



Designation: A 322 – 91 (Reapproved 2001)

## Standard Specification for Steel Bars, Alloy, Standard Grades<sup>1</sup>

This standard is issued under the fixed designation A 322; 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 hot-wrought alloy steel bars. Bar applications include forging, heat treating, cold drawing, machining and many structural components (Note 1).

NOTE 1—A guide for the selection of steel bars is contained in Practice A 400.

1.2 The bars shall be furnished in the grades specified in Table 1. Sections and sizes of bar steel available are covered in Specification A 29/A 29M. Hot-wrought alloy steel bars are produced in cut lengths and coils; the manufacturer should be consulted regarding sections and sizes available in coils, produced to a chemical composition.

1.3 Some applications may require superior surface quality, or special chemical restrictions, metallurgical characteristics, heat treatment, or surface finishes which the purchaser may obtain by designating one or more of the available Supplementary Requirements.

1.4 The values stated in inch-pound units are to be regarded as the standard.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

A 29/A 29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished, General Requirements for<sup>2</sup>

A 304 Specification for Steel Bars, Alloy, Subject to End-Quench Hardenability Requirements<sup>2</sup>

A 400 Practice for Steel Bars, Selection Guide, Composition, and Mechanical Properties<sup>2</sup>

E 112 Test Methods for Determining Average Grain Size<sup>3</sup>

E 381 Method of Macroetch Testing, Inspection, and Rating Steel Products, Comprising Bars, Billets, Blooms, and Forgings<sup>3</sup>

E 527 Practice for Numbering Metals and Alloys (UNS)<sup>4</sup>

<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> Annual Book of ASTM Standards, Vol 01.05.

<sup>3</sup> Annual Book of ASTM Standards, Vol 03.01.

<sup>4</sup> Annual Book of ASTM Standards, Vol 01.01.

### 3. Ordering Information

3.1 Orders under this specification should include the following as required to describe adequately the desired material:

3.1.1 Quantity (weight or number of bars),

3.1.2 Name of material (hot-wrought alloy steel bars),

3.1.3 Dimensions,

3.1.4 ASTM designation,

3.1.5 Deoxidation practice (see 5.3),

3.1.6 Grade designation or chemical composition limits (see 6.1 and Table 1),

3.1.7 Grain size if required,

3.1.8 Test reports, if required (Section 8),

3.1.9 Additions to the specification and Supplementary Requirements, if required, and

3.1.10 Application.

### 4. General Requirements

4.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification A 29/A 29M, unless otherwise provided herein.

### 5. Materials and Manufacture

5.1 The steel shall be made by one or more of the following primary processes: open-hearth, basic-oxygen, or electric-furnace. The primary melting may incorporate separate degassing or refining and may be followed by secondary melting using electro-slag remelting or vacuum arc remelting. Where secondary melting is employed, the heat shall be defined as all of the ingots remelted from a single primary heat.

5.2 The steel shall be furnished as strand cast or ingot cast, unless otherwise specified.

5.3 *Deoxidation*—Killed steel is required.

5.3.1 The purchaser may designate that the steel be made to coarse or fine austenitic grain size. (See Supplementary Requirement S9 or S10.)

5.4 *Slow Cooling*—Immediately after hot forming, the bars shall be allowed to cool to a temperature below the critical range under suitable conditions to prevent imperfections caused by too rapid cooling.



5.5 Thermal Treatment—Various thermal treatments such as annealing, stress relief, quench and temper, normalize, etc., are available. Such treatments must be specified as a Supplementary Requirement.

6. Chemical Composition

6.1 The heat analysis shall conform to the requirements for chemical composition in Table 1 for the grade specified.

TABLE 1 Grade Designations and Chemical Compositions of Hot-Wrought Alloy Steel Bars<sup>A,B</sup>

Table with columns: UNS Designation, Grade Designations, and Chemical Composition (Carbon, Manganese, Phosphorus, Sulfur, Silicon, Nickel, Chromium, Molybdenum, Vanadium). Rows list various steel grades like G13300, G40230, G40240, etc.