



Designation: **B424 – 11 (Reapproved 2016) B424 – 19**

Standard Specification for ~~Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825, UNS N08221, and Nickel-Iron-Chromium-Molybdenum-Copper Alloys UNS N06845) Plate, Sheet, and Strip~~¹

This standard is issued under the fixed designation B424; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. ~~Scope~~ Scope*

1.1 This specification² covers rolled nickel-iron-chromium-molybdenum-copper alloys (UNS ~~N08825, N06845, UNS N08221, UNS N08825, and UNS N06845~~)~~N08827~~)³ plate, sheet, and strip.

1.2 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.

1.3 *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 Safety Data Sheet (SDS) for this product/material as provided by the manufacturer, to establish appropriate safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:⁴

~~B425 Specification for Nickel-Iron-Chromium-Molybdenum-Copper Alloys Rod and Bar~~

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

3. Terminology

3.1 *Descriptions of Terms Specific to This Standard*—The terms given in **Table 1** shall apply.

4. General Requirements

4.1 Material furnished under this specification shall conform to the applicable requirements of Specification **B906**.

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

5.1.1 ASTM designation and year of issue.

5.1.2 Alloy name or UNS number.

5.1.3 *Condition*—**Table 2** and **Appendix X1**.

5.1.4 *Finish*—**Appendix X1**.

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-424 in Section II of that Code.

³ New designation established in accordance with ASTM 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.

*A Summary of Changes section appears at the end of this standard

TABLE 1 Product Description

Product	Thickness, in. (mm)
Hot-rolled plate ^A	$\frac{3}{16}$ (4.76) and over
Cold-rolled plate ^A	$\frac{3}{16}$ to $\frac{3}{8}$ (4.8 to 9.5), incl
Hot-rolled sheet ^A	0.018 to 0.250 (0.46 to 6.4), incl
Cold-rolled sheet ^B	0.018 to 0.250 (0.46 to 6.4), incl
Cold-rolled strip ^B	0.005 to 0.250 (0.13 to 6.4), incl

^A Material $\frac{3}{16}$ to $\frac{1}{4}$ in. (4.8 to 6.4 mm), incl, in thickness may be furnished as sheet or plate provided the material meets the specification requirements for the condition ordered.

^B Material under 48 in. (1219 mm) in width may be furnished as sheet or strip provided the material meets the specification requirements for the condition ordered.

5.1.5 *Dimensions*—Thickness, width, and length.

5.1.6 *Quantity*.

5.1.7 *Optional Requirements*:

5.1.7.1 *Sheet and Strip*—Whether to be furnished in coil, in cut straight lengths, or in random straight lengths.

5.1.7.2 *Strip*—Whether to be furnished with commercial slit edge, square edge, or round edge.

5.1.7.3 *Plate*—Whether to be furnished specially flattened (see 8.7); also how plate is to be cut (Table 3).

5.1.8 *Certification*—State if certification is required (Specification B906, section on Material Test Report and Certification).

5.1.9 *Samples for Product (Check) Analysis*—Whether samples for product (check) analysis should be furnished (see Specification B906, section on Sampling).

5.1.10 *Purchaser Inspection*—If the purchaser wishes to witness tests or inspection of material at the place of manufacture, the purchase order must so state, indicating which tests or inspections are to be witnessed (Specification B906, section on Inspection).

6. Chemical Composition

6.1 The material shall conform to the composition limits specified in Table 4.

6.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis per Specification B906.

7. Mechanical Properties

7.1 *Mechanical Properties*—The material shall conform to the mechanical properties specified in Table 2.

8. Dimensions and Permissible Variations

8.1 *Thickness and Weight*:

8.1.1 *Plate*—For plate up to 2 in. (50.8 mm), inclusive, in thickness, the permissible variation under the specified thickness and permissible excess in overweight shall not exceed the amounts prescribed in Specification B906, Permissible Variations in Thickness and Overweight of Rectangular Plates Table.

8.1.1.1 For use with Specification B906, Permissible Variations in Thickness and Overweight of Rectangular Plates Table, plate shall be assumed to weigh 0.294 lb/in.³ (8.138 g/cm³).

8.1.2 *Plate*—For plate over 2 in. (50.8 mm) in thickness, the permissible variations over the specified thickness shall not exceed the amounts prescribed in Specification B906, Permissible Variations in Thickness for Rectangular Plates Over 2 in. (51 mm) in Thickness Table.

8.1.3 *Sheet and Strip*—The permissible variations in thickness of sheet and strip shall be as prescribed in Specification B906, Permissible Variations in Thickness of Sheet and Strip Table. The thickness of strip and sheet shall be measured with the micrometer spindle $\frac{3}{8}$ in. (9.5 mm) or more from either edge for material 1 in. (25.4 mm) or over in width and at any place on the strip under 1 in. (25.4 mm) in width.

8.2 *Width or Diameter*:

8.2.1 *Plate*—The permissible variations in width of rectangular plates and diameter of circular plates shall be as prescribed in Specification B906, Permissible Variations in Width of Sheared, Plasma Torch-Cut, and Abrasive-Cut Rectangular Plate Table and Permissible Variations in Diameter for Circular Plates Table.

8.2.2 *Sheet and Strip*—The permissible variations in width for sheet and strip shall be as prescribed in Specification B906, Permissible Variations in Width of Sheet and Strip Table.

8.3 *Length*:

TABLE 2 Mechanical Properties for Plate, Sheet, and Strip
(All Thicknesses and Sizes Unless Otherwise Indicated)

Alloy	Condition	Tensile Strength, min, ksi (MPa)	Yield Strength ^A (0.2 % Offset), min, ksi (MPa)	Elongation in 2 in. or 50 mm (or 4 D), min, %
<i>Hot-Rolled Plate:</i>				
—UNS N08825	annealed	85 (586)	35 (241)	30
—UNS N08221	annealed	79 (544)	34 (235)	30
—UNS N06845	annealed	100 (690)	40 (276)	30
UNS N06845	annealed	100 (690)	40 (276)	30
UNS N08221	annealed	79 (544)	34 (235)	30
UNS N08825	annealed	85 (586)	35 (241)	30
UNS N08827	annealed	85 (586)	35 (241)	30
<i>Cold-Rolled Plate:</i>				
—UNS N08825	annealed	85 (586)	35 (241)	30
—UNS N08221	annealed	79 (544)	34 (235)	30
—UNS N06845	annealed	100 (690)	40 (276)	30
UNS N06845	annealed	100 (690)	40 (276)	30
UNS N08221	annealed	79 (544)	34 (235)	30
UNS N08825	annealed	85 (586)	35 (241)	30
UNS N08827	annealed	85 (586)	35 (241)	30
<i>Hot-Rolled Sheet:</i>				
—UNS N08825	annealed	85 (586)	35 (241)	30
—UNS N08221	annealed	79 (544)	34 (235)	30
—UNS N06845	annealed	100 (690)	40 (276)	30
UNS N06845	annealed	100 (690)	40 (276)	30
UNS N08221	annealed	79 (544)	34 (235)	30
UNS N08825	annealed	85 (586)	35 (241)	30
UNS N08827	annealed	85 (586)	35 (241)	30
<i>Cold-Rolled Sheet:</i>				
—UNS N08825	annealed	85 (586)	35 (241)	30
—UNS N08221	annealed	79 (544)	34 (235)	30
—UNS N06845	annealed	100 (690)	40 (276)	30
UNS N06845	annealed	100 (690)	40 (276)	30
UNS N08221	annealed	79 (544)	34 (235)	30
UNS N08825	annealed	85 (586)	35 (241)	30
UNS N08827	annealed	85 (586)	35 (241)	30
<i>Cold-Rolled Strip:</i>				
UNS N06845	annealed	100 (690) ^B	40 (276)	30 ^B
—UNS N08825	annealed	85 (586) ^B	35 (241)	30 ^B
—UNS N08221	annealed	79 (544) ^B	34 (235)	30 ^B
—UNS N06845	annealed	100 (690) ^B	40 (276)	30 ^B
UNS N08221	annealed	79 (544) ^B	34 (235)	30 ^B
UNS N08825	annealed	85 (586) ^B	35 (241)	30
UNS N08827	annealed	85 (586) ^B	35 (241)	30 ^B

^A Yield strength requirements do not apply to material under 0.020 in. (0.51 mm) in thickness.

^B Not applicable for thickness under 0.010 in. (0.25 mm).

8.3.1 Sheet and strip of all sizes may be ordered to cut lengths, in which case a variation of 1/8 in. (3.2 mm) over the specified length shall be permitted.

8.3.2 Permissible variations in length of rectangular plate shall be as prescribed in Specification B906, Permissible Variations in Length of Sheared, Plasma, Torch-Cut, and Abrasive-Cut Rectangular Plate Table.

8.4 *Straightness:*

8.4.1 The edgewise curvature (depth of chord) of flat sheet, strip, and plate shall not exceed 0.05 in. (1.27 mm) multiplied by the length in feet (0.04 mm multiplied by the length in centimetres).

8.4.2 Straightness for coiled material is subject to agreement between the manufacturer and the purchaser.

8.5 *Edges:*

8.5.1 When finished edges of strip are specified in the contract or order, the following descriptions shall apply:

8.5.1.1 Square-edge strip shall be supplied with finished edges, with sharp, square corners, without bevel or rounding.

8.5.1.2 Round-edge strip shall be supplied with finished edges, semicircular in form, the diameter of the circle forming the edge being equal to the strip thickness.

8.5.1.3 When no description of any required form of strip edge is given, it shall be understood that edges such as those resulting from slitting or shearing will be acceptable.

8.5.1.4 Sheet shall have sheared or slit edges.

8.5.1.5 Plate shall have sheared or cut (machined, abrasive cut, powder cut, or inert arc cut) edges, as specified.

8.6 *Squareness (Sheet)*—For sheets of all thicknesses, the angle between adjacent sides shall be 90 ± 0.15° (1/16 in. in 24 in.) (1.6 mm in 610 mm).