Designation: A 739 – 90a (Reapproved 2006)

Standard Specification for Steel Bars, Alloy, Hot-Wrought, for Elevated Temperature or Pressure-Containing Parts, or Both[1]

This standard is issued under the fixed designation A 739; 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 Department of Defense.

1. Scope

1.1 This specification[2] covers hot-wrought, ferritic alloy steel bars for elevated temperature or pressure-containing parts suitable for fusion welding or both.

1.2 The bars are furnished in the following grades:

Grade B 11: 1.25 % chromium, 0.55 % molybdenum
Grade B 22: 2.25 % chromium, 1.00 % molybdenum

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.

2. Referenced Documents

2.1 *ASTM Standards:* [3]

A 29/A 29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

3. Ordering Information

3.1 Orders for material under this specification should include the following information:

3.1.1 Quantity (weight or number of pieces),

3.1.2 Name of material (ferritic alloy steel bars),

3.1.3 Condition (hot wrought, normalized and tempered, machine straightened and descaled),

3.1.4 Dimensions (cross-sectional shape, size, and length),

3.1.5 ASTM designation and date of issue,

3.1.6 Grade (Table 1),

TABLE 1 Chemical Requirements

Element	Composition, %	
	Grade B 11	Grade B 22
Carbon, max	0.05–0.20	0.05–0.15
Manganese	0.40–0.65	0.30–0.60
Phosphorus, max	0.035	0.035
Sulfur, max	0.040	0.040
Silicon	0.50–0.80	0.50 max
Chromium	1.00–1.50	2.00–2.50
Molybdenum	0.45–0.65	0.90–1.10

3.1.7 Additions to the specification, and

3.1.8 End use.

NOTE 1—A typical description is as follows: 10 000 lb, Ferritic Alloy Steel Bars, Hot Wrought Normalized and Tempered, and Descaled, 1.000-in. diameter by 10 ft, ASTM A 739 dated____, Grade B 11, Special Straightened, Special Machined Fittings.

4. Materials and Manufacture

4.1 *Melting Practice*—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 electroslag 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.

4.2 *Condition*—Unless otherwise specified, bars shall be hot wrought, heat treated, and descaled.

4.3 *Heat Treatment*:

4.3.1 The bars shall be normalized and tempered.

4.3.2 Austenitizing temperature shall be within the range from 1700 to 1800°F (927 to 982°C).

4.3.3 Cooling from the austenitizing temperature may be accomplished by cooling in still air or moving air, at the producer's option. When permitted by the purchaser, cooling from the austenitizing temperature may be accelerated by spray or liquid quenching.

4.3.4 The minimum tempering temperature shall be 1200°F (649°C) for Grade B 11 and 1250°F (677°C) for Grade B 22.

[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 ASME Boiler and Pressure Vessel Code applications see related Specification SA-739 in Section II of that code.

[3] 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.

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5. Chemical Composition

5.1 The heat analysis shall conform to the limits for chemical composition specified in Table 1 for the grade ordered.

6. Mechanical Properties

6.1 *Tensile Requirements*—The bars as represented by the test specimens shall conform to the tensile requirements specified in Table 2.

6.2 *Specimens*—Tension test specimens shall be taken longitudinally and machined from the locations specified in Test Methods and Definitions A 370.

6.3 *Number of Tests*:

6.3.1 Two tension tests shall be made to represent bars of the same size from each heat in each heat treatment charge. For continuous heat-treated material, not fewer than two tension tests shall represent a lot selected on the basis of one tension test from each 10 000 lb (4500 kg).

6.3.2 When heat treated without interruption in continuous furnaces, the material in a lot shall be from the same heat, same prior condition, same size, and subjected to the same heat treatments.

6.4 *Test Methods*—Tension tests shall be made in accordance with Test Methods and Definitions A 370. The yield strength shall be determined by the 0.2 % offset method.

7. Workmanship, Finish, and Appearance

7.1 *Workmanship*—The bars shall be free of pipe, cracks, and flakes. 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.

7.2 *Descaling*—Unless otherwise specified, the bars shall be descaled.

TABLE 2 Tensile Requirements

	Grade B 11	Grade B 22
Tensile strength, ksi (MPa)	70.0–95.0 (483–655)	75.0–95.0 (517–655)
Yield strength, min, ksi (MPa)	45.0 (310)	45.0 (310)
Elongation in 2 in. or 50 mm, min, %	18	18
Reduction of area, min, %	45	45

8. General Requirements

8.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification A 29/A 29M.

9. Certification and Test Reports

9.1 A manufacturer's certification that the material was manufactured and tested in accordance with this specification together with a report of the analysis and tension test results shall be furnished at the time of shipment. The report shall include the name of the manufacturer, ASTM designation number and year date and revision letter, if any, grade, heat number, and size.

10. Product Marking

10.1 The bars shall be marked in accordance with Specification A 29/A 29M except as modified or supplemented by 10.2 through 10.4 of this specification.

10.2 When specified by the purchaser, the heat number shall be permanently stamped on one end of each bar 2.50 in. and larger in nominal diameter (or equivalent cross-sectional area).

10.3 The bars shall neither be hot nor cold stamped on the sides unless approved by the purchaser on the purchase order.

10.4 Each lift, regardless of size, shall be tagged with the information required by Specification A 29/A 29M.

11. Keywords

11.1 alloy steel bars; high-temperature applications; hot-wrought steel bars; pressure-containing parts; steel bars; temperature service application—high

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