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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5536L

Issued MAY 1954
Revised JUL 1993
Reaffirmed APR 2006

Superseding AMS 5536K

Nickel Alloy, Corrosion and Heat Resistant, Sheet, Strip, and Plate
47.5Ni - 22Cr - 1.5Co - 9.0Mo - 0.60W - 18.5Fe
Solution Heat Treated

UNS N06002

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 5536 is the metric version of this AMS.

1.2 Application:

These products have been used typically for parts requiring oxidation resistance up to 2200 °F and relatively high strength up to 1500 °F, 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 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, 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

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

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 139 Conducting Creep, Creep-Rupture, and Stress-Rupture Tests 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

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, Pa 19111-5094.

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

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	0.05	0.15
Manganese	- -	1.00
Silicon	- -	1.00
Phosphorus	- -	0.040
Sulfur	- -	0.030
Chromium	20.50	23.00
Cobalt	0.50	2.50
Molybdenum	8.00	10.00
Tungsten	0.20	1.00
Iron	17.00	20.00
Aluminum	- -	0.50
Titanium	- -	0.15
Boron	- -	0.010
Copper	- -	0.50
Nickel	remainder	

3.1.1 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: Hot or cooled 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):

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 descaled.

3.3 Heat Treatment:

The product shall be solution heat treated by heating in a suitable atmosphere within the range 2100 to 2150 °F, holding at the selected temperature within ±25 °F for a time commensurate with product thickness, and rapidly cooling.

3.4 Properties:

The product shall conform to the following requirements:

3.4.1 Tensile Properties: Shall be as specified in Table 2, determined in accordance with ASTM E 8.

TABLE 2 - Minimum Tensile Properties

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D MPa
Up to 0.010, excl	105	45.0	--
0.010 to 0.020, excl	105	45.0	29
0.020 to 0.1874, incl	105	45.0	35
Over 0.1874 to 2.000, incl	100	40.0	35
Over 2.000	95.0	40.0	35

3.4.2 Bending: Product 0.1874 inch and under in nominal thickness shall withstand, without cracking, bending at room temperature 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	Bend Factor
Up to 0.050, incl	1.5
Over 0.050 to 0.1874, incl	2

3.4.3 Stress-Rupture Properties at 1500°F: A tensile specimen, maintained at 1500 °F ± 3 while a load sufficient to produce an initial axial stress of 16.0 ksi is applied continuously, shall not rupture in less than the time indicated in Table 4. The test shall be continued to rupture without change of load. Elongation after rupture, measured at room temperature, shall be not less than shown in Table 4. Tests shall be conducted in accordance with ASTM E 139.

TABLE 4 - Stress Rupture Parameters

Nominal Thickness Inches	Time to Rupture Hours, minimum	Elongation % in 4D
0.010 to 0.020, excl	15	3
0.020 and over	24	8

3.4.3.1 The test of 3.4.3 may be conducted using a load higher than required to produce an initial axial stress of 16,0 ksi but load shall not be changed while test is in progress. Time to rupture and elongation requirements shall be as specified in Table 4.

3.4.3.2 The test of 3.4.3 may be conducted using incremental loading. In such case, the load required to produce an initial axial stress of 16.0 ksi shall be used to rupture or for 24 hours, whichever occurs first. After the 24 hours and at intervals of 8 to 16 hours, preferably 8 to 10 hours, thereafter, the stress shall be increased in increments of 2000 psi. Time to rupture and elongation requirements shall be as specified in Table 4.

3.4.3.2.1 The test of 3.4.3.2 applies only to product 0.020 inch and over in nominal thickness.:

3.4.4 Grain Size: Sheet and strip 0.125 inch and under in nominal thickness shall have average grain size of ASTM No. 4 or finer, determined in accordance with ASTM E 112.

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.