in  
accordance with AWS "Qualification" requirements.

Provide certification that welders to be employed in work have satisfactorily passed AWS  
qualification tests.

Cold-Formed Steel: Comply with AISI SG-671

#### DELIVERY, STORAGE, AND HANDLING

Deliver materials to site at such intervals to ensure uninterrupted progress of work.

### **PART 2 - PRODUCTS**

#### MATERIALS

Structural Steel Shapes, Plates, and Bars: A-572 Grade 50. For structural shapes and ASTM A  
36 for plates and bars.

Hot-Formed Steel Tubing: ASTM A 501.

Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.

Anchor Bolts: ASTM A 307, non-headed type unless otherwise indicated.

High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and  
hardened washers, as follows:

Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with  
ASTM A 325.

Electrodes for Welding: Comply with AWS Code.

Structural Steel Primer Paint: Fabricator's standard rust- inhibiting primer.

Metallic Shrinkage-Resistant Grout: Premixed factory-packaged ferrous aggregate grouting  
compound.

Embeco 885; Master Builders.

Cold Rolled Forming: Comply with ASTM A607, Grade 50

### FABRICATION

Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC

Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

Connections: Weld or bolt shop connections, as indicated. All connections shall be A.I.S.C. standard framed connections unless otherwise shown. Shop connections shall be welded or bolted and field connections shall be bolted unless otherwise shown or required. Enlargement of holes will not be permitted. Length and spacing of shop bolts shall be such that accessibility for making field connections is not impaired.

Unless otherwise noted on the drawings, all connections shall develop one-half the uniform load capacity of the beam for the given span.

High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts."

Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.

Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

### SHOP PAINTING

Painting: Provide a one-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

### SOURCE QUALITY CONTROL

General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

### **PART 3 - EXECUTION**

#### **ERECTION**

Surveys: Employ a surveyor for accurate erection of structural steel. Check elevations of concrete, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect.

Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.

Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

For proprietary grout materials, comply with manufacturer's instructions.

Splice members only where indicated and accepted on shop drawings.

Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing.

Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

## QUALITY CONTROL

The Owner will select and pay for a testing and inspection service to perform the following test.

Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

Field-Bolted Connections: Inspect in accordance with AISC specifications.

Field Welding: Inspect and test during erection of structural steel as follows:

Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

Perform visual inspection of all welds.

**END OF SECTION**



## **SECTION 05400**

### **COLD-FORMED METAL FRAMING**

#### **PART 1 - GENERAL**

##### **SCOPE:**

Provide cold-formed metal framing as indicated on the Drawings and specified in this Section.

Types of cold-formed metal framing units include C-shaped load-bearing steel studs, eave members, purlins, joists, and miscellaneous framing.

Unless specifically noted otherwise, all cold-formed metal framing shall be minimum 16 gage.

##### **Related Work:**

Section 05500-Metal Fabrications  
Section 09260-Gypsum Drywall Systems

##### **SUBMITTALS:**

**Product Data:** Manufacturer's specifications, physical properties, and installation instructions for each item of cold-formed metal framing and accessories.

**Shop Drawings:** Dimensioned detail drawings for special components and installations not fully dimensioned or detailed in manufacturer's product data.

Include placing drawings for framing members showing size and gage designations, number, type, location, and spacing. Indicate supplemental strapping, bracing, splices, bridging, accessories, anchorages, and details required for proper installation.

##### **QUALITY ASSURANCE:**

**Component Design:** Calculate structural properties of studs and joists in accordance with American Iron and Steel Institute (AISI) "Specifications for Design of Cold-Formed Steel Structural Members."

**Welding:** Use qualified welders and comply with American Welding Society (AWS) D1.3 "Structural Welding Code - Sheet Steel."

**Coordination:** Coordinate framing locations and spacing with existing structural systems and other related work.

## **PART 2 - PRODUCTS**

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:

Clark Steel Framing Systems  
Dale Industries, Inc.  
Dietrich Industries, Inc.  
Superior Steel Studs, Inc.  
Unimast Incorporated  
Prior Approved Equal

System Components: Manufacturer's standard load-bearing steel studs and joists of type, size, shape, and gage as indicated. With each type of metal framing required, provide manufacturer's standard, steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories for applications indicated, as needed to provide a complete metal framing system.

For 16-gage and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 40,000 psi; ASTM A 446, A 570, or A 611.

For 18-gage and lighter units, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi; ASTM A 446, A 570, or A 611.

Finish: Provide galvanized finish for all metal framing components complying with ASTM A 525 for minimum G 60 coating.

Finish of installation accessories shall match that of main framing components, unless otherwise indicated.

Fasteners: Provide nuts, bolts, washers, screws, and other fasteners with corrosion-resistant plated finish.

Electrodes for Welding: Comply with AWS Code and as recommended by stud manufacturer.

Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

Prefabricated Option:

General: Framing components may be prefabricated into assemblies before erection. Fabricate panel plumb, square, true to line, and braced against racking with joints welded. Perform lifting of prefabricated units to prevent damage or distortion.

Fabricate units in jig templates to hold members in proper alignment and position and to assure consistent component placement.

Fastenings: Unless indicated otherwise on drawings, attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with manufacturer. Wire tying of framing components is not permitted.

Fabrication Tolerances: Fabricate units to a maximum allowable tolerance variation from plumb, level, and true to line 1/8 inch in 10 feet.

### **PART 3 - EXECUTION**

#### **INSTALLATION - GENERAL:**

Cold formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.

Install shop or field-fabricated, cold-formed framing and securely anchor to supporting structure.

Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variations in plane and true position between fabricated panels not exceeding 1/16".

Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this section.

Install supplementary framing, blocking, and bracing in metal framing system, wherever needed to support other work requiring attachment to the framing. Where type of supplementary support is not otherwise indicated, comply with framing manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.

Frame openings larger than 2 feet square with double members at each side of opening except where more than two are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs or cripples above and below openings.

Frame both sides of expansion and control joints with separate framing, do not bridge the joint with components of stud system.

Install horizontal stiffeners in stud framing system, spaced at not more than 54 inches o.c. Secure at each intersection.

Cut framing members by sawing or shearing; do not torch cut.

Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods use in correcting welding work.

Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both side of joints.

Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings that are inaccessible on completion of framing work.

Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet 1:960 as follows:

Space individual framing members no more than, plus or minus, 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of panel or other finishing materials.

#### FIELD QUALITY CONTROL:

Testing: Owner will engage a qualified independent testing agency to perform field quality control testing.

Field and shop welds will be subject to inspection and testing. All welding at load bearing wall of roof framing shall be visually inspected.

Testing agency will report test results promptly and in writing to Contractor and Architect.

Remove and replace work that does not comply with specified requirements.

Additional testing and inspecting at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

**REPAIRS AND PROTECTION:**

**Galvanizing Repairs:** Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

**Touch-up Painting:** Wire brush, clean, and paint scarred areas, welds, and rust spots on fabricated and installed prime-painted, cold-formed metal framing. Paint framing surfaces with same type of shop paint used on adjacent surfaces.

Protect panel product that will be exposed to weather for more than 30 days by covering exposed exterior surface of panel product with a securely fastened air-infiltration barrier. Apply covering immediately after panel product is installed.

Protect cutouts, corners, and joints in panel product by filling with a flexible sealant or by applying tape recommended by panel product is installed.

Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

**END OF SECTION**



## **SECTION 05500**

### **METAL FABRICATIONS**

#### **PART 1 - GENERAL**

##### **SCOPE:**

The extent of miscellaneous metal work is shown on drawings and includes items fabricated from iron and steel shapes, plates, bars, pipes and castings which are not a part of structural steel or other metal systems in other sections of these specifications.

The types of miscellaneous metal items include, but are not limited to the following:

- Fasteners
- Pipe Railing Handrails
- Miscellaneous framing and supports

##### **QUALITY ASSURANCE:**

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

##### **SUBMITTALS:**

Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal assemblies. Include plans and elevations at not less than 1" to 1'-0" scale and include details of sections and connections at not less than 3" to 1'-0" scale. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.

#### **PART 2 - PRODUCTS**

##### **MATERIALS AND COMPONENTS:**

Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, burrs, and roughness.

## STEEL MEMBERS:

Steel shall conform to the latest edition of the ASTM Standard Specifications A36, entitled "Structural Steel."

Steel Tubes: ASTM A-501.

Steel Pipes: ASTM A-53.

Steel Plates, Shapes and Bars: ASTM A 36.

Steel Bars and Bar-Size Shapes: ASTM A 306, Grade 65, or ASTM A 36.

Gray Iron Castings: ASTM A 48, Class 30.

Non-Shrink Non-Ferrous Grout: CE CRD C588.

## FASTENERS:

General: Use materials same as or compatible with metal being connected. 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, with ASTM A 563 hex nuts and flat washers.

Lag Bolts: Flat-head carbon steel, FS FF-S-111.

Expansion Bolts: USM "Parabolt", Bed Head "Sleeve Anchors", Hilti "Kwik-Bolt", or similar expanding shield type anchor bolt, galvanized or stainless steel.

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

## PAINT:

Metal Primer Paint: Zinc chromate, red metal primer, tack free after 8 hours drying time at 77° F.; RIP 476 by Southern Coatings and Chemical Co., Inc., or Tnemec 99 by Tnemec Co.

Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, complying with ASTM A 780. Dry film shall contain not less than 94% zinc dust by weight.

## FABRICATION - GENERAL:

### Workmanship:

Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or reviewed on shop drawings, using proven details of fabrication and support.

Use type of materials shown or specified for various components of work.

Steel shall be fabricated in accordance with the current edition of the specifications adopted by the American Institute of Steel Construction. All shop connections are to be welded unless otherwise noted. Field connections may be welded or bolted. Joints are to be designed to support one-half the uniform load capacity of the member for the given span and will be in accordance with the latest specifications of the American Institute of Steel Construction for framed connections.

Holes shall not be made or enlarged by burning.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Weld corners and seams continuously, complying with AWS recommendations. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Welding electrodes for manual shielded metal-arc welding shall conform to AWS A5.1 or A5.5 E70XXX welding electrodes and flux used in submerged arc process shall conform to AWS A5.17 F7X-EXXX. Use low hydrogen electrodes for A572 steel.

Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of Phillips flat-head (countersunk) screws or bolts, when sizing and connection loads allow.

Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices as shown and as required to provide adequate support for intended use.

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

## PIPE RAILINGS:

Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, and finish. See drawings for pipe sizes and layouts. Thickness of pipe, post spacings, and anchorages shall be as required to support structural loads.

Pipe railings used in exterior conditions shall be hot dipped galvanized after fabrication/assembly. Field welds and other damaged surface areas shall be touched up with galvanizing repair paint prior to acceptance. No field painting shall be required on hot dipped galvanized surfaces.

Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and welded all around.

Form changes in direction of railing members by radius bends. Form simple and compound curves by bending pipe in jigs to produce uniform curvature. Maintain cylindrical cross-section of pipe throughout entire bend.

Provide wall returns at ends of wall-mounted handrails, properly capped. Provide extensions at top and bottom of rail runs in accordance with applicable codes (Life Safety Code, ADAAG, etc.).

Provide wall brackets, end closures, flanges, misc. fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts, sleeves and other anchorage devices for connection to concrete or masonry work.

Railings: 1-1/2 inch o.d. by 13 gage high strength tubing, ASTM A500 B.

#### Galvanizing:

Provide a zinc coating for all items exposed to the exterior and where otherwise indicated on the drawings as follows:

ASTM A 153 for galvanizing iron and steel hardware.

ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip, 0.0125" thick and heavier.

ASTM A 386 for galvanizing assembled steel products.

#### Shop Painting:

Shop paint metal work, except surfaces and edges to be field welded, items embedded in concrete and galvanizing surfaces.

Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 "Hand Tool Cleaning," or SSPC SP-3 "Power Tool Cleaning," or SSPC SP-7 "Brush Blast Cleaning."

Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning."

Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions and at a rate to provide uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.

Apply one (1) shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

### **PART 3 - EXECUTION**

#### **INSTALLATION:**

General: Set metal fabrications accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Brace temporarily or anchor temporarily in formwork where work is to be built into concrete, masonry or similar construction.

Anchor securely as shown or as required for the intended use, using concealed anchors wherever possible.

Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place constructions, including 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 items. Set work accurately, in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are built into concrete, masonry or similar construction.

Fit exposed connections accurately together to form tight, smooth hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surface to 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 and methods used in correcting welding work.

Touch-Up Painting: Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

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

**Installation of Manufactured Items:**

Install manufactured items in strict accordance with manufacturer's written instructions. Comply with details and approved shop drawings.

Provide and install all materials, components, and accessories as required for a complete job.

Design and installation of handrails and railings shall comply with all codes having jurisdiction over the project, including NFPA 101-Life Safety Code, Jefferson Parish Building Code, ADA-AG, and OSHA.

Fit exposed connections accurately together to form tight hairline joints.

Paint all non-galvanized components with two coats per Section 09900-Painting.

**COMPLETION:**

Completed metal work shall be securely anchored, free from rattles and excessive vibration during use. Items shall be plumb, level, straight and properly aligned. Exposed grouting shall be neat, uniform, and without holes and gaps.

Joints shall be snug-fitting and uniform; exposed welds shall be ground smooth and touch-up, and free of crevices, spatter and flux. Bolts, screws, nuts and other threaded fasteners shall occur only where permitted, and shall be drawn up tightly but not over-tightened; exposed heads and nuts shall be undamaged.

Remove, adjust and re-install, or remove and replace with new material, items which are not in compliance due to improper installation and materials, and items which are defective and damaged.

Clean finished surfaces which are soiled and marked by metal work installation. Remove and replace other materials which cannot be cleaned and those which are damaged by metal work installation.

**END OF SECTION**