



Designation: B 582 – 02

# Standard Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy Plate, Sheet, and Strip<sup>1</sup>

This standard is issued under the fixed designation B 582; 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 The specification<sup>2</sup> covers plate, sheet, and strip of nickel-chromium-iron-molybdenum-copper alloys (UNS N06007, N06975, N06985, and N06030)\* as shown in Table 1, for use in general corrosive service.

1.2 The following products are covered under this specification:

1.2.1 *Sheet and Strip*—Hot or cold rolled, solution annealed, and descaled unless solution anneal is performed in an atmosphere yielding a bright finish.

1.2.2 *Plate*—Hot or cold rolled, solution annealed, and descaled.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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 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:

B 880 Specification for General Requirements for Chemical Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys<sup>3</sup>

E 8 Test Methods for Tension Testing of Metallic Materials<sup>4</sup>

E 18 Test Methods for Rockwell Hardness and Rockwell

Superficial Hardness of Metallic Materials<sup>4</sup>

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications<sup>5</sup>

E 55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition<sup>6</sup>

E 140 Hardness Conversion Tables for Metals (Relationship Between Brinell Hardness, Vickers Hardness, Rockwell Hardness, Rockwell Superficial Hardness, and Knoop Hardness)<sup>4</sup>

E 1473 Test Methods for Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys<sup>6</sup>

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *cold-rolled plate*—material  $\frac{3}{16}$  to  $\frac{3}{8}$  in. (4.76 to 9.52 mm), inclusive, in thickness.

3.1.2 *hot-rolled plate*—material  $\frac{3}{16}$  in. (4.76 mm) and over in thickness.

3.1.3 *plate*—material  $\frac{3}{16}$  in. (4.76 mm) and over in thickness.

3.1.4 *sheet and strip*—material under  $\frac{3}{16}$  in. (4.76 mm) in thickness.

## 4. Ordering Information

4.1 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:

4.1.1 *Alloy*—Table 1,

4.1.2 *Dimensions*—Thickness (in decimals of an inch), width, and length (inch or fractions of an inch),

4.1.3 *Optional Requirement, Plate*—How the plate is to be cut (see 7.1 and Table 2),

4.1.4 *Certification*—State if certification or a report of test results is required (Section 16),

4.1.5 *Purchaser Inspection*—State which tests or inspections are to be witnessed (Section 14), and

4.1.6 *Samples for Product (Check) Analysis*—State whether samples should be furnished (Section 5).

<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 ASME Boiler and Pressure Vessel Code applications, see related Specification SB-582 in Section II of that Code.

\* New designation established in accordance with ASTM E 527 and SAE J1086, Practice for Numbering Metals and Alloys (UNS).

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 02.04.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 03.01.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>6</sup> *Annual Book of ASTM Standards*, Vol 03.05.

**TABLE 1 Chemical Requirements**

Element	Composition Limits, %			
	Alloy N06007	Alloy N06975	Alloy N06985	Alloy N06030
Nickel	remainder <sup>A</sup>	47.0 to 52.0	remainder <sup>A</sup>	remainder <sup>A</sup>
Chromium	21.0 to 23.5	23.0 to 26.0	21.0 to 23.5	28.0 to 31.5
Iron	18.0 to 21.0	remainder <sup>A</sup>	18.0 to 21.0	13.0 to 17.0
Molybdenum	5.5 to 7.5	5.0 to 7.0	6.0 to 8.0	4.0 to 6.0
Copper	1.5 to 2.5	0.70 to 1.20	1.5 to 2.5	1.0 to 2.4
Manganese	1.0 to 2.0	1.0 max	1.0 max	1.5 max
Cobalt, max	2.5	...	5.0	5.0
Carbon, max	0.05	0.03	0.015	0.03
Tungsten	1.0 max	...	1.5 max	1.5 to 4.0
Silicon, max	1.0	1.0	1.0	0.8
Phosphorus, max	0.04	0.03	0.04	0.04
Sulfur, max	0.03	0.03	0.03	0.02
Columbium + tantalum	1.75 to 2.50	...	0.50 max	0.30 to 1.50
Titanium	...	0.70–1.50	...	...

<sup>A</sup>See 13.1.1.

**TABLE 2 Permissible Variations in Width and Length of Sheared, Torch-Cut, or Abrasive-Cut Rectangular Plate**

Specified Thickness	Permissible Variations in Widths and Lengths for Dimensions Given, in. (mm)			
	Up to 30 (760), incl		Over 30 (760), incl	
	+	-	+	-
	Inches			
<i>Sheared:</i>				
3/16 to 5/16, incl	3/16	1/8	1/4	1/8
Over 5/16 to 1/2, incl	1/4	1/8	3/8	1/8
<i>Abrasive-cut:</i>				
3/16 to 1 1/2, incl	1/16	1/16	1/16	1/16
Over 1 1/2 to 2 1/2, incl	1/8	1/8	1/8	1/8
<i>Torch-cut:</i> <sup>A</sup>				
3/16 to 2, excl	1/2	0	1/2	0
2 to 3, incl	5/8	0	5/8	0
	Millimetres			
<i>Sheared:</i>				
4.76 to 7.94, incl	4.76	3.18	6.35	3.18
Over 7.94 to 12.70, incl	6.35	3.18	9.52	3.18
<i>Abrasive-cut:</i>				
4.76 to 38.1, incl	1.59	1.59	1.59	1.59
Over 38.1 to 63.5, incl	3.18	3.18	3.18	3.18
<i>Torch-cut:</i> <sup>A</sup>				
4.8 to 50.8, excl	12.7	0	12.7	0
50.8 to 76.2, incl	15.9	0	15.9	0

<sup>A</sup>The tolerance spread shown for torch-cutting may be obtained all on the minus side, or divided between the plus and the minus side, if so specified by the purchaser.

## 5. Chemical Composition

5.1 *Heat Analysis*—The material shall conform to the composition limits specified in Table 1.

5.2 *Product (Check) Analysis*—If a product (check) analysis is made by the purchaser, the material shall conform to the requirements specified in Table 1 subject to the permissible tolerances in Specification B 880.

## 6. Mechanical Properties and Other Requirements

6.1 *Tensile Properties*—The material shall conform to the mechanical property requirements prescribed in Table 3.

6.2 *Hardness*—The hardness values given in Table 3 are informative only.

## 7. Edges

7.1 Plates shall have sheared or cut machined, abrasive cut, powder cut, or inert arc cut edges, as specified.

7.2 Sheet and strip shall have sheared or slit edges.

## 8. Permissible Variations in Dimensions

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

Alloy	Density	
	lb/in. <sup>3</sup>	g/cm <sup>3</sup>
N06007	0.300	8.31
N06975	0.295	8.17
N06985	0.300	8.31
N06030	0.297	8.22

### 8.2 Thicknesses:

8.2.1 *Plate*—The permissible variations in thickness of plate shall be as prescribed in Table 4.

8.2.2 *Sheet and Strip*—The permissible variations in thickness of sheet and strip shall be as prescribed in Table 5. The thickness shall be measured with the micrometer spindle 3/8 in. (9.52 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 Table 2.

8.3.2 *Sheet and Strip*—The permissible variations in width for sheet and strip shall be as prescribed in Table 6.

### 8.4 Length:

8.4.1 *Plate*—Permissible variations in the length of rectangular plate shall be as prescribed in Table 2.

8.4.2 *Sheet and Strip*—Sheet and strip may be ordered to cut lengths, in which case a variation of 1/8 in. (3.18 mm) over the specified length shall be permitted, with a 0 minus tolerance.

8.5 *Straightness*—The edgewise curvature (depth of cord) of sheet, strip, and plate shall not exceed 0.05 in./ft (4.2 mm/m).

8.6 *Squareness (Sheet)*—For sheets of all thickness and widths of 6 in. (152.4 mm) or more, the angle between adjacent sides shall be 90 ± 0.15° (1/16 in. in 24 in. or 2.6 mm/m).

8.7 *Flatness*—Plate, sheet, and strip shall be commercially flat.

## 9. Workmanship, Finish, and Appearance

9.1 The material shall be uniform in quality and condition, smooth, and free of injurious imperfections.