SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5541F

Issued JUL 1957
Revised JUL 2000
Reaffirmed JAN 2007

Superseding AMS 5541E

Nickel Alloy, Corrosion and Heat Resistant, Sheet and Strip
73Ni - 15.5Cr - 2.4Ti - 0.7Al - 7.0Fe
Annealed

UNS N07722

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

1. SCOPE:

1.1 Form:

This specification covers a corrosion and heat resistant nickel alloy in the form of sheet and strip.

1.2 Application:

These products have been used typically for parts requiring high strength up to 1500 °F (816 °C) and oxidation resistance up to 1800 °F (982 °C), but usage is not limited to such applications. Parts may be formed and then heat treated to improve strength at elevated temperatures.

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.

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, 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

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

2.2 ASTM Publications:

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

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 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	--	0.08
Manganese	--	1.00
Silicon	--	0.70
Sulfur	--	0.01
Chromium	14.00	17.00
Nickel	70.00	--
Titanium	2.00	2.75
Aluminum	0.40	1.00
Iron	5.00	9.00
Cobalt (3.1.1)	--	1.00
Copper	--	0.50

3.1.1 Determination not required for routine acceptance.

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

3.2 Condition:

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 Sheet: No. 2D finish.

3.2.2 Strip: No 1 strip finish.

3.3 Heat Treatment:

Product shall be annealed by heating to a temperature within the range 1750 to 1850 °F (954 to 1010 °C), holding at the selected temperature within ±25 °F (±14 °C) for a time commensurate with section thickness, and cooling rapidly.

3.4 Properties:

The product shall conform to the following requirements:

3.4.1 As Annealed:

3.4.1.1 Tensile Properties: Shall be as shown in Table 2, determined in accordance with ASTM E 8 or ASTM E 8M.

TABLE 2A - Tensile Properties, Inch/Pound Units

Nominal Thickness Inch	Tensile Strength ksi, max	Elongation in 2 Inches or 4D %, min
0.010 to 0.024, incl	130.0	30
Over 0.024 to 0.250, incl	125.0	40

TABLE 2B - Tensile Properties, SI Units

Nominal Thickness Millimeters	Tensile Strength MPa, max	Elongation in 50.8 mm or 4D %, min
0.25 to 0.61, incl	896	30
Over 0.61 to 6.35, incl	862	40

3.4.1.2 Bending: The product 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 Inch	Nominal Thickness Millimeters	Bend Factor
Up to 0.050, incl	Up to 1.27, incl	1
Over 0.050 to 0.250, incl	Over 1.27 to 6.35, incl	2

3.4.2 After Precipitation Heat Treatment: The product shall have the following properties after being precipitation heat treated by heating to 1300 °F ± 25 (704 °C ± 14), holding at heat for not less than 16 hours, and cooling in air:

3.4.2.1 Tensile Properties: Shall be as shown in Table 4, determined in accordance with ASTM E 8 or ASTM E 8M.

TABLE 4A - Minimum Tensile Properties, Inch/Pound Units

Nominal Thickness Inch	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.010 to 0.024, incl	140.0	90.0	15
Over 0.024 to 0.250, incl	140.0	90.0	20

TABLE 4B - Minimum Tensile Properties, SI Units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
0.25 to 0.61, incl	965	621	15
Over 0.61 to 6.35, incl	965	621	20

3.4.2.2 Hardness: Should be not lower than 23 HRC, or equivalent (See 8.3), determined in accordance with ASTM E 18, but the product shall not be rejected on the basis of hardness if the tensile properties determined on specimens taken from the same sample as that with nonconforming hardness or another sample with similar nonconforming hardness are acceptable.

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 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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.