

# ASTM B435 / ASME SB435

## SPECIFICATION FOR UNS N06002, UNS N06230, UNS N12160, AND UNS R30556 PLATE, SHEET, AND STRIP

This specification covers alloys UNS N06002, UNS N06230, UNS N12160, and UNS R30556 in the form of rolled plate, sheet, and strip for heat-resisting and general corrosive service.

The following products are covered under this specification:

Sheet and Strip :- material under 3/16 in. (4.76 mm) in thickness: Hot- or cold-rolled, annealed, and descaled unless solution annealing is performed in an atmosphere yielding a bright finish.

Plate :- material 3/16 in. (4.76 mm) and over in thickness: Hot- rolled, solution-annealed, and descaled.

### A. General Requirements :-

1. Material furnished under this specification shall conform to the applicable requirements of Specification B 906 unless otherwise provided herein.

### B. Chemical Composition :-

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

**Table 1**

Element	UNS N06002	UNS N06230	UNS R30556	UNS N12160
Nickel	remainder	remainder	19.0–22.5	remainder
Iron	17.0–20.0	3.0 max	remainder	3.5 max
Chromium	20.5–23.0	20.0–24.0	21.0–23.0	26.0–30.0
Cobalt	0.5–2.5	5.0 max	16.0–21.0	27.0–33.0
Molybdenum	8.0–10.0	1.0–3.00	2.5–4.0	1.0 max
Tungsten	0.2–1.0	13.0–15.0	2.0–3.5	1.0 max
Carbon	0.05–0.15	0.05–0.15	0.05–0.15	0.15 max
Silicon	1.00 max	0.25–0.75	0.20–0.80	2.4–3.0
Manganese	1.00 max	0.30–1.00	0.50–2.00	1.5 max
Phosphorus	0.04 max	0.030 max	0.04 max	0.030 max
Sulfur	0.03 max	0.015 max	0.015 max	0.015 max
Columbium (Nb)	...	...	0.30 max	1.0 max
Tantalum	...	...	0.30–1.25	...
Aluminum	...	0.50 max	0.10–0.50	...
Zirconium	...	...	0.001–0.10	...
Lanthanum	...	0.005–0.050	0.005–0.10	...
Nitrogen	...	...	0.10–0.30	...
Boron	...	0.015 max	0.02 max	...
Titanium	...	...	...	0.20–0.80

### C. Mechanical Properties and Other Requirements :-

1. Tensile Properties—

- i. The material shall conform to the room temperature tensile properties prescribed in Table 2.

**Table 2**

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, %
N06002	95 (655)	35 (240)	35
N06230 (B)	110 (760)	45 (310)	40
R30556 (C)	100 (690)	45 (310)	40
N12160 (D)	90 (670)	35 (240)	40

(A) D refers to the diameter of the tension specimen.

(B) Solution annealed at a temperature between 2200 and 2275°F (1204 and 1246°C) followed by a water quench or rapidly cooled by other means.

(C) Solution annealed at 2100°F (1150°C) minimum.

(D) Solution annealed at 1950°F (1065°C) minimum.

2. Grain Size for Sheet and Strip:

- i. Annealed alloys UNS N06002, UNS N06230, and UNS R30556 sheet and strip shall conform to the grain size requirements given in Table 3.
- ii. Annealed alloy UNS N12160 shall conform to an average grain size of ASTM No. 5 or coarser.

**Table 3**

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)

**D. Weight :-**

For calculations of mass or weight, the

Alloy	Density	
	lb/in. <sup>3</sup>	g/cm <sup>3</sup>
N06002	0.297	8.23
N06230	0.324	8.97
R30556	0.297	8.23
N12160	0.292	8.08

**E. Length :-**

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

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