Designation: B818 – 03 (Reapproved 2013)

Standard Specification for Cobalt-Chromium-Nickel-Molybdenum-Tungsten Alloy (UNS R31233) Plate, Sheet and Strip[1]

This standard is issued under the fixed designation B818; 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 specification covers cobalt-chromium-nickel-molybdenum-tungsten alloy UNS R31233 in the form of rolled plate, sheet, and strip for wear applications and general corrosion service.

1.2 The following products are covered under this specification:

1.2.1 *Sheet and Strip*—Hot or cold rolled, annealed and descaled unless solution-annealing is performed in an atmosphere yielding a bright finish.

1.2.2 *Plate*—Hot rolled, solution-annealed, and descaled.

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 Material Safety Data Sheet (MSDS) 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:*[2]

B906 Specification for General Requirements for Flat-Rolled Nickel and Nickel Alloys Plate, Sheet, and Strip

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *plate*—material 3⁄16 in. (4.76 mm) and over in thickness.

3.1.2 *sheet and strip*—material under 3⁄16 in. (4.76 mm) in thickness.

4. General Requirements

4.1 Material furnished under this specification shall conform to the applicable requirements of Specification B906 unless otherwise provided herein.

5. Ordering Information

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

5.1.1 *Alloy.*

5.1.2 *Dimensions*—Thickness (in decimals of an inch), width, and length (inch or fraction of an inch).

5.1.3 *Certification*—State if a report of test results is required (see Specification B906, Section 21).

5.1.4 *Optional Requirement*—Plate; state how plate is to be cut (see Specification B906, Table A2.3).

5.1.5 *Purchase Inspection*—State which tests or inspections are to be witnessed (see Specification B906, Section 18).

5.1.6 *Samples, for Product (Check) Analysis*—State whether samples should be furnished (see Specification B906, Section 7.2.2).

6. Chemical Composition

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

6.2 If a product (check) analysis is made by the purchaser, the material shall conform to the requirements specified in Table 1 and Specification B906.

7. Mechanical Properties and Other Requirements

7.1 *Tensile Properties*—The material shall conform to the room temperature tensile properties prescribed in Table 2.

8. Dimensions, Mass, and Permissible Variations

8.1 *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.

Current edition approved Feb. 1, 2013. Published February 2013. Originally approved in 1991. Last previous edition approved in 2008 as B818 – 03 (2008). DOI: 10.1520/B0818-03R13.

[2] 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 Chemical Requirements

Element	Composition Limits, %
Boron	0.015 max
Carbon	0.02–0.10
Chromium	23.5–27.5
Iron	1.0–5.0
Manganese	0.1–1.5
Molybdenum	4.0–6.0
Nitrogen	0.03–0.12
Nickel	7.0–11.0
Phosphorous	0.030 max
Sulfur	0.020 max
Silicon	0.05–1.00
Tungsten	1.0–3.0
Cobalt	Remainder[A]

[A] See Specification B906.

TABLE 2 Mechanical Property Requirements

Tensile Strength, min, ksi (MPa)	130 (896)
Yield Strength, min, ksi (MPa)	55 (379)
Elongation in 2 in. (50.8 mm) or 4*D*[A] min %	15

[A] *D* refers to the diameter of the tension specimen.

8.1.1 *Sheet and Strip*—The thickness shall be measured with the micrometer spindle ⅜ in. (9.525 mm) or more from any edge for material 1 in. (25.4 mm) or over in width and at any place on material under 1 in. in width.

8.2 *Length:*

8.2.1 *Sheet and Strip*—Sheet and strip may be ordered to cut lengths, in which case a variation of ⅛ in. (3.175 mm) over the specified length shall be permitted, with a "0" minus tolerance.

8.3 *Straightness:*

8.3.1 The edgewise curvature (depth of chord) of flat sheet, strip, and plate shall not exceed the product of 0.05 in. multiplied by the length in feet (0.04 mm multiplied by the length in centimetres).

8.3.2 Straightness for coiled strip is subject to agreement between the manufacturer and the purchaser.

8.4 *Squareness (Sheet)*—For sheets of all thicknesses and widths of 6 in. (152.4 mm) or more, the angle between adjacent sides shall be 90 ± 0.15° (1/16 in. in 24 in. or 2.6 mm/m).

8.5 *Flatness*—Plate, sheet, and strip shall be commercially flat.

8.6 *Edges:*

8.6.1 Plates shall have sheared, abrasive cut, or plasma torch-cut edges as specified.

8.6.2 Sheet and strip shall have sheared or slit edges.

9. Product Marking

9.1 Each plate, sheet, or strip shall be marked on one face with the specification number, heat number, manufacturer's identification, and size. The markings shall have no deleterious effect on the material or its performance and shall be sufficiently stable to withstand normal handling.

9.2 Each bundle or shipping container shall be marked with this specification number; the size; gross, tare, and net weight; consignor and consignee address; contract or order number; and such other information as may be defined in the contract or order.

10. Keywords

10.1 plate; sheet; strip; R31233

APPENDIX

(Nonmandatory Information)

X1. HEAT TREATMENT

X1.1 Proper heat treatment during or subsequent to fabrication is necessary for optimum performance and the manufacturer shall be consulted for details.