Short Form Specifications

CSSBI S20 – 2018

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PREFACE

One of the objectives of the Canadian Sheet Steel Building Institute is the development of product standards to promote safety and sound construction practices. These Short Form Specifications are intended to assist specifiers, designers, buyers, manufacturers and erectors of steel roof and floor deck by providing information which can be incorporated into individual job specifications as desired.

The requirements contained herein are in accordance with sound engineering principles, augmented by experience. They include recommended minimum requirements for grade of steel, base steel design thickness, metallic coating designation, loads, resistances and deflections, as well as design, fabrication and erection in general. While the material is believed to be technically correct and in accordance with recognized practice at the time of publication, it does not obviate the need to determine its suitability for a given situation. Neither the Canadian Sheet Steel Building Institute nor its Members warrant or assume any liability for the suitability of the material for any general or particular purpose.

**CANADIAN SHEET STEEL BUILDING INSTITUTE**

**SHORT FORM SPECIFICATION FOR STEEL ROOF DECK**

# General Conditions

The General Conditions shall be and are hereby made a part of this division.

# Work Included

## Furnish all labour, materials and equipment necessary to fabricate and, where shown or called for by the tender documents, hoist into position and erect the steel roof deck.

## Supply and install accessories where shown or called for by the tender documents (e.g. *cell closures*).

## Cut and reinforce holes and openings up to 450 mm across the flutes. Cut only, holes and openings larger than 450 mm across the flutes, where shown or called for by the tender documents.

# Work Not Included

## Reinforcing or structural framing of openings larger than 450 mm across the flutes.

## Field painting including touch‑up to the underside of top chords or flanges of supporting steel members where discolouration due to welding has occurred.

## Mechanical clips, nails, adhesives or other fasteners for securing insulation, thermal barrier, or vapour retarder to steel roof deck.

## Cutting and drilling of holes for the attachment of suspended ceiling hangers, or for the attachment of any work of other trades.

## Bearing plates, shelf angles, diagonal supports and other structural steel required to support the steel roof deck.

## Wood nailers, cants, vapour retarder, insulation, thermal barrier, waterproofing membrane, and ballast.

## Architectural trim.

# Materials

## Steel roof deck shall be formed of metallic coated sheet steel conforming to one of the following specifications:

1. ASTM A653/A653M *Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process**,* minimum Grade 230 with a base steel design thickness or 0.76 mm or greater and a minimum zinc-iron alloy coating designation of ZF75; or,
2. ASTM A792/A792M *Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process*, minimum Grade 230 with a base steel design thickness or 0.76 mm or greater and a minimum 55% aluminum-zinc alloy coating designation of AZM150.

*NOTE: Specification writer may specify a heavier base steel design thickness and/or a heavier metallic coating to satisfy any special requirements.*

# Drawings

## The Buyer shall provide complete architectural and structural plans, specifications, and approved structural support spacings, correctly dimensioned. The building structural design documents shall include the type and spacing of the fasteners connecting the steel deck to the supporting structure.

## The steel roof deck Erector shall submit ... copies of erection drawings for review. The Buyer shall return one copy with his approval, or with such corrections as he may deem necessary.

## Erection drawings shall show clearly the location of various sheet lengths, sheet quantities, thicknesses, and metallic coating designations.

## When changes are made by the Buyer, the cost of such changes shall be the basis for re‑negotiating the contract.

5.5 Roof deck erector should advise the manufacturer of the maximum weight per bundle required on the job.

# Design

## In the absence of laws, regulations, ordinances and specifications to the contrary, structural design of the steel roof deck shall be in accordance with 6.2 to 6.6 inclusive.

## Structural properties and member resistances shall be calculated in accordance with CAN/CSA‑S136*.*

## Wherever structural framing permits, and subject to reasonable limitations for handling, steel roof deck shall be fabricated to span continuously over at least four structural supports (three spans).

## Steel roof deck shall be fastened to the supporting structural steel by mechanical fastening or arc spot welding.

*NOTES:*

(1) When arc spot welding is used, the thickness and width of the supporting steel element to which the deck is to be attached is a factor in producing satisfactory arc spot welds.

*(2) Where deck is required to be fastened to structural supports by mechanical fasteners such as screws, pneumatic or powder‑actuated pins or other fasteners, the Specification Writer should state the fastening requirements clearly.*

## Steel roof deck shall have at least the minimum strength and stiffness appropriate for the applica­tion and performance of conventional built‑up roof­ing. Unless otherwise specified, the minimum uni­form total factored load for the design of steel roof deck shall be 3.5 kPa. Deflection shall not exceed L/240 of the span under a minimum uniform service load of 1.9 kPa.

NOTE: The load and deflection requirements are intended to provide the minimum deck strength and stiffness, which combined with a sufficiently sturdy framing system, are considered to be appro­priate for the application and performance of con­ventional types of built‑up roofing. The loads spe­cified in 6.5 are not those due to wind, snow or other forces, which for a particular locality, may be higher or lower. Where other criteria are to apply, the Specification Writer should state the requirements clearly.

## Loads due to wind, snow or other forces, including related loading distributions and building Importance Category, shall be as prescribed by the structural plans and specifications.

# Erection

## All erection work, including field welding or mechanical fasteners, shall be the responsibility of the Erector and such erection work shall be carried out by trained erection crews, all in accordance with the Manufacturer’s and these specifications. When arc spot welding is used, Erectors shall be qualified in accor­dance with CSA Standard W47.1 *Certification of Com­panies for Fusion Welding of Steel*, and weld­ers shall be qualified for deck welding by the Cana­dian Welding Bureau.

## Steel roof deck units shall be placed and adjusted to final position on the supporting structure before being permanently fastened thereto. If structural supports are not in proper alignment, the problem shall be reported to the General Contractor in order that the necessary corrections can be made before proceeding with the work.

## Steel roof deck units shall be adequately fastened to structural supports as specified in the building structural design documents. The maximum spacing of fastenings along bearing supports shall be 400 mm or 2 flute spacings, whichever is the lesser. Where arc spot welds are used they shall have a 20 mm nominal top diameter.

## End laps shall be not less than 50 mm and shall be formed over supports.

## Side laps of adjacent units shall be fastened at intervals not exceeding 900 mm on centre. Closer spacing may be required for diaphragm action, as determined by the building structural designer. For thicknesses 0.91 mm and greater, side laps may be welded using 25 mm long seam welds.

## For openings up to 150 mm across the flutes, no reinforcement is necessary provided that not more than two vertical webs are removed.

## For openings over 150 mm to 450 mm across the flutes, provide suitable reinforcement based on a structural analysis of the loads involved.

## If additional openings not shown or called for by the tender documents are required, such openings shall be cut and reinforced by the Erector, but the cost of such extra work shall be charged to the Buyer.

## Where steel roof deck is welded in place, the steel deck surface shall be immediately inspected, and all topside areas where the metallic coating has been burned by welding shall be covered by a suitable primer, applied according to the primer manufacturer's instructions.

## The installation of hanger tabs for supporting loads other than a suspended ceiling cannot be used without the capacity of the deck being confirmed by a structural engineer for the applied point loads.

# Limitations

## Any damage or alterations by others to the steel roof deck, including that due to construction loads applied at any time, shall not be the responsibility of the Erector or the Manufacturer.

# Access

## Access for unloading bundles of deck onto the structure shall be provided by the General Contractor.

# Storage of Materials on Site

## Steel roof deck shall normally be delivered to the jobsite as required for erection, but if site storage becomes necessary, the following requirements shall be observed:

1. tilt bundles for drainage;
2. block bundles off ground for effective drainage and ventilation;
3. block long bundles to prevent sagging; and
4. store away from chemically corrosive substances (e.g. *salt, cement, fertilizer*), away from materials that could contaminate the surface (e.g. *diesel oil, paint, grease*), and away from site traffic.

## If the bundles are to be covered, avoid impermeable material such as plastic and ensure that adequate ventilation is provided to prevent condensation.

## Areas for storage shall be provided by the General Contractor as close to the building as is practicable.

## Protection against damage shall be provided by the General Contractor.

# Cleanup

## Remove all debris of this trade and leave work ready for other trades.

# Field Painting

## Metallic-coated steel deck material is normally given a passivation treatment at the steel mill in order to inhibit the formation of wet storage stain. Material so treated is often difficult to paint satisfactorily unless the passivating treatment is removed by mechanical or chemical means.

**GUIDE SPECIFICATION FOR COMPOSITE STEEL DECK**

# General

The General Conditions shall be and are hereby made a part of this division.

# Work Included in this Division

## Furnish all labour, materials and equipment necessary to fabricate and, where shown or called for by the tender documents, hoist into position and erect the composite steel deck.

## Supply and install accessories where shown or called for by the tender documents (e.g. cell closures, flashings).

## Field weld steel shear connectors through the low flute of composite steel deck, where shown or called for by the tender documents. Stud welding shall be done in accordance with the requirements of CSA Standard W59 *Welded Steel Construction (Metal Arc Welding)*.

NOTE: The top surface of the flange or chord of the supporting structural member to which shear connectors are to be welded shall be free of paint, dirt, heavy rust, loose mill scale, sand or other materials which could interfere with the welding operation.

# Work Not Included in this Division

## All collateral materials (e.g. formwork, screed flash, concrete, welded wire mesh, reinforcing steel, fire-proofing).

## Forming openings in the composite slab and cutting the composite steel deck after concreting.

## Reinforcing or structural framing around holes or openings.

## Field painting including touch‑up to the underside of top chords or flanges of supporting steel members where discolouration due to welding has occurred.

## Cutting and drilling of holes for the attachment of suspended ceiling hangers, or for the attachment of any work of other trades.

## Bearing plates, shelf angles, diagonal supports and other structural steel required to support the composite steel deck.

## Supply and installation of tape or metal covers for abutting ends.

# Material

## Composite steel deck shall be formed of metallic coated sheet steel conforming to ASTM A653/A653M *Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process,* minimum Grade 230 with a minimum metallic coating designation of ZF75 (zinc-iron alloy coating) or Z275 (zinc coating). The base steel design thickness shall be 0.76 mm or greater for non-cellular sections, and 0.91/0.91 mm or greater for cellular sections intended for the provision of electrical services.

*NOTE: The base steel design thickness and/or metallic coating shall be increased where necessary in order to satisfy structural, electrical, specified fire resistance rating, or other requirements as called for by the tender documents.*

## Cell closures and flashings shall be supplied of similar material and metallic coating designation to that specified for the composite steel deck. The base steel design thickness shall not be less than 0.76 mm.

# Drawings

## The Buyer shall provide complete architectural and structural plans, specifications, and approved structural steel support spacings correctly dimensioned. The building structural design documents shall include the type and spacing of the fasteners connecting the steel deck to the supporting structure.

## The composite steel deck Erector shall submit ... copies of erection drawings for review. The Buyer shall return one copy with his approval, or with such corrections as he may deem necessary.

## Erection drawings shall show clearly the location of various sheet lengths, sheet quantities, sheet thicknesses, and metallic coating designations.

## When changes are made by the Buyer, the cost of such changes shall be the basis for re-negotiating the contract.

# Design (General)

## In the absence of laws, regulations, ordinances and specifications to the contrary, structural design of composite steel deck as a form shall be in accordance with 7.1 to 7.2 inclusive. The structural design of composite slabs shall be in accordance with good engineering practice based on performance tests conducted by or on behalf of the Manufacturer.

NOTE: CSSBI publication S3 provides criteria for limit states design of composite slabs. CSSBI publication S2 provides criteria for testing composite slabs.

## The non-composite structural properties of composite steel deck shall be calculated in accordance with CAN/CSA-S136.

## Wherever structural framing permits, and subject to reasonable limitations for handling, composite steel deck shall be fabricated to span continuously, as a form, over at least four structural supports (three spans).

## Electrical raceway units shall conform to CSA Standard C22.2 No. 79 *Cellular Metal and Cellular Concrete Floor Raceways and Fittings*.

## Resistance welds used to interconnect top and bottom elements of cellular sections shall be designed in accordance with CAN/CSA-S136, and shall have a maximum spacing of 225 mm parallel to the direction of flutes. Resistance welding procedures and equipment shall be satisfactory to the Canadian Welding Bureau.

# Design of Deck as a Form

## **Strength:** Composite steel deck shall resist the effects of the dead loads due to wet concrete and steel deck, combined with the following minimum construction live loads applied separately:

1. 1 kPa uniform load; or
2. 2 kN/m transverse line load at the centre of the span (may be assumed to have a width of 300 mm).

*NOTE: The uniform construction live load of 1 kPa is considered adequate for typical construction applications that consist of concrete transport and placement by hose and finishing using hand tools. The designer typically has little or no control over means-and-methods of construction, and it should be brought to the attention of the contractor that bulk dumping of concrete using buckets, chutes, or handcarts, or the use of heavier motorized finishing equipment such as power screeds, may require design of the deck as a form using a uniform construction live load of 2.4 kPa or greater.*

## **Deflections:** Calculated deflections shall be based on the uniform dead load due to wet concrete and steel deck. The maximum midspan deflection shall be limited to L/180 or 20 mm whichever is smaller.

NOTE: Calculated deflection is relative to supporting members. For unequal spans, or where additional loads resulting from the deflection of supporting structural members are required to be taken into account, an analysis is necessary. The designer is urged to check the deflection of the total system. Typical load tables are based on uniform slab thickness. If the designer wants to include additional concrete loading on the deck because of frame deflection, the additional load should be shown on the design drawings or stated in the deck section of the contract documents.

# Erection

## All erection work, including field welding or mechanical fasteners, shall be the responsibility of the Erector and such erection work shall be carried out by trained erection crews, all in accordance with the Manufacturer’s and these specifications. Erectors shall be qualified in accordance with CSA Standard W47.1 *Certification of Companies for Fusion Welding of Steel*. Welders shall be qualified for deck welding by the Canadian Welding Bureau.

## Composite steel deck units shall be placed and adjusted to final position on the supporting structure before being permanently fastened thereto. If structural supports are not in proper alignment, the problem shall be reported to the General Contractor in order that the necessary corrections can be made before proceeding with the work.

## Establishment of the datum line for positioning electrified cellular composite steel deck units shall be the responsibility of the General Contractor.

## Composite steel deck shall be adequately connected to structural supports as specified in the building structural design documents. The maximum spacing of fastenings shall be 400 mm along bearing supports. Where arc spot welds are used they shall have a 20 mm nominal top diameter.

## Side laps of adjacent units shall be fastened at intervals not exceeding 600 mm on centre. Closer spacing may be required for diaphragm action, as determined by the building structural designer. For thicknesses 0.91 mm and greater, side laps may be welded using 25 mm long seam welds.

*Note: Side lap weld connections on material thinner than 0.91 mm are permitted by CSA-S136, but not recommended due to the difficulty in making quality welds in thin material.*

## The Erector shall install all flashings or closures at openings and columns shown or called for by the tender documents.

## All cellular composite steel deck units intended for electrical raceways shall be properly leveled. Abutting ends shall be in alignment within 3 mm both vertically and horizontally.

## Bottom elements of cellular composite steel deck units shall not be separated from each other at abutting ends by more than 12 mm.

## No holes shall be made in the walls of cells used as raceways other than those necessary for proper installation of the cellular composite steel deck. Such holes shall be adequately covered to prevent entry of concrete.

## Any internal projection in a cell, due to welding or other operations, that could damage conductor insulation shall be removed or rendered harmless.

# Limitations

## Any damage or alterations by others to the composite steel deck, including that due to construction loads applied at any time, shall not be the responsibility of the Erector or Manufacturer.

# Access

## Access for unloading bundles of deck onto the structure shall be provided by the General Contractor.

# Storage of Materials on Site

## Composite steel deck shall normally be delivered to the jobsite as required for erection, but if site storage becomes necessary, the following requirements shall be observed:

* 1. tilt bundles for drainage;
	2. block bundles off the ground for effective drainage and ventilation;
	3. block long bundles to prevent sagging; and
	4. store away from chemically corrosive substances (e.g. *salt, cement, fertilizer*), away from materials that could contaminate the surface (e.g. *diesel, oil, paint, grease*) and away from site traffic.
	5. If the bundles are to be covered, avoid impermeable material such as plastic and ensure that adequate ventilation is provided to prevent condensation.

## Areas for storage shall be provided by the General Contractor as close to the building as is practicable.

## Protection against damage shall be provided by the General Contractor.

# Cleanup

## Remove all debris of this trade and leave work ready for other trades.