



Designation: ~~B573–06 (Reapproved 2016)~~ B573 – 24

Standard Specification for Nickel-Molybdenum-Chromium-Iron Alloys (~~UNS N10003, N10242~~) Bar or Rod¹

This standard is issued under the fixed designation B573; 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~~ Scope*

1.1 This specification² covers nickel-molybdenum-chromium-iron alloys (~~UNS N10003 and UNS N10242~~) in the form of bar ~~rod~~ for use in general corrosive service or rod. The alloys are typically for general corrosive service but not limited to this usage.

1.2 ~~The following products are covered under this specification:~~ Alloys that can currently be certified to this specification are UNS N10003 and UNS N10242.

1.2.1 ~~Rods 5/16 to 3/4 in. (7.94 to 19.05 mm) excl in diameter, hot or cold finished, annealed, and pickled or mechanically descaled.~~

1.2.2 ~~Rods 3/4 to 3 1/2 in. (19.05 to 88.9 mm) incl in diameter, hot or cold finished, annealed, ground, or turned.~~

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar with all hazards including those identified in the appropriate Safety Data Sheet (SDS) for this product/material as provided by the manufacturer, to establish appropriate safety and health safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards*.³

[B880 Specification for General Requirements for Chemical Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys](#)

[B899 Terminology Relating to Non-ferrous Metals and Alloys](#)

[E8E8/E8M Test Methods for Tension Testing of Metallic Materials](#) [~~Metric~~] ~~E0008~~ ~~E0008M~~

[E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

[E1473 Test Methods for Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys](#)

¹ This specification is under the jurisdiction of ASTM Committee B02 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 Specification SB-573 in Section II of that Code.

³ 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.

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

3. Terminology

3.1 Common B02.07 terminology is found in Specification [B899](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *bar, n*—an elongated, forged or rolled metal product with uniform strength, length and diameter.

3.2.2 *rod, n*—a hot-finished product 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 *Dimensions*—Nominal diameter and length. The shortest usable multiple length shall be specified (Table 1).~~

~~4.1.2 *Certification*—State if certification or a report of test results is required (Section 15).~~

~~4.1.3 *Purchaser Inspection*—State which tests or inspections are to be witnessed (Section 13).~~

~~4.1.4 *Samples for Product (Check) Analysis*—State whether samples shall be furnished (9.2.2).~~

4.2 Examples of such requirements include but are not limited to the following:

4.2.1 *Dimensions*—See Section 8.

4.2.2 *Purchaser Inspection*—See Section 13.

4.2.3 *Samples for Product (Check) Analysis*—See Section 10.

5. Materials and Manufacture

5.1 The finish options for products certified to this specification are:

5.1.1 Hot-Finished, Annealed, and Descaled Rod,

5.1.2 Hot-Finished, Annealed, and Ground Bar,

5.1.3 Hot-Finished, Annealed, and Turned Bar,

5.1.4 Cold-Finished and Annealed Bar, and

5.1.5 Cold-Finished, Annealed, and Ground Bar.

TABLE 14 Permissible Variations in Length of Rods

Random mill lengths	2 to 12 ft (610 to 3660 mm) long with not more than 25 weight % under 4 ft (1.22 m).
Random mill lengths	2 ft to 12 ft (610 mm to 3660 mm) long with not more than 25 weight % under 4 ft (1.22 m).
Multiple lengths	Furnished in multiples of a specified unit length, within the length limits indicated above. For each multiple, an allowance of ¼ in. (6.35 mm) shall be made for cutting, unless otherwise specified. At the manufacturer's option, individual specified unit lengths may be furnished.
Nominal lengths	Specified nominal lengths having a range of not less than 2 ft (610 mm) with no short lengths allowed.
Cut lengths	A specified length to which all rods shall be cut with a permissible variation of + ⅛ in. (3.17 mm) – 0.

5.2 The diameters permitted for certification for each finish appear in the left column of Table 3.

6. Chemical Composition

6.1 The material shall conform to the requirements as to chemical composition prescribed in Table 21.

6.2 If a product (check) analysis is made by the purchaser, the material shall conform to the requirements specified it shall be done in Table 2 subject to the permissible tolerances in conformance with Specification B880.

7. Mechanical Properties and Other Requirements

7.1 The mechanical properties of the material at room temperature shall conform to those shown in Table 32.

8. Dimensions and Permissible Variations

8.1 *Diameter*—The permissible variations from the specified diameter shall be as prescribed in Table 43.

8.2 *Out-of-Roundness*—The permissible variation in roundness shall be as prescribed in Table 43.

8.3 *Machining Allowances*—When the surfaces of finished material are to be machined, the following allowances are suggested for normal machining operations:

8.3.1 *As-finished (Annealed and Descaled)*—For diameters of $\frac{5}{16}$ in. to $\frac{11}{16}$ in. (7.94 to 17.46 mm) in. (7.94 mm to 17.46 mm) incl, an allowance of $\frac{1}{16}$ in. (1.59 mm) in. (1.59 mm) should be added on the diameter should be made for finish machining.

TABLE 21 Chemical Requirements^A

Element	Composition, %	
	UNS N10242N10003	UNS N10003N10242
Chromium	7.0–9.0	6.0–8.0
Chromium	6.0–8.0	7.0–9.0
Iron, max	2.0	5.0
Iron	5.0	2.0
Carbon	0.03 max	0.04–0.08
Carbon	0.04–0.08	0.03
Silicon, max	0.80	1.00
Silicon	1.00	0.80
Cobalt, max	1.00	0.20
Cobalt	0.20	1.00
Manganese, max	0.80	1.00
Manganese	1.00	0.80
Tungsten, max	...	0.50
Vanadium, max	...	0.50
Tungsten	0.50	...
Vanadium	0.50	...
Molybdenum	24.0–26.0	15.0–18.0
Molybdenum	15.0–18.0	24.0–26.0
Phosphorus, max	0.030	0.015
Phosphorus	0.015	0.030
Sulfur, max	0.015	0.020
Sulfur	0.020	0.015
Aluminum plus titanium, max	...	0.50
Aluminum ^B	0.50	...
Copper, max	0.50	0.35
Copper	0.35	0.50
Boron, max	0.006	0.010
Boron	0.010	0.006
Nickel	remainder	remainder
Aluminum, max	0.50	...
Aluminum	...	0.50

^A Values in the table are maximums unless a range or minimum is indicated.

^B Includes titanium.