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Metric Zinc Coated (Galvanized) Sheet Steel for Structural Building Products

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PREFACE

One of the precepts of the Members of the Canadian Sheet Steel Building Institute is the development of, and adherence to, standards which promote safety and good practice.

This Technical Bulletin is intended to assist in the specifying of zinc-coated sheet steel for structural building products. It provides basic technical information in metric format and outlines the minimum quality standards considered appropriate for various end applications.

REFERENCE PUBLICATIONS

American Society for Testing and Materials (ASTM)

A446 — Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality.

Canadian Sheet Steel Building Institute (CSSBI)

CSSBI 101M — Zinc Coated Structural Quality Steel Sheet for Roof and Floor Deck.

CSSBI TECHNICAL BULLETIN No. 6

METRIC ZINC COATED (GALVANIZED) SHEET STEEL FOR STRUCTURAL BUILDING PRODUCTS

1. SCOPE

1.1 These requirements apply to zinc coated (galvanized) sheet steel for structural building products such as roof deck, floor deck, cladding, and insulated panels, plus similar components of steel building systems.

(Note: Where exterior building products are to be coated with a paint system as delivered from a fabricator, see CSSBI Technical Bulletin No. 7 "Prefinished and Post-Painted Galvanized Sheet Steel for Exterior Building Products," Pub. No. 40.7)

1.2 Unless otherwise stated, where reference is made to another publication, the reference shall be to the latest edition or revision approved by the organization issuing the publication.

2. MATERIAL STANDARDS

2.1 Zinc coated material for steel roof and floor deck shall conform to CSSBI Specification 101M *Zinc Coated Structural Quality Steel Sheet for Roof and Floor Deck*, Grade A or B. See Table 1M for specified mechanical properties.

2.2 Zinc coated material for sheet steel cladding and insulated panels, including similar components of steel building systems, shall conform to ASTM A446 *Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality*, Grade A, B, C, D, E or F. See Table 1M for specified mechanical properties.

3. THICKNESS

3.1 All sheet steel thicknesses are expressed in millimetres to 2 decimal places.

3.2 Base steel **nominal** thickness is used to establish section properties and for structural design calculations.

3.3 Overall zinc coated **nominal** thickness (base steel nominal thickness plus thickness allowance for zinc coating) is used by a Fabricator when placing an order with a Producer.

3.4 For material ordered to CSSBI 101M the base steel **actual** thickness shall be within the stated tolerance on the base steel nominal thickness. (Table 2M)

3.5 For material ordered to ASTM A446 the overall zinc coated **actual** thickness shall be within the stated tolerance on the overall zinc coated nominal thickness. (Table 3M)

3.6 Base steel **actual** thickness is used for determination of base steel mechanical properties by test. This thickness is determined by measurement and *not* by deducting calculated zinc coating thickness from overall thickness.

4. MINIMUM THICKNESS

4.1 For adequacy and safety in design and for aesthetic and serviceability considerations where applicable, the base steel minimum thickness for various building products shall be in accordance with Table 4M.

5. ZINC COATING

5.1 Zinc coating applied to steel sheet by the hot-dip method, as required by CSSBI 101M and ASTM A446 is offered in a series of unit mass weights (grams of zinc per square metre of sheet, total both sides) each unit mass being given a zinc coating designation.

Refer to Table 5M for nomenclature and the calculated thickness of zinc representative of each designation.

(Note: Z275 coating is the most frequently specified and is generally the most readily available)

5.2 Z275 and heavier coatings are normally furnished with a regular spangle. When so specified, the Z275 coating can be furnished with minimized spangle.

5.3 Wiped Coat, under the designation ZF075, refers to the coating of zinc-iron alloy remaining on a steel sheet surface from which free zinc has been wiped as the sheet leaves the zinc pot. The coating surface is matte grey in appearance and spangle-free, suitable for painting without special treatment. Widely used for steel deck and liner sheets of insulated panels, the zinc-iron alloy coating offers short term protection to the base steel during fabrication, shipment, site storage, and erection. For long term or severe exposure in service the heavier Z275 coating should be specified as a minimum.

5.4 Electrolytic zinc coated steel sheets, as covered by ASTM A591 *Steel Sheet, Cold-Rolled, Electrolytic Zinc-Coated*, are somewhat similar in appearance to Wiped Coat except that the zinc coating is generally thinner. These light coatings are not intended to withstand anything but mild exposure without proper additional chemical treatment and painting. For structural building products, electrolytic zinc coatings should be at least equivalent in weight to Wiped Coat, and, (as noted in 5.3) for long term or severe exposure in service a heavier coating at least equivalent to Z275 should be specified.

6. MINIMUM ZINC COATING

6.1 Zinc coating is required for all sheet steel structural building products except those fabricated from stainless or weathering steels or otherwise provided with suitable atmospheric corrosion resistance. The minimum coating shall be ZF075 (wiped coat). For exterior use the minimum coating shall be Z275. Refer to Table 6M.

6.2 For unusual exposure conditions requiring special consideration consult CSSBI or a CSSBI Member Company.

7. VERIFICATION OF THICKNESS

7.1 To spot check for thickness, the overall sheet thickness is measured to the nearest 0.01 millimetre (using a flat-anvil micrometer equipped with a ratchet stop, or other suitable device), at a location at least 10 mm from an edge or corner bend. The overall thickness as measured should correspond to the overall nominal thickness as specified, any difference being within the tolerance permitted on the base steel thickness in the case of CSSBI 101M material (Table 2M), or within the tolerance permitted on overall thickness in the case of ASTM A446 material (Table 3M).

For example, material specified to have a base steel nominal thickness of 0.76 mm and a Z275 coating would have an overall nominal thickness of 0.80 mm (Table 2M, Table 3M). The acceptable thickness limits are 0.74/0.90 mm for CSSBI 101M material (from Table 2M) and 0.70/0.90 mm for ASTM A446 material

(from Table 3M). For usual structural applications, only the lower thickness limit is of importance.

7.2 The procedure given in 7.1 is **not** suitable for determination of material mechanical properties by test, or other situations where precise thickness determination is needed. For these cases the actual base steel thickness is measured after careful removal of the coating.

8. GAUGE NUMBERS

The use of gauge numbers to specify thickness of sheet steel structural products has been discontinued within the industry.

9. SPECIFICATION OF MATERIAL

9.1 Designers and specification writers should specify for a particular product:

- (a) specification designation and grade of steel required
- (b) base steel nominal thickness required
- (c) zinc coating designation required
- (d) any special requirements

The Fabricator will incorporate the information furnished to him when preparing his material purchase order or when requisitioning material from his existing stock.

9.2 Typical Call-up for Steel Roof Deck Material

"Steel Roof deck shall be fabricated from sheet steel conforming to CSSBI 101M (latest revision) Grade **A**, with a base steel nominal thickness of **0.76** mm and a zinc coating designation of **Z275**."

9.3 Typical Call-up for Steel Wall Panel Material

"The exterior exposed element of the wall panel shall be fabricated from sheet steel conforming to ASTM A446 (latest revision) Grade **A**, with a base steel nominal thickness of **0.61** mm and a zinc coating designation of **Z275**. The interior exposed element shall be fabricated from sheet steel conforming to ASTM A446 (latest revision) Grade **A** with a base steel nominal thickness of **0.61** mm and a zinc coating designation of **ZF075**."

TABLE 1M — METRIC MECHANICAL PROPERTIES: ZINC COATED STRUCTURAL QUALITY STEEL SHEET, COILS AND CUT LENGTHS

Specified Mechanical Property	ASTM A446-76						CSSBI 101-78M	
	Gr.A	B	C	D	E*	F	Gr.A	B
Tensile Strength, min (MPa)	310	360	380	450	570	480	310	360
Yield Point, min (MPa)	230	255	275	345	550	345	230	255
Elongation in 50 mm, min (percent)	20	18	16	12	—	12	20	18

*Full hard material with minimum formability. For specific applications only.

TABLE 2M — METRIC THICKNESS DIMENSIONS AND TOLERANCES: CSSBI 101M MATERIAL

Base Steel Nominal (1) Thickness, mm	Tolerance on Base Steel Nominal Thickness Over (+) and Under (-), mm		Overall Zinc Coated Nominal Thickness (mm)						
			Zinc Coating Designation						
			(2) ZF075	Z275	Z350	Z450	Z600	Z700	
2.67	+0.18	-0.12	2.67	2.71	2.72	2.74	2.76	2.77	
1.91	+0.15	-0.10	1.91	1.95	1.96	1.98 (3)	2.00	2.01	
1.52	+0.15	-0.10	1.52	1.56	1.57	1.59	1.61	1.62	
1.22	+0.15	-0.10	1.22	1.26	1.27	1.29	1.31	1.32	
0.91	+0.10	-0.06	0.91	0.95	0.96	0.98	1.00 (4)	1.04	
0.76	+0.10	-0.06	0.76	0.80	0.81	0.83	0.85 (4)	0.86	

NOTES:

- (1) Base Steel Nominal Thickness is used to establish section properties and for structural design calculations.
- (2) The small thickness increment for ZF075 (wiped coat) is disregarded.
- (3) Enquire as to delivery date, if time is critical.
- (4) Enquire as to availability.

TABLE 3M — METRIC THICKNESS DIMENSIONS AND TOLERANCES: ASTM A446 MATERIAL

Base Steel Nominal Thickness (1) (mm)	Overall Zinc Coated Nominal Thickness (mm)						Tolerance on Overall Zinc Coated Nominal Thickness (5) over and under (mm)
	Zinc Coating Designation (2)						
	(3) ZF075	Z275	Z350	Z450	Z600	Z700	
2.67	2.67	2.71	2.72	2.74	2.76	2.77	0.23
1.91	1.91	1.95	1.96	1.98 (4)	2.00	2.01	0.20
1.52	1.52	1.56	1.57	1.59	1.61	1.62	0.15
1.22	1.22	1.26	1.27	1.29	1.31	1.32	0.13
0.91	0.91	0.95	0.96	0.98	1.00	1.01	0.10
0.76	0.76	0.80	0.81	0.83	0.85 (6)	0.86	0.10
0.61	0.61	0.65	0.66	0.68	0.70	0.71	0.10
0.46	0.46	0.50	0.51	0.53	0.55	0.56	0.10

NOTES:

- (1) Base steel nominal thickness is used to establish section properties and for structural design calculations.
- (2) The listed zinc coating designations apply to metric A446 material from Canadian producers. There are some minor variations from the coating designations given in ASTM A446.
- (3) The small thickness increment for ZF075 (wiped coat) is disregarded.
- (4) Enquire as to delivery date, if time is critical.
- (5) Includes allowance for variation in both base steel thickness and coating thickness.
- (6) Enquire as to availability.

TABLE 4M — CSSBI STANDARDS FOR BASE STEEL MINIMUM METRIC THICKNESS

PRODUCT	Base Steel Minimum Thickness (mm) (1)	Base Steel Nominal Thickness (mm)
Steel Roof Deck	0.70	0.76
Steel Floor Deck, Structural only	0.70(2)	0.76(2)
Cellular Steel Floor Deck with Wired Raceways and 64 mm or greater concrete cover thickness	0.85(2)	0.91(2)
Cellular Steel Floor Deck with Wired Raceways and less than 64 mm concrete cover thickness	1.42	1.52
Cladding and Panels (interior and exterior exposed elements)	0.36	0.46

NOTES:

- (1) Thickness is measured at any point not less than 10 mm from an edge or corner bend.
- (2) Flat sheet used as the lower element of a two-element section shall have a base steel minimum thickness of 1.12 mm (1.22 mm nominal) where sprayed fire protection is applied to the underside unless otherwise listed by Underwriters' Laboratories of Canada for a specific assembly.

TABLE 5M — METRIC ZINC COATING DESIGNATION, MINIMUM UNIT MASS, AND COATING THICKNESS ALLOWANCE

Zinc Coating Designation	Minimum Unit Mass by Triple Spot Test (g/m ² of sheet)	Coating Thickness Allowance, Nominal, Total Both Sides of Sheet (mm)
Z700	700	0.10
Z600	600	.08
Z450	450	.07
Z350	350	.05
Z275	275	.04
ZF075 (wiped)	75	.01(1)

NOTES:

- (1) The coating thickness allowance for wiped coat historically has been disregarded.

TABLE 6M — CSSBI STANDARDS FOR MINIMUM METRIC ZINC COATING

PRODUCT OR ELEMENT	MINIMUM ZINC COATING ON PRODUCT OR ELEMENT	
	Unpainted	Painted(1)
Exterior Exposed Cladding and Exterior Exposed Elements of Wall/Roof Panels	Z275	Z275
Interior Exposed Roof/Floor Deck (2) and Interior Exposed Elements of Wall/Roof Panels	Z275	ZF075
Roof/Floor Deck with ceilings under, in buildings conditioned for human comfort	ZF075	ZF075
All products or elements exposed to a heavy industrial or otherwise corrosive environment	Z275+	Z275+
	Consult CSSBI or a CSSBI Member Company for recommendations concerning particular conditions	

NOTES:

- (1) "Painted" refers to products or elements fabricated from prefinished (coil coated) sheet, as well as those which are factory post-painted or field painted using appropriate procedures.
- (2) Roof/Floor Deck which acts as an enclosure of an air-handling system should be considered as "interior exposed."

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