



Standard Specification for Martensitic Stainless Steel Forgings and Forging Stock for High-Temperature Service¹

This standard is issued under the fixed designation A 1021; 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 martensitic chromium stainless steel forgings, forged bar, and forging stock for high temperature service. The mechanical properties are developed by suitable heat treatment, as indicated for each alloy.

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

2. Referenced Documents

2.1 ASTM Standards:

A 275 Test Method for Magnetic Particle Examination of Steel Forgings²

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

A 788 Specification for Steel Forgings, General Requirements²

E 112 Test Methods for Determining Average Grain Size⁴

E 292 Test Methods for Conducting Time-For-Rupture Notch Tension Tests of Materials⁴

E 381 Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings⁴

E 562 Test Method for Determining Volume Fraction by Systematic Manual Point Count⁴

3. Ordering Information

3.1 In addition to the ordering information required by Specification A 788, the purchaser shall specify the grade designation, heat treatment condition, class and finish, and include a sketch or written description of the forging with the inquiry and order.

4. General Requirements

4.1 Materials supplied to this specification shall conform to the requirements of Specification A 788, including any supplementary requirements that are indicated in the purchase order.

Failure to comply with the general requirements of Specification A 788 constitutes non-conformance with this specification. In case of conflict between the requirements of this specification and Specification A 788, this specification shall prevail.

5. Manufacture

5.1 *Melting Process*—All melting processes of Specification A 788 are permitted unless the purchaser invokes Supplementary Requirement S1.

5.2 *Forging Process*—Either the closed impression die or the open die, including ring rolling, forging processes may be utilized unless the purchaser specifies a process.

5.3 *Heat Treatment*—Quenched and tempered classes shall be heat-treated in accordance with Table 1.

5.3.1 *Number of Heat Treatments*—Heat treatment as defined in Table 1 shall consist of austenitizing, quenching, and tempering. Retempering is permitted but purchaser approval is required for more than one complete reheat treatment.

5.4 *Stress Relief*—When heat treatment for mechanical properties is followed by straightening, a stress-relieving heat treatment is required in accordance with Table 1.

5.4.1 *Quenching after Stress Relief*—Liquid quenching of stress-relieved forgings is prohibited.

5.5 *Finish*—Forgings may be furnished in one of the following hot-finished conditions:

5.5.1 *Finish F*—As forged without descaling.

5.5.2 *Finish FD*—Forged and descaled.

5.5.3 *Finish RT*—Rough turned or rough machined to specified dimensions. Billets or blooms ordered as forging stock shall be furnished with a ground, machined, or descaled surface unless otherwise specified in the ordering document.

5.6 *Camber*—Camber shall not exceed ¼ in. (5 mm) in 5 ft (150 cm).

6. Chemical Composition

6.1 The steel shall conform to the requirements for chemical composition prescribed in Table 2.

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 *Annual Book of ASTM Standards*, Vol 01.05.

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

⁴ *Annual Book of ASTM Standards*, Vol 03.01.

*A Summary of Changes section appears at the end of this standard.