



Standard Specification for Steel Forging Stock¹

This standard is issued under the fixed designation A 711; 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.

^{ε1} NOTE—Keywords were added editorially in July 1997.

1. Scope

1.1 This specification covers cast carbon and alloy steel ingots and strand castings, semi-wrought ingots and strand castings and rolled or forged blooms, billets, and slabs for forging.

1.2 Blooms, billets, and slabs are semi-finished steel products, hot rolled or forged to approximate cross-sectional dimensions. Blooms and billets may be square, round, octagonal, or rectangular in section; slabs are rectangular. Although no invariable rule prevails between the terms blooms and billets, and they are frequently used interchangeably, the following size distinctions are in general use.

1.2.1 *Blooms*—Cross-sectional area greater than 36 in.² (232 cm²).

1.2.2 *Billets*—Maximum cross-sectional area 36 in.² (232 cm²).

1.2.3 *Slabs*—Minimum thickness, 1½ in. (38.0 mm); width, more than twice the thickness; and generally a cross-sectional area of not less than 16 in.² (103 cm²).

1.2.4 Ingots either top or bottom poured or secondary remelted are covered.

1.2.5 Strand castings with or without additional reduction are covered.

1.3 Supplementary requirements (S1 to S19) of an optional nature are provided. They shall apply only when specified by the purchaser.

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 for²

A 275/A 275M Test Method for Magnetic Particle Examination of Steel Forgings²

¹ This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.06 on Steel Forgings and Billets.

Current edition approved July 15, 1992. Published September 1992. Originally published as A 711 – 74. Last previous edition A 711 – 91.

² *Annual Book of ASTM Standards*, Vol 01.05.

A 388/A 388M Practice for Ultrasonic Examination of Heavy Steel Forgings²

A 788 Specification for Steel Forgings, General Requirements²

E 45 Test Methods for Determining the Inclusion Content of Steel³

E 112 Test Methods for Determining the Average Grain Size³

E 381 Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings³

3. Ordering Information

3.1 When this specification is to be applied to an inquiry, contract, or order, the purchaser shall furnish the following information:

3.1.1 The grade of material desired.

3.1.2 Product form restrictions (for example, ingots, strand castings, billets) if any, and

3.1.3 Applicable supplementary requirements.

4. Materials and Manufacture

4.1 Steel production shall be in accordance with Specification A 788.

4.2 *Discard*—Sufficient discard shall be made to secure freedom from piping and undue segregation.

4.3 *Reduction from Ingot*—Except as otherwise agreed in accordance with Supplementary Requirement S3.2, the material shall be made from product having at least two times the cross-sectional area of the material.

4.4 *Stability*—Material shall be furnished in a condition to withstand, for an indefinite time, exposure to all climatic conditions without developing any external or internal cracks. The method of cooling or of treatment before shipment shall be optional with the manufacturer, but he shall be responsible (in the same manner as for defects disclosed after delivery) for cracks that may develop before material is subjected to reheating. When specific stability treatment of material is specified by the purchaser, the manufacturer shall be responsible only for carrying out those specific operations but shall not be responsible for cracks that may develop before material

³ *Annual Book of ASTM Standards*, Vol 03.01.

is subjected to reheating.

5. Chemical Composition

5.1 The chemical composition shall conform to the requirements specified in the purchase order or the individual product specification. For convenience the grades commonly specified for carbon and alloy steel, blooms, billets, or slabs are shown in Table 1 and Table 2 of the latest issue of Specification A 29/A 29M. Blooms, billets, or slabs may be ordered to these grade designations, and when so ordered shall conform to the specified limits by heat analysis.

5.2 Except when Supplementary Requirement S5 is in use, or as required by a product specification, Table 3 or Table 4 of Specification A 29/A 29M shall be used in determining the ranges and limits for compositions other than those shown in Table 1 or Table 2 of Specification A 29/A 29M.

5.3 Heat Analysis:

5.3.1 An analysis of each heat of steel shall be made in accordance with Specification A 788.

5.4 Product Analysis:

5.4.1 A product analysis may be made by the purchaser in accordance with Specification A 788, except that sampling shall be as required in 5.3.2. When the steel has to conform to Table 1 or Table 2 of Specification A 29/A 29M, then the product analysis limits shall be listed in Table 5 or Table 6 of that specification.

5.4.2 To indicate adequately the composition of a heat or lot, samples selected to represent the heat as fairly as possible shall be taken midway between center and outside of the material from a minimum number of pieces as follows:

Lots	Number of Pieces
15 tons (13.6 Mg) or less	4
Over 15 tons (13.6 Mg)	6

5.4.3 If the number of pieces from cast or heat is less than the number of samples specified in 5.2.2, one sample shall be taken from each piece.

5.4.4 When chips are taken by drilling, the approximate diameter of the drill used shall be as follows:

Area of Cross Section to Be Sampled, in. ² (cm ²)	Approximate Drill Diameter, in. (mm)
16 (103) and under	½ (12.7)
Over 16 (103)	1 (25.4)

6. Permissible Variations

6.1 The permissible variation from the specified or theoretical weight of blooms, billets, and slabs shall be $\pm 5\%$ for individual pieces or for lots of less than a carload. For carload lots the permissible variation shall be $\pm 2.5\%$ of the total weight of the lot.

7. Workmanship, Finish, and Appearance

7.1 The material shall be free of injurious imperfections.

7.2 Conditioning, cutting, or parting of material may be done by scarfing or flame-cutting when methods involving preheating and temperature control necessary to avoid any

damage to flame-cut material are employed.

7.3 *Surface Conditioning*—Material may be conditioned to remove injurious surface defects, provided the depth of conditioning does not exceed $\frac{1}{16}$ in. (1.6 mm) for each inch of dimension concerned, up to a maximum depth of $\frac{3}{4}$ in. (18.1 mm), and provided that the width of the conditioning is at least four times its greatest depth; except that in the case of slabs where the width is at least twice the thickness, the depth of conditioning on the wide surfaces may exceed this allowance by 50 %, up to a maximum depth of $\frac{3}{4}$ in. (19.1 mm). The maximum depth of conditioning on two parallel sides at opposite locations shall not exceed one and one half times the maximum allowed for one side. All conditioned areas must be flared to result in a uniform blending.

8. Inspection

8.1 The inspector representing the purchaser shall have entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests (except product chemical analysis) and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

8.2 The purchaser may make the tests to govern the acceptance or rejection of material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

9. Rejection and Rehearing

9.1 Material which does not conform to the requirements of this specification shall be subject to rejection and the manufacturer so notified.

9.2 Unless otherwise specified, any rejections based on tests made in accordance with 9.2 shall be reported to the manufacturer by the purchaser.

9.3 Samples tested in accordance with 9.2 that represent rejected material shall be preserved for one month from the date the rejection is reported to the manufacturer. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

10. Product Marking

10.1 The cast or heat number shall be marked or stamped on a side near the end or on the end when practicable. When the material is bundled, the cast or heat number shall be marked on a tag attached to the bundle.

11. Keywords

11.1 billets; blooms; slabs; steel forging stock