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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE**AMS 5599E**

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Superseding AMS 5599D

Submitted for recognition as an American National Standard

NICKEL ALLOY, CORROSION AND HEAT RESISTANT, SHEET, STRIP, AND PLATE
62Ni - 21.5Cr - 9.0Mo - 3.7(Cb+Ta)
Annealed

UNS N06625

1. SCOPE:

1.1 Form:

This specification covers a corrosion and heat resistant nickel alloy in the form of sheet, strip, and plate procured in inch/pound units.

1.1.1 MAM 5599 is the metric version of this AMS.

1.2 Application:

These products have been used typically for parts requiring corrosion and oxidation resistance up to 2000 °F, particularly where such parts may require welding during fabrication, but usage is not limited to such applications.

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.

AMS 2262 Tolerances, 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 and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock

AMS 2807 Identification, Carbon and Low-Alloy Steels, Corrosion and Heat Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing

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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 112 Determining the Average Grain Size

ASTM E 290 Semi-Guided Bend Test for Ductility of Metallic Materials

ASTM E 354 Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

(R)

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 354, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Carbon	--	0.10
Manganese	--	0.50
Silicon	--	0.50
Phosphorus	--	0.015
Sulfur	--	0.015
Chromium	20.00	23.00
Molybdenum	8.00	10.00
Columbium + Tantalum	3.15	4.15
Iron	--	5.00
Cobalt (3.1.1)	--	1.00
Titanium	--	0.40
Aluminum	--	0.40
Nickel	remainder	

3.1.1 Determination not required for routine acceptance.

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

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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 the following commercial corrosion-resistant steel finishes 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, annealed, and descaled.

3.3 Heat Treatment:

The product shall be annealed by heating to a temperature not lower than 1600 °F, holding at the selected temperature within ± 25 °F for a time commensurate with section thickness, and cooling at a rate equivalent to an air cool or faster.

3.4 Properties:

The product shall conform to the following requirements:

3.4.1 Tensile Properties: Shall be as shown in Table 2 for product up to 1.000 inch in nominal thickness, determined in accordance with ASTM E 8.

TABLE 2 - Minimum Tensile Properties

Property	Value
Tensile Strength	120 ksi
Yield Strength at 0.2% Offset	60.0 ksi
Elongation in 2 Inches or 4D	30%

3.4.1.1 Yield strength requirement does not apply to product under 0.020 inch in nominal thickness.

3.4.1.2 Elongation requirement does not apply to product under 0.010 inch in nominal thickness.

3.4.2 Bending: Sheet and strip shall withstand, without cracking, bending in accordance with ASTM E 290 through an angle of 180 degrees around a diameter equal to the bend factor shown in Table 3 times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

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TABLE 3 - Bending Parameters

Nominal Thickness Inch	Bend Factor
Up to 0.050, incl	1
Over 0.050 to 0.1874, incl	2

3.4.3 Grain Size: Shall be as follows, determined in accordance with ASTM E 112:

3.4.3.1 Sheet and Strip: Shall be as shown in Table 4 or finer.
(R)

TABLE 4 - Maximum Grain Size

Nominal Thickness Inch	ASTM Grain Size No.
Up to 0.050, incl	5
Over 0.050 to 0.1874, incl	4

3.4.3.2 Plate: Shall be ASTM No. 3 or finer.
(R)

3.5 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.

3.6 Tolerances:

Shall conform to all applicable requirements of AMS 2262.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: (R)

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.