



Designation: A109/A109M – 25

Standard Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled¹

This standard is issued under the fixed designation A109/A109M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers cold-rolled carbon steel strip in cut lengths or coils, furnished to closer tolerances than cold-rolled carbon steel sheet, with specific temper, with specific edge or specific finish, and in sizes as follows:

Width, in.	Thickness, in.
Over $\frac{1}{2}$ to 23 $\frac{15}{16}$	0.300 and under
Over 12.5 to 600 mm	7.6 mm and under

1.2 Cold-rolled strip is produced with a maximum specified carbon not exceeding 0.25 percent.

1.3 Strip tolerance products may be available in widths wider than 23 $\frac{15}{16}$ in. [600 mm] by agreement between purchaser and supplier. However, such products are technically classified as cold rolled sheet. The tolerances, finishes, tempers, edges, and available widths and thicknesses differentiate cold rolled strip from the product known as cold rolled sheet which is defined by Specification **A568/A568M** and from cold rolled high carbon strip which is defined by Specification **A682/A682M**.

1.4 For the purpose of determining conformance with this specification, values shall be rounded to the nearest unit in the right hand place of figures used in expressing the limiting values in accordance with the rounding method of Practice **E29**.

1.5 The SI portions of the tables contained herein list permissible variations in dimensions and mass (see **Note 1**) in SI (metric) units. The values listed are not exact conversions of the values listed in the inch-pound tables, but instead are rounded or rationalized values. Conformance to SI tolerances is mandatory when the “M” specification is used.

NOTE 1—The term *weight* is used when inch-pound units are the standard. However, under SI the preferred term is *mass*.

1.6 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in

each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.7 This specification is expressed in both inch-pound units and SI units. However, unless the order specifies the applicable “M” specification designation (SI units), the material shall be furnished to inch-pound units.

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- A370** Test Methods and Definitions for Mechanical Testing of Steel Products
- A568/A568M** Specification for Steel, Sheet, Carbon, Structural, and High-Strength Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
- A682/A682M** Specification for Steel, Strip, High-Carbon, Cold-Rolled, General Requirements For (Withdrawn 2009)³
- A700** Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment
- A751** Test Methods and Practices for Chemical Analysis of Steel Products
- A941** Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
- A1073/A1073M** Practice for Using Hand Micrometers to Measure the Thickness of Uncoated Steel Sheet and Nonmetallic and Metallic-Coated Steel Sheet
- E18** Test Methods for Rockwell Hardness of Metallic Materials

¹ This specification is under the jurisdiction of ASTM Committee **A01** on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee **A01.19** on Steel Sheet and Strip.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard



E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E92 Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials

E430 Test Methods for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry

2.2 *Military Standard:*

MIL-STD-129 Marking for Shipment and Storage⁴

2.3 *Federal Standard:*

123 Marking for Shipments (Civil Agencies)⁴

183 Continuous Identification Marking of Iron and Steel Products⁴

3. Terminology

3.1 *Definitions*—For definitions of other terms used in this specification, refer to Terminology **A941**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *annealing, n*—the process of heating to and holding at a suitable temperature and then cooling at a suitable rate, for such purposes as reducing hardness, facilitating cold working, producing a desired microstructure, or obtaining desired mechanical, physical, or other properties.

3.2.1.1 *box annealing, n*—involves annealing in a sealed container under conditions that minimize oxidation. The strip is usually heated slowly to a temperature below the transformation range, but sometimes above or within it, and is then cooled slowly.

3.2.1.2 *continuous annealing, n*—involves heating the strip in continuous strands through a furnace having a controlled atmosphere followed by a controlled cooling.

3.2.2 *carbon steel, n*—the designation for steel when no minimum content is specified or required for aluminum, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium or any other element added to obtain a desired alloying effect; when the specified minimum for copper does not exceed 0.40 % or when the maximum content specified for any of the following elements does not exceed the percentage noted: manganese 1.65, silicon 0.60, or copper 0.60.

3.2.2.1 *Discussion*—In all carbon steels small quantities of certain residual elements unavoidably retained from raw materials are sometimes found which are not specified or required, such as copper, nickel, molybdenum, chromium, and so forth. These elements are considered as incidental and are not normally reported.

3.2.3 *cold reduction, n*—the process of reducing the thickness of the strip at room temperature. The amount of reduction is greater than that used in skin-rolling (see **3.2.7**).

3.2.4 *dead soft, n*—the temper of strip produced without definite control of stretcher straining or fluting. It is intended for deep drawing applications where such surface disturbances are not objectionable.

3.2.5 *finish, n*—the degree of smoothness or luster of the strip. The production of specific finishes requires special preparation and control of the roll surfaces employed.

3.2.6 *normalizing, n*—heating to a suitable temperature above the transformation range and then cooling in air to a temperature substantially below the transformation range. In bright normalizing the furnace atmosphere is controlled to prevent oxidizing of the strip surface.

3.2.7 *skin-rolled, n*—a term denoting a relatively light cold rolling operation following annealing. It serves to reduce the tendency of the steel to flute or stretcher strain during fabrication. It is also used to impart surface finish, or affect hardness or other mechanical properties, or to improve flatness.

3.2.8 *temper, n*—a designation by number to indicate the hardness as a minimum, as a maximum, or as a range. The tempers are obtained by the selection and control of chemical composition, by amounts of cold reduction, by thermal treatment, and by skin-rolling.

4. Ordering Information

4.1 Orders for material to this specification shall include the following information, as necessary, to describe adequately the desired product:

- 4.1.1 Quantity,
- 4.1.2 Name of material (cold-rolled carbon steel strip),
- 4.1.3 Condition (oiled or not oiled),
- 4.1.4 Temper (Section **7**),
- 4.1.5 Edge (Section **8**),
- 4.1.6 Dimensions (Section **9**),
- 4.1.7 Workmanship, Finish, and Appearance (Section **10**),
- 4.1.8 Coil size requirements (**15.2**),
- 4.1.9 ASTM designation and year of issue,
- 4.1.10 Copper-bearing steel, if required,
- 4.1.11 Application (part identification or description),
- 4.1.12 Cast or heat analysis (request, if required), and
- 4.1.13 Special requirements, if required.

NOTE 2—A typical ordering description is as follows: 20 000 lb Cold-Rolled Strip, Oiled, Temper 4, Edge 3, Finish 3, 0.035 by 9 in. by coil, 5000 lb max, 16-in. ID ASTM A 109-XX, for Toaster Shells.

5. Materials and Manufacture

5.1 The steel shall be made by the open-hearth, basic-oxygen, or electric-furnace process.

5.2 Cold-rolled carbon steel strip is normally manufactured from continuously cast steel with aluminum used as the deoxidizer. However, some applications are specified as silicon killed. Ingot cast rimmed, capped and semi-killed steels are subject to limited availability.

5.3 Cold-rolled carbon steel strip is manufactured from hot-rolled descaled coils by cold reducing to the desired thickness on a single stand mill or on a tandem mill consisting of several single stands in series. Sometimes an anneal is used at some intermediate thickness to facilitate further cold reduction or to obtain desired temper and mechanical properties in the finished strip. An anneal and skin pass is typically used as the final step for Temper 4 and 5.

⁴ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://quicksearch.dla.mil>.