



Standard Specification for Nickel-Molybdenum-Chromium-Iron Alloys (UNS N10003, UNS N10242) Plate, Sheet, and Strip¹

This standard is issued under the fixed designation B434; 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)* plate, sheet, and strip for use in general corrosive 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 annealing is performed in an atmosphere yielding a bright finish.

1.2.2 *Plate*—Hot rolled, 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*:³

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

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 June 1, 2011. Published June 2011. Originally approved in 1966. Last previous edition approved in 2006 as B434 – 06. DOI: 10.1520/B0434-06R11.

² For ASME Boiler and Pressure Vessel Code applications see related Specification SB-434 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 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.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *plate, n*—material $\frac{3}{16}$ in. (4.76 mm) and over in thickness.

3.1.2 *sheet and strip, n*—material under $\frac{3}{16}$ 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 the safe and satisfactory performance of material ordered under this specification. Examples of such requirements include but are not limited to the following:

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

5.1.2 *Certification*—State if certification or a report of test results is required,

5.1.3 *Purchase Inspection*—State which tests or inspections are to be witnessed, and

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

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** subject to the permissible tolerances in 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**.

7.2 *Grain Size for Sheet and Strip*—Sheet and strip shall conform to the grain size requirements given in **Table 3**.



TABLE 1 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	...

TABLE 2 Mechanical Properties for Plate and Sheet

UNS	Tensile Strength, min, ksi (MPa)	Yield Strength (0.2 %% Offset), min, ksi (MPa)	Elongation in 2 in. (50.8 mm) or 4D ^A min, %
N10003	100 (690)	40 (280)	40
N10242	105 (725)	45 (310)	40

^A D refers to the diameter of the tension specimen.

TABLE 3 Grain Size for Annealed Sheets

Thickness, in. (mm)	ASTM Micrograin Size Number, max	Average Grain Diameter, max, in (mm)
0.125 (3.175) and under	3.0	0.0050 (0.127)
Over 0.125 (3.175)	1.5	0.0084 (0.214)

8. Dimensions and Permissible Variations

8.1 *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

8.2 Thickness:

8.2.1 *Plate*—The permissible variations in thickness of plate shall be as prescribed in Table A2.1 in Specification B906.

8.2.2 *Sheet and Strip*—The permissible variations in thickness of sheet and strip shall be as prescribed in Table A2.2 in Specification B906. The thickness shall be measured with the micrometer spindle $\frac{3}{8}$ 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.

8.3 Width:

8.3.1 *Plate*—The permissible variations in width of rectangular plates shall be as prescribed in Table A2.3 in Specification B906.

8.3.2 *Sheet and Strip*—The permissible variations in width for sheet and strip shall be as prescribed in Table A2.4 in Specification B906.

8.4 Length:

8.4.1 *Plate*—Permissible variations in the length of rectangular plate shall be as prescribed in Table A2.3 in Specification B906.

8.4.2 *Sheet and Strip*—Sheet and strip may be ordered to cut lengths, in which case a variation of $\frac{1}{8}$ in. (3.175 mm) over the specified length shall be permitted, with a 0 minus tolerance.

8.5 Straightness:

8.5.1 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.

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

8.6 *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 deg ($\frac{1}{16}$ in. in 24 in. or 2.6 mm/m).

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

8.8 Edges:

8.8.1 Plate shall have sheared or abrasive cut edges.

8.8.2 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 the name of the material; 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; UNS N10003 ; UNS N10242



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.

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