



Designation: A 108 – 03

## Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished<sup>1</sup>

This standard is issued under the fixed designation A 108; 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 approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

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

### 1. Scope

1.1 This specification covers cold-finished carbon and alloy steel bars produced in straight length and coil to chemical compositions. 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 A 400.

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 the standard. The values given in parentheses are for information only.

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

- A 29/A 29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for
- A 304 Specification for Carbon and Alloy Steel Bars Subject to End-Quench Hardenability Requirements
- A 322 Specification for Steel Bars, Alloy, Standard Grades
- A 370 Test Methods and Definitions for Mechanical Testing of Steel Products
- A 400 Practice for Steel Bars, Selection Guide, Composition, and Mechanical Properties
- A 510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
- A 576 Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality

- A 700 Specification for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment
- E 45 Test Methods for Determining the Inclusion Content of Steel
- E 112 Test Methods for Determining the Average Grain Size
- E 381 Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings
- E 527 Practice for Numbering Metals and Alloys (UNS)
- E 1077 Test Method for Estimating the Depth of Decarburization of Steel Specimens
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

#### 2.2 Other Documents:

- SAE Handbook and SAE J1086 Recommended Practice for Numbering Metals and Alloys (UNS)<sup>3</sup>
- Federal Standard 66 C Steel, Chemical Composition and Hardenability<sup>4</sup>
- ISS Steel Bar Product Guideline for Bar Steel<sup>5</sup>

### 3. Terminology

#### 3.1 Definition:

3.1.1 *product tolerance levels*—cold-finished steel bar is produced with up to four (4) 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 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, grade designation or limits,
- 4.1.4 Silicon level, if required,

<sup>1</sup> 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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<sup>2</sup> 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.

<sup>3</sup> Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001.

<sup>4</sup> Available from the Standardization Documents Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094 Attn: NPODS.

<sup>5</sup> Available from American Iron and Steel Institute (AISI), 1101 17th St., NW, Suite 1300, Washington, DC 20036.

4.1.5 Additional machinability-enhancing elements (see Footnote F to Table 1 of Specification A 29A 29M),

4.1.6 Condition (Surface Roughness tolerances listed in Table A1.7),

4.1.7 Tolerance Levels (Reference tolerances listed in Table A1.1 through Table A1.9),

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 A 108, dated \_\_\_\_; SAE 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 A 108, dated \_\_\_\_; SAE 1045; Fine Grain; Cold Drawn, Turned, Ground and Polished; chamfer both ends; Mechanical Property Test Results; Hardness test; Inspect for Residual Magnetism; 2.000-in. (50.80 mm) diameter round; 12 ft (3657.61 mm) long; Heat Analysis Required; Precision Machined Parts. Product codes allow you to abbreviate, yet identify a complex ordering description in the following simplified description: Steel Bar: ASTM A 108, dated \_\_\_\_; SAE 1045; Fine Grain; 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 A 29/A 29M.

## 6. Materials and Manufacture

6.1 *Feedstock*—Cold-finished steel bar shall be produced from hot-wrought carbon or alloy steel bar (Specification A 29/A 29M), or from hot-wrought rod designated for cold-finished bar (Specification A 510).

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, and

6.3.2.4 Quench and tempered.

## 7. Chemical Composition

7.1 *Chemical Composition:*

7.1.1 The chemical analysis of the steel shall conform to that specified in Specification A 29/A 29M for the steel grade ordered, or to such other limits as may be specified using the standard ranges in Specification A 29/A 29M.

7.1.2 Steels may be selected from: Specifications A 29/A 29M, A 304, A 322, A 510, and A 576; Federal Standard 66 C; the SAE Handbook; or the ISS Steel Bar Product Guideline for Bar Steel.

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 A 29/A 29M.

## 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 seams, laps, segregation, or other imperfections which, due to their nature, degree, or extent, will interfere with the use of the material in machining or fabrication of suitable parts. (Reference Table A1.8)

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 polish, 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.

9.3 *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.

#### **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

### **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, 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 A 370.

#### **S7. Surface Inspection**

S7.1 When required, purchaser may require the supplier to inspect the cold finish steel bar surface within an electromagnetic surface inspection process to detect and sort surface discontinuities that exceed the maximum allowed depth tolerances listed in Table A1.8 or other tolerances agreed upon between the purchaser and supplier.

#### **S8. Bar Marking**

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

### **ANNEX**

#### **(Mandatory Information)**

#### **A1. PERMISSIBLE VARIATIONS IN QUALITY CHARACTERISTICS—INCH-POUND AND METRIC UNITS**