

**MISCELLANEOUS STEEL FABRICATIONS**

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**1. GENERAL**

**1.1 Work Included**

- .1 Supply and installation of fabricated steel components.
- .2 Supply and installation of anchors and fasteners required for anchorage and support of fabricated steel components.
- .3 Supply and installation of lifting eyes, plates and miscellaneous steel items.
- .4 Supply instructions and templates as required for accurate setting of anchors and components.
- .5 Finishes to items specified herein.

**1.2 Standards**

- .1 CAN/CGSB 1.181-99 Ready-Mixed Organic Zinc-Rich Coating.
- .2 CAN/CSA-S16-01 Consolidation.
- .3 CAN/CSA G40.20-04 General Requirements for Rolled or Welded Structural Quality Steel.
- .4 CAN/CSA G164-M92(R2003) Hot Dip Galvanizing of Irregularly Shaped Articles.
- .5 CSA W47.1-03 Certification of Companies for Fusion Welding of Steel.
- .6 CSA W55.3-1965(R2003) Resistance Welding Qualification Code for Fabricators of Structural Members used in Buildings.
- .7 CSA W59-03 Welded Steel Construction (Metal Arc Welding).
- .8 ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .9 ASTM A153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .10 ASTM A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .11 ASTM A307 Specification for Carbon Steel Bolts and Studs, 60000 psi.
- .12 ASTM A325 Specification for High-Strength Bolts for Structural Steel Joints.
- .13 ASTM A666 Specification for Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar for Structural Applications.

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- .14 ASTM F738-M Specification for Stainless Steel Metric Bolts, Screws and Studs.
- .15 ASTM F1136 Specification for Chromium/Zinc Corrosion Protective Coating for Fasteners.
- .16 Steel Structures Painting Council (SSPC).
- .17 Local Building By-Laws
- .18 Canadian Government Specification Board (CGSB)

**1.3 Submittals**

- .1 Submit Shop Drawings in accordance with Specification Section 01300.
- .2 Clearly indicate components, finishes, materials, dimensions, profiles, sizes, fabrication details, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
- .3 Include installation instructions, erection drawings, elevations, and details where applicable.
- .4 Indicate welded connections using CISC standard welding symbols. Clearly indicate net weld lengths.
- .5 Welding Procedure for Steel and Stainless Steel:
  - .1 Submit certificate that companies which will be welding stainless steel are CSA accepted.
  - .2 Comply with CSA W47.1-03 and W59-03.

**2. PRODUCTS**

**2.1 Materials**

- .1 Plate steel, channels and angles: CAN/CSA G40.21-04, Grade 300W.
- .2 Structural steel: CAN/CSA G40.21-04, Grade 350W.
- .3 Steel anchors, studs, taps and bolts: ASTM A307, Grade B carbon steel.
- .4 Unless otherwise specified, provide fasteners as follows:
  - .1 Steel bolts - ASTM A325.
  - .2 Stainless steel bolts - ASTM A320, Grade B8, (AISI Type 316).
  - .3 Fastenings in stainless steel and aluminum work - stainless steel.

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- .5 Steel pipe: ASTM A53, Type S Grade A or ANSI B36.10.
- .6 Stainless steel: Alloy 304 and 316 as indicated on Drawings:
  - .1 Plates, Sheets and Strips: ASTM A240/A240M, AISI Type 316 (316L for welded connections)
  - .2 Bolts, Threaded Rods, Anchor Bolts, and Anchor Studs: ASTM F593, AISI Type 316, Condition CW.
  - .3 Nuts: ASTM F594, AISI Type 316, Condition CW.
  - .4 Bars and Angles: ASTM A276, AISI Type 316 (316L for welded connections).
  - .5 Shapes: ASTM A276, AISI Type 304 (304L for welded connections).
- .7 Deformed Steel Reinforcing Bars to CAN/CSA G30.18-M92(R20002), Grade 400W.
- .8 Stud Anchors - Nelson stud headed concrete anchors or accepted alternate.
- .9 Nuts, bolts, and fastening devices connecting steel parts to aluminum: stainless steel Type 316 , with appropriate isolation devices.
- .10 Isolation coating: Bituminous paint, single-component, alkali resistant coal-tar pitch based. Cleaner for surface preparation shall be compatible with the coating.
- .11 Prime paint: CISC/CPMA 2-75 unless otherwise required for finish coating.
- .12 Zinc rich primer: CAN/CGSB 1.181-99, Sealtight Galvafruid Zinc-Rich Coating by W.R.Meadows Ltd.
- .13 Galvanizing: CAN/CSA-G164-M92(R2003).

**2.2 Fabrication**

- .1 Shop fabricate components where possible.
- .2 Verify all dimensions on-site prior to fabrication to ensure accurate fitting.
- .3 Assembly:
  - .1 Accurately cut, machine and fit joints, corners, mitres so that junctions between components fit together tightly, and in true planes.
  - .2 Fasten work with concealed methods, unless indicated on the Drawings.

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- .3 Weld all connections where possible, and bolt where not possible, cut off bolts flush with nuts. Countersink bolt heads and prevent loosening of nuts. Ream holes drilled for fastenings.
- .4 Weld joints tight, flush, and grind smoother, in true planes with base metals. Make welds continuous at joints where entry of water into building or into voids of members or assemblies is possible.
- .5 Provide for differential movements with assemblies and at junctions of assemblies with surrounding work.

**2.3 Surface Preparation**

- .1 Thoroughly clean and suitably pretreat steel prior to finishing.
- .2 Remove loose mill scale, rust, oil, grease, dirt and other foreign matter using one or more of the following methods:
  - .1 solvent cleaning
  - .2 wire brushing
  - .3 power wire brushing
  - .4 sandblasting
- .3 Grind smooth sharp projections.
- .4 After fabrication, clean, scrape and remove rust, mill scale, grease and other extraneous material, and prepare surface in accordance to CAN/CGSB-85.100-93.

**2.4 Finishes**

- .1 Prime paint:
  - .1 Clean metal in accordance with surface preparation requirements of CMPA/CISC 2-75.
  - .2 Apply a full smooth coat of primer to ferrous metal components to be painted in accordance with CAN/CSA-S16-1. Apply primer at temperature above 7°C to a dry film thickness of 50 to 75 micrometers.
  - .3 Leave surfaces to be welded unpainted.
  - .4 Work primer into corner and open spaces so that all visible and accessible surfaces are fully covered. Do not prime portion where items are to be built into concrete except for 25 mm adjacent to exposed portion.
- .2 Hot Dip Galvanizing:

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- .1 After fabrication, hot dip all ferrous metals miscellaneous parts, including bolts, nuts, washers, and hangers to CAN/CSA-G164-M92(R2003).
- .2 Where size permits galvanize components after assembly.
- .3 Back Painting: Back-paint metal surfaces (except stainless steel) in contact with dissimilar metal or concrete with bituminous paint, one millimetre (1.0)mm DFT minimum for the following conditions: (1) exterior components (2) interior components exposed to high humidity.
- .4 Paint galvanized metal surfaces to be in contact with or encased in concrete with rust inhibitive epoxy coating ICI Devoe Coating:Devran 201. Prepare surfaces to SSPC SP1, and apply paint to 125 microns DFT.
- .5 Carbon Steel:
  - .1 Where carbon steel is intended to be exposed to atmospheric conditions, hot-dip galvanize the fabrications.
  - .2 Where carbon steel is intended to be in contact with concrete, hot-dip galvanized the surfaces to be in such contact.
- .6 Stainless steel:
  - .1 Remove rust and postweld discoloration from stainless steel by grinding, using only stainless steel tools.
  - .2 Passivate stainless steel, which was cleaned by grinding, with a solution of 12-15% nitric acid and 3% hydrofluoric acid.
  - .3 Finishes: No.4 finish XL Blend S
- .7 Touch up shop painted items which have chipped or abraded during transportation using same material.

## **3. EXECUTION**

### **3.1 Installation**

- .1 Obtain the Contract Administrator's permission prior to site cutting or making adjustments which are not part of the scheduled work.
- .2 Install items plumb, square and level; fit accurately, and maintain free from distortion or defects detrimental to appearance and performance.
- .3 Make provisions for erection stresses and temporary bracing. Keep work in alignment at all times.

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- .4 Replace items damaged in course of installation.
- .5 Perform required field welding. Visible field welds to be smooth, grind as required.
- .6 Perform all field assembly bolting and welding to match standard of shop bolting and welding. Bolts and screws are to be concealed whenever possible.
- .7 Supply and install anchors for setting in concrete as shown on Drawings but not less than 125 mm embedment.
- .8 Prevent electrolysis between aluminum and dissimilar metals in contact with appropriate isolation devices.
- .9 Install components square, straight and true to line.
- .10 Securely anchor components in place.
- .11 After installation, site clean and refinish damaged finishes, welds, bolt heads and nuts.
- .12 Refinish with primer or zinc rich paint to match original finish.

**3.2 Schedule of Components**

- .1 Supply and install components as specified herein and as shown on Drawings:
  - .1 Pipe supports.
  - .2 Monorail beams and crane runway beams.
  - .3 Platform beams and columns.
  - .4 Lifting eye bolts.
  - .5 Plates and miscellaneous steel items.
  - .6 Anchors and fasteners.

**END OF SECTION**