



Designation: B 719 – 00

Standard Specification for Nickel-Chromium-Molybdenum-Cobalt-Tungsten- Iron-Silicon Alloy (UNS N06333) Bar¹

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1. Scope

1.1 This specification covers wrought alloy UNS N06333 in the form of hot-finished and cold-finished bars and flats intended for heat resisting applications and general corrosive service.

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

2. Referenced Documents

2.1 ASTM Standards:

B 880 Specification for General Requirements for Chemical Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys²

E 8 Test Methods for Tension Testing of Metallic Materials³

E 10 Test Method for Brinell Hardness of Metallic Materials³

E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials³

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

E 140 Hardness Conversion Tables for Metals³

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

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *bars*—material of round, hexagonal, octagonal, or square solid section, furnished in straight lengths, ¼ in. [6.35 mm] and over in diameter or size.

3.1.2 *flats*—material ¼ to 10 in. [6.35 to 254 mm], inclusive, in width and 120 in. [3.05 mm] and over in thickness.

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 Annual Book of ASTM Standards, Vol 02.04.

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.

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 name or UNS number.

4.1.2 Quantity.

4.1.3 ASTM Designation and year of issue.

4.1.4 Section (round, square, hexagonal, and so forth).

4.1.5 Dimensions, including length.

4.1.6 Finish, hot or cold.

4.1.7 *Certification*—state if certification is required (Section 16).

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

4.1.9 *Purchaser Inspection*—If a purchaser wishes to witness tests or inspections of material at the place of manufacture, the purchase order must so state indicating which tests or inspections are to be witnessed.

5. Material and Manufacture

5.1 All material shall be furnished in the annealed condition, except that cold-drawn hexagons may be given a cold draw sizing pass subsequent to the final anneal.

NOTE 1—Hot-finished rectangular bar in widths 10 in. [254 mm] and under may be furnished as hot-finished plate with sheared or cut edges.

6. Chemical Requirements

6.1 The material shall conform to the requirements as to chemical composition specified in Table 1.

6.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations per B 880.

7. Mechanical and Other Requirements

7.1 The mechanical properties of the material at room temperature shall conform to those shown in Table 2.

TABLE 1 Chemical Requirements

Element	Composition Limits, %
Carbon	0.10 max
Manganese	2.0 max
Phosphorus	0.03
Sulfur	0.03
Silicon	1.5 max
Chromium	24.0–27.0
Nickel	44.0–48.0
Molybdenum	2.5–4.0
Cobalt	2.5–4.0
Tungsten	2.5–4.0
Iron ^A	remainder

^AElement may be determined arithmetically by difference.

TABLE 2 Mechanical Properties

Tensile Strength, min psi [MPa]	Yield Strength, 0.2 % offset, min. psi [MPa]	Elongation in 2 in. or 50 mm, or 4D, min%	Hardness ^A
80 000 [551]	35 000 [241]	30	75 to 95 HRB

^AHardness values are informative only and not to be construed as the basis for acceptance.

8. Permissible Variations in Dimensions

8.1 All bars shall conform to the permissible variations in dimensions specified in Tables 3–8, inclusive.

9. Workmanship, Finish, and Appearance

9.1 The material shall be uniform in quality and condition, smooth, commercially straight, and free from injurious imperfections.

10. Sampling

10.1 Lot Definitions:

10.1.1 A lot for chemical analysis shall consist of one heat.

10.1.2 A lot for mechanical properties shall consist of material from one heat of the same condition and cross section, and no more than 40 000 lb [18 100 kg] in mass.

10.2 Test Material Selection:

10.2.1 *Chemical Analysis*—Representative samples from each lot shall be taken during pouring or subsequent processing.

10.2.1.1 Product (check) analysis shall be wholly the responsibility of the purchaser.

10.2.2 *Mechanical Properties*—Samples of the material to provide test specimens for mechanical properties shall be taken from such locations in each lot as to be representative of that lot.

11. Number of Tests

11.1 *Chemical Analysis*—One test per lot.

11.2 *Mechanical Properties*—One test per lot.

12. Specimen Preparation

12.1 Tension-test specimens shall be taken from material in the final condition and tested in the direction of fabrication.

12.1.1 All material shall be tested in full cross-section size when possible. When a full cross-section size test cannot be performed, the largest possible round specimen in ASTM Test Methods E 8 shall be used.

13. Test Methods

13.1 Determine the chemical composition, mechanical, and other properties of the material as enumerated in this specification, in case of disagreement, in accordance with the following methods:

TABLE 3 Permissible Variations in Size of Hot-Rolled Round and Square Bars

<https://standards.iteh.ai/catalog/standards/sist/6c426766-64a0-4145-87a0-52a0a818656e/astm-b719-00>

NOTE 1—Out of round is the difference between the maximum and minimum diameters of the bar, measured at the same cross section.

NOTE 2—Out of square section is the difference in the two dimensions at the same cross section of a square bar, each dimension being the distance between opposite faces.

NOTE 3—Size tolerances for rounds in the size range from ¼ in. [6.4 mm] to approximately ⅝ in. [15.9 mm], which are produced on rod mills in coils, are not shown herein.

NOTE 4—Variations in size of coiled product made on rod mills are greater than size tolerances for product made on bar mills.

Specified Size		Size Tolerance				Out of Round (Note 1) or Out of Square Section (Note 2)	
in.	mm	Over		Under		in.	mm
		in.	mm	in.	mm		
¼ to ⅙	6.4 to 7.9	0.005	0.13†	0.005	0.13	0.008	0.20
Over ⅙ to ⅗	7.9 to 11.1	0.006	0.15	0.006	0.15	0.009	0.23
Over ⅗ to ⅝	11.1 to 15.9	0.007	0.18	0.007	0.18	0.010	0.25
Over ⅝ to ⅞	15.9 to 22.2	0.008	0.20	0.008	0.20	0.012	0.30†
Over ⅞ to 1	22.2 to 25.4	0.009	0.23	0.009	0.23	0.013	0.33†
Over 1 to 1⅙	25.4 to 28.6	0.010	0.25	0.010	0.25	0.015	0.38
Over 1⅙ to 1¼	28.6 to 31.8	0.011	0.28	0.011	0.28	0.016	0.41
Over 1¼ to 1⅓	31.8 to 34.9	0.012	0.30†	0.012	0.30†	0.018	0.46
Over 1⅓ to 1½	34.9 to 38.1	0.014	0.36	0.014	0.36	0.021	0.53
Over 1½ to 2	38.1 to 50.8	⅙	0.4	⅙	0.4	0.023	0.58
Over 2 to 2½	50.8 to 63.5	⅓	0.8	0	0	0.023	0.58
Over 2½ to 3½	63.5 to 88.9	⅜	1.2	0	0	0.035	0.89
Over 3½ to 4½	88.9 to 114.3	⅙	1.6	0	0	0.046	1.17
Over 4½ to 5½	114.3 to 139.7	⅝	2.0	0	0	0.058	1.46
Over 5½ to 6½	139.7 to 165.1	⅙	3.2	0	0	0.070	1.78
Over 6½ to 8	165.1 to 203.2	⅝	4.0	0	0	0.085	2.16

† Editorially corrected.