



Designation: B 637 – 98

Standard Specification for Precipitation-Hardening Nickel Alloy Bars, Forgings, and Forging Stock for High-Temperature Service¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification² covers hot- and cold-worked precipitation-hardenable nickel alloy rod, bar, forgings, and forging stock for high-temperature service (Table 1).

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in brackets are for information only.

2. Referenced Documents

2.1 ASTM Standards:

E 8 Test Methods for Tension Testing of Metallic Materials³

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁴

E 139 Test Methods for Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials³

E 1473 Test Methods for Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys⁵

3. Terminology

3.1 Definitions:

3.1.1 *bar*—material of rectangular (flats), hexagonal, octagonal, or square solid section in straight lengths.

3.1.2 *rod*—material of round solid section furnished in straight lengths.

4. Ordering Information

4.1 It is the responsibility of the purchaser to specify all requirements that are necessary for the safe and satisfactory performance of material ordered under this specification. Examples of such requirements include, but are not limited to, the following:

4.1.1 Alloy (Table 1).

4.1.2 Condition (temper) (Table 2).

4.1.3 *Shape*—Rod or bar (round, rectangle, square, hexagon, octagon).

4.1.3.1 Forging (sketch or drawing).

4.1.4 Dimensions, including length.

4.1.5 Quantity (mass or number of pieces).

4.1.6 *Forging Stock*—Specify if material is stock for reforging.

4.1.7 Finish.

4.1.8 *Certification*—State if certification is required (Section 15).

4.1.9 *Samples for Product (Check) Analysis*—Whether samples for product (check) analysis shall be furnished (9.2).

4.1.10 *Purchaser Inspection*—If the purchaser wishes to witness tests or inspection of material at the place of manufacture, the purchase order must so state indicating which tests or inspections are to be witnessed (Section 13).

5. Chemical Composition

5.1 The material shall conform to the requirements as to chemical composition prescribed in Table 1.

5.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations prescribed in Table 1.

6. Mechanical Properties

6.1 Unless otherwise specified, the material shall be supplied in the solution treated condition, suitable for subsequent age hardening.

6.2 The solution treated material shall be capable of meeting the mechanical property requirements of Table 3, and the stress rupture requirements of Table 4, following the precipitation hardening treatment described in Table 2.

6.3 When the material is to be supplied in the solution treated plus aged condition, the requirements of Table 3 and Table 4 shall apply, with the precipitation hardening treatment of Table 2, or as agreed upon between the purchaser and the manufacturer as part of the purchase contract.

7. Dimensions and Permissible Variations

7.1 *Diameter, Thickness, or Width*—The permissible variations from the specified dimensions of cold-worked rod and bar

¹ This specification is under the jurisdiction of ASTM Committee B-2 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.07 on Refined Nickel and Cobalt and Their Alloys.

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² For ASME Boiler and Pressure Vessel Code applications, see related Specification SB-637 in Section II of that Code.

³ *Annual Book of ASTM Standards*, Vol 03.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ *Annual Book of ASTM Standards*, Vol 03.06.