AEROSPACE MATERIAL SPECIFICATION

AMS5595	REV. G

Issued 1968-11
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Superseding AMS5595F

Steel, Corrosion Resistant, Sheet, Strip, and Plate
9.0Mn - 20Cr - 6.5Ni - 0.28N
Solution Heat Treated
(Composition similar to UNS S21904)

RATIONALE

This document has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

1.1 Form

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

1.2 Application

These products have been used typically for parts requiring high strength and corrosion resistance from -423 to +1100 °F (-253 to +593 °C), where such parts may require welding during fabrication, 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 cancelled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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http://www.sae.org/technical/standards/AMS5595G

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org

AMS2242	Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Sheet, Strip, and Plate
AMS2248	Chemical Check Analysis Limits, Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS2807	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 International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org

ASTM A 262	Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
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 290	Bend Testing of Material for Ductility
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	--	0.04
Manganese	8.00	10.00
Silicon	--	1.00
Phosphorus	--	0.060
Sulfur	--	0.030
Chromium	19.00	21.50
Nickel	5.50	7.50
Nitrogen	0.15	0.40
Molybdenum	--	0.75
Copper	--	0.75

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Sheet and Strip

Cold rolled, solution heat treated, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled having a surface appearance comparable to the following commercial corrosion-resistant steel finishes in accordance with ASTM A 480/A480M and AS4194, and 3.2.1.1 or 3.2.1.2 as applicable.

3.2.1.1 Sheet

Shall be No. 2D finish, except No. 2B finish may be supplied if acceptable to purchaser.

3.2.1.2 Strip

Shall be No. 1 strip finish.

3.2.2 Plate

Hot rolled, solution heat treated, and descaled.

3.3 Solution Heat Treatment

The product shall be solution heat treated by heating to a temperature not lower than 1900 °F (1038 °C), holding at the selected temperature within ±25 °F (±14 °C) for a time commensurate with cross-sectional thickness and the heating equipment and procedure used, and cooling at a rate equivalent to a rapid air cool or faster.

3.4 Properties

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

3.4.1 Average Grain Size

Shall be as shown in Table 2, determined in accordance with ASTM E 112.

TABLE 2 - AVERAGE GRAIN SIZE

Nominal Thickness Inch	Nominal Thickness Millimeters	ASTM Grain Size No.
Up to 0.1875, excl	Up to 4.762, excl	7 or finer
0.1875 to 1.00 incl	4.762 to 25.4, incl	3 or finer

3.4.2 Tensile Properties

Shall be as shown in Table 3.

TABLE 3A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Thickness Inch	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.1875, excl	100	60	40
0.1875 and over	90	50	40

TABLE 3B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 4.762, excl	689	414	40
4.762 and over	621	345	40

3.4.3 Hardness

Should be not higher than 100 HRB, or equivalent (See 8.2). Product shall not be rejected on the basis of hardness if the tensile properties are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness, or another sample with similar nonconforming hardness.

3.4.4 Bending

Product 0.749 inch (19.02 mm) and under in nominal thickness shall be tested in accordance with ASTM E 290 using a sample prepared nominally 0.75 inch (19.0 mm) in width, with its axis of bending parallel to the direction of rolling, and shall withstand, without cracking, when bending at room temperature through the angle shown in Table 4 around a diameter equal to the bend factor times the nominal thickness of the product. In case of dispute, results of tests using the guided bend test of ASTM E 290 shall govern.

TABLE 4 - BENDING PARAMETERS

Nominal Thickness Inch	Nominal Thickness Millimeters	Angle Deg, min	Bend Factor
Up to 0.249, incl	Up to 6.32, incl	180	1
Over 0.249 to 0.749, incl	Over 6.32 to 19.02, incl	90	1

3.4.5 Susceptibility to Intergranular Attack

Specimens shall be sensitized by heating in air to 1250 °F ± 10 (677 °C ± 6), holding at heat for 60 minutes ± 5, and cooling in air. The sensitized specimens shall show no evidence of intergranular attack when immersed in acidified copper sulfate solution in accordance with ASTM A 262, Practice E, except that exposure time shall be 72 hours and metallic copper shall not be added. After immersion, the specimens shall withstand, without cracking, bending in accordance with ASTM A 262, Practice E.

3.5 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.