SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE MAM 5599C

Issued OCT 1987
Revised MAY 2000
Cancelled MAR 2003

Superseding MAM 5599B

Nickel Alloy, Corrosion and Heat Resistant, Sheet, Strip, and Plate
62Ni - 21.5Cr - 9.0Mo - 3.7 (Cb+Ta)
Annealed

N06625

CANCELLATION NOTICE

This specification has been declared “CANCELLED” by the Aerospace Materials Division, SAE, as of March, 2003. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications.

AMS 5599 covers the same material.

“CANCELLED” specifications are available from SAE.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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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 SI (metric) units.

1.1.1 AMS 5599 is the inch/pound version of this MAM.

1.2 Application:

These products have been used typically for parts requiring corrosion and oxidation resistance up to 1095 °C, particularly where such parts may require welding during fabrication, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order form a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

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

MAM 2262	Tolerances, Metric, Nickel, Nickel Alloy, and Cobalt Alloy Sheet, Strip, and Plate
AMS 2269	Chemical Check Analysis Limits, Nickel, 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

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 8M	Tension Testing of Metallic Materials (Metric)
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

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

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	3.15	4.15
Tantalum	--	0.05
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 (See 4.4).

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

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Sheet and Strip: Hot or cold rolled, solution heat treated, and, unless solution heat treatment 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), except that product 0.010 inch (0.25 mm) and under in nominal thickness shall have a surface appearance comparable to a No. 2B finish.

3.2.1.1 Sheet: No. 2D finish.

3.2.1.2 Strip: No. 1 strip finish.

3.2.2 Plate: Hot rolled, solution heat treated, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled.

3.3 Heat Treatment:

The product shall be annealed by heating to a temperature not lower than 870 °C, holding at the selected temperature within ±15 °C 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 25.0 millimeters in nominal thickness, determined in accordance with ASTM E 8M.

TABLE 2 - Minimum Tensile Properties

Property	Value
Tensile Strength	825 MPa
Yield Strength at 0.2% Offset	415 MPa
Elongation in 50 mm or 4D	30%

3.4.1.1 Yield strength requirement does not apply to product under 0.50 millimeter in nominal thickness.

3.4.1.2 Elongation requirement does not apply to product under 0.25 millimeter 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.

TABLE 3 - Bending Parameters

Nominal Thickness Millimeters	Bend Factor
Up to 1.25, incl	1
Over 1.25 to 4.75, incl	2

3.4.3 Average 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.