



Designation: A 592/A 592M – 89 (Reapproved 1999)

Standard Specification for High-Strength Quenched and Tempered Low-Alloy Steel Forged Fittings and Parts for Pressure Vessels¹

This standard is issued under the fixed designation A 592/A 592M; 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.

1. Scope

1.1 This specification² covers high-strength quenched and tempered low-alloy steel forged fittings and parts for pressure vessels. The maximum thickness of forgings under this specification shall be 1½ in. [38 mm] for Grade A, and 3¾ in. [95 mm] for Grades E and F (4 in. [102 mm] maximum as heat treated).

NOTE 1—These grades are similar to corresponding grades in Specification A 517/A 517M.

1.2 Welding technique is of fundamental importance and it is presupposed that welding procedures will be in accordance with approved methods for the class of material used.

1.3 The values stated in either inch-pound units or SI (metric) units are to be regarded separately as the standard; within the text and tables, the SI units are shown in [brackets]. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.4 Unless the order specifies the applicable “M” specification designation, the material shall be furnished to the inch-pound units.

2. Referenced Documents

2.1 ASTM Standards:

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products³

A 517/A 517M Specification for Pressure Vessel Plates, Alloy Steel, High-Strength, Quenched and Tempered⁴

A 788 Specification for Steel Forgings, General Requirements⁵

E 112 Test Methods for Determining the Average Grain Size⁶

3. Ordering Information and General Requirements

3.1 In addition to the ordering information required by Specification A 788, the purchaser shall include with the inquiry and order a detailed drawing, a sketch, or written description of the forging.

3.2 Material supplied to this specification shall conform to the requirements of Specification A 788, which outlines additional ordering information, manufacturing requirements, testing and retesting methods and procedures, marking, certification, product analysis variations, and additional supplementary requirements.

3.3 If the requirements of this specification are in conflict with the requirements of Specification A 788, the requirements of this specification shall prevail.

4. Materials and Manufacture

4.1 *Melting Process*—The steel shall be made in accordance with the Melting Process Section of Specification A 788.

4.2 *Grain Size*—The steel shall be fully killed, fine grained (ASTM No. 5 or finer), as determined in accordance with Test Methods E 112, Plate IV.

4.3 *Discard*—Sufficient discard shall be made from each ingot to ensure freedom from piping and excessive segregation.

4.4 The finished product shall be a hot-worked forging as defined by Specification A 788, and shall be forged as close as practicable to the finished shape and size.

5. Heat Treatment

5.1 After forging and before reheating, the forgings shall be cooled to provide substantially complete transformation of austenite. Heat treatment for properties shall consist of heating the forgings to not less than 1650°F [900°C], quenching in a liquid medium, and tempering at 1150°F [620°C] minimum, with a holding time of 1 h/in. [1 h/25 mm] minimum, but in no case less than ½ h. Forgings with sections over 2½ to 4 in. [65 to 100 mm] inclusive, shall be liquid quenched from a

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² For ASME Boiler and Pressure Vessel Code applications see related Specification SA-592/SA-592M in Section II of that Code.

³ *Annual Book of ASTM Standards*, Vol 01.03.

⁴ *Annual Book of ASTM Standards*, Vol 01.04.

⁵ *Annual Book of ASTM Standards*, Vol 01.05.

⁶ *Annual Book of ASTM Standards*, Vol 03.01.