

# Standard for Steel Building Systems

OBSOLETE  
HISTORICAL REFERENCE ONLY

CSSBI 30M-95  
April, 1995



CANADIAN  
**SHEET STEEL**  
BUILDING INSTITUTE

## PREFACE

One of the objects of the CSSBI and its members is the development of standards which promote safety, performance and good practice. This Standard is published to assist designers, specifiers and users of Steel Building Systems (SBS) by providing information which can be adopted by reference where desired. It also can act as a reference for building code officials and other governing authorities.

The material presented herein has been prepared for the general information of the reader and care has been taken to ensure that the technical provisions contained herein are in accordance with sound engineering principles, augmented by experience. 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 liability for the suitability of this Standard for any general or particular application.

Of necessity, much of the detailed information concerning the design requirements are contained in the various publications to which this Standard makes reference.

## REFERENCE PUBLICATIONS

### American Society for Testing and Materials (ASTM)

- A653/A653M** Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process, Structural (Physical) Quality  
**A792M** Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot Dip Process, General Requirements (Metric)

### Canadian Sheet Steel Building Institute (CSSBI)

- CSSBI B8-95** Buildings Incorporating Steel Building Systems: Responsibilities of the Parties Involved  
**CSSBI B15-93** Snow, Wind and Earthquake Load Design Criteria for Steel Building Systems  
**CSSBI C1-95** Certificate of Design and Manufacturing Conformance for the Steel Building System Described

### Canadian Standards Association (CSA)

- CAN/CSA-S16.1-M** Limit States Design of Steel Structures  
**CAN/CSA-S136-M** Cold Formed Steel Structural Members  
**CAN/CSA-A660-M** Certification of Manufacturers of Steel Building Systems  
**W47.1** Certification of Companies for Fusion Welding of Steel Structures  
**W55.3** Resistance Welding Qualification Code for Fabricators of Structural Members used in Buildings  
**W59-M** Welded Steel Construction (Metal Arc Welding)

### National Research Council of Canada

- National Building Code of Canada  
The Supplement to the National Building Code of Canada

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# Standard for Steel Building Systems

## 1. SCOPE

- 1.1 This Standard covers the design, fabrication and erection of Steel Building Systems.
- 1.2 This Standard includes only the necessary technical provisions for Steel Building Systems and is not intended to cover other contractual matters.

## 2. GENERAL

- 2.1 This Standard shall apply in those cases where the provisions of building codes or the Buyer's stated requirements are not specific. In the event of any conflict between the provisions of this Standard and the building regulations, such regulations shall apply and this Standard shall only amplify.
- 2.2 Where reference is made to another publication, such reference shall be considered to apply to the latest edition or revision approved by the organization issuing that publication.
- 2.3 Unless otherwise specified, the Manufacturer shall furnish all required materials in accordance with this Standard.
- 2.4 Unless otherwise specified, the roof slope, eave height, length and width of building and spacing of bays shall be to the Manufacturer's standards.

## 3. DEFINITIONS

- 3.1 **Manufacturer** means a company which fabricates a Steel Building System.
- 3.2 **Buyer** means a person, firm or organization contracting with the Seller for the supply of a Steel Building System.
- 3.3 **Seller** means the person, firm or organization who sells a Steel Building System, whether a Manufacturer, dealer or erector.
- 3.4 **Steel Building System** means a building system, intended primarily for commercial, industrial or institutional occupancies, featuring steel structural and cladding components in conjunction with applicable appurtenances. Components are engineered to facilitate mass production and assembly in various combinations.
- 3.5 **Structural Framing** means the steel framework consisting of primary members (rigid frames, beams, girders, trusses, arches, rafters, columns), secondary members (purlins, joists, struts, bracing, tension rods, girts, eave struts, base angle and channel, header, jambs, sills and other structural items) and all necessary hardware.
- 3.6 **Cladding** means the exposed exterior wall and roof skin consisting of steel sheets or

panels and including fasteners and attachments, weather sealants, trim, flashing, fascia, and closures, as applicable.

- 3.7 **Appurtenances** means accessory items such as doors, windows, louvres, ventilators, fans, ceilings, insulation, sky and wall lights, partitions, interior liner, gutters and downspouts, as applicable.

## 4. DESCRIPTION OF TYPES OF STEEL BUILDING SYSTEMS

- 4.1 **Rigid Frame:** This type of building, which may be either a single or multi-span structure, utilizes clear span rigid frames consisting of rafters (tapered or uniform depth) rigidly connected to columns (tapered or uniform depth) with either fixed or pinned base details. The rigid frames, spanning the width of the building, are spaced on predetermined bay lengths and support the secondary structural members and cladding.
- 4.2 **Beam and Column:** This type of building utilizes tapered or uniform depth beams or girders supported by columns and may be either a single or multi-span structure. The primary beams or girders, spanning the width of the building, are spaced on predetermined bay lengths and support the secondary structural members and cladding.
- 4.3 **Truss Frame:** This type of building utilizes variable or uniform depth braced trusses supported by columns and may be either a single or multi-span structure. The primary trusses spanning the width of the building, are spaced on pre-determined bay lengths and support the secondary structural members and cladding.
- 4.4 **Self-Framing:** This type of building utilizes the cladding as primary load bearing roof and/or wall elements in addition to functioning as a weather barrier, and may be either a single or multi-span structure.

## 5. CHECKLIST OF ITEMS

- 5.1 A Steel Building System includes the following:
  - 5.1.1 Structural Framing (excluding self-framing type) including all necessary hardware.
  - 5.1.2 Cladding, including fasteners, and attachments, weather sealants, flashing, trim, fascia and closures, as applicable.
  - 5.1.3 Exterior doors, windows, louvres and ventilators, including framing, fittings and hardware, as applicable.

- 5.1.4 Valley gutters in the case of multi-span buildings.
- 5.2 Unless otherwise specified, a Steel Building System does not include:
  - 5.2.1 Foundations and their design.
  - 5.2.2 Anchor bolts, anchor bolt templates, and levelling plates.
  - 5.2.3 Setting, or supervision of setting, of anchor bolts.
  - 5.2.4 Grouting of any type in the recess around the base of the wall cladding.
  - 5.2.5 Grouting under columns, door jambs and end wall columns.
  - 5.2.6 Electrical installations and wiring.
  - 5.2.7 Plumbing, heating and air conditioning.
  - 5.2.8 Field painting.
  - 5.2.9 Interior finishing and carpentry work of any kind.
  - 5.2.10 Masonry or masonry anchors.
  - 5.2.11 Step flashing, and flashing to existing buildings.
  - 5.2.12 Valley interior downspouts, and drains (either underfloor or overhead).
  - 5.2.13 Cranes, including beams, rails and hoists.
  - 5.2.14 Glazing for windows and other openings.
  - 5.2.15 Miscellaneous items such as exhaust fans, eave gutters and downspouts.
  - 5.2.16 Openings, flashing, and framing in roof and wall required by other trades and for accessories furnished by others.
  - 5.2.17 Insulation.
  - 5.2.18 Structural fire protection.

## 6. MATERIAL STANDARDS

### 6.1 Structural Framing

- 6.1.1 Members and components of the structural framing shall be fabricated of structural quality steel conforming to CSA or ASTM material standards.
- 6.1.2 Structural fasteners shall be of a type permitted by CSA Standards CAN/CSA-S16.1-M or CAN/CSA-S136-M.

### 6.2 Cladding

- 6.2.1 Cladding materials, including coatings and finishes, shall be suitable for weather exposure under the anticipated environmental conditions.
- 6.2.2 Carbon and low-alloy sheet steel shall conform to an appropriate CSA, ASTM or other published material standard, and shall be protected with a zinc, aluminum, or aluminum-zinc alloy coating. Base steel nominal thickness shall be 0.46 mm (0.018 in) or greater.
- 6.2.3 Zinc coated sheet steel shall conform to ASTM A653/A653M, with minimum

coating Z275 (G90). Aluminum-zinc alloy coated sheet steel shall conform to ASTM A792M with minimum coating AZ150.

- 6.2.4 Prefinished sheet steel shall be coated in coil form with colours of proven durability for exterior exposure.
- 6.2.5 Fasteners for attaching cladding to structural framing and for attaching flashing, trim, etc., shall be to the Manufacturer's standards. Carbon steel fasteners shall have a minimum coating thickness of 0.008 mm (0.0003 in) of zinc or equivalent.

### 6.3 Appurtenances

- 6.3.1 Unless otherwise specified, all appurtenances included with the Steel Building System shall be to the Manufacturer's standards.

## 7. DESIGN LOADS AND COMBINATIONS

- 7.1 Unless otherwise specified, the values, dispositions and combinations of live loads, including wind loads, snow loads and seismic loads shall be as prescribed by the National Building Code of Canada for the locality concerned.
- 7.2 Dead load shall include the weight of all permanent construction and specified stationary equipment.
- 7.3 Live load shall include loads due to use and occupancy, specified movable equipment, snow, rain, impact and any other specified live load.
- 7.4 Wind load shall be that due to wind blowing on the building from any horizontal direction.
- 7.5 Seismic load shall be the lateral load acting on the building in any horizontal direction as the result of earthquake motion.
- 7.6 Refer to CSSBI Bulletin B-15 for wind, snow and earthquake load design criteria.

## 8. DESIGN

- 8.1 The following standards shall apply to design:
  - 8.1.1 Structural steel members and parts: CSA Standard CAN/CSA-S16.1-M.
  - 8.1.2 Cold formed steel structural members: CSA Standard CAN/CSA-S136-M.
  - 8.1.3 Structural welding (metal arc): CSA Standard W59-M.
  - 8.1.4 Resistance welding: CSA Standard CAN/CSA-S136-M.
- 8.2 Framed openings for windows, doors and other appurtenances shall be designed to structurally replace the cladding or framing members they displace.
- 8.3 Cladding components, including joints, flashing and attachments of appurtenances shall be designed to be weathertight.

## 9. FABRICATION

- 9.1 Manufacturers of Steel Building Systems shall be approved to the requirements of CSA Standard CSA-A660-M.
- 9.2 Materials furnished shall be as specified for the Steel Building System.
- 9.3 Components of the Steel Building System shall be fabricated true to dimensions so that in erection parts will fit properly together. Fabrication tolerances for formed and built up structural members are given in Appendix A.
- 9.4 The size and weight of components as packaged for shipment shall be such as to permit transportation by common carrier.
- 9.5 Fabricators of welded structural components shall be approved to the requirements of CSA Standard W47.1 and/or CSA Standard W55.3, as applicable.
- 9.6 All structural framing members shall have one coat of factory applied primer or other corrosion resisting coating on suitably prepared surfaces. These coatings are intended for short term temporary protection only.
- 9.7 Dissimilar materials which are incompatible in contact shall be separated by means of suitable coatings, gaskets or other effective means.

## 10. MARKING AND IDENTIFICATION

- 10.1 Erection part numbers shall be shown clearly on all members or bundles of identical pieces.
- 10.2 Fasteners required for erection shall be packaged and identified by size and type.
- 10.3 A master shipping list containing a description of the material, including erection part numbers, shall accompany the shipment of material.

## 11. INSPECTION

- 11.1 All finished material shall be inspected by the Manufacturer prior to shipment.

## 12. ERECTION

- 12.1 Unloading instructions, storage of materials and erection procedures as outlined by the Manufacturer shall be followed as closely as possible.
- 12.2 Erection tolerances for structural framing shall be in accordance with CSA Standard CAN/CSA-S16.1-M. In general, structural framing members are considered plumb, level, and aligned when the variance does not exceed 1:300.

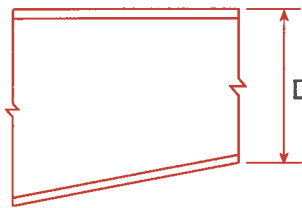
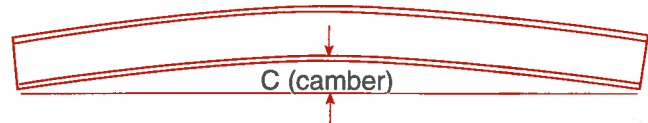
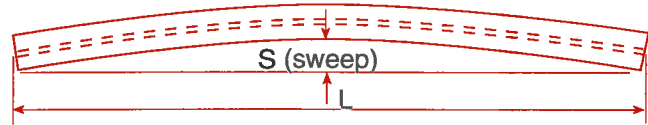
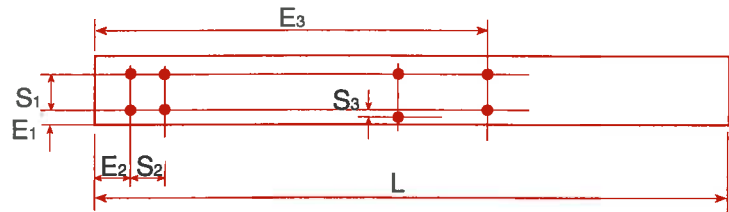
## 13. DRAWINGS

- 13.1 Proposal drawings, when required, indicating the scope of work covered by the proposal, shall be considered as sufficient information for bidding purposes.
- 13.2 Upon award of contract, erection drawings, foundation loads and anchor bolt setting plans shall be available from the Seller prior to shipment of materials.

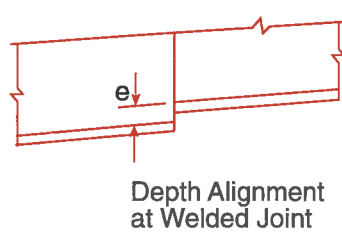
## 14. CERTIFICATION

- 14.1 The SBS Manufacturer shall submit a completed "Certificate of Design and Manufacturing Conformance for the Steel Building System Described", CSSBI C1-95, or as given in the CSA Standard CSA-A660-M. The certificate shall be signed and sealed by a professional engineer registered in a province of Canada.
- 14.2 If requested by the Buyer, the Seller shall submit with the proposal and/or bid the certificate of a professional engineer registered in a province of Canada to the effect that the Steel Building System which is the subject of such proposal and/or bid is in accordance with the stated requirements of the Buyer, the building regulations and this Standard, so far as is applicable.
- 14.3 If requested by the Buyer, upon award of contract the Seller shall submit a structural analysis of the Steel Building System which is the subject of such contract. The analysis shall be signed and sealed by a professional engineer registered in a province of Canada.

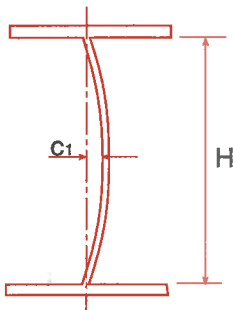
# FABRICATION TOLERANCES FOR BUILT-UP STRUCTURAL MEMBERS



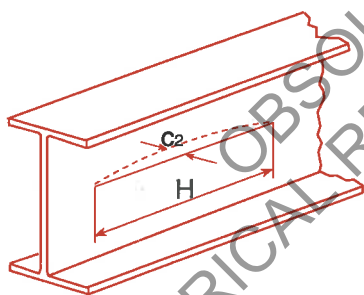
Depth



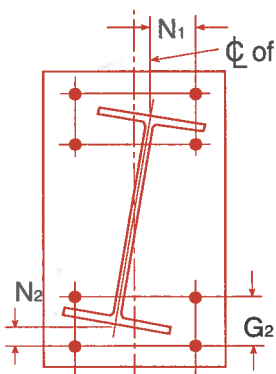
Depth Alignment at Welded Joint



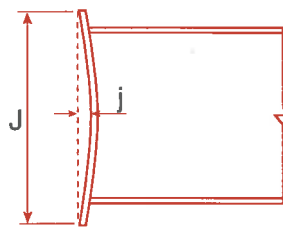
Web Flatness



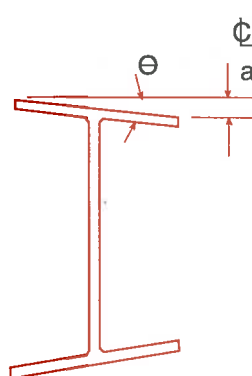
DIMENSION	FABRICATION TOLERANCE	
	Millimetres	Inches
a	6 max ( $\Theta \leq 3^\circ$ )	1/4 max ( $\Theta \leq 3^\circ$ )
b	6	1/4
C <sub>1</sub> , C <sub>2</sub>	0.015 H	H/72
e	3	1/8
D	± 5	± 3/16
E <sub>1</sub> , E <sub>2</sub> , E <sub>3</sub>	± 3	± 1/8
S <sub>1</sub> , S <sub>2</sub>	± 1	± 1/32
S <sub>3</sub>	± 2	± 1/16
N <sub>1</sub>	± 3	± 1/8
N <sub>2</sub>	± 5	± 3/16
G <sub>1</sub> , G <sub>2</sub>	± 2	± 1/16
j	3 (J ≤ 600) 5 (600 < J ≤ 1200) 6 (J > 1200)	1/8 (J ≤ 24) 3/16 (24 < J ≤ 48) 1/4 (J > 48)
L	± 6	± 1/4
C (camber)	0.002L	1/4 (Lft/10)
S (sweep)	0.002L	1/4 (Lft/10)



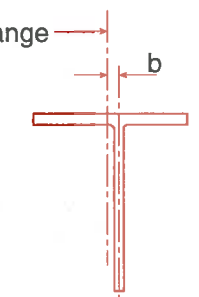
Splice Plate Alignment



Flatness of Splice Plate After Welding

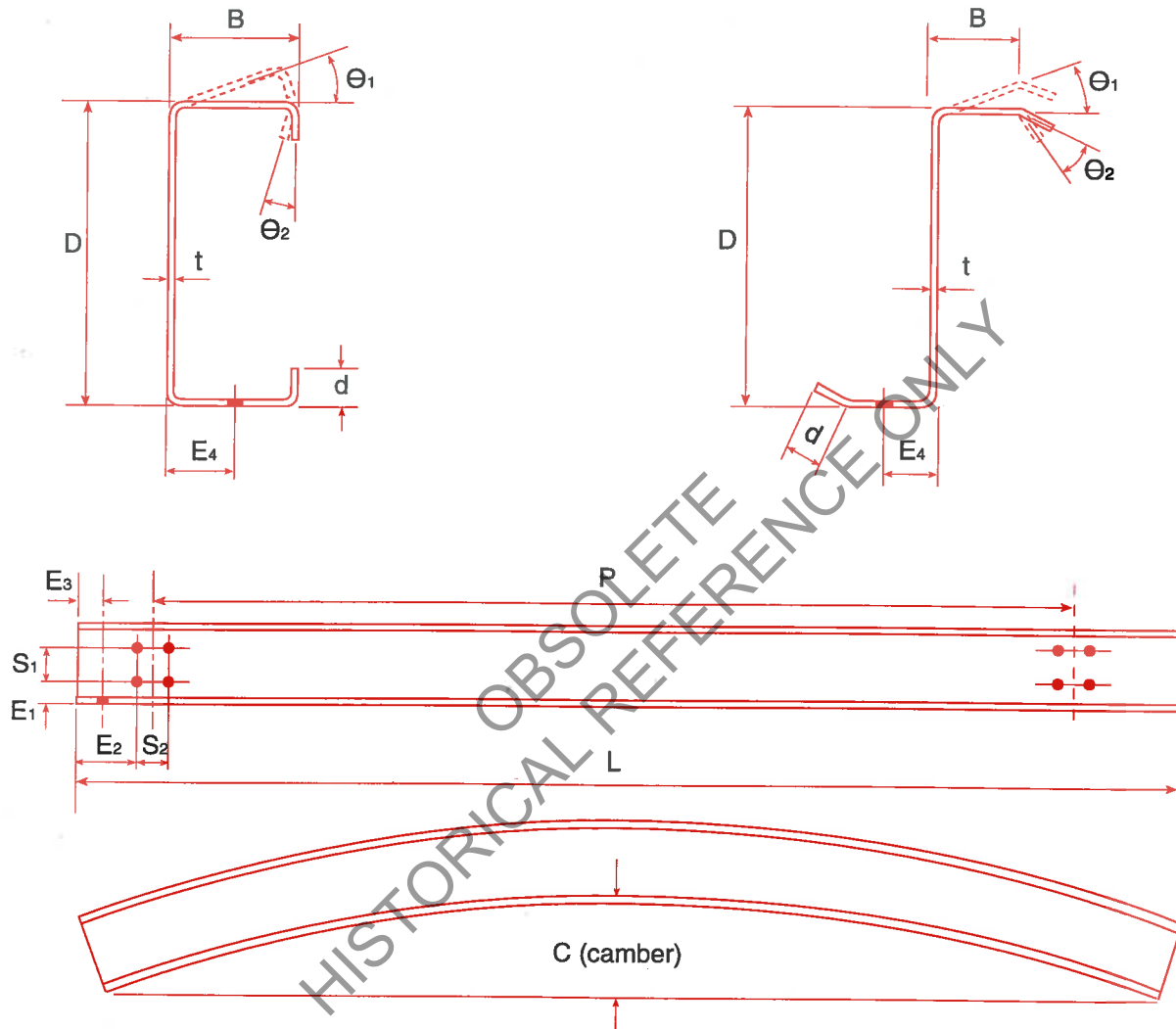


Flange Out-of-Square



Web Off-Centre

# FABRICATION TOLERANCES FOR FORMED STRUCTURAL MEMBERS



DIMENSION OR ANGLE	FABRICATION TOLERANCE	
	Millimetres	Inches
$B, D$	$\pm 5$	$\pm 3/16$
$d$	$+ 10 -3$	$+ 3/8 -1/8$
$\Theta_1$	$\pm 3^\circ$	$\pm 3^\circ$
$\Theta_2$	$\pm 5^\circ$	$\pm 5^\circ$
$P, L$	$\pm 3$	$\pm 1/8$
$C$	$0.002 L$	$1/4 (Lft/10)$
$E_1, E_2, E_3, E_4$	$\pm 3$	$\pm 1/8$
$S_1, S_2$	$\pm 2$	$\pm 1/16$
$t$	$t \text{ min} = \text{in accordance with CAN/CSA-S136}$	



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The *CANADIAN SHEET STEEL BUILDING INSTITUTE*, the national association of the structural sheet steel industry, promotes the use of sheet steel in building construction through engineered design and standards of quality and performance. Activities focus on sheet steel building products, lightweight steel cladding, lightweight steel framing and steel building systems for commercial, industrial and institutional applications as well as similar products and systems for residential and farm applications.

The Institute provides information regarding the standards of design, fabrication and erection, and offers technical assistance in the use of cold formed and pre-engineered steel products. The CSSBI also represents its members in technical matters connected with government, and provides liaison with organizations such as the Canadian Standards Association and the National Research Council.

CSSBI Member Companies are voluntarily committed to maintaining high industry standards in the design, manufacture and installation of cold formed steel building products and systems. Specifying requirements to CSSBI Standards and dealing with CSSBI Member Companies, can provide added assurance of quality construction. Only CSSBI Member Companies are authorized to display the CSSBI logo on drawings, stationary, company literature and advertising.

