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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-4544

REV
E

Submitted for recognition as an American National Standard

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Superseding AMS-4544D

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

UNS N04400

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 requiring corrosion resistance.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1 Aerospace Material Specifications:

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

MAM-2262 - Tolerances, Metric, Nickel, Nickel Alloy, and Cobalt Alloy Sheet, Strip, and Plate

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

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

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2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM E 8 - Tension Testing of Metallic Materials
 ASTM E 8M - Tension Testing of Metallic Materials (Metric)
 ASTM E 18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
 ASTM E 76 - Chemical Analysis of Nickel-Copper Alloys
 ASTM E 290 - Semi-Guided Bend Test for Ductility of Metallic Materials

2.3 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.3.1 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E 76, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min	max
Nickel + Cobalt	63.0	- 70.0
Iron	--	2.5
Manganese	--	2.0
Cobalt (3.1.1)	--	1.0
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, unless annealing is performed in an atmosphere yielding a bright finish, descaled having a surface appearance comparable to 3.2.1.1 or 3.2.1.2 as applicable (See 8.2).

3.2.1.1 Sheet: No. 2D finish.

3.2.1.2 Strip: No. 1 strip finish.

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

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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 E 8 or ASTM E 8M:

Tensile Strength	70,000 – 85,000 psi (483 – 586 MPa)
Elongation in 2 Inches (50.8 mm) or 4D, minimum	35%

3.3.2 Bending: Product 0.250 inch (6.35 mm) and under in nominal thickness shall withstand, without cracking, bending in accordance with ASTM E 290 through an angle of 180 degrees 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 inch (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 E 18, 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, maximum
Over 0.250	Over 6.35	69 – 80 HRB

3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

3.5 Tolerances: Shall conform to all applicable requirements of AMS-2262 or MAM-2262.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests for all technical requirements are acceptance tests and shall be performed on each heat or lot, as applicable.

4.3 Sampling and Testing: Shall be in accordance with AMS-2371.

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4.4 Reports: The vendor of the product shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for the tensile and bending properties of each lot. This report shall include the purchase order number, lot number, AMS-4544E, size, and quantity.

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 legibly marked on one face, in the respective location indicated below, with AMS-4544E, lot number, manufacturer's identification, and nominal thickness. The characters shall be applied using a suitable marking fluid removable in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the product or its performance and shall be sufficiently stable to withstand normal handling.

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

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

5.1.3 Coiled Sheet and Strip: Shall be marked near both the outside and inside ends of the coil; the markings shall be applied as in 5.1 or shall appear on a durable tag or label attached to the coil and marked with the information of 5.1. When the product is wound on cores, the tag or label may be attached to the core.

5.2 Packaging:

5.2.1 The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.

5.2.2 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-163, Commercial Level, unless Level A is specified in the request for procurement.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Product not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.

8. NOTES:

8.1 Marginal Indicia: The phi ($\emptyset$) symbol is used to indicate technical changes from the previous issue of this specification.