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Superseding AMS5505D	

Steel, Corrosion and Heat Resistant, Sheet, Strip, and Plate
12Cr (SAE 51410 Modified)
Ferrite Controlled, Annealed
(Composition similar to UNS S41000)

RATIONALE

AMS5505E 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 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 °F (538 °C), and where control of ferrite content is necessary, 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 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

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2.1 (Continued):

AMS 2248	Chemical Check Analysis Limits, 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
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 370	Mechanical Testing of Steel Products
ASTM A 480/A 480M	Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM E 112	Determining Average Grain Size
ASTM E 353	Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron 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 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 applicable 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 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, 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 Annealed Tensile Properties: Shall be as shown in Table 2 for product over 0.005 inch (0.13 mm) in nominal thickness.

TABLE 2 - Annealed Tensile Properties

Property		Value
Tensile Strength, max		95 ksi (655 MPa)
Elongation in 2 inches (50.8 mm) or 4D, min		
Nominal Thickness Inches	Nominal Thickness Millimeters	
Over 0.005 to 0.030, incl	Over 0.13 to 0.76, incl	15%
Over 0.030	Over 0.76	20%

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.

TABLE 3 - Bending Parameters

Nominal Thickness Inch	Nominal Thickness Millimeters	Type of Bend	Angle Degree min	Bend Factor
Up to 0.375, incl	Up to 9.52, incl	Free Bend	180	1
Over 0.375 to 0.500, incl	Over 9.52 to 12.70, incl	Free Bend	180	2

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.

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 °F ± 10 (927°C±6), holding at heat for 1 hour ± 0.25, cooling at a rate equivalent to cooling in still air, and tempering twice at 600°F± 10 (316 °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, Hardened and Tempered

Property		Value
Tensile Strength		180 ksi (1241 MPa)
Yield Strength at 0.2% Offset		147 ksi (1014 MPa)
Elongation in 2 inches (50.8 mm) or 4D		
Nominal Thickness Inches	Nominal Thickness Millimeters	
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 8.2).

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.