



Designation: A108 – 18

Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished¹

This standard is issued under the fixed designation A108; 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-finished carbon and alloy steel bars produced in straight length and coil. Cold-finished bars are suitable for heat treatment, for machining into components, or for use in the as-finished condition as shafting, or in constructional applications, or for other similar purposes (Note 1). Grades of steel are identified by grade numbers or by chemical composition.

NOTE 1—A guide for the selection of steel bars is contained in Practice A400.

1.2 Some end uses may require one or more of the available designations shown under Supplementary Requirements. Supplementary requirements shall apply only when specified individually by the purchaser.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *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

- A29/A29M Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
- A304 Specification for Carbon and Alloy Steel Bars Subject to End-Quench Hardenability Requirements
- A322 Specification for Steel Bars, Alloy, Standard Grades

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 A01.15 on Bars.

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

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A400 Practice for Steel Bars, Selection Guide, Composition, and Mechanical Properties

A510/A510M Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel

A576 Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality

2.2 Other Documents:

SAE Handbook and SAE J1086 Recommended Practice for Numbering Metals and Alloys (UNS)³

AIST Bar Steels: Steel Product Manual⁴

3. Terminology

3.1 Definitions:

3.1.1 *product tolerance levels*—cold-finished steel bar is produced with up to three (3) increasingly tight tolerance levels, for the individual product characteristics, dependent on the method of manufacture necessary to meet purchaser-ordered specification requirements. (Product Tolerance Level 1 is selected, unless otherwise specified by the purchaser.)

4. Ordering Information

4.1 Orders for cold-finished steel bar to this specification should include the following items to adequately describe the material:

- 4.1.1 Name of material,
- 4.1.2 ASTM specification number and date of issue,
- 4.1.3 Chemical composition, or steel grade designation or limits as defined in Specification A29/A29M,
- 4.1.4 Silicon level, if required,
- 4.1.5 Additional machinability-enhancing elements (see Footnote F to Table 1 of Specification A29/A29M),
- 4.1.6 Surface Condition (Surface tolerances listed in Table A1.7, Table A1.8, and Table A1.9),
- 4.1.7 Tolerance Levels (Reference tolerances listed in Table A1.1 through Table A1.9),

³ Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, http://www.sae.org.

⁴ Available from Association for Iron & Steel Technology (AIST), 180 Thorn Hill Road, Warrendale, PA 15086–7528, http://www.aist.org

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

- 4.1.8 Shape (round, hexagon, square, flat, etc.), size, and length,
- 4.1.9 Report of heat analysis, if required,
- 4.1.10 End use,
- 4.1.11 Additions to the specification and special or supplementary requirements, if required, and
- 4.1.12 For coiled product, the coil weights, inside diameter, outside diameter, and coil height limitations, when required.

NOTE 2—A typical ordering description is as follows: Steel Bar; ASTM A108, dated ____; ASTM Steel Grade - 1117; Coarse Grain; Cold Drawn; 1.500 in. (38.10 mm) diameter round; 12 ft (3657.61 mm) long; Heat Analysis Required; Precision Machined Parts.

NOTE 3—A more complex ordering description is as follows: Steel Bar; ASTM A108, dated ____; ASTM Steel Grade - 1045; Fine Grain; Cold Drawn, Turned, Ground and Polished; chamfer both ends; Mechanical Property Test Results; Hardness test; 2.000 in. (50.80 mm) diameter round; 12 ft (3657.61 mm) long; Heat Analysis Required; Precision Machined Parts.

5. General Requirements

5.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification [A29/A29M](#).

6. Materials and Manufacture

6.1 *Feedstock*—Cold-finished steel bar shall be produced from hot-wrought carbon or alloy steel bar (Specification [A29/A29M](#)), or from hot-wrought rod designated for cold-finished bar (Specification [A510/A510M](#)).

6.2 *Condition*—The product shall be furnished in one of the following conditions as specified by the purchaser.

6.2.1 Rounds:

- 6.2.1.1 Cold drawn,
- 6.2.1.2 Cold drawn, turned, and polished,
- 6.2.1.3 Cold drawn, ground, and polished,
- 6.2.1.4 Cold drawn, turned, ground, and polished,
- 6.2.1.5 Cold drawn, turned, and ground,
- 6.2.1.6 Hot wrought, turned, and polished,
- 6.2.1.7 Hot wrought, turned, ground and polished,
- 6.2.1.8 Hot wrought, turned, and ground, and
- 6.2.1.9 Hot wrought, rough turned.

6.2.2 Squares, Hexagons:

- 6.2.2.1 Cold drawn, and
- 6.2.2.2 Cold rolled.

6.2.3 Flats:

- 6.2.3.1 Cold drawn, and
- 6.2.3.2 Cold rolled.

6.2.4 Special Bar Sections:

- 6.2.4.1 Cold drawn, and
- 6.2.4.2 Cold rolled.

6.3 Heat Treatment:

6.3.1 Unless otherwise specified, the bars shall be furnished as cold-finished. Plain Carbon Steels with a maximum carbon over 0.55 % and Alloy Steels with a maximum carbon over 0.38 % shall be annealed prior to cold finishing.

6.3.2 The following heat-treatment processes may be performed singularly or in combination:

- 6.3.2.1 Annealed,
- 6.3.2.2 Normalized,

- 6.3.2.3 Stress relieved,
- 6.3.2.4 Quenched and tempered, and
- 6.3.2.5 Induction hardened.

7. Chemical Composition

7.1 Chemical Composition:

7.1.1 The chemical analysis of the steel shall conform to that specified in Specification [A29/A29M](#) for the steel grade ordered, or to such other limits as may be specified using the standard ranges in Specification [A29/A29M](#).

7.1.2 Steels may be selected from: Specifications [A29/A29M](#), [A304](#), [A322](#), [A510/A510M](#), and [A576](#); the SAE Handbook; or the AIST Bar Steels: Steel Product Manual.

7.1.3 When a steel's composition cannot be identified by a standard grade number in accordance with [7.1.1](#) and [7.1.2](#), the limits for each required element may be specified using the chemical ranges shown in the table (Heat Analysis Chemical Ranges and Limits of Carbon Steel Bars) of Specification [A29/A29M](#).

8. Tolerance Levels

8.1 *Cold-Finished Bars*—The permissible dimensional variations for cold-finished carbon and alloy steel bar shall not exceed the applicable tolerance levels or limits stated in [Annex A1](#) for inch-pound values.

9. Workmanship, Finish, and Product Presentation

9.1 Workmanship:

9.1.1 Within the limits of good manufacturing and inspection practices, the bars shall be free of injurious imperfections which, due to their nature, degree, or extent, will interfere with the use of the material in machining or fabrication of suitable parts.

9.1.2 [Table A1.8](#) contains the recommended minimum stock removal (per side of bar) to assist in the removal of surface discontinuities in cold finished or hot rolled bars.

9.2 Finish:

9.2.1 Unless otherwise specified, the bars shall have a commercial bright smooth surface finish, obtained by conventional cold-finishing operations such as cold drawing or cold rolling.

9.2.2 When a superior bar surface finish is required, bars may be obtained as: turned and polished, ground and polished, or turned, ground, and polished. (Reference [Table A1.7](#))

9.2.3 Bars that are thermally treated after cold finishing may exhibit a discolored or oxidized surface.

9.2.4 When diameter tolerances for round bars are more restrictive than commercial standard size tolerances listed in [Table A1.1](#) or [Table A1.2](#), then refer to [Table A1.3](#) size tolerances attained from the Grinding and Polished operation.

9.3 Product Presentation:

9.3.1 The bars shall be given a surface coating of oil or other rust inhibitor to protect against corrosion during shipment.

9.3.2 The bar bundles shall be identified, packaged and loaded to preserve the physical appearance, product tolerance and identity of the cold-finished product, as agreed upon between the purchaser and supplier, at time of order acceptance.

NOTE 4—Steel bar or machined bar surface is a perishable quality condition and may be altered by mis-handling or detrimental exposure to moisture or corrosive conditions. The preservation of surface quality requires the utmost care in subsequent customer handling, storage, or processing. Rust preventive oils are necessary to coat and provide a barrier to displace harmful moisture or corrosive conditions to prevent rust.

10. Certification

10.1 Upon request of the purchaser in the contract or order, a manufacturer's certification that the material was manufac-

tured and tested in accordance with this specification together with a report of the test results shall be furnished at the time of shipment.

11. Keywords

11.1 alloy steel; carbon steel; cold-finished; steel bar; turned bar

SUPPLEMENTARY REQUIREMENTS

One or more of the following supplementary requirements shall be applied only when specified by the purchaser in the inquiry, contract, or order. Details of these supplementary requirements shall be agreed upon in writing, by the manufacturer and the purchaser. Supplementary requirements shall in no way negate any requirement of the specification itself.

S1. Hot Rolling Reduction Ratio

S1.1 When required, purchaser may require the supplier to report the reduction ratio of the initial Bloom/Billet cross sectional area to finished hot rolled cross sectional area.

S2. Steel Melting Process

S2.1 When required, purchaser may require the supplier to report the steel melting process (Basic Oxygen Furnace, Electric Arc Furnace, etc.) for each initial heat/lot number supplied to the purchaser.

S3. Steel Refinement Process

S3.1 When required, purchaser may require the supplier to report the steel refinement processes performed after melting and before casting (Vacuumed Degassed, etc.) on the heat/lot number supplied to the purchaser.

S4. Continuous Casting Process

S4.1 When required, purchaser may require the supplier to report the casting process (Bloom, Billet, etc.) for each heat/lot number supplied to the purchaser.

S5. Country or Countries of Origin

S5.1 When required, purchaser may require the supplier to report the country of origin where the steel was melted for each heat/lot number supplied to the purchaser.

S5.2 When required, purchaser may require the supplier to report the country of origin where the steel was hot rolled for each heat/lot number supplied to the purchaser.

S5.3 When required, purchaser may require the supplier to report the country of origin where the steel was cold finished for each heat/lot number supplied to the purchaser.

S6. Mechanical Properties

S6.1 When required, at time of inquiry or purchase, purchaser may require the supplier to report the cold-finished steel bar mechanical properties for each heat/lot number supplied to the purchaser. Mechanical properties shall be evaluated in accordance with Test Methods and Definitions in Test Methods **A370**.

S7. Surface Inspection

S7.1 When required, at time of inquiry or purchase, purchaser may require the supplier to inspect the cold finish steel bar surface within a non-destructive surface inspection process to assist in the detection of most surface discontinuities that exceed the maximum allowed depth tolerances listed in **Table A1.8** or other tolerances agreed upon between the purchaser and supplier. Non-destructive surface inspection process has limitations and will not guarantee or warranty 100 % detection of all surface discontinuities in a steel bar.

S8. Bar Marking

S8.1 When required, bar marking specification requirements shall be agreed upon between the purchaser and supplier.