SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS5537 | REV. H

Issued 1952-02
Revised 2002-01
Reaffirmed 2012-07

Superseding AMS5537G

Cobalt Alloy, Corrosion and Heat-Resistant, Sheet, Strip, Foil, and Plate
52Co - 20Cr - 10Ni - 15W
Solution Heat Treated

(Composition similar to UNS R30605)

RATIONALE

AMS5537H has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Form:

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

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 2000 °F (1093 °C), 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 forms 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 or www.sae.org.

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

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS5537H

2.1 (Continued):

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
AS4194	Sheet and Strip Surface Finish Nomenclature

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM A 480/A 480M	Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM E 8	Tension Testing of Metallic Materials
ASTM E 8M	Tension Testing of Metallic Materials (Metric)
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 345	Tension Testing of Metallic Foil
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	0.05	0.15
Manganese	1.00	2.00
Silicon	--	0.40
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	19.00	21.00
Nickel	9.00	11.00
Tungsten	14.00	16.00
Iron	--	3.00
Cobalt	remainder	

3.1.1 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, Strip, and Foil: 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 in accordance with ASTM A 480/A 480M and AS4194 comparable to 3.2.1.1 or 3.2.1.2 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.

3.3 Properties:

The product shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as shown in Table 2, determined in accordance with ASTM E 8, ASTM E 8M, or ASTM E 345 for foil.

TABLE 2A - Tensile Properties, Inch/Pound Units

Nominal Thickness Inches	Tensile Strength ksi, min	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches %, min
Up to 0.003, excl	130	55 min	Report
0.003 to 0.005, incl	130	55 to 80	25
Over 0.005 to 0.020 incl	130	55 to 80	30
Over 0.020 to 0.032 incl	130	55 to 80	35
Over 0.032 to 0.043 incl	130	55 to 80	40
Over 0.043 to 2.250, incl	130	55 to 80	45

TABLE 2B - Tensile Properties, SI Units

Nominal Thickness Millimeters	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm %, min
Up to 0.076, excl	896	379 min	Report
0.076 to 0.127, incl	896	379 to 552	25
Over 0.127 to 0.51, incl	896	379 to 552	30
Over 0.51 to 0.81, incl	896	379 to 552	35
Over 0.81 to 1.09, incl	896	379 to 552	40
Over 1.09 to 57.15, incl	896	379 to 552	45

3.3.2 Bending: The product shall withstand, without cracking, bending at ambient temperature in accordance with ASTM E 290 through the angle shown in Table 3 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.

TABLE 3 - Bending Parameters

Nominal Thickness Inch	Nominal Thickness Millimeters	Angle Degrees	Bend Factor
Up to 0.050, incl	Up to 1.27, incl	180	1.5
Over 0.050 to 0.1874, incl	Over 1.27 to 4.760, incl	120	2

3.3.3 Stress-Rupture Properties at 1500 °F (816 °C): A tensile specimen, maintained at 1500 °F ± 3 (816 °C ± 2) while a load sufficient to produce an initial axial stress of 24.0 ksi (165 MPa) or higher 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 inches (50.8 mm). Tests shall be conducted in accordance with ASTM E 139.

3.3.3.1 For product 0.010 inch (0.25 mm) and under in nominal thickness, stress-rupture properties may be established using a sample up to 0.025 inch (0.64 mm) in nominal thickness from the same master coil and heat. The supplier's certification of test shall indicate the thickness at which the stress-rupture test was performed.

3.3.3.2 The test of 3.3.3 may be conducted using incremental loading. In such case, the load required to produce an initial axial stress of 24.0 ksi (165 MPa) or higher shall be used to rupture or for 24 hours, whichever occurs first. After the 24 hours and at intervals of 8 to 16 hours thereafter, the stress shall be increased in increments of 2.0 ksi (14 MPa). Time to rupture and elongation requirements shall be as specified in 3.3.3.

3.4 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.

3.5 Tolerances:

Shall conform to all applicable requirements of AMS 2262 or MAM 2262.