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Metric Standard for Sheet Steel Cladding

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**CANADIAN
SHEET STEEL
BUILDING INSTITUTE**

HISTORICAL REFERENCE ONLY

The purpose of this Standard is to:

1. Define current practice.
2. Set minimum quality standards.
3. Assist in the design, specification and use of Sheet Steel Cladding.

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 good practices.

This Standard is intended to assist Buyers, Fabricators, and Erectors of Sheet Steel Cladding by providing information which can be adopted by reference where desired.

The requirements contained herein are in accordance with sound engineering principles, augmented by experience. They include recommended minimum requirements for such factors as grade of steel, base steel nominal thickness, zinc coating designation, and loading, as well as design, fabrication and erection in general.

This Standard is based on the SI metric system. Reference publications may employ Imperial or U.S. customary units.

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REFERENCE PUBLICATIONS

This Standard makes reference to the following:

American Iron and Steel Institute (AISI)

Specification For The Design of Cold-Formed Stainless Steel Structural Members.

American Society for Testing and Materials (ASTM)

A666 Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar for Structural Applications.

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

A525 Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, General Requirements.

A606 Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low Alloy, with Improved Corrosion Resistance.

Canadian Standards Association (CSA)

S136 Cold Formed Steel Structural Members

Canadian Sheet Steel Building Institute (CSSBI)

40.6 Metric Zinc Coated (Galvanized) Sheet Steel For Structural Building Products — Technical Bulletin No. 6.

40.7 Prefinished and Post-Painted Galvanized Sheet Steel For Exterior Building Products — Technical Bulletin No. 7.

METRIC STANDARD for SHEET STEEL CLADDING

1. SCOPE

1.1 This Standard covers the design, fabrication and erection of wall and roof cladding formed from a suitable type of steel sheet, such as:

- (a) zinc coated (galvanized),
- (b) prefinished (coil coated),
- (c) stainless, or
- (d) weathering (atmospheric corrosion resisting)

1.2 This Standard applies to Sheet Steel Cladding for use on buildings with low internal humidity and includes the necessary closures, gaskets, caulking, flashings and fasteners to effect a weathertight installation in accordance with the job plans and specifications.

1.3 This Standard does not cover items which are normally outside the scope of work of the Sheet Steel Cladding Fabricator and Erector such as, but not limited to:

- (a) structural steel girts, purlins, wall supports, and roof supports,
- (b) base angles and caulking of same,
- (c) doors, sash, and louvers, including structural framing or reinforcement for same and other openings,
- (d) field painting, and
- (e) cant or parapet flashing, and other flashing associated with other trades.

(NOTE: Sheet steel material suitable for exposed flashing, etc., usually can be supplied to other trades by arrangement with the Fabricator. This is recommended where appearance is important.)

1.4 This Standard does not apply to roof deck where built-up roofing or other covering is to be placed on top of the deck, nor to roof cladding for use on flat roofs. (Refer to CSSBI *Standard for Steel Roof Deck*, Pub. 38.36 for recommended minimum requirements applicable to flat roofs.)

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 conflict with a legal building regulation, such regulation shall apply and this Standard shall only amplify.

2.2 Where reference is made to another publication, such reference shall refer to the latest edition or revision approved by the organization issuing that publication, unless otherwise stated.

2.3 When the details of the design are not clearly specified in the plans and specifications furnished by the Buyer, the Fabricator shall furnish all materials required in accordance with the current specifications and standards of the Canadian Sheet Steel Building Institute (CSSBI).

2.4 CSSBI Publication 40.6 *Metric Zinc Coated (Galvanized) Sheet Steel For Structural Building Products* is a part of this Standard. CSSBI Publication 40.7 *Prefinished and Post-Painted Galvanized Sheet Steel For Exterior Building Products* is a part of this Standard.

2.5 For applications not covered herein, such as abnormal corrosion conditions, diaphragm action to resist in-plane shear forces, loads other than those stipulated in Section 8, etc., this Standard should be supplemented by such additional requirements as current good practice would indicate.

3. DEFINITIONS

3.1 **Buyer** means the person, firm or company contracting with the Fabricator or Erector for the supply and installation of Sheet Steel Cladding.

3.2 **Erector** means an erector of Sheet Steel Cladding who may also be a Fabricator.

3.3 **Fabricator** means a fabricator of Sheet Steel Cladding.

3.4 **Roof** means a surface which is inclined less than 70 degrees from the horizontal.

3.5 **Sheet Steel Cladding** means those components of sheet steel which form the exposed exterior surface of a wall, or roof, of a building.

3.6 **Span** means the lesser of (a) the distance between centres of supports, and (b) the clear distance between supports plus the depth of the cladding profile.

3.7 **Thickness** of sheet steel used for cladding means the base steel thickness exclusive of any coating. **Nominal Thickness** means the representative base steel thickness used to establish section properties. **Minimum Thickness** means the least thickness obtained by measurement at any point located at least 10 mm from an edge or corner bend.

3.8 **Wall** means a surface which is inclined 20 degrees or less from the vertical.

4. SHEET STEEL REQUIREMENTS

4.1 Materials

4.1.1 Zinc coated (galvanized) sheet steel used for cladding and flashing shall conform to ASTM A446 *Standard Specification for Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality*, minimum Grade A, minimum zinc coating designation Z275, and Nominal Thickness not less than 0.46 mm. Refer to CSSBI Publication 40.6 for details.

4.1.2 Prefinished and post-painted galvanized sheet steel, in addition to meeting the requirements of 4.1.1, shall also conform to the requirements of CSSBI Publication 40.7.

4.1.3 Stainless sheet steel used for cladding and flashing shall conform to ASTM A666 *Standard Specification for Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar for Structural Applications*. Exposed surfaces shall have a finish as specified by the plans and specifications.

4.1.4 Weathering (atmospheric corrosion resisting) sheet steel used for cladding and flashing shall conform to ASTM A606 *Standard Specification for Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy, with Improved Corrosion Resistance*, Type 4 having a chemical composition recommended by the steel producer for weathering applications. Nominal Thickness shall not be less than 1.22 mm. Exposed surfaces shall be free of oil, paint, lacquer and other coatings which would inhibit weathering.

4.1.5 Fasteners for attaching cladding to structural framing or other structural support, and for attaching flashing to cladding, shall be as recommended by the Fabricator. Fasteners for attaching stainless steel cladding and flashing shall be made from chromium-nickel alloy steels.

4.2 Minimum Thickness

The Minimum Thickness of sheet steel used for cladding and flashing shall not be less than the difference between the specified Nominal Thickness and its permissible negative deviation (under-tolerance).

5. FABRICATION

5.1 General

Sheet Steel Cladding shall be fabricated in accordance with the applicable requirements of CSA S136 *Cold Formed Steel Structural Members*. Care shall be taken to protect exposed surfaces and other features that are important to appearance.

5.2 Tolerances

5.2.1 Upon completion of fabrication, the depth of Sheet Steel Cladding shall not be more than 1 mm under the design depth.

5.2.2 Upon completion of fabrication, the cover width of Sheet Steel Cladding shall not exceed the specified cover width by more than 1 percent.

6. COLLATERAL MATERIAL

6.1 All collateral material used in wall or roof systems employing Sheet Steel Cladding shall be of a nature, style and form which will not damage or impair the servicability of, nor — in the case of exposed surfaces — the appearance of, Sheet Steel Cladding. Collateral material may include, but is not limited to, *vapour barrier, insulation, interior steel liner, sub-girts or purlins, and studs*.

7. SAFETY DURING ERECTION

7.1 Minimum safety requirements pertaining to Sheet Steel Cladding erection are outlined in 7.2 to 7.7 inclusive. In the event of any conflict between these requirements and any legal regulations, the latter shall apply and these requirements shall only amplify.

- 7.2 All cladding components being hoisted to the working level shall be adequately banded and carefully slung employing steel wire rope.
- 7.3 All bundles shall be tag lined during the ascent of the hoisting operation. Precaution shall be taken to avoid damage to cladding components and to prevent marring of exposed surfaces.
- 7.4 All cladding components, after being positioned, shall be adequately secured in place as quickly as possible and in all cases prior to leaving the jobsite at the end of the working day.
- 7.5 All loose bundles of cladding components shall be adequately secured at the completion of each working day.
- 7.6 All scaffolds, platforms, ladders, etc., required by the Erector for installation of cladding components shall at all times be properly secured to prevent accidental movement or collapse.
- 7.7 All cuttings, strapping, packaging materials, and other debris pertaining to cladding components shall be cleaned up each working day and disposed of in a suitable manner.

8. GUIDE SPECIFICATION FOR SHEET STEEL CLADDING

8.1 General

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

8.2 Work Included in this Division

- 8.2.1 Furnish all labour, materials and equipment necessary to fabricate and erect the Sheet Steel Cladding as shown or called for by the tender documents.
- 8.2.2 Supply and install accessories where shown or called for by the tender documents, e.g. *cell closures* and *flashings*.
- 8.2.3 Cut and flash wall penetrations shown or called for by the tender documents.

8.3 Work Not Included in this Division

- 8.3.1 Structural steel girts and wall supports.
- 8.3.2 Structural steel purlins and roof supports.

- 8.3.3 Field painting.
- 8.3.4 Base angles and caulking of same.
- 8.3.5 Doors, sash, louvers, ventilators.
- 8.3.6 Structural framing or reinforcement for doors sash penetrations or other openings.
- 8.3.7 Cant or parapet flashings, and flashings associated with other trades.
- 8.3.8 Steel roof and floor deck.

8.4 Materials

8.4.1 Sheet Steel Cladding and flashing shall be formed of steel conforming to one of the following material standards, as applicable:

- (a) ASTM A446 *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality*, minimum Grade A, with a base steel Nominal Thickness of ____ mm or greater and minimum zinc coating designation **Z275**. Where material is to be pre-finished (coil coated) or post-painted, the material shall also conform to CSSBI Publication 40.7 *Prefinished and Post-Painted Galvanized Sheet Steel For Exterior Building Products*. The Finish Coat shall be . . . (Specify series, colour, etc., as applicable).
- (b) ASTM A666 *Standard Specification for Austenitic Stainless Steel, Sheet, Strip Plate and Flat Bar for Structural Applications* type _____. Exposed surfaces shall have _____ finish.
- (c) ASTM A606 *Standard Specification for Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low Alloy, with Improved Corrosion Resistance*, type 4, having a chemical composition recommended by the steel producer for weathering applications. Base steel Nominal Thickness shall be ____ mm or greater.

(NOTE: Base steel nominal thickness should not be less than 0.46 mm for zinc coated sheet and 1.22 mm for weathering steel sheet. Minimum zinc coating for zinc coated sheet, painted or not, is Z275 for exterior exposure.)

8.5 Drawings and Specifications

- 8.5.1 The Buyer shall provide complete architectural and structural plans, specifications, and approved structural steel erection drawings with girt and purlin spacings correctly dimensioned.
- 8.5.2 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.
- 8.5.3 Erection drawings shall show clearly the location of various cladding units, section designations, finishes, quantities and any other information required for erection purposes.
- 8.5.4 When changes are made by the Buyer, the cost of such changes shall be the basis for re-negotiating the contract.

8.6 Design

- 8.6.1 In the absence of laws, regulations, ordinances and specifications to the contrary, the structural design of Sheet Steel Cladding shall be in accordance with 8.6.2 to 8.6.8 inclusive.
- 8.6.2 Structural properties shall be calculated in accordance with CSA Standard S136 *Cold Formed Steel Structural Members*, or AISI *Specification for Design of Cold-Formed Stainless Steel Structural Members*, whichever is applicable.
- 8.6.3 Wherever structural framing permits, and subject to reasonable limitations for handling, Sheet Steel Cladding shall be designed and fabricated to span continuously over at least three spans.

8.6.4 Design pressures due to wind, snow or other forces, and related pressure coefficients, shall be as prescribed by the structural plans and specifications. Design pressures and pressure coefficients shall be in accordance with the *National Building Code of Canada* unless otherwise stated.

8.6.5 Sheet Steel Cladding components shall be adequately interconnected and adequately fastened to structural supports to sustain design loads.

8.6.6 Deflection of Sheet Steel Cladding components due to uniformly distributed wind and/or snow pressure shall not exceed 1/90 of the span for walls, nor 1/180 of the span for roofs.

8.6.7 Maximum uniform live load based on deflection shall be calculated as follows:

For single spans:

$$W_L = \frac{384 E I}{5 C_d L^3}$$

For two equal spans:

$$W_L = \left[\frac{384 E I}{5 C_d L^3} \right] \times 2.4$$

For three or more equal spans:

$$W_L = \left[\frac{384 E I}{5 C_d L^3} \right] \times 1.89$$

Where:

W_L = allowable live load (wind and/or snow pressure), kPa

E = modulus of elasticity
 = 203,000 MPa for carbon and low alloy steel
 = 193,000 MPa for stainless steel

C_d = deflection coefficient
 = 90 for wall cladding
 = 180 for roof cladding

I = moment of inertia at the design stress with exterior surface in compression for positive net wind or snow pressures; or with exterior surface in tension for negative net wind pressure; mm⁴/m of width

L = Span, mm

8.6.8 Maximum uniform total load based on bending stress shall be calculated as follows:

For single span:

$$W_T = \frac{8FS}{L^2}$$

For two equal spans, use the lesser of:

$$W_T = \frac{8FS_1}{L^2} \quad W_T = \frac{128 FS}{9L^2}$$

For three or more equal spans, use the lesser of:

$$W_T = \frac{10FS_1}{L^2} \quad W_T = \frac{12.5FS}{L^2}$$

Where:

W_T = allowable uniform total load normal to the cladding surface, kPa

S = section modulus at design stress with exterior surface in compression for positive net total load; or with exterior surface in tension for negative net total load, mm³/m of width

S_1 = section modulus at design stress with exterior surface in tension for positive net total load; or with exterior surface in compression for negative net total load, mm³/m of width

F = allowable design stress for the type and grade of steel to be used, MPa

L = Span, mm

8.7 Erection

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

8.7.2 Sheet Steel Cladding shall be adjusted to final position before

being permanently fastened to structural supports. If such supports are improperly aligned, levelled or plumbed, the problem shall be reported to the General Contractor in order that the necessary corrections be made before proceeding with the work.

8.7.3 Endlaps shall be located over supports. Minimum endlaps shall be:

- 50 mm for wall cladding
- 100 mm for roof cladding used on roofs with a slope of 1 in 4 or more
- as per Fabricator's specification for roofs sloping less than 1 in 4

8.7.4 Sidelaps, if used, shall be connected at intervals not exceeding 600 mm.

8.7.5 Openings, and any necessary flashing, shall be provided as indicated by the tender documents.

8.7.6 If additional openings not shown or called for by the tender documents are required, such openings shall be cut and flashed under the work of this division, but the cost of such extra work shall be charged to the division requiring the openings.

8.7.7 Where cutting or drilling coated material is undertaken, care shall be exercised to ensure that cuttings do not remain to rust on exposed cladding surfaces. Where practicable, cutting and drilling shall be conducted so that cuttings do not strike or accumulate on exposed cladding surfaces.

8.8 Limitations

8.8.1 Any damage or alterations by others to the Sheet Steel Cladding shall not be the responsibility of the Erector or Fabricator.

8.9 Access

8.9.1 Access for unloading bundles of cladding onto or adjacent to the structure shall be provided by the General Contractor.

8.10 Storage Of Materials On Site

Sheet Steel Cladding shall normally be delivered to the jobsite as required for erection, but if site storage becomes necessary, suitable storage areas shall be provided by the General Contractor as close to the building as is practicable. Preferably this storage shall be under cover.

When stored, all bundles of Sheet Steel Cladding shall be stacked on wood blocking, clear of the ground and tilted sufficiently to ensure that no water remains on the material. All bundles shall be opened on the underside to allow drainage from leaks or condensation.

(NOTE: When stored under certain conditions of humidity and temperature fluctuations, zinc coated steel may exhibit white staining of the coating surface where moisture has accumulated. A nominal amount of white staining, also known as wet storage stain, is not detrimental to the functioning of the product and is usually considered acceptable.)

8.11 Clean Up

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

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