



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 4544C

Superseding 4544B

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ALLOY SHEET, STRIP, AND PLATE, CORROSION RESISTANT
67Ni - 30Cu
Annealed

1. SCOPE:

1.1 Form: This specification covers a corrosion-resistant nickel-copper alloy in the form of sheet, strip, and plate.

1.2 Application: Primarily for formed or moderately drawn parts, such as fuel and oil systems components, requiring corrosion resistance.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

2.1.1 Aerospace Material Specifications:

AMS 2262 - Tolerances, Nickel, Nickel Base, and Cobalt Base Alloy Sheet, Strip, and Plate

AMS 2269 - Chemical Check Analysis Limits, Wrought Nickel and Nickel Base Alloys

AMS 2350 - Standards and Test Methods

AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM E8 - Tension Testing of Metallic Materials

ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

ASTM E76 - Chemical Analysis of Nickel-Copper Alloys

ASTM E290 - Semi-Guided Bend Test for Ductility of Metallic Materials

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

3. TECHNICAL REQUIREMENTS:

SAE Technical Board rules provide that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

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3.1 **Composition:** Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E76, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	min	max
∅	Nickel + Cobalt	63.00 - 70.00
	Iron	-- 2.50
	Manganese	-- 2.00
	Cobalt (3.1.1)	-- 1.00
	Silicon	-- 0.50
	Carbon	-- 0.30
	Sulfur	-- 0.024
	Copper	remainder

3.1.1 Determination not required for routine acceptance.

∅ 3.1.2 **Check Analysis:** Composition variations shall meet the requirements of AMS 2269.

3.2 **Condition:** The product shall be supplied in the following condition:

3.2.1 **Sheet and Strip:** Cold rolled, annealed, and descaled unless annealing is performed in an atmosphere yielding a bright finish, having a surface appearance as close as possible to a commercial corrosion resistant steel No. 2D finish; standards for acceptance shall be as agreed upon by purchaser and vendor.

∅ 3.2.2 **Plate:** Hot rolled and annealed; when so ordered, plate shall be descaled.

3.3 **Properties:** The product shall conform to the following requirements:

3.3.1 **Tensile Properties:** Shall be as follows, determined in accordance with ASTM E8:

∅	Tensile Strength	70,000 - 85,000 psi (483 - 586 MPa)
	Elongation in 2 in. (50.8 mm) or 4D, min	35%

3.3.2 **Bending:** Product 0.250 in. (6.35 mm) and under in nominal thickness shall withstand, without cracking, bending in accordance with ASTM E290 through an angle of 180 deg (3.14 rad) around a diameter equal to the nominal thickness of the product with axis of bend parallel to the direction of rolling.

3.3.2.1 Bending requirements for product over 0.250 in. (6.35 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.3 **Hardness:** The product should have hardness as follows, or equivalent, determined in accordance with ASTM E18, but shall not be rejected on the basis of hardness if the tensile property requirements are met:

Nominal Thickness		Hardness
Inch	(Millimetres)	
Up to 0.250, incl	(Up to 6.35, incl)	73 HRB, max
Over 0.250	(Over 6.35)	69 - 80 HRB

3.4 **Quality:** The product shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2262.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance or routine control tests.

4.3 Sampling: Shall be in accordance with AMS 2371 and the following:

4.3.1 Tensile test specimens from widths 9 in. (229 mm) and over shall be taken with axis perpendicular to the direction of rolling; for widths less than 9 in. (229 mm), tensile test specimens shall be taken with axis parallel to the direction of rolling.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and the results of tests on each thickness from each heat to determine conformance to the tensile property and bending requirements of this specification. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2371.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Each sheet, strip, and plate shall be marked on one face, in the respective location indicated below, with AMS 4544C, heat number, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be capable of being removed in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the material or its performance and shall be sufficiently stable to withstand normal handling.

5.1.1 Flat Strip 6 In. (152 mm) and Under in Width: Shall be marked in one or more lengthwise rows of characters recurring at intervals not greater than 3 ft (914 mm).

5.1.2 Flat Sheet, Flat Strip Over 6 In. (152 mm) in Width, and Plate: Shall be marked in lengthwise rows of characters recurring at intervals not greater than 3 ft (914 mm), the rows being spaced not more than 6 in. (152 mm) apart and alternately staggered.