



# Standard Specification for Nickel-Chromium-Iron-Molybdenum-Tungsten Alloy (UNS N06920) Plate, Sheet, and Strip<sup>1</sup>

This standard is issued under the fixed designation B814; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers nickel-chromium-iron-molybdenum-tungsten alloy UNS N06920 in the form of rolled plate, sheet, and strip for general corrosion 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; and

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) 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:*<sup>2</sup>

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

## 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 Materials 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 to this specification. Examples of such requirements include, but are not limited to, the following:

5.1.1 *Alloy.*

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

5.1.3 *Certification*—State whether a report of test results is required (Specification **B906**).

5.1.4 *Optional Requirement*—Plate; state how the plate is to be cut (see **8.8.1** and Specification **B906**, Table A2.3).

5.1.5 *Purchase Inspection*—State which tests or inspections are to be witnessed (Specification **B906**).

5.1.6 *Samples for Product (Check) Analysis*—State whether samples shall be furnished (Specification **B906**).

## 6. Chemical Composition

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

6.2 If a product (check) analysis is made by the purchaser, the material shall conform to the product (check) analysis variations in accordance with 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**.

## 8. Dimensions, Mass, and Permissible Variations

8.1 For the purposes of calculating the weight of the material covered by this specification, a density of 0.303 lb/in.<sup>3</sup> (8.39 g/cm<sup>3</sup>) shall be used.

8.2 *Thickness:*

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.



TABLE 1 Chemical Requirements

| Element         | Composition Limits, % |
|-----------------|-----------------------|
| Chromium        | 20.5–23.0             |
| Iron            | 17.0–20.0             |
| Molybdenum      | 8.0–10.0              |
| Tungsten        | 1.0–3.0               |
| Carbon, max     | 0.03                  |
| Cobalt, max     | 5.0                   |
| Manganese, max  | 1.0                   |
| Phosphorus, max | 0.040                 |
| Sulfur, max     | 0.030                 |
| Silicon, max    | 1.0                   |
| Nickel          | Remainder             |

TABLE 2 Mechanical Property Requirements

|                                                           |          |
|-----------------------------------------------------------|----------|
| Tensile Strength, min, ksi (MPa)                          | 95 (655) |
| Yield Strength, min, ksi (MPa)                            | 35 (240) |
| Elongation in 2 in. (50.8 mm) or 4D <sup>A</sup> , min, % | 35       |

<sup>A</sup> D refers to the diameter of the tension specimen.

8.2.1 *Plate*—The permissible variations in thickness of plate shall be as prescribed in Specification B906 Table A2.1 and Table 3.

8.2.2 *Sheet and Strip*—The permissible variations in thickness of sheet and strip shall be as prescribed in Specification B906 Table A2.2. 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. (25.4 mm) in width.

### 8.3 Width:

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

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

### 8.4 Length:

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

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  $90 \pm 0.15^\circ$  ( $\frac{1}{16}$  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 Plates shall have sheared, abrasive cut, or plasma-torch-cut edges as specified.

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 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 N06920

TABLE 3 Permissible Variations in Thickness for Wide Plates<sup>A</sup>

| Specified Thickness <sup>B</sup> , in. (mm)         | Width, in. (mm)                                            |                                    |                                     |                 |
|-----------------------------------------------------|------------------------------------------------------------|------------------------------------|-------------------------------------|-----------------|
|                                                     | Over 48 (1219 mm) to 84 (2134), incl                       | Over 84 (2134) to 120 (3048), incl | Over 120 (3048) to 144 (3658), incl | Over 144 (3658) |
|                                                     | Tolerance Over Specified Thickness <sup>C</sup> , in. (mm) |                                    |                                     |                 |
| $\frac{3}{8}$ (9.52) to $\frac{3}{4}$ (19.05), excl | 0.055 (1.40)                                               | 0.060 (1.52)                       | 0.075 (1.90)                        | 0.090 (2.29)    |
| $\frac{3}{4}$ (19.05) to 1 (25.40), excl            | 0.060 (1.52)                                               | 0.065 (1.65)                       | 0.085 (2.16)                        | 0.100 (2.54)    |
| 1 (25.40) to 2 (50.80), excl                        | 0.070 (1.78)                                               | 0.075 (1.90)                       | 0.095 (2.41)                        | 0.115 (2.92)    |

<sup>A</sup> Thickness is measured along the longitudinal edges of the plate at least  $\frac{3}{8}$  in. (9.52 mm), but not more than 3 in. (76.20 mm), from the edge.

<sup>B</sup> Plates over 2 in. (50.80 mm) thick are produced. Thickness tolerances for such plates are not included.

<sup>C</sup> For circles, the over thickness tolerances in this table apply to the diameter of the circle corresponding to the width ranges shown. For plates of irregular shape, the over thickness tolerances apply to the greatest width corresponding to the width ranges shown. For plates up to 2 in. (50.80 mm), inclusive, in thickness, the tolerance under the specified thickness is 0.010 in. (0.25 mm).

## **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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