



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 5505B

Superseding AMS 5505A

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STEEL SHEET, STRIP, AND PLATE, CORROSION AND MODERATE HEAT RESISTANT
12Cr (SAE 51410 Modified)
Ferrite Controlled

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 and assemblies 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 (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

- 2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2242 - Tolerances, Corrosion and Heat Resistant Steel and Iron Base Alloy Sheet, Strip, and Plate and Titanium and Titanium Alloy Sheet, Strip, and Plate

AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys

AMS 2303 - Aircraft Quality Steel Cleanliness, Martensitic Corrosion Resistant Steels, Magnetic Particle Inspection Procedure

AMS 2315 - Free Ferrite Content, Method for Determining Percent

AMS 2350 - Standards and Test Methods

AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings

- 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 - Estimating the Average Grain Size of Metals

ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

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

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Standards:

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

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3. TECHNICAL REQUIREMENTS:

- 3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by 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 0.76, incl) 15%
Over 0.030	(Over 0.76) 20%

- 3.3.2 Bending: Product 0.500 in. (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	Type of Bend	Angle deg, min	Bend Factor
Inch			
(Millimetres)			
Up to 0.375, incl	Free Bend	180	1
(Up to 9.52, incl)	V-Block	135	2
Over 0.375 to 0.500, incl	Free Bend	180	2
(Over 9.52 to 12.70, incl)	V-Block	135	4

3.3.2.1 Bending requirements for plate over 0.500 in. (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 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. (9.52 mm) and under in nominal thickness and specimens 0.375 in. $\pm$ 0.010 (9.52 mm $\pm$ 0.25) thick cut from heavier product shall have the following properties after being heat treated by heating to 1700°F $\pm$ 10 (925°C $\pm$ 5), holding at heat for 1 hr $\pm$ 0.25, cooling in still air, and tempering twice at 600°F $\pm$ 10 (315°C $\pm$ 5) for 2 hr $\pm$ 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		
Inch	(Millimetres)	
Up to 0.035, incl	(Up to 0.89, incl)	4%
Over 0.035 to 0.070, incl	(Over 0.89 to 1.78, incl)	5%
Over 0.070 to 0.110, incl	(Over 1.78 to 2.79, incl)	7%
Over 0.110 to 0.150, incl	(Over 2.79 to 3.81, incl)	9%
Over 0.150	(Over 3.81)	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 internal and external imperfections detrimental to usage of the product.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2242.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples 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 perform such confirmatory testing as he deems 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 lot.

Ø 4.3 Sampling: Shall be in accordance with AMS 2371 and the following:

- 4.3.1 Specimens for tensile tests of widths 9 in. (229 mm) and over shall be taken with the axis of the specimen perpendicular to the direction of rolling; for widths less than 9 in. (229 mm), specimens shall be taken with the axis parallel to the direction of rolling.

4.4 Reports:

- 4.4.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests for chemical composition and, when specified, AMS 2303 frequency-severity rating of each heat and for tensile and bending properties, grain size, response to heat treatment, and ferrite content of each size from each heat. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat.
- 4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

Ø 4.5 Resampling and Retesting: Shall be in accordance with AMS 2371.

5. PREPARATION FOR DELIVERY:

- 5.1 Identification: Each sheet, strip, and plate shall be marked on one face, in the respective location indicated below, with AMS 5505B, heat number, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be removable in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the product or its performance and shall be sufficiently stable to withstand normal handling.

5.1.1 Flat Strip 6 In. (152 mm) and Under in Width: Shall be marked in one or more lengthwise rows of characters recurring at intervals not greater than 3 ft (914 mm).

5.1.2 Flat Sheet, Flat Strip Over 6 In. (152 mm) in Width, and Plate: Shall be marked in lengthwise rows of characters recurring at intervals not greater than 3 ft (914 mm), the rows being spaced not more than 6 in. (152 mm) apart and alternately staggered.

5.1.3 Coiled Sheet and Strip: Shall be marked near both the outside and inside ends of the coil; the markings shall be applied as in 5.1 or shall appear on a durable tag or label attached to the coil and marked with the information of 5.1. When the inside end of the coil is inaccessible, as when the product is wound on cores, the tag or label may be attached to the core.

5.2 Packaging:

- 5.2.1 The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.