

Standards for Steel Roof Deck

OBSOLETE
HISTORICAL REFERENCE ONLY



CANADIAN

Sheet Steel Building

INSTITUTE

Crestview Plaza, South Service Road, Port Credit, Ontario

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The purpose of this standard is to:

- 1. Update steel roof deck standards.*
- 2. Set minimum quality standards.*
- 3. Assist in the design, specification, and application of steel roof deck.*

Preface

One of the precepts of the Members of the Canadian Sheet Steel Building Institute is the development of and adherence to product standards to promote safety and sound construction practices.

This standard is designed to assist buyers, manufacturers, and erectors of steel roof deck by providing information which can be adopted by reference where desired.

The practices and customs contained herein are in accordance with good engineering practice and based on experience, and include minimum recommended requirements for such factors as design, grade of steel, nominal core thickness, zinc coating, span, welding practices, etc.

STANDARDS for STEEL ROOF DECK

1. SCOPE

- 1.1 This standard covers the design and erection of steel roof deck with cells at a maximum of eight inches on centre and a maximum depth of profile of three inches, and intended for use with built-up roofing placed on top of the deck.
- 1.2 Where reference is made to other publications, such reference shall be considered to refer to the latest edition approved by the organization issuing that publication.

2. GENERAL

- 2.1 This standard is to govern in those cases where the provisions of building codes, architects' and engineers' plans and specifications are not specific. In the event of any conflict between this standard and any legal building regulations, such regulations shall apply and this standard shall only amplify.
- 2.2 When details of design are not clearly specified in the plans and specifications furnished by the Buyer, the Manufacturer shall furnish all materials required in accordance with the current specifications and standards of the Canadian Sheet Steel Building Institute.
- 2.3 CSSBI Technical Bulletin No. 3 "Standard Zinc-Coated (Galvanized) Sheet Steel for Structural Building Products" is a part of this standard.
- 2.4 Supplementary rules or requirements, such as diaphragm action design to resist horizontal wind and seismic forces, may be necessary for applications not covered herein.

2.5 Definitions

- 2.5.1 Manufacturer means a company which fabricates steel roof deck.
- 2.5.2 Erector means an erector or installer of steel roof deck who may also be a Manufacturer.

2.5.3 Buyer means the person, firm or company contracting with the Manufacturer or the Erector for the supply and installation of steel roof deck.

2.5.4 Span means the lesser of the distance, centre to centre of supports for steel roof deck, or the clear distance between support flanges plus the depth of the deck.

2.5.5 Gauge means Manufacturers' Standard Gauge (MSG). (See Technical Bulletin No. 3 for thicknesses, weights, tolerances, etc.).

2.5.6 Built-up Roofing includes vapour barriers, insulations, felts, adhesives, gravel, etc., placed on the steel roof deck.

3. MATERIALS

3.1 General

The steel used for roof deck shall be zinc-coated (galvanized) steel to ASTM Specification A446 (latest revision) "Specification for Zinc-Coated (Galvanized) Steel Sheets of Structural Quality, Coils, and Cut Lengths", Minimum Grade A.

3.2 Uncoated Steel Core

Minimum core nominal thickness shall be 0.0299 inches. (Refer to CSSBI Technical Bulletin No. 3 for thickness tolerances, Tables I and IV, and Mechanical Properties, Table II).

3.3 Zinc Coating

Minimum zinc coating class shall be Wiped Coated. (Refer to CSSBI Technical Bulletin No. 3, Table V, for standards of minimum zinc coating class for typical product exposures).

4. COLLATERAL MATERIAL

4.1 General

Although certain collateral material such as vapour barrier, insulation, water-proofing membrane, and related sheet metal

work is not supplied by the steel roof deck manufacturers, it is desirable to have certain principles followed in the specifying and furnishing of such materials in order to provide an acceptable insulated steel roof deck construction.

This standard is not intended to encroach upon the standard practices of the vapour barrier, insulation, roofing, sheet metal industries, and other suppliers, but is intended only to supplement and amplify such practices.

4.2 Insulation

All steel roof deck shall be covered with a material of sufficient insulating value to prevent condensation under normal occupancy conditions. Insulation shall be adequately attached to the steel deck.

4.3 Vapour Barrier

A vapour barrier system is recommended.

4.4 Roof Covering

A suitable roof covering shall be applied over the insulation and provisions made for thermal movement thereof, if necessary.

4.5 Sheet Metal Work

All flashings, etc., unless otherwise specified, shall be detailed and furnished by others.

4.6 Field Painting

Any field painting shall be the responsibility of the Buyer. It is recommended that following installation, wiped coated steel be painted without delay with a good quality paint designed for the condition of exposure. (Refer to Technical Bulletin No. 3, Table IV, for recommended minimum zinc coating classes for typical product exposures).

5. SAFETY

5.1 General

The following are minimum safety requirements pertaining to steel roof deck construction. In the event of any conflict between these requirements and any legal regulations, such regulations shall apply and these requirements shall only amplify.

- 5.1.1 All steel roof deck being hoisted to the working level shall be tightly banded

and carefully slung employing steel wire rope and using a choker type sling.

- 5.1.2 All bundles shall be tag lined during the ascent of the hoisting operation.

- 5.1.3 All steel roof deck sheets after being laid and aligned, shall be properly secured in place prior to leaving the jobsite at the end of a working day.

- 5.1.4 All loose bundles of steel roof deck sheets shall be secured at the completion of each working day.

- 5.1.5 All steel roof deck cuttings, strappings, packaging material, and other debris pertaining to steel roof deck shall be removed from the roof area and lowered to the ground at the completion of each working day.

6. SPECIFICATION FOR STEEL ROOF DECK

6.1 General

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

6.2 Work Included In This Division

- 6.2.1 Furnishing all labour, materials and equipment necessary to fabricate and, where shown or called for on the tender drawings, hoist into position and erect the steel roof deck.
- 6.2.2 Supplying and installing, where shown or called for on the tender drawings, accessories such as cell closures.
- 6.2.3 Cutting and reinforcing of holes and openings up to 18 inches diameter or square, and the cutting only of holes and openings larger than 18 inches diameter or square, as shown on the tender drawings.

6.3 Work Not Included In This Division

- 6.3.1 Reinforcing or structural framing of openings larger than 18 inches diameter or square.
- 6.3.2 Field painting of the steel roof deck.
- 6.3.3 Mechanical clips, nails, adhesives or other fasteners for securing insulation to steel roof deck.

- 6.3.4 Cutting and drilling of holes for the attachment of suspended ceiling hangers, or for attachment of any work of other trades.
- 6.3.5 Bearing plates, shelf angles, and other structural steel required to support the steel roof deck.
- 6.3.6 Wood nailers, vapour barrier, insulation, and built-up roofing.
- 6.3.7 Architectural trim.

6.4 Materials

6.4.1 The steel roof deck shall be formed of zinc-coated (galvanized) steel to ASTM Specification A446 (Latest revision) "Specification for Zinc-Coated (Galvanized) Steel Sheets of Structural Quality, Coils and Cut Lengths", minimum Grade A with a minimum nominal steel core thickness of 0.0299 inches and a minimum Zinc Coating Class of 0.25 ounces per square foot total both sides.

(Note: Specification writer may specify a heavier minimum nominal steel core thickness and/or a heavier zinc coating class. See Technical Bulletin No. 3 for further details).

6.5 Drawings and Specifications

6.5.1 The Buyer shall provide complete architectural and structural plans, specifications, and approved structural steel erection diagrams with roof purlin spacings correctly dimensioned. Should the purlin spacing vary from the original architectural and structural design drawings, this shall be brought to the attention of the Buyer.

6.5.2 Erection drawings, furnished by the Manufacturer, shall clearly show the location of various sheet lengths and sheet quantities, gauges and protective coatings. Quantities and lengths of steel roof deck sheets shall be the responsibility of the Manufacturer.

6.5.3 This contractor shall submit copies of erection drawings for approval. The Buyer shall return one copy with his

approval or with such corrections as he may deem necessary. The Manufacturer or Erector shall not start shop work prior to final approval of drawings unless approval is waived by the Buyer.

6.5.4 When changes are made by the Buyer the cost of such changes shall be the basis of re-negotiations of the contract.

6.6 Design

6.6.1 In the absence of laws, regulations, ordinances and specifications to the contrary, structural design of the steel roof deck shall be in accordance with the following:

6.6.1.1 Structural properties shall be calculated using the current edition of Canadian Standards Association standard S136 "Design of Light Gauge Steel Structural Members", or the AISI "Specification for the Design of Cold-Formed Steel Structural Members".

6.6.1.2 Wherever structural steel layout permits, and subject to reasonable limitations for handling, the steel roof deck shall be designed and fabricated to span continuously over at least three spans.

6.6.1.3 The allowable live load due to deflection limitations shall be calculated with the following formulae:

For Single Spans:

$$W_L = \frac{384 K E I}{5 \times 144 L^3}$$

For Two Equal Spans:

$$W_L = \frac{384 K E I \times 2.4}{5 \times 144 L^3}$$

For Three or More Equal Spans:

$$W_L = \frac{384 K E I \times 1.89}{5 \times 144 L^3}$$

Where:

W_L = Live load (snow load) psf but not less than 40 psf.

E = Modulus of Elasticity
= 29.5×10^6 psi.

K = 1/360 for steel roof decks supporting a plastered ceiling

K = 1/240 for all other steel roof deck.

I = Moment of Inertia at the design stress with top surface in compression in.4/ft. of width.

L = Span, ft.

6.6.1.4 The allowable total load due to stress limitations shall be calculated with the following formulae:

For Single Span:

$$W_T = \frac{Sf}{1.5 L^2}$$

For Two Equal Spans use the lesser of:

$$W_T = \frac{S_1 f}{1.5 L^2} \quad W_T = \frac{32 S f}{27 L^2}$$

For Three or More Equal Spans use the lesser of:

$$W_T = \frac{S_1 f}{1.2 L^2} \quad W_T = \frac{25 S f}{24 L^2}$$

Where:

W_T = Total load in psf, but not less than 50 psf.

S = Section Modulus at design stress with top surface in compression, in.3/ft. of width.

S_1 = Section Modulus at design stress with bottom surface in compression, in.3/ft. of width.

f = Design stress, psi

= 20,000 psi for Grade A Steel

= 22,400 psi for Grade B Steel

L = Span, ft.

6.6.1.5 The allowable total load due to web crippling shall be calculated as follows:

For Single Span:

$$W_T = \frac{2 P}{L}$$

For Two Equal Spans use the lesser of:

$$W_T = \frac{8 P}{3 L} \quad W_T = \frac{4 P_1}{5 L}$$

For Three or More Equal Spans use the lesser of:

$$W_T = \frac{5 P}{2 L} \quad W_T = \frac{10 P_1}{11 L}$$

Where:

W_T = Total load in psf, but not less than 50 psf.

P = Allowable end reaction at the end supports.

P_1 = Allowable reaction at the intermediate supports, lbs./ft. of width.

L = Span, ft.

6.6.1.6 The steel roof deck shall have interlocking male and female side laps to connect adjacent parallel units.

6.7 Erection

6.7.1 When under a supply and erection contract, all erection work shall be the responsibility of the Manufacturer and such erection work shall be carried out by the Manufacturer's trained erection crews or Manufacturer's approved erector, all in accordance with the Manufacturer's specifications.

- 6.7.2 The steel roof deck shall be placed on the supporting steelwork and adjusted to final position before being permanently secured thereto with each unit brought to a proper bearing on the supports. If supporting steelwork is not in proper alignment or at correct levels, the problem shall be reported to the General Contractor in order that the necessary corrections be made before proceeding with the work.
- 6.7.3 The steel roof deck shall be welded to the supporting steel with $\frac{3}{4}$ inch diameter arc welds at 16 inch maximum centres at all bearing points.
- 6.7.4 End laps shall be not less than 2 inches and shall be formed over supports.
- 6.7.5 The side laps shall be mechanically fastened at not more than 36 inch centres. (Heavy gauges may be welded).
- 6.7.6 For openings up to 6 inch diameter or square, no reinforcement is necessary provided that not more than two vertical webs are removed.
- 6.7.7 For openings with 6 to 12 inch diameter or square, provide not less than 2 x 2 x $\frac{1}{4}$ inch angle reinforcing to frame across each side of the hole in a direction perpendicular to the flutes, and the angles shall be welded to at least two flutes on either side of the hole. Alternatively, reinforcing shall be determined through a structural analysis with the loads involved.
- 6.7.8 For openings 12 to 18 inch diameter or square, provide suitable reinforcement based on a structural analysis of the loads involved.
- 6.7.9 If additional openings not shown or called for on the tender drawings are required, such openings shall be cut and reinforced under the work of this division, but the cost of such extra work shall be charged to the division requiring the openings.
- 6.7.10 Immediately the deck is welded in place, the steel deck surface shall be inspected, and all areas where zinc coating has been burned by welding shall be covered by a suitable zinc-enriched paint, applied according to the paint manufacturer's instructions.
- 6.8 Limitations**
- 6.8.1 Any damage or alterations by others to the steel roof deck shall not be the responsibility of the Erector or Manufacturer.
- 6.9 Storage of Materials on Site**
- 6.9.1 Steel roof deck shall normally be delivered to the jobsite as required for erection, but if site storage becomes necessary, the bundles of deck shall be stacked on wood blocking clear of the ground and tilted slightly to ensure that no water lies on the material.
- 6.9.2 Areas for storage shall be provided by the General Contractor as close to the building as is practicable.
- 6.9.3 Protection against damage shall be provided by the General Contractor.
- 6.10 Cleanup**
- 6.10.1 Remove all debris of this trade and leave work ready for other trades.