Designation: A289/A289M – 97 (Reapproved 2013)

Standard Specification for Alloy Steel Forgings for Nonmagnetic Retaining Rings for Generators[1]

This standard is issued under the fixed designation A289/A289M; 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 specification covers nonmagnetic alloy steel retaining ring forgings for generators.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 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:*[2]

A342/A342M Test Methods for Permeability of Feebly Magnetic Materials

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A531/A531M Practice for Ultrasonic Examination of Turbine-Generator Steel Retaining Rings

A788/A788M Specification for Steel Forgings, General Requirements

E45 Test Methods for Determining the Inclusion Content of Steel

E112 Test Methods for Determining Average Grain Size

E165/E165M Practice for Liquid Penetrant Examination for General Industry

3. Ordering Information and General Requirements

3.1 Material supplied to this specification shall conform to the requirements of Specification A788/A788M, which outlines ordering information, manufacturing requirements, testing methods and retesting procedures, marking, certification, product analysis variation, and additional supplementary requirements.

3.2 If the requirements of this specification are in conflict with the requirements of Specification A788/A788M, the requirements of this specification shall prevail.

3.3 Supplementary requirements of an optional nature are provided. They shall apply only when specified by the purchaser.

4. Manufacture

4.1 The steel shall be made by the electro-slag-remelt (ESR) process. The electrodes shall be made by either the basic electric furnace or ladle refining processes.

4.2 Sufficient discard shall be taken from each ingot to secure freedom from piping and undue segregation.

4.3 Forged rings shall be solution treated following hot working and prior to the cold expansion procedure.

4.4 Rings shall be rough machined prior to cold expansion or final heat treatment.

4.5 Rings shall be expanded by an appropriate method such as segmented dies, tapered plug, etc. in the temperature range of 60 to 390°F [15 to 200°C] in order to develop the required tensile properties.

4.6 After cold expansion, the rings shall be heated to between 575 and 750°F [300 to 400°C] at a rate not to exceed 75°F [40°C]/h, held at this temperature for 6 to 12 h, and then slow cooled to ambient temperature.

5. Chemical Requirements

5.1 *Heat Analysis*—The heat analysis obtained from sampling in accordance with Specification A788/A788M shall comply with Table 1 of this specification.

5.2 *Product Analysis*—When a product analysis is performed at the request of the purchaser, the provisions of Table 1 of Specification A788/A788M shall apply. The analysis shall be made from a forging representing each heat.

NOTE 1—The material shown in Table 1 of A289/A289M was formerly known as Class C.

[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.

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[2] 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.