AEROSPACE MATERIAL SPECIFICATION

AMS5504™	REV. P

Issued 1948-07
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Revised 2024-09

Superseding AMS5504N

(R) Steel, Corrosion- and Heat-Resistant, Sheet, Strip, and Plate,
12.5Cr (410),
Annealed

(Composition similar to UNS S41000)

RATIONALE

AMS5504P is the result of a Five-Year Review and update of the specification. The revision prohibits unauthorized exceptions (see 3.6, 4.4.1, and 8.5), updates composition testing and reporting (see 3.1 and 3.1.2), revises finish requirements (see 3.2.1), adds continuous heat-treatment option (see 3.2.3), reformats Table 2, adds strain rate control during tensile testing (see 3.3.1.1), updates bending requirements (see 3.3.2), and adds pyrometry requirements (see 3.3.4).

1. SCOPE

1.1 Form

This specification covers a corrosion- and moderate heat-resistant steel in the form of sheet, strip, and plate over 0.005 inch (0.13 mm) in nominal thickness.

1.2 Application

These products have been used typically for parts requiring oxidation resistance up to 1000 °F (538 °C), and they are useful at higher temperatures when stresses are low, 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.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (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

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS5504P/

AMS2371 Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock

AMS2750 Pyrometry

AMS2807 Identification, Carbon and Low-Alloy Steels, Corrosion- and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing

AS7766 Terms Used in Aerospace Metals Specifications

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 A370 Mechanical Testing of Steel Products

ASTM A751 Analysis of Steel Products

ASTM E112 Determining Average Grain Size

ASTM E140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

ASTM E290 Bend Testing of Material for Ductility

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Composition shall conform to the following percentages by weight, determined in accordance with ASTM A751 or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.15
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	11.50	13.50
Nickel	--	0.75
Molybdenum	--	0.50
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 AMS2248.

3.1.2 The producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection unless limits of acceptability are specified by the purchaser.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Sheet and Strip

Sheet and strip shall be hot or cold rolled, annealed, and, unless annealing is performed in an atmosphere yielding a bright finish, descaled producing a uniform finish.

3.2.2 Plate

Plate shalll be hot rolled, annealed, and descaled.

3.2.3 Continuous Heat Treatment

When continuous heat treating is used, process parameters (e.g., furnace temperature set points, heat input, travel rate, etc.) for continuous heat-treating lines shall be established by the material producer and validated by testing of product to the requirements of 3.3.

3.3 Properties

The product shall conform to the following requirements; tensile and hardness testing shall be performed in accordance with ASTM A370:

3.3.1 Tensile Properties

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

Nominal Thickness		Tensile Strength		Yield Strength at 0.2% Offset, Min		Elongation in 2 Inches (50 mm) or 4D
Inch	mm	ksi	MPa	ksi	MPa	% Min
Up to 0.030, excl	0.76	65 to 95	448 to 655	30.0	207	12
0.030 and over	0.76	65 to 95	448 to 655	30.0	207	15

3.3.1.1 Unless otherwise specified, the strain rate shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ±0.002 in/in/min (±0.002 mm/mm/min) through 0.2% offset yield strain. After the yield strain, the speed of the testing machine shall be set between 0.05 and 0.5 inch/inch (0.05 and 0.5 mm/mm) of the length of the reduced parallel section (or distance between the grips for specimens not having a reduced section) per minute. Alternatively, an extensometer and strain rate indicator may be used to set the strain rate between 0.05 and 0.5 in/in/min (0.05 and 0.5 mm/mm/min). The requirement for compliance becomes effective for material produced 1 year after the publication date of this specification.

3.3.2 Bending

Product 0.500 inch (12.70 mm) and under in nominal thickness shall be tested in accordance with ASTM E290. Transverse testing shall be performed at room temperature. Bend requirements shall be in accordance with Table 3. When visually examined, the specimen shall exhibit no cracking. In case of dispute, the results of tests using the guided bend test of ASTM E290 shall apply.

Table 3 - Bending parameters

Nominal Thickness Inch	Nominal Thickness Millimeters	Type of Bend	Angle Deg	Bend Radius(1, 2)
Up to 0.375, incl	Up to 9.52, incl	Free Bend	180	0.5 t
Over 0.375 to 0.500, incl	Over 9.52 to 12.70, incl	Free Bend	180	1 t

(1) Bend radius is defined as a bend factor multiplied by the nominal thickness (t).
(2) Prior versions of this specification may have specified a bend factor and a bend diameter in lieu of bend radius.

3.3.3 Average Grain Size

Sheet and strip shall have grain size of ASTM No. 5 or finer, determined in accordance with ASTM E112. Grain size requirements for plate shall be as agreed upon by the purchaser and producer.

3.3.4 Response to Heat Treatment

Samples of product 0.500 inch (12.70 mm) and under in nominal thickness and specimens 0.500 inch ± 0.010 inch (12.70 mm ± 0.25 mm) thick cut from heavier product shall have hardness of 35 to 45 HRC, or equivalent (see 8.2), after being heat treated by heating to 1750 °F ± 10 °F (954 °C ± 6 °C), holding at heat for 15 to 30 minutes, and cooling at a rate equivalent to cooling in still air. Pyrometry shall be in accordance with AMS2750.

3.3.5 Mechanical property requirements for product outside the thickness range of 1.1 shall be as agreed upon by the purchaser and producer.

3.4 Quality

The product, as received by the 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

Tolerances shall conform to all applicable requirements of AMS2242.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.