



Designation: B709 – 22

Standard Specification for Iron-Nickel-Chromium-Molybdenum Alloy Plate, Sheet, and Strip¹

This standard is issued under the fixed designation B709; 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.

1. Scope*

1.1 This specification covers iron-nickel-chromium-molybdenum alloy (UNS N08028) plate, sheet, and strip in the solution annealed condition.

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 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:*²

B899 Terminology Relating to Non-ferrous Metals and Alloys

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

E8/E8M Test Methods for Tension Testing of Metallic Materials

3. Terminology

3.1 *Definitions:*

3.1.1 The terms and definitions of Terminology **B899** apply.

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 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.

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 those specified in Ordering Information Section in Specification **B906**.

5. General Requirements

5.1 Material furnished under this specification shall conform to the applicable requirements of Specification **B906**, unless otherwise specified herein.

6. Materials and Manufacture

6.1 *Heat Treatment*—The final heat treatment shall be a solution anneal. Minor cold working such as flattening or temper rolling may be performed after the final solution annealing treatment.

NOTE 1—This recommended solution anneal consists of heating to a minimum temperature of 1975 °F (1080 °C) and cooling rapidly to room temperature.

7. Chemical Composition

7.1 The material sampled in accordance with **10.1** shall conform to the composition limits prescribed in **Table 1**.

7.2 If a product analysis is made by the purchaser, the material shall conform to the product (check) analysis requirements in Specification **B906**.

8. Mechanical Properties

8.1 The material shall conform to the requirements as to the mechanical property prescribed in **Table 2**.

9. Dimensions and Permissible Variations

9.1 *Sheet*—Material furnished under this specification shall conform to the applicable requirements of Specification **B906**, except as specified in **Table 3** and **Table 4**.

9.2 *Cold-Rolled Strip*—Material furnished under this specification shall conform to the applicable requirements of Specification **B906**, except as specified in **Tables 5-7**.

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

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

10. Sampling

10.1 *Sampling for Chemical Analysis, Mechanical Testing, and Corrosion Testing shall be performed in accordance with Specification B906, except as specified herein:*

10.1.1 *Plate*—A lot of plate for testing and inspection purposes shall consist of the products resulting from the rolling of one heat of material in the same condition and specified thickness, solution annealed by the same practice, but in no case more than 25 000 lb (11 340 kg).

10.1.2 *Sheet and Strip*—A lot of sheet or strip for testing and inspection purposes shall consist of material from one heat in the same form (sheet or strip), condition, finish, and specified thickness, solution annealed by the same practice but in no case more than 25 000 lb (11 340 kg).

10.2 *Sampling for Mechanical Tests:*

10.2.1 When samples are to be taken after delivery, the purchaser of material ordered to cut lengths may request on the purchase order additional material of adequate size to provide sample coupons for inspection purposes.

11. Number of Tests and Retests

11.1 In the case of sheet or strip supplied in coil form, two or more tension tests (one from each end of each coil), and one or more hardness tests shall be made on specimens taken from each end of the coil. When material is supplied in flat sheet, flat strip, or plate, one tension and one or more hardness tests shall be made on each 100 or less sheets, strips, or plates of the same lot. When specified, one corrosion test shall be conducted for each lot.

11.2 If any specimens selected to represent any lot fail to meet any of the test requirements, the material represented by

such specimens may be retested. If there is valid reason to believe the result is not representative, the material may be re-annealed and retested.

12. Specimen Preparation

12.1 Tension test specimens from material under ½ in. (12.7 mm) in thickness shall be of the full thickness of the material and machined to the form and dimensions shown for the sheet-type specimen in Test Methods E8/E8M. Tension test specimens from material ½ in. (12.7 mm) and over shall be of the full thickness of the material, machined to the form and dimensions shown for the plate-type specimen in Test Methods E8/E8M.

13. Keywords

13.1 N08028; plate; sheet; strip

TABLE 1 Chemical Requirements^A

Element	Composition, %
Ni	30.0 to 34.0
Fe	remainder ^B
Cr	26.0 to 28.0
Mo	3.0 to 4.0
C	0.030
Si	1.00
Mn	2.50
P	0.030
S	0.030
Cu	0.6 to 1.4

^A Maximum, unless range is indicated.

^B Determined arithmetically by difference.

TABLE 2 Mechanical Property Requirements

Form	Tensile Strength, min, ksi (MPa)	Yield Strength (0.2 % off-set), min, ksi (MPa)	Elongation in 2 in. or 50 mm, or 4D, min, %	Rockwell Hardness (or equivalent) ^A
Sheet	73 (500)	31 (214)	40	70–90 HRB
Strip	73 (500)	31 (214)	40	70–90 HRB
Plate	73 (500)	31 (214)	40	70–90 HRB

^A Hardness values are shown for information only and shall not constitute a basis for acceptance or rejection as long as the other mechanical properties are met.