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SAE-AMS5505, "STEEL, CORROSION AND HEAT RESISTANT SHEET, STRIP, AND PLATE 12CR (SAE 51410 MODIFIED) FERRITE CONTROLLED, ANNEALED", was adopted on 17-MAR-89 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Commander, Defense Supply Center Philadelphia, ATTN: DSCP-ILEA, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Copies of this document may be purchased from the Society of Automotive Engineers 400 Commonwealth Drive Warrendale, Pennsylvania, United States, 15096-0001. http://www.sae.org/

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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5505D

Issued JUL 1961
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Submitted for recognition as an American National Standard

Superseding AMS 5505C

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

UNS S41000

1. SCOPE:

1.1 Form:

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

1.2 Application:

These products have been used typically for parts requiring uniformly high room-temperature tensile properties, oxidation resistance up to 1000 ºF (538 ºC), and where control of ferrite content is necessary, but usage is not limited to such applications.

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 in effect on the date of the purchase order.

2.1 SAE Publications:

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

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 2315 Determination of Delta Ferrite Content
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

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 the 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 DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

(R)

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	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 and Strip: Cold rolled, annealed, and, unless annealing is performed in an atmosphere yielding a bright finish, descaled having a surface appearance comparable 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 shown in Table 2 for product over 0.005 inch (0.13 mm) in nominal thickness.

TABLE 2 - Tensile Properties

Property		Value
Tensile Strength, max		95.0 ksi (655 Mpa)
Elongation in 2 inches (50.8 mm) or 4D, min		
Nominal Thickness Inches	Nominal Thickness Milimeters	
Over 0.005 to 0.030, incl	Over 0.13 to 0.76, incl	15%
Over 0.0030	Over 0.76	20%

3.3.1.1 (R) Tensile property requirements for product 0.005 inch (0.13 mm) and under in nominal thickness are not applicable unless separately 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 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. 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.

TABLE 3 - Bending Parameters

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

3.3.2.1 Bending requirements for product over 0.500 inch (12.70 mm) in nominal thickness are not applicable unless separately agreed upon by purchaser and vendor.

3.3.3 Average Grain Size: Sheet and strip shall have average grain size of ASTM No. 5 or finer, determined in accordance with ASTM E 112 (See 8.3).

3.3.4 Response to Heat Treatment: Product 0.375 inch (9.52 mm) and under in nominal thickness and specimens not less than 0.375 inch (9.52 mm) thick in any dimension cut from heavier product shall have the following properties, after being heat treated by heating to 1700 ºF ± 10 (927 ºC ± 6), holding at heat for 1 hour ± 0.25, cooling in still air, and tempering twice at 600 ºF ± 10 (316 º.C ± 6) for 2 hours ± 0.25:

3.3.4.1 Tensile Properties: Shall be as shown in Table 4.

TABLE 4 - Minimum Tensile Properties

Property		Value
Tensile Strength, min		180 ksi (1241 Mpa)
Yield Strength at 0.2 Offset, min		147 ksi (1014 Mpa)
Elongation in 2 inches (50 mm) or 4D, min		
Nominal Thickness Inches	Nominal Thickness Milimeters	
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: Shall be 39 to 46 HRC, or equivalent (See 8.4). (R)

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:

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:
(R)

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.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), tensile properties (3.3.1), average grain size (3.3.3),
(R) response to heat treatment (3.3.4), ferrite content (3.3.5), and tolerances (3.5) are acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests: Bending (3.3.2) is a periodic test and shall be performed at a frequency
(R) selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:
(R)

Shall be in accordance with AMS 2371.

4.4 Reports:
(R)

The vendor of the product shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for tensile properties, average grain size, response to heat treatment, and ferrite content of each lot and, when performed, the results of tests to determine conformance to the periodic test requirements. This report shall include the purchase order number, lot number, AMS 5505D, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2371.