

ASTM B574 / ASME SB574

Standard Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Molybdenum Chromium, Low-Carbon Nickel- Molybdenum-Chromium-Tantalum, Low-Carbon Nickel- Chromium-Molybdenum-Copper, and Low-Carbon Nickel- Chromium-Molybdenum-Tungsten Alloy Rod

This specification covers rod of low-carbon nickel-chromium- molybdenum alloys (UNS N1 0276, N06022, N06035, N06455, N06058, and N06059), low-carbon nickel-molybdenum-chromium (UNS N10362), low-carbon nickel-molybdenum- chromium-tantalum (UNS N06210), low-carbon nickel-chromium-molybdenum-copper alloy (UNS N06200), and low-carbon nickel-chromium-molybdenum- tungsten (UNS N06686) as shown in Table 1, for use in general corrosive service.

The following products are covered under this specification:

Rods 5/16 to 3/4 in. (7.94 to 19.05 mm), exclusive, in diameter, hot or cold finished, solution annealed and pickled, or mechanically descaled.

Rods 3/4 to 3(1/2) in. (19.05 to 88.9 mm), inclusive, in diameter, hot or cold finished, solution annealed, ground or turned.

Rods 1/4 to 3(1/2) in. (6.35 to 88.9 mm), inclusive, in diameter, solution annealed, cold finished, as cold finished, ground or turned (N06059 and N06686 only).

A. Chemical Composition :-

The material shall conform to the composition limits specified in Table 1.

Table 1

Element	Alloy N06035	Alloy N10276	Alloy N06022	Alloy N06455	Alloy N06059	Alloy N06058	Alloy N06200	Alloy N10362	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	21.5-23.0	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	13.8-15.6	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	1.25 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	1.0	2.5	2.5	2.0	0.3	0.3 max	2.0 max	...	1.0	...
Carbon, max	0.05	0.01	0.015	0.015	0.01	0.01	0.01	0.01	0.015	0.01
Silicon, max	0.6	0.08	0.08	0.08	0.1	0.1	0.08	0.08	0.08	0.08
Manganese, max	0.5	1.0	0.5	1.0	0.5	0.5	0.5	0.6	0.5	0.75
Vanadium, max	0.2	0.35	0.35	...	...	...	...	...	0.35	...
Phosphorus, max	0.03	0.04	0.02	0.04	0.015	0.015	0.025	0.025	0.02	0.04
Sulfur, max	0.015	0.03	0.02	0.03	0.01	0.01	0.01	0.01	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	remainder ^A
Aluminum	0.40 max	...	...	...	0.1–0.4	0.40 max	0.50 max	0.50 max	...	...
Copper	0.30 max	...	...	...	0.50 max	0.50 max	1.3–1.9	...	...	...
Tantalum	...	...	...	...	...	...	...	...	1.5–2.2	...

^A See point E.1.

B. Mechanical Properties and Other Requirements :-

The mechanical properties of the material at room temperature shall conform to those shown in Table 2 and Table 3.

Table 2

Alloy	Grade	Tensile Strength, min, psi (MPa)	Yield Strength (0.2 % Offset), min, psi (MPa)	Elongation in 2 in. (50.8 mm) or 4D ^A min, %
N06059	1	120 (827)	85 (586)	20
	2	135 (931)	125 (862)	20
	3	160 (1103)	150 (1034)	15
N06686	1	120 (827)	85 (586)	20
	2	135 (931)	125 (862)	20
	3	160 (1103)	150 (1034)	20

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

Table 3

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, %
N10276	100000 (690)	41000 (283)	40
N06022	100000 (690)	45000 (310)	45
N06035	85000 (586)	35000 (241)	30
N06455	100000 (690)	40000 (276)	40
N06058	110000 (760)	52000 (360)	40
N06059	100000 (690)	45000 (310)	45
N06200	100000 (690)	45000 (310)	45
N10362	105000 (725)	45000 (310)	40
N06686	100000 (690)	45000 (310)	45
N06210	100000 (690)	45000 (310)	45

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

C. Length :-

1. Unless multiple, nominal, or cut lengths are specified, random mill lengths shall be furnished.
2. The permissible variations in length of multiple, nominal, or cut length rod shall be as prescribed in Table 4. Where rods are ordered in multiple lengths, a 1/4-in. (6.35-mm) length addition shall be allowed for each uncut multiple length.

Table 4

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 1/4 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 $\pm 1/8$ in. (3.17 mm) - 0.

D. Weight :-

For calculations of mass or weight, the following densities shall be used:

Alloy	Density	
	lb/in. ³	g/cm ³
N10276	0.321	8.87
N06022	0.314	8.69
N06035	0.296	8.18
N06455	0.312	8.64
N06058	0.318	8.8
N06059	0.311	8.6
N06200	0.307	8.5
N10362	0.319	8.83
N06686	0.315	8.73
N06210	0.316	8.76

E. Test Methods :-

The chemical composition and mechanical properties of the material as enumerated in this specification shall be determined, in case of disagreement, in accordance with the following ASTM methods:

1. Chemical Analysis—Test Methods E1473, For elements not covered by Test Methods E1473, the referee method shall be as agreed upon between the manufacturer and the purchaser. The nickel composition shall be determined arithmetically by difference.
2. Tension Test — Test Methods E8.
3. Method of Sampling — Practice E55.
4. Determining Significant Places — Practice E29.

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