

DIVISION 05 Section 05 00 00 METALS

General

- 1.1 Welding companies to be certified:
 - 1.1.1 Under Division 1 or 2.1 of CSA W47.1 - Certification of Companies for Fusion Welding of Steel, where such welding is required
 - 1.1.2 Under CSA W55.3 - Certification of Companies for Resistance Welding of Steel and Aluminum, where such welding is required.
- 1.2 Welding to be done in accordance with CSA W59.
- 1.3 Structural steel work to be done in accordance with CSA S16 and CSA S136.
- 1.4 All welded connections are to be designed, and all welding materials and procedures are to be selected and supervised by a Canadian Welding Bureau Welding Engineer in accordance with CSA W59.
- 1.5 Design shall not include exposed steel structure unless approved by DTIR Representative.
- 1.6 Sustainability
 - 1.6.1 Under Division 1 or 2.1 of CSA W47.1 - Certification of Companies for Fusion Welding of Steel, where such welding is required
 - 1.6.2 Design for future disassembly. Where feasible make possible the removal and future re-use, refurbishing or recycling of steel. Design mechanical connections to be reversible-i.e. using bolted rather than welded connections where feasible. Bolting also eliminates the dangerous fumes and gases associated with welding.
 - 1.6.3 Design Structural systems for efficiency and durability to reduce carbon footprint. Consider future flexibility and adaptability.
- 1.7 Durability
 - 1.7.1 Under Division 1 or 2.1 of CSA W47.1 - Certification of Companies for Fusion Welding of Steel, where such welding is required

Section 05 10 00 Structural Steel for Buildings

1 General

- 1.1 Design details and connections in accordance with requirements of CSA S16 to resist moments and shear forces. Allow for movement.
- 1.2 Design all new roofs with structural slope to roof drains. Minimum slope is to be two (2) percent. Confirm with Architect and Structural Engineer that the roof is designed to minimize ponding water, and overflow roof scuppers are provided at the proper height to minimize risk of overloading roof design.

2 Material

- 2.1 Structural Steel is provided to requirements of CAN/CSA-G40.20/G40.21, Grade 300W and Grade 350W, Class C or Class H for HSS Sections.
- 2.2 Anchor Bolts are to be provided to requirements of CAN/CSA-G40.20/G40.21, Grade 300W.
- 2.3 Bolts, nuts, and washers are to be provided to requirements of ASTM F3125/F3125M.
- 2.4 Welding Materials are to be provided to requirements of CSA W48 Series and certified by the Canadian Welding Bureau.
- 2.5 Shop paint primer is to be provided to requirements of CISC/CPMA 1-73a.
- 2.6 Hot dip galvanizing, for galvanized steel exposed to outside, is to be provided to CSA G164, minimum zinc coating of 600 g/m².

3 Execution

- 3.1 Fabrication of structural steel is to be provided in accordance with CAN/CSA S16, and with the reviewed shop drawings.
- 3.2 Erect structural steel in accordance with CAN/CSA S16, and in accordance to limited design principles.
- 3.3 Provide 1/4" (6 mm) diameter x 9" (225 mm) long hump rods at 16" (450 mm) OC on all faces of each column butting to concrete block partitions.
- 3.4 Shop Painting
 - 3.4.1 For steel not receiving finish paint on-site. Clean, prepare surfaces, and shop prime structural steel in accordance with CSA S16, except where members will be encased in concrete.

- 3.4.2 For steel to receive further finish painting on-site. Clean, prepare surfaces, and shop prime in accordance with CISC/CPMA 2-75, (brush blasted).
- 3.5 Shop Primer to be water based where feasible and to be selected to have minimal off- gassing of volatile organic compounds.
- 3.6 Written approval of Engineer is to be obtained prior to field cutting or altering of structural members.
- 3.7 Members are to be welded with continuous welds, and ground smooth where welding is indicated.
- 3.8 Bolts, rivets, welds, burns and/ or scratched surfaces to be cleaned with a mechanical brush and touched up with shop primer at completion of erection.

Section 05 21 00 Steel Joist Framing

1 General

- 1.1 Design steel joist and bridging to carry loads in accordance with CSA S16, CSA S136.
- 1.2 Design joists and anchorages for uplift forces.
- 1.3 Limit roof joist deflection due to specified live load to 1/240 of the span.
- 1.4 Limit floor joist deflection due to specified live load to 1/360 of the span.

2 Materials

- 2.1 Structural Steel to be provided to CAN/CSA-G40.20/G40.21 and CSA S136.
- 2.2 Welding Materials to be provided to CSA W59.
- 2.3 Shop Primer to be provided to CISC/CPMA 1-73a, CISC/CPMA 2-75.
- 2.4 Shop Painting
 - 2.4.1 For joists not receiving finish painting on-site:
 - 2.4.2 Clean, prepare, and shop prime all surfaces of steel joists to CSA S16, CAN/CGSB 85.100.
 - 2.4.3 Strip paint from bolts, nuts, sharp edges, and corners before prime coat is dry.

- 2.5 For joists receiving further finish painting on-site:
 - 2.5.1 Clean, prepare, and shop prime all surfaces of steel joists to CISC/CPMA 2-75, (brush blasted).
 - 2.5.2 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.
 - 2.6 For provision of certification weldments must be inspected and conform to the Canadian Welding Bureau requirements.
- 3 Execution
- 3.1 Erect steel joists and bridging as indicated in accordance with CSA S16.
 - 3.2 Complete installation of bridging, and anchorages before placing construction loads on joists.
 - 3.3 Obtain written approval from Engineer prior to field cutting or altering joists, or bridging.
 - 3.4 Clean and touch up shop primer to bolts, welds, burned or scratched surfaces at completion of erection.

Section 05 30 00 Steel Decking

- 1. General
 - 1.1. Where sound control is required in a space use acoustic steel deck. Acoustic steel deck is to be perforated on the vertical face of the flutes and have interlocking side laps.
 - 1.2. Design Criteria
 - 1.2.1. Design steel deck using limit states design in accordance with Canadian Sheet Steel Building Institute CSSBI-10M.
 - 1.2.2. Steel deck and connections to carry dead loads, live diaphragm action lateral loads, composite deck action loads, wind uplift, and other loads appropriate to the project.
 - 1.2.3. Deflection under specified live load not to exceed 1/240th of the span, except when gypsum board ceilings are hung directly from the deck, then ensure a live load deflection does not exceed 1/360th of the span.
 - 1.2.4. Where vibration effects are controlled, ensure dynamic characteristics of decking system are designed in accordance with CSA S16, Appendix 'G'.
- 2. Materials
 - 2.1. Zinc-iron Alloy ZF coated steel sheet:

- 2.1.1. The minimum metallic coating designations for steel roof deck not exposed in service to the weather are ZF75 (zinc coating) or Z180 for ASTM A653/A653M materials and AZM150 for ASTM A792/A792M.
 - 2.1.2. The minimum metallic coating designations for steel roof deck exposed to the weather are Z275(zinc coating) or Z180 for ASTM A653/A653M
 - 2.2. Where deck is to receive paint, supply wiped or satin coated decking.
 - 2.3. Provide acoustic insulation as per Part 1, Section 2, Division 07, 07 20 00 - Thermal Protection.
 - 2.4. Provide closures type recommended by Deck manufacturer.
 - 2.5. Provide cover plates, cell closures, and flashing. Plates to have a minimum base steel thickness of 0.76 mm. Plates are to have the same type of metallic coating, and thickness as coating material provided for the steel deck.
3. Execution
 - 3.1. Design, detail, and fabricate in accordance with CSA S136 and CSSBI 10M.
 - 3.2. Do Welding in accordance with CSA W59, except where specified otherwise.
 - 3.3. Erect steel deck in accordance with CSA S136 and CSSBI 10M, except as specified otherwise:
 - 3.3.1. Butt ends 1.5 mm to 3 mm gap. Install steel cover plates over gaps wider than 3 mm.
 - 3.3.2. Lap ends 50 mm minimum.
 - 3.3.3. After deck is permanently secured in place, immediately touch up metallic coated top surface with compatible primer where burned by welding.
 - 3.4. Prior to concrete placement, ensure steel deck is free of soil, debris, standing water, loose mill scale, and other foreign matter.
 - 3.5. Place and support steel reinforcement maintaining covers to reinforcement as indicated.
 - 3.6. Closures
 - 3.6.1. Install closures as required. Closures to be effective against weather, thermal and acoustic effects.
 - 3.6.2. For details not indicated, follow manufacturer's printed instructions.

3.7. Openings and Areas of Concentrated Loads:

- 3.7.1. No reinforcement is required for openings cut in deck which are smaller than 150 mm square.
- 3.7.2. Deck openings to be framed, with any one dimension between 150 mm to 300 mm, as designed by Engineer, except as otherwise indicated.
- 3.7.3. For deck openings, with any one dimension greater than 300 mm, and for areas of concentrated load, reinforce deck in accordance with Engineer's structural framing details.

3.8. Install connections in accordance with CSSBI recommendations as indicated.

Section 05 50 00 Metal Fabrications

.1 General

- 1.1 Provide angle framing for equipment. Prime, paint, and size to suit equipment.
- 1.2 Provide metal supports for wood benches. Primed and paint except, in wet areas where they are to be galvanized.
- 1.3 Provide metal locker supports. Prime and paint.
- 1.4 Railings are to be designed to meet latest National Building Code's requirements for vertical and horizontal live loading.

2 Materials

- 2.1 Steel Sections and plates to be provided to CAN/CSA-G40.20/G40.21, Grade 300W, and 350W.
- 2.2 Steel Pipe is to be provided to ASTM A53/A53M galvanized finish.
- 2.3 Welding materials to be provided to CSA W59.
- 2.4 Bolts, and anchor bolts to be provided to ASTM A307.
- 2.5 Galvanizing to be hot dipped with zinc coating 600 g/m^2 provided to CSA G164.
- 2.6 Stainless steel tubing to be provided to ASTM A269/A269M, type 302 Commercial Grade.
- 2.7 Chromium plating on steel to be provided with a plating sequence of 0.009 mm thickness of copper, 0.010 mm thickness of nickel, and 0.0025 mm thickness of chromium.
- 2.8 Shop coat primer is to be provided to CAN/CGSB 1.40.

2.9 Zinc primer to be zinc rich, ready mix to CAN/CGSB 1.181.

2.10 Grout to be non-shrink, non-metallic, flowable, 24h, 15 MPa, with a minimum pull-out strength of 7.9 MPa.

3 Fabrication

3.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

3.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws, or as indicated.

3.3 Where possible, fit and shop assemble work, ready for erection.

3.4 Exposed welds to be continuous for length of each joint. File or grind exposed welds smooth and flush.

3.5 Railings are to be designed to meet latest National Building Code's requirements for vertical and horizontal live loading.

3.6 Channel Frames to be fabricated from steel, sized to suit openings. Weld channels to form continuous frame for jambs, and heads of openings. Size to suit opening.

3.7 Provide lateral restraining angles for masonry walls, sized by the Structural Engineer. Prime, paint and finish.

3.8 Provide loose lintels for all masonry openings, as sized by the Structural Engineer.

3.9 Provide Angle Framing for Equipment, prime painted and sized to suit equipment.

3.10 Erection

3.10.1 Welding to be done in accordance with CSA W59 unless specified otherwise.

3.10.2 Companies are to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding, and/or CSA W55.3- for resistance welding.

3.10.3 Erect metal work square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

3.10.4 Make field connections with high tensile bolts to CSA S16, or weld.

3.10.5 Touch-up galvanized surfaces with inorganic zinc rich primer where burned by field welding.

3.10.6 Grout as required.

Section 05 51 00 Metal Stairs and Ladders

1 General

- 1.1 Design metal stair, balustrade and landing construction and connections to Latest Edition Building Code requirements for vertical and horizontal live loads.

2 Materials

- 2.1 Steel sections to be provided to CAN/CSA-G40.20/G40.21, Grade 300W.
- 2.2 Steel plate to be provided to CAN/CSA-G40.20/G40.21, Grade 300W.
- 2.3 Steel pipe to be provided to ASTM A53/A53M, standard weight, schedule 40, seamless black.
- 2.4 Steel tubing to be provided to CAN/CSA-G40.20/G40.21, ASTM A500/A500M-18, sizes and dimensions as indicated.
- 2.5 Aluminum bar, rod, wire, and extruded shapes to be provided to CSA HA 5.6351-T6.
- 2.6 Welding materials to be provided to CSA W59.
- 2.7 Bolts to be provided to ASTM A307-14e1.
- 2.8 High strength bolts to be provided to ASTM F3125/F3125M.
- 2.9 Shop Coat Primer to be provided to CAN/CGSB 1.40.
- 2.10 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes - latest edition.

3 Execution

- 3.1 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings. Make exposed connections of same material, colour and finish as base material on which they occur.
- 3.2 Accurately form connections with exposed faces flush, mitres and joints tight. Make risers of equal height.
- 3.3 Grind or file exposed welds and steel sections smooth.

- 3.4 Shop fabricate stairs in sections as large and complete as practical.
- 3.5 Shop Painting
 - 3.5.1 Clean surfaces in accordance with Steel Structures Painting Council SSPC SP 2 or MPI applicable standards.
 - 3.5.2 Apply one coat of shop primer except interior surfaces of pans.
 - 3.5.3 Apply two coats of primer in contrasting colours to parts inaccessible after final assembly.
 - 3.5.4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 deg. C.
 - 3.5.4 Do not paint surfaces to be field welded.
- 3.6 Stair Installation
 - 3.6.1 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting the stairs to the structure.
 - 3.6.2 Hand items over for casting into concrete or building into masonry to the appropriate trades together with the setting templates.
 - 3.6.3 Do welding work in accordance with CSA W59, unless specified otherwise.
 - 3.6.4 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

END