

PART 1 - GENERAL

1.1 Performance Requirements

- .1 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - .1 Temperature Change: 67 deg C, ambient; 100 deg C, material surfaces.

1.2 Submittals

- .1 Product Data: Submit product data for any of the following items that are required for this Project.
 - .1 Paint products.
 - .2 Grout.
- .2 Shop Drawings: Show fabrication and installation details for metal fabrications.
 - .1 Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.3 Quality Assurance

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.

1.4 Project Conditions

- .1 Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 Materials, General

- .1 Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 Ferrous Metals

- .1 Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- .2 Steel sections: to CAN/CSA-G40.20/G40.21

Grade 300 W.

- .3 Steel plate: to CAN/CSA-G40.20/G40.21, Grade 260 W, pattern smooth.
- .4 Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - .1 Size of Channels: 41 by 41 mm.
 - .2 Material: Galvanized steel, ASTM A 653/A 653M.
 - .3 Material: Cold-rolled steel, ASTM A 1008/A 1008M; hot-dip galvanized after fabrication.
- .5 Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 Fasteners

- .1 Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM F 568M, Property Class 4.6; with hex nuts, ASTM A 563M; and, where indicated, flat washers.
- .2 Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325M, Type 3; with hex nuts, ASTM A 563M, Class 8S3; and, where indicated, flat washers.
- .3 Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - .1 Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- .4 Eyebolts: ASTM A 489.
- .5 Machine Screws: ASME B18.6.7M.
- .6 Lag Screws: ASME B18.2.3.8M.
- .7 Wood Screws: Flat head, ASME B18.6.1.
- .8 Plain Washers: Round, ASME B18.22M.
- .9 Lock Washers: Helical, spring type, ASME B18.21.2M.
- .10 Post-Installed Anchors: Torque-controlled

expansion anchors or chemical anchors.

- .1 Material for Interior Locations:
Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941M, Class Fe/Zn 5, unless otherwise indicated.
- .2 Material for Exterior Locations and Where Stainless Steel is Indicated:
Alloy Group A4 stainless-steel bolts, ASTM F 738M, and nuts, ASTM F 836M.

- .11 Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 41 by 22 mm by length indicated with anchor straps or studs not less than 75 mm long at not more than 200 mm o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 Miscellaneous Materials

- .1 Welding materials: to CSA W59.
- .2 Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- .3 Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 Fabrication, General

- .1 Shop Assembly: Preassemble items in the shop to greatest extent possible. 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.
- .2 Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1 mm unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- .3 Form bent-metal corners to smallest radius

- possible without causing grain separation or otherwise impairing work.
- .4 Form exposed work with accurate angles and surfaces and straight edges.
 - .5 Weld corners and seams continuously to comply with the following:
 - .1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - .2 Obtain fusion without undercut or overlap.
 - .3 Remove welding flux immediately.
 - .4 At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - .6 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
 - .7 Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
 - .8 Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
 - .9 Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - .1 Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 3.2 by 38 mm, with a minimum 150 mm embedment and 50 mm hook, not less than 200 mm from ends and corners of units and 600 mm o.c.,

unless otherwise indicated.

2.6 Miscellaneous
Framing and
Supports

- .1 General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- .2 Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - .1 Fabricate units from slotted channel framing where indicated.
 - .2 Furnish inserts for units installed after concrete is placed.
- .3 Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
 - .1 Provide bearing plates welded to beams where indicated.
 - .2 Drill or punch girders and plates for field-bolted connections where indicated.
- .4 Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 600 mm o.c.

2.7 Finishes, General

- .1 Comply with NAAMM's *Metal Finishes Manual for Architectural and Metal Products* for recommendations for applying and designating finishes.
- .2 Finish metal fabrications after assembly.
- .3 Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 Steel and Iron
Finishes

- .1 Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - .1 Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- .2 Shop prime iron and steel items not indicated to be galvanized unless they are

- to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- .1 Shop prime with universal shop primer unless zinc-rich primer is indicated.
- .3 Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
- .1 Exterior Items: SSPC-SP 6/NACE No. 3, *Commercial Blast Cleaning*.
 - .2 Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, *Commercial Blast Cleaning*.
 - .3 Items Indicated to Receive Primers Specified in Division 09 Section *High-Performance Coatings*: SSPC-SP 6/NACE No. 3, *Commercial Blast Cleaning*.
 - .4 Other Items: SSPC-SP 3, *Power Tool Cleaning*.
- .4 Shop Priming: Apply shop primer to comply with SSPC-PA 1, *Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel*, for shop painting.
- .1 Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 Installation, General

- .1 Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- .2 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 surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- .3 Field Welding: Comply with the following

requirements:

- .1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - .2 Obtain fusion without undercut or overlap.
 - .3 Remove welding flux immediately.
 - .4 At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
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- .4 Fastening to In-Place Construction:
Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
 - .5 Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
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- 3.2 Installing Miscellaneous Framing and Supports
 - .1 General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
 - .2 Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - .1 Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in *Installing Bearing and Levelling Plates* Article.
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- 3.3 Adjusting and Cleaning
 - .1 Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up

shop-painted surfaces.

- .1 Apply by brush or spray to provide a minimum 0.05 mm dry film thickness.

- .2 Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.