



Designation: **B435 – 06 (Reapproved 2011)^{ε1} B435 – 06 (Reapproved 2016)**

Standard Specification for UNS N06002, UNS N06230, UNS N12160, and UNS R30556 Plate, Sheet, and Strip¹

This standard is issued under the fixed designation B435; 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.

^{ε1} NOTE—The tensile strength for N12160 in Table 2 was editorially corrected in March 2014.

1. Scope

1.1 This specification² covers alloys UNS N06002, UNS N06230, UNS N12160, and UNS R30556*R30556³ in the form of rolled plate, sheet, and strip for heat-resisting and 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 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)(SDS) 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*:⁴

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

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

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 material ordered under this specification. Examples of such requirements include, but are not limited to the following:

5.1.1 *Alloy*,

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² For ASME Boiler and Pressure Vessel Code applications, see related Specification SB-435 in Section II of that Code.

* New designation established in accordance with Practice **E527** and SAE J1086, Practice for Numbering Metals and Alloys (UNS).

³ New designation established in accordance with Practice **E527** and SAE J1086, Practice for Numbering Metals and Alloys (UNS).

⁴ 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.

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 certification or a report of test results is required (Specification B906, section on Material Test Report or Certification),

5.1.4 *Optional Requirement*—Plate; state how plate is to be cut (Specification B906, Table titled Permissible Variations in width and Length of Sheared, Torch-Cut, or Abrasive-Cut Rectangular Plate),

5.1.5 *Purchase Inspection*—State which tests or inspections are to be witnessed (Specification B906, section on Inspection), and

5.1.6 *Samples for Product (Check) Analysis*—State whether samples should be furnished (Specification B906, section on Sampling).

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.

7.2 *Grain Size for Sheet and Strip*:

7.2.1 Annealed alloys UNS N06002, UNS N06230, and UNS R30556 sheet and strip shall conform to the grain size requirements given in Table 3.

7.2.2 Annealed alloy UNS N12160 shall conform to an average grain size of ASTM No. 5 or coarser.

8. Dimensions, Mass, and Permissible Variations

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

Alloy	Density lb/in. ³	Density (g/cm ³)
N06002	0.297	(8.23)
N06230	0.324	(8.97)
R30556	0.297	(8.23)
N12160	0.292	(8.08)

8.2 *Thickness*:

8.2.1 *Sheet and Strip*—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 *Length*:

8.3.1 *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.

8.4 *Straightness*:

8.4.1 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).

TABLE 1 Chemical Requirements

Element	Composition Limits, %			
	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