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Standard Specification for Nickel-Molybdenum-Chromium-Iron Alloys (UNS N10003, N10242) 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

1.1 This specification² covers nickel-molybdenum-chromium-iron alloys (UNS N10003 and UNS ~~N10242~~^{*N10242})³ rod for use in general corrosive service.

1.2 The following products are covered under this specification:

1.2.1 Rods $\frac{5}{16}$ to $\frac{3}{4}$ in. (7.94 to 19.05 mm) excl in diameter, hot or cold finished, annealed, and pickled or mechanically descaled.

1.2.2 Rods $\frac{3}{4}$ to $3\frac{1}{2}$ 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 Materials Safety Data Sheet (MSDS)(SDS) for this product/material as provided by the manufacturer; to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*⁴

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

[E8 Test Methods for Tension Testing of Metallic Materials](#)

[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](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *rod, n*—a 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](#)).

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.

^{*} New designation established in accordance with Practice E527 and SAE J1086, Recommended Practice for Numbering Metals and Alloys (UNS).

³ New designation established in accordance with Practice E527 and SAE J1086, Recommended Practice for Numbering Metals and Alloys (UNS).

⁴ 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.

TABLE 1 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).
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. Chemical Composition

5.1 The material shall conform to the requirements as to chemical composition prescribed in [Table 2](#).

5.2 If a product (check) analysis is made by the purchaser, the material shall conform to the requirements specified in [Table 2](#) subject to the permissible tolerances in Specification [B880](#).

6. Mechanical Properties and Other Requirements

6.1 The mechanical properties of the material at room temperature shall conform to those shown in [Table 3](#).

7. Dimensions and Permissible Variations

7.1 *Diameter*—The permissible variations from the specified diameter shall be as prescribed in [Table 4](#).

7.2 *Out-of-Roundness*—The permissible variation in roundness shall be as prescribed in [Table 4](#).

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

7.3.1 *As-finished (Annealed and Descaled)*—For diameters of 5/16 to 1 1/16 in. (7.94 to 17.46 mm) incl, an allowance of 1/16 in. (1.59 mm) on the diameter should be made for finish machining.

7.4 *Length*:

7.4.1 Unless multiple, nominal, or cut lengths are specified, random mill lengths shall be furnished.

7.4.2 The permissible variations in length of multiple, nominal, or cut length rod shall be as prescribed in [Table 1](#). Where rods are ordered in multiple lengths, ¼ in. (6.35 mm) length addition shall be allowed for each uncut multiple length.

7.5 *Ends*: <http://standards.iteh.ai/catalog/standards/astm/753fa62d-462e-4e94-be2b-807586d4ea5c/astm-b573-062016>

7.5.1 Rods ordered to random or nominal lengths shall be furnished with either cropped or sawed ends.

7.5.2 Rods ordered to cut lengths shall be furnished with square saw cut or machined ends.

7.6 *Weight*—For calculation of mass or weight, the following densities shall be used:

Alloy	lb/in ³	g/cm ³
N10003	0.317	8.78
N10242	0.327	9.05

TABLE 2 Chemical Requirements

Element	Composition, %	
	UNS N10242	UNS N10003
Chromium	7.0-9.0	6.0-8.0
Iron, max	2.0	5.0
Carbon	0.03 max	0.04-0.08
Silicon, max	0.80	1.00
Cobalt, max	1.00	0.20
Manganese, max	0.80	1.00
Tungsten, max	...	0.50
Vanadium, max	...	0.50
Molybdenum	24.0-26.0	15.0-18.0
Phosphorus, max	0.030	0.015
Sulfur, max	0.015	0.020
Aluminum plus titanium, max	...	0.50
Copper, max	0.50	0.35
Boron, max	0.006	0.010
Nickel	remainder	remainder
Aluminum, max	0.50	...