



Designation: A 638/A 638M – 00

Standard Specification for Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service¹

This standard is issued under the fixed designation A 638/A 638M; 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 hot-finished or cold-finished precipitation hardening iron base superalloy bars, forgings, and forging stock for high-temperature service. The mechanical properties of these alloys are developed by suitable solution treating and precipitation hardening treatments.

1.2 Two grades of iron base alloy are covered. Selection will depend upon design, service conditions, mechanical properties, and elevated temperature characteristics.

1.3 The values stated in either inch-pound units or SI (metric) units are to be regarded separately as standards; 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 independent of the other. Combining values from the two systems may result in nonconformance with the specification.

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

2. Referenced Documents

2.1 ASTM Standards:

- A 484/A484M Specification for General Requirements for Stainless Steel Bars, Billets and Forgings³
- A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products⁴
- E 30 Test Methods for Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron⁵

3. Ordering Information

3.1 It is the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this

specification. Such requirements may include, but are not limited to, the following:

- 3.1.1 Quantity (weight or number of pieces),
- 3.1.2 Name of material (precipitation hardening iron base superalloy),
- 3.1.3 Form (bars, forgings, and forging stock),
- 3.1.4 Dimensions (in the case of rough or finished forgings the order shall be accompanied by a print or drawing or otherwise adequately described as to the shape and dimension),
- 3.1.5 Grade designation (Table 1),
- 3.1.6 Condition (Section 5),
- 3.1.7 Finish (Section 3),
- 3.1.8 Mechanical requirements (Section 8),
- 3.1.9 ASTM designation, and
- 3.1.10 Special requirements.

4. General Requirements

4.1 In addition to the requirements of this specification, all requirements of the current edition of Specification A 484/A 484M shall apply. Failure to comply with the general requirements of Specification A 484/A 484M constitutes nonconformance with this specification.

5. Condition

5.1 The product forms covered in this specification may be furnished in one of the following conditions:

- 5.1.1 Hot-finished,
- 5.1.2 Solution treated (Grade 660 only—Type 1 or Type 2 solution treatment as specified),
- 5.1.3 Solution and precipitation treated (Grade 660 only—Type 1 or Type 2 solution treatment as specified), or
- 5.1.4 Other as specified.

6. Heat Treatment

6.1 Samples cut from bars, forgings, or a sample forged from the forging stock shall conform to the mechanical properties of Table 1 and Table 2 when heat treated as prescribed in Table 3.

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 A01.17 on Flat Stainless Steel Products.

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² For ASME Boiler and Pressure Vessel Code applications see related Specification SA-638 in Section II of that Code.

³ *Annual Book of ASTM Standards*, Vol 01.05.

⁴ *Annual Book of ASTM Standards*, Vol 01.03.

⁵ *Annual Book of ASTM Standards*, Vol 03.05.