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AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard



AMS 5504K

Issued JUL 1948
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Superseding AMS 5504J

Steel Sheet, Strip, and Plate, Corrosion and Heat Resistant 12.5Cr (SAE 51410) Annealed

UNS S41000

1. SCOPE:

1.1 Form:

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

1.2 Application:

Primarily for parts requiring oxidation resistance up to 1000 °F (538 °C) but useful at the higher temperatures only when stresses are low.

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 the issue of effect on the date of the purchase order.

2.1 SAE Publications:

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

2.1.1 Aerospace Material Specifications:

- AMS 2242 Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Sheet, Strip, and Plate
- MAM 2242 Tolerances, Metric, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Sheet, Strip, and Plate
- AMS 2248 Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
- AMS 2371 Quality Assurance Sampling and Testing of 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

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2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM A 370 Mechanical Testing of Steel Products

ASTM E 112 Determining Average Grain Size

ASTM E 353 Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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 E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min	max
Carbon	--	0.15
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	11.50	13.50
Nickel	--	0.75
Molybdenum	--	0.50
Aluminum	--	0.05
Copper	--	0.50
Tin	--	0.05
Nitrogen	--	0.08

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Sheet and Strip: Cold rolled, annealed, and, unless annealing is performed in an atmosphere yielding a bright finish, descaled having a surface appearance conforming to 3.2.1.1 or 3.2.1.2 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, annealed, and descaled.

3.3 Properties:

The product shall conform to the following requirements; tensile, hardness, and bend testing shall be performed in accordance with ASTM A 370:

3.3.1 Tensile Properties: Shall be as follows for product over 0.005 inch (0.13 mm) in nominal thickness:

Tensile Strength	65.0 - 95.0 ksi (448 - 655 MPa)
Yield Strength at 0.2% Offset, minimum	
Elongation in 2 Inches (50.8 mm) or 4D, minimum	30.0 ksi (207 MPa)
Nominal Thickness	
Up to 0.030 inch (0.76 mm), excl	12%
0.030 inch (0.76 mm) and over	15%

3.3.1.1 Tensile property requirements for product 0.005 inch (0.13 mm) and under in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.2 Bending: Product 0.500 inch (12.70 mm) and under in nominal thickness shall withstand, without cracking, bending through the angle indicated below 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. Only one type of test will be required in routine inspection; in case of dispute, results of tests using the V-block procedure shall govern.

Nominal Thickness Inch	Nominal Thickness Millimeters	Type of Bend	Angle deg, min	Bend Factor
Up to 0.375, incl	Up to 9.52, incl	Free Bend	180	1
		V-Block	135	2
Over 0.375 to 0.500, incl	Over 9.52 to 12.70, incl	Free Bend	180	2
		V-Block	135	4

3.3.2.1 Bending requirements for plate over 0.500 inch (12.70 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.3 Grain Size: Sheet and strip shall have grain size predominantly 5 or finer with occasional grains as large as 3 permissible, determined by comparison of a polished and etched specimen with the chart in ASTM E 112. Grain size requirements for plate shall be as agreed upon by purchaser and vendor.

3.3.4 Response to Heat Treatment: Product 0.500 inch (12.70 mm) and under in nominal thickness and specimens 0.500 inch \pm 0.010 (12.70 mm \pm 0.25) thick cut from heavier product shall have hardness of 35 - 45 HRC, or equivalent, after being heat treated by heating to 1750 °F \pm 10 (954 °C \pm 6), holding at heat for 15 - 30 minutes, and cooling in still air.

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 2242 or MAM 2242.

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. 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.