



Designation: B 575 – 04

Standard Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, Low-Carbon Nickel- Chromium-Molybdenum-Tantalum, and Low-Carbon Nickel- Chromium-Molybdenum-Tungsten Alloy Plate, Sheet, and Strip¹

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1. Scope*

1.1 This specification² covers plate, sheet, and strip of low-carbon nickel-chromium-molybdenum alloys (UNS N10276, N06022, N06455, N06035, UNS N06058, UNS N06059)*, low-carbon nickel-chromium-molybdenum-copper alloy (UNS N06200), low-carbon nickel-chromium-molybdenum-tantalum alloy (UNS N06210), and low-carbon nickel-chromium-molybdenum-tungsten alloy (UNS N06686) as shown in Table 1, 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, solution annealed, and descaled unless solution anneal is performed in an atmosphere yielding a bright finish.

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

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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 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.*

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 related Specification SB-575 in Section II of that Code.

* New designation established in accordance with ASTM E 527 and SAE J1086, Practice for Numbering Metals and Alloys (UNS).

2. Referenced Documents

2.1 *ASTM Standards:*³

B 906 Specification for General Requirements for Flat-Rolled Nickel and Nickel Alloys Plate, Sheet, and Strip

E 112 Test Methods for Determining Average Grain Size

E 140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, and Scleroscope Hardness

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *cold-rolled plate, n*—material $\frac{3}{16}$ to $\frac{3}{8}$ in. (4.76 to 9.52 mm), inclusive, in thickness.

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

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

3.1.4 *sheet and strip, n*—material under $\frac{3}{16}$ in. (4.76 mm) in thickness.

4. General Requirements

4.1 Material furnished to this specification shall conform to the applicable requirements of Specification **B 906** 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*—Table 1,

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.

TABLE 1 Chemical Requirements

Element	Composition Limits, %								
	Alloy N06035	Alloy N10276	Alloy N06022	Alloy N06455	Alloy N06059	Alloy N06058	Alloy N06200	Alloy N06210	Alloy N06686
Molybdenum	7.60–9.00	15.0–17.0	12.5–14.5	14.0–17.0	15.0–16.5	19.0 - 21.0	15.0–17.0	18.0–20.0	15.0–17.0
Chromium	32.25–34.25	14.5–16.5	20.0–22.5	14.0–18.0	22.0–24.0	20.0- 23.0	22.0–24.0	18.0–20.0	19.0–23.0
Iron	2.00 max	4.0–7.0	2.0–6.0	3.0 max	1.5, max	1.5, max	3.0 max	1.0 max	5.0 max
Tungsten	0.60 max	3.0–4.5	2.5–3.5	...	...	0.3 max	...	...	3.0–4.4
Cobalt, max	1.00	2.5	2.5	2.0	0.3	0.3	2.0 max	1.0	...
Carbon, max	0.050	0.010	0.015	0.015	0.010	0.010	0.010	0.015	0.010
Silicon, max	0.60	0.08	0.08	0.08	0.10	0.10	0.08	0.08	0.08
Manganese, max	0.50	1.0	0.50	1.0	0.5	0.5	0.50	0.5	0.75
Vanadium, max	0.20	0.35	0.35	...	...	...	...	0.35	...
Phosphorus, max	0.030	0.04	0.02	0.04	0.015	0.015	0.025	0.02	0.04
Sulfur, max	0.015	0.03	0.02	0.03	0.010	0.010	0.010	0.02	0.02
Titanium	...	...	...	0.7 max	...	...	...	...	0.02–0.25
Nickel	remainder ^A	remainder ^A	remainder ^A	remainder ^A	Bal	Bal	remainder ^A	remainder ^A	remainder ^A
Aluminum	0.40 max	...	...	...	0.1–0.4	0.40 max	0.50 max	...	...
Copper	0.30 max	...	...	...	0.50 max	0.50 max	1.3–1.9	...	...
Tantalum	...	...	...	...	...	...	...	1.5–2.2	...

^A Shall be determined arithmetically by difference.

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

5.1.3 *Optional Requirement*—Plate; state how plate is to be cut (Specification B 906, Table A2.3),

5.1.4 *Certification*—State if certification or a report of test results is required (Specification B 906, Section 21),

5.1.5 *Purchase Inspection*—State which tests or inspections are to be witnessed (Specification B 906, Section 18), and

5.1.6 *Samples for Product (Check) Analysis*—State whether samples should be furnished (Specification B 906, 7.2.2).

6. Chemical Composition

6.1 The material shall conform to the composition limits specified 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 B 906.

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 *Hardness*—The hardness values given in Table 2 are informative only.

7.3 *Grain Size for Sheet and Strip*— Sheet and strip shall conform to the grain sizes as illustrated in Plate 1 of Test Methods E 112. The requirements shall be as indicated in Table 3.

TABLE 3 Grain Size for Annealed Sheet

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

8. Dimensions, Mass, and Permissible Variations

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

Alloy	lb/in. ³	Density g/cm ³
N10276	0.321	(8.87)
N06022	0.314	(8.69)
N06455	0.312	(8.64)
N06035	0.296	(8.18)
N06058	0.318	(8.80)
N06059	0.311	(8.60)
N06200	0.307	(8.50)
N06210	0.316	(8.76)
N06686	0.315	(8.73)

8.2 *Thickness*:

8.2.1 *Plate*—The permissible variations in thickness of plate shall be as prescribed in Specification B 906, Table A2.1.

8.2.2 *Sheet and Strip*— The permissible variations in thickness of sheet and strip shall be as prescribed in Specification B 906, Table A2.2. The thickness shall be measured with the

TABLE 2 Mechanical Property Requirements

Alloy	Tensile Strength, min, psi (MPa)	Yield Strength (0.2 % Offset), min, psi (MPa)	Elongation in 2 in. (50.8 mm) or 4D ^A min, %	Rockwell Hardness, ^B max
N10276	100 000 (690)	41 000 (283)	40	100 HRB
N06022	100 000 (690)	45 000 (310)	45	100 HRB
N06455	100 000 (690)	40 000 (276)	40	100 HRB
N06035	85 000 (586)	35 000 (241)	30	100 HRB
N06058	110 000 (760)	52 000 (360)	40	100 HRB
N06059	100 000 (690)	45 000 (310)	45	100 HRB
N06200	100 000 (690)	41 000 (283)	45	100 HRB
N06686	100 000 (690)	45 000 (310)	45	100 HRB
N06210	100 000 (690)	45 000 (310)	45	100 HRB

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

^B Hardness values are shown for information purposes only and are not to be used as a basis of acceptance or rejection. For approximate hardness conversions, see Hardness Conversion Tables E 140.