



Standard Specification for Vacuum-Treated 12 % Chromium Alloy Steel Forgings for Turbine Rotors and Shafts¹

This standard is issued under the fixed designation A 768; 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 covers vacuum-treated 12 % chromium steel forgings for turbine rotors and shafts.

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

2. Referenced Documents

2.1 ASTM Standards:

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

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

A 418 Test Method of Ultrasonic Examination of Turbine and Generator Steel Rotor Forgings²

A 472 Test Method for Heat Stability of Steam Turbine Shafts and Rotor Forgings²

A 788 Specification for Steel Forgings, General Requirements²

3. Ordering Information

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, sketch, or written description of the forging, including the mechanical test specimen location.

4. General Requirements

4.1 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.

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

5. Manufacture

5.1 The melting processes of Specification A 788 shall be applicable except that the open-hearth or basic oxygen methods of primary melting shall not be used, and the molten steel shall be vacuum degassed prior to or during pouring of the ingot.

5.1.1 If the ESR process is used, then the electrodes shall have been produced from vacuum degassed primary heat(s).

5.2 In addition to the requirements of Specification A 788, it is important to maintain the axial center of the forging in common with the axial center of the original ingot.

5.3 Heat Treatment:

5.3.1 The heat treatment for mechanical properties shall consist of quenching and tempering.

5.3.1.1 The preliminary heat treatment shall consist of normalizing well above the transformation temperature range. This operation may be performed before preliminary machining (see 5.4.1).

5.3.1.2 The quenching treatment shall be from above the transformation range but below the normalizing temperature described in 5.3.1.1. This treatment shall be performed after preliminary machining (see 5.4.1). Austenitizing temperatures shall be in accordance with Table 1.

5.3.1.3 The final tempering temperature shall be in accordance with Table 1.

5.3.1.4 After heat treatment and subsequent rough machining and boring (see 5.4.2 and 5.4.3), the forging shall be stress-relieved at a temperature not more than 100°F (55°C) below the final tempering temperature, but not less than 1100°F (593°C).

5.3.1.5 With the prior approval of the purchaser, the stress-relief temperature may approach, equal, or slightly exceed the final tempering temperature as a means of adjusting final strength or toughness. If the stress relief temperature is within 25°F (14°C) of the final tempering temperature, or higher, additional tension tests must be obtained (see 7.1.3).

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 A01.06 on Steel Forgings and Billets.

Current edition approved Jan. 15, 1995. Published March 1995. Originally published as A 768 – 79. Last previous edition A 768 – 93.

² Annual Book of ASTM Standards, Vol 01.05.

³ Annual Book of ASTM Standards, Vol 01.03.