SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS5530	REV. G

Issued	1947-09
Revised	1988-01
Noncurrent	1994-03
Reaf Nonc	2012-04

Superseding AMS5530F

Alloy Sheet, Strip, and Plate, Corrosion and Heat Resistant
58Ni - 15.5Cr - 16Mo - 3.8W - 5.5Fe
Solution Heat Treated

RATIONALE

AMS5530G has been reaffirmed to comply with the SAE five-year review policy.

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of March 1994. It is recommended, therefore, that this specification not be specified for new designs.

"NONCURRENT" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "NONCURRENT" specifications is available from SAE.

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http://www.sae.org/technical/standards/AMS5530G

1. SCOPE:

1.1 Form:

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

1.2 Application:

Primarily for parts, such as nozzle diaphragms, burner liners, tail pipes, and exhaust cones, requiring high strength up to 1500°F (815°C) and oxidation resistance up to 1800°F (980°C), and which may require welding during fabrication.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications:

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

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 2350	Standards and Test Methods
AMS 2371	Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock

2.2 ASTM Publications:

Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia PA 19103.

ASTM E8	Tension Testing of Metallic Materials
ASTM E18	Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E112	Determining Average Grain Size
ASTM E139	Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials
ASTM E290	Semi-Guided Bend Test for Ductility of Metallic Materials
ASTM E354	Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

2.3 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

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 E354, by spectrochemical or other analytical methods approved by purchaser:

	min	max
Carbon	--	0.08
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.03
Chromium	14.50	16.50
Molybdenum	15.00	17.00
Tungsten	3.00	4.50
Iron	4.00	7.00
Vanadium	--	0.35
Cobalt (3.1.1)	--	2.50
Nickel plus Cobalt	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: Hot rolled 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:

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, having a surface appearance comparable to a commercial corrosion-resistant steel No. 1 finish.

3.3 Solution Heat Treatment:

The product shall be solution heat treated by heating to 2225°F ± 25 (1220°C ± 15), holding at heat for a time commensurate with section thickness, and cooling at a rate equivalent to air cool or faster.

3.4 Properties:

The product shall conform to the following requirements:

3.4.1 Tensile Properties: Shall be as specified in Table I, determined in accordance with ASTM E8.

TABLE I

Nominal Thickness Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
Up to 0.187, incl	115,000	50,000	40
Over 0.187 to 0.750, incl	100,000	45,000	30
Over 0.750 to 2.500, incl	90,000	45,000	20

TABLE I (SI)

Nominal Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa min	Elongation in 50 mm or 1D %, min
Up to 4.75, incl	795	345	40
Over 4.75 to 18.75, incl	690	310	30
Over 18.75 to 62.50, incl	620	310	20

3.4.1.1 Tensile properties of plate over 2.500 in. (62.50 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.4.2 Hardness: Should be as shown in Table II, determined in accordance with ASTM E18, but the product shall not be rejected on the basis of hardness if the tensile property requirements are met.

TABLE II

Nominal Thickness		Hardness, HRC, max
Inches	Millimetres	
Up to 0.187, incl	Up to 4.75, incl	24
Over 0.187 to 2.500, incl	Over 4.75 to 62.50, incl	25
Over 2.500	Over 62.50	As agreed upon

3.4.3 Grain Size: Sheet and strip shall have grain size not courser than shown in Table III, determined by comparison of a polished and etched specimen with the chart in ASTM E112.

TABLE III

Nominal Thickness		ASTM Grain Size
Inch	Millimetres	
Up to 0.125, incl	Up to 3.00, incl	3
Over 0.125	Over 3.00	1.5

3.4.3.1 Grain size of plate shall be as agreed upon by purchaser and vendor.

3.4.4 Bending: Sheet and strip shall withstand, without cracking, bending in accordance with ASTM E290 through an angle of 180 deg around a diameter equal to the bend factor times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

Nominal Thickness		Bend Factor
Inch	Millimetres	
Up to 0.050, excl	Up to 1.25, excl	1
0.050 and over	1.25 and over	2

3.4.4.1 Bending requirements for plate shall be as agreed upon by purchaser and vendor.

3.4.5 Stress-Rupture Properties at 1500°F (815°C): A tensile specimen, maintained at 1500°F ± 3 (815°C ± 2) while a load sufficient to produce an initial axial stress of 18,000 psi (125 MPa) is applied continuously, shall not rupture in less than 24 hours. The test shall be continued to rupture without change of load. Elongation after rupture, measured at room temperature, shall be not less than 10% in 2 in. (50 mm) or 4D. The test shall be conducted in accordance with ASTM E139.

3.4.5.1 The test of 3.4.5 may be conducted using a load higher than required to produce an initial axial stress of 18,000 psi (125 MPa) but load shall not be changed while test is in progress. Time to rupture and elongation requirements shall be as specified in 3.4.5.

3.4.5.2 When permitted by purchaser, the test of 3.4.5 may be conducted using incremental loading. In such case, the load required to produce an initial axial stress of 18,000 psi (125 MPa) shall be maintained to rupture or for 24 hr, whichever occurs first. After the 24 hr and at intervals of 8 - 16 hr, preferably 8 - 10 hr, thereafter, the stress shall be increased in increments of 2000 psi (15 MPa). Time to rupture and elongation requirements shall be as specified in 3.4.5.

3.5 Quality:

The product, as required 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 performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. 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 to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling:

Shall be in accordance with AMS 2371.