



AISI S220-20



**American
Iron and Steel
Institute**

AISI STANDARD

North American Standard for Cold-Formed Steel Nonstructural Framing

2020 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.

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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 Nonstructural Framing*, 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 2020 edition:

1. The relevant provisions of AISI S201-17, *North American Standard for Cold-Formed Steel Framing – Product Data*, are incorporated into this Standard. AISI S201 will no longer be maintained.
2. Section A1.2.3 is added to define the governing standard if conflict exists between this Standard and the *applicable building code*.
3. Tracks with flange width designation of 150 are added to Table A5-4.
4. References in Section A7 are updated. Section references and notations are updated throughout the Standard to be consistent with AISI S100-16 (2020) w/S2-20.
5. Screw edge distance has been revised to 1.5 times nominal diameter in Section B3.1.2.1.
6. References to ASTM C951 and ASTM C1513 are removed from Section B3.1.3 since both standards are not applicable to the given provisions.

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 NONSTRUCTURAL FRAMING

A. GENERAL

A1 Scope and Applicability

A1.1 Scope

This Standard applies to the design and installation of *cold-formed steel nonstructural members* in buildings.

A1.2 Applicability

A1.2.1 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).

A1.2.2 In Canada, members in walls acting as guards, as defined in the *National Building Code of Canada* (NBCC), shall be considered *structural members*.

A1.2.3 This Standard shall govern over other standards, including those referenced in this Standard, in matters pertaining to elements falling within the scope of this Standard, as defined in Section A1.1. Where conflicts between this Standard and the *applicable building code* occur, the requirements of the *applicable building code* shall govern. In areas without an *applicable building code*, this Standard defines the minimum acceptable standards for elements falling within the scope of this Standard, as defined in Section A1.1.

A1.2.4 This Standard does not preclude the use of other *approved* materials, assemblies, structures, or designs of equivalent performance.

A1.2.5 This Standard includes Sections A through D inclusive, and Appendix 1.

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.

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.

Punchout. A hole made during the manufacturing process in the web of a steel framing member.

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 Material

A3.1 In the United States and Mexico, 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.

A3.2 In Canada, 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.

A4 Corrosion Protection

A4.1 Protective Coatings

A4.1.1 In the United States and Mexico, 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.

A4.1.2 In Canada, *nonstructural members* shall have a minimum metallic coating of G40 [Z120] complying with the requirements of ASTM A653/A653M, or AZ50 [AZM150] complying with the requirements of ASTM A792/A792M.

A4.2 Additional corrosion protection shall not be required on edges of metallic-coated steel framing members, shop or field cut, punched, or drilled.

A4.3 Framing members shall be located within the building envelope and shielded from direct contact with moisture from the ground or the outdoor climate.

A4.4 Dissimilar metals shall not be used in direct contact with *cold-formed steel* framing members unless *approved* for that application.

A4.5 *Cold-formed steel* framing members shall not be embedded in concrete unless *approved* for that application.

A4.6 Fasteners shall have a corrosion-resistant treatment or be manufactured from material not susceptible to corrosion.

A5 Products

A5.1 Base Steel Thickness

A5.1.1 In no case shall the minimum *base steel thickness* be less than 95% of the *design thickness*.

A5.1.2 In Canada, *nonstructural members* shall be manufactured from steel having a minimum *base steel thickness* of 0.0179 in. (0.455 mm). *Nonstructural members* that can show third-party testing in accordance with AISI S916 and conform to the limiting height tables in ASTM C754 need not meet the minimum steel thickness limitation.

A5.2 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).

A5.3 Product Designator

A four-part product designator that identifies the size (both *web* depth and *flange* width), type, and thickness shall be used for reference to *nonstructural members*. The product 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) A three- or four-digit numeral indicating member *web* depth in 1/100 inch.
- (b) A letter indicating member type, in accordance with the following:
 - S = *C-shape* (commonly used as a *stud* 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*
- (c) A three-digit numeral indicating *flange* width in 1/100 inch, followed by a dash.
- (d) A two- or three-digit numeral indicating *designation thickness*.