SAE The Engineering Society For Advancing Mobility Land Sea Air and Space

400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5505C

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Superseding AMS 5505B

STEEL SHEET, STRIP, AND PLATE, CORROSION AND MODERATE HEAT RESISTANT 12Cr (SAE 51410 Modified) Ferrite Controlled, 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 uniformly high room temperature tensile properties along with oxidation resistance up to 1000°F (540°C), where control of ferrite content is necessary.

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 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 2303 - Aircraft Quality Steel Cleanliness, Martensitic Corrosion Resistant Steels, Magnetic Particle Inspection Procedure
AMS 2315 - Determination of Free Ferrite Content
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

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

ASTM A370 - Mechanical Testing of Steel Products
ASTM E112 - Determining Average Grain Size
ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron 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 E353 or by spectrochemical or other analytical methods approved by purchaser:

	min	max
Carbon	0.12	0.15
Manganese	--	0.60
Silicon	--	0.50
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	11.50	12.50
Nickel	--	0.75
Molybdenum	--	0.20
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: Cold rolled, annealed, and descaled (No. 2D finish).

3.2.2 Strip: Cold rolled, annealed, and descaled (No. 1 strip finish).

3.2.3 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 A370:

3.3.1 Tensile Properties: Shall be as follows:

Tensile Strength, max		95,000 psi (655 MPa)
Elongation in 2 in. (50 mm) or 4D, min		
Nominal Thickness		
Inches	Millimetres	
Up to 0.030, incl	Up to 0.75, incl	15%
Over 0.030	Over 0.75	20%

3.3.2 Bending: Product 0.500 in. (12.50 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		Type of Bend	Angle deg, min	Bend Factor
Inch	Millimetres			
Up to 0.375, incl	Up to 9.50, incl	Free Bend	180	1
		V-Block	135	2
Over 0.375 to 0.500, incl	Over 9.50 to 12.50, incl	Free Bend	180	2
		V-Block	135	4

3.3.2.1 Bending requirements for plate over 0.500 in. (12.50 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 E112. Grain size requirements for plate shall be as agreed upon by purchaser and vendor.

3.3.4 Response to Heat Treatment: Product 0.375 in. (9.50 mm) and under in nominal thickness and specimens 0.375 in. ± 0.010 (9.50 mm ± 0.25) thick cut from heavier product shall have the following properties after being heat treated by heating to 1700°F ± 10 (925°C ± 5), holding at heat for 1 hr ± 0.25, cooling in still air, and tempering twice at 600°F ± 10 (315°C ± 5) for 2 hr ± 0.25.

3.3.4.1 Tensile Properties:

Tensile Strength, min	180,000 psi (1240 MPa)
Yield Strength at 0.2% Offset, min	147,000 psi (1010 MPa)
Elongation in 2 in. (50 mm) or 4D, min	

Nominal Thickness		
Inches	Millimetres	
Up to 0.035, incl	Up to 0.88, incl	4%
Over 0.035 to 0.070, incl	Over 0.88 to 1.75, incl	5%
Over 0.070 to 0.110, incl	Over 1.75 to 2.75, incl	7%
Over 0.110 to 0.150, incl	Over 2.75 to 3.75, incl	9%
Over 0.150	Over 3.75	11%

3.3.4.2 Hardness: Should be 39 - 44 HRC, or equivalent, but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.3.4.1 are met.

3.3.5 Ferrite Content: Product, heat treated in accordance with 3.3.4, shall contain not more than 5% ferrite, determined by a method specified in AMS 2315.

3.4 Quality:

3.4.1 When specified, steel shall be aircraft quality conforming to AMS 2303.

3.4.2 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. 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.

4.4 Reports: