



AISI S220-15



**American
Iron and Steel
Institute**

AISI STANDARD

North American Standard for Cold-Formed Steel Framing – Nonstructural Members

2015 Edition



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DISCLAIMER

The material contained herein has been developed by the American Iron and Steel Institute (AISI) Committee on Framing Standards. The Committee has made a diligent effort to present accurate, reliable, and useful information on cold-formed steel framing design and installation. The Committee acknowledges and is grateful for the contributions of the numerous researchers, engineers, and others who have contributed to the body of knowledge on the subject. Specific references are included in the *Commentary*.

With anticipated improvements in understanding of the behavior of cold-formed steel framing and the continuing development of new technology, this material will become dated. It is anticipated that AISI will publish updates of this material as new information becomes available, but this cannot be guaranteed.

The materials set forth herein are for general purposes only. They are not a substitute for competent professional advice. Application of this information to a specific project should be reviewed by a design professional. Indeed, in many jurisdictions, such review is required by law. Anyone making use of the information set forth herein does so at their own risk and assumes any and all liability arising therefrom.

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PREFACE

The American Iron and Steel Institute Committee on Framing Standards has developed AISI S220, *North American Standard for Cold-Formed Steel Framing – Nonstructural Members*, to address requirements for construction with *nonstructural members* made from cold-formed steel. This Standard is intended for adoption and use in the United States, Canada and Mexico.

This Standard provides an integrated treatment of Allowable Strength Design (ASD), Load and Resistance Factor Design (LRFD), and Limit States Design (LSD). This is accomplished by including the appropriate resistance factors (ϕ) for use with LRFD and LSD, and the appropriate factors of safety (Ω) for use with ASD. It should be noted that LSD is limited to Canada and LRFD and ASD are limited to Mexico and the United States.

The following major revisions were made in the 2015 edition:

- (1) Performance requirements for screw penetration were added in Section A6.6.
- (2) Referenced documents in Section A7 were updated.
- (3) Errata in Section B1(b) was fixed; i.e., “using $\beta_o = 1.6$ ” was added.
- (4) Testing requirements were expanded in Section F1 to reference the new AISI S916 Test Standard, when required to determine the strength and stiffness of composite nonstructural interior partition wall assemblies.
- (5) Testing requirements were added in Section F2 to reference the new AISI S915 Test Standard, when required to determine the strength and deformation behavior of bridging connectors.
- (6) Testing requirements for screw penetration were added in Section F3, and the test method was added in Appendix 1.

The Committee acknowledges and is grateful for the contributions of the numerous engineers, researchers, producers and others who have contributed to the body of knowledge on the subjects. The Committee wishes to also express its appreciation for the support of the Canadian Sheet Steel Building Institute.

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NORTH AMERICAN STANDARD FOR COLD-FORMED STEEL FRAMING — NONSTRUCTURAL MEMBERS

A. GENERAL

A1 Scope

The design and installation of *cold-formed steel nonstructural members* in buildings shall be in accordance with the provisions of this Standard.

This Standard applies to *nonstructural members* that comply with the following:

- 1) Member is in a steel-framed system that is limited to a transverse (out-of-plane) load of not more than 10 lb/ft² (0.48 kPa) in the U.S. and Mexico and 0.50 kPa in Canada.

Exception: Pressurized air plenums, ceilings and elevator shaft enclosures are permitted to have a load of not more than 15 lb/ft² (0.72 kPa).

- 2) Member is in a steel-framed system that is limited to a superimposed axial load, exclusive of sheathing materials, of not more than 100 lb/ft (1.46 kN/m).
- 3) Member is limited to a superimposed axial load of not more than 200 lbs (0.89 kN).

In Canada: Members in walls acting as guards, as defined in the *National Building Code of Canada* (NBCC), shall be considered *structural members*.

This Standard does not preclude the use of other materials, assemblies, structures, or designs not meeting the criteria herein when the other materials, assemblies, structures, or designs demonstrate equivalent performance for the intended use of those specified in this Standard. Where there is a conflict between this Standard and other reference documents, the requirements contained within this Standard shall govern.

This Standard includes Sections A through F inclusive.

A2 Definitions

In this Standard, “shall” is used to express a mandatory requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the Standard. Provisions described as “permitted” are optional, and the election to use such provisions is at the discretion of the *registered design professional*.

Where the following terms appear in this Standard in italics, such terms shall have meaning as defined herein or AISI S100 [CSA S136]. Terms included in square brackets are specific to LSD terminology. Where a country is indicated in square brackets following the definition, the definition shall apply only in the country indicated. Terms not defined in Section A2 shall have the ordinary accepted meaning in the context for which they are intended.

Applicable Building Code. The building code under which the building is designed.

Approved. Approved by the authority having jurisdiction or *design professional*.

Base Steel Thickness. The thickness of bare steel exclusive of all coatings.

Cold-Formed Sheet Steel. Sheet steel or strip steel that is manufactured by (1) press braking blanks sheared from sheets or cut length of coils or plates, or by (2) continuous roll forming of cold- or hot-rolled coils of sheet steel; both forming operations are performed at ambient room temperature, that is, without any addition of heat such as would be required for hot forming.

Cold-Formed Steel. See *Cold-Formed Sheet Steel*.

C-Shape. A *cold-formed steel* shape used for structural and *nonstructural members* consisting of a

web, two (2) *flanges* and two (2) *lips* (edge stiffeners).

Design Load. Applied load determined in accordance with either *LRFD load combinations* or *ASD load combinations*, whichever is applicable. [USA and Mexico]

Design Professional. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the state, province or territory in which the project is to be constructed.

Designation Thickness. The minimum *base steel thickness* expressed in *mils* and rounded to a whole number.

Factored Load. Product of a *specified load* and appropriate load factor. [Canada]

Flange. For a *C-shape*, *U-shape* or *track*, that portion of the framing member that is perpendicular to the *web*. For a *furring channel*, that portion of the framing member that connects the *webs*.

Header. A horizontal *structural member* used over floor, roof or wall openings to transfer *loads* around the opening to supporting *structural members*.

Light-Frame Construction. Construction where the vertical and horizontal structural elements are primarily formed by a system of repetitive *cold-formed steel* or wood framing members.

Joist. A *structural member* primarily used in floor and ceiling framing.

Nonstructural Member. A member in a steel-framed system that is not a part of the gravity load-resisting system, lateral force-resisting system or building envelope.

Structural Member. A member that resists *design loads* [*factored loads*], as required by the *applicable building code*, except when defined as a *nonstructural member*.

Stud. A vertical framing member in a wall system or assembly.

Track. A framing member consisting of only a *web* and two (2) *flanges*. *Track web* depth measurements are taken to the inside of the *flanges*.

Web. That portion of a framing member that connects the *flanges*.

A3 Loads and Load Combinations

Steel-framed systems utilizing *nonstructural members* shall be designed in accordance with the *applicable building code*. In the absence of an *applicable building code*, the loads, forces, and combinations of loads shall be in accordance with accepted engineering practice for the geographical area under consideration as specified by the applicable sections of *Minimum Design Loads for Buildings and Other Structures* (ASCE 7) in the United States and Mexico, and the *National Building Code of Canada* (NBCC) in Canada.

A4 Material

Nonstructural members utilized in *cold-formed steel* framed construction shall be cold-formed to shape from sheet steel complying with the requirements of ASTM A1003/A1003M Type NS.

In Canada: Alternatively, *nonstructural members* shall be cold-formed to shape from sheet steel in compliance with the requirements of ASTM A653 Type SS or ASTM A792 Type SS.

A5 Corrosion Protection

A5.1 *Nonstructural members* utilized in *cold-formed steel* framed construction shall have a protective coating conforming to ASTM A653/A653M G40 minimum or shall have a protective coating with an equivalent corrosion resistance.

In Canada: *Nonstructural members* shall have a metallic coating of G40 [Z120] complying with the requirements of ASTM A653/A653M, or AZ50 [AZM150] complying with the requirements of ASTM A792/A792M.

A5.2 Additional corrosion protection shall not be required on edges of metallic-coated steel framing members, shop or field cut, punched or drilled.

A5.3 Framing members shall be located within the building envelope and shielded from direct contact with moisture from the ground or the outdoor climate.

A5.4 Dissimilar metals shall not be used in direct contact with *cold-formed steel* framing members unless *approved* for that application.

A5.5 *Cold-formed steel* framing members shall not be embedded in concrete unless *approved* for that application.

A5.6 Fasteners shall have a corrosion-resistant treatment, or be manufactured from material not susceptible to corrosion.

A6 Products

A6.1 Base Steel Thickness

In no case shall the minimum *base steel thickness* be less than 95% of the *design thickness*.

A6.2 Minimum Flange Width

For *C-shape* members intended to receive sheathing, the minimum *flange* width shall be 1-1/4 inch (31.8 mm). For *track*, the minimum *flange* width shall be 1 inch (25.4 mm).

A6.3 Product Designator

References to *nonstructural members* shall use a four-part product designator that identifies the size (both *web* depth and *flange* width), style, and thickness. The standard designator as described (i.e., based on U.S. Customary units) shall be used for either U.S. Customary or SI Metric units. The product designator shall consist of the following sequential codes:

A three- or four-digit numeral indicating member *web* depth in 1/100 inch. A letter indicating:

S = *Stud* or *joist* framing member which has *lips*

T = *Track* section

U = Channel or *stud* framing section which does not have *lips*

F = Furring channels

L = Angle or *L-header*

A three-digit numeral indicating *flange* width in 1/100 inch, followed by a dash, and a two- or three-digit numeral indicating *designation thickness*.

A6.4 Manufacturing Tolerances

Nonstructural members utilized in *cold-formed steel* framed construction shall comply with the manufacturing tolerances listed in Table A6-1.