



AEROSPACE MATERIAL SPECIFICATION	AMS5528™	REV. K
	Issued 1953-12 Reaffirmed 2012-10 Revised 2024-05 Superseding AMS5528J	
Steel, Corrosion-Resistant, Sheet, Strip, and Plate 17Cr - 7.1Ni - 1.1Al (Alloy 17-7) Solution Heat Treated, Precipitation Hardenable (Composition similar to UNS S17700)		

RATIONALE

AMS5528K is the result of a Five-Year Review and update of the specification. The revision addresses size limits and product exceptions (see 1.1, 3.4.3, 4.4.1, and 8.5), adds stress-corrosion information (see 1.2.1), adds information on reporting composition (see 3.1.1), updates finish requirements (see 3.2.1), adds pyrometry requirements (see 3.4.2), adds strain rate requirements (see 3.4.2.1.1), clarifies bend test requirements (see 3.4.1.3), and updates hardness conversion information (see 8.2).

1. SCOPE

1.1 Form

This specification covers a corrosion-resistant steel in the form of sheet, strip, and plate 0.005 to 1.000 inches (0.13 to 25.40 mm) in nominal thickness in the solution heat-treated condition.

1.2 Application

These products have been used typically for parts requiring corrosion resistance and high strength up to 600 °F (316 °C), and where such parts may require welding during fabrication, but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking; ARP1110 recommends practices to minimize such conditions.

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.

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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
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	Chemical Analysis of Steel Products
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 percentages by weight shown in Table 1, determined in accordance with ASTM A751 or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.09
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	16.00	18.00
Nickel	6.50	7.75
Aluminum	0.75	1.50

- 3.1.1 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.

3.1.2 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

Sheet and strip shall be cold rolled, solution heat treated, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled producing a uniform finish.

3.2.2 Plate

Plate shall be hot rolled, solution heat treated, and descaled.

3.3 Solution Heat Treatment

The product shall be solution heat treated at a temperature not to exceed 1975 °F (1079 °C), holding at heat for a time commensurate with thickness and the heating equipment and procedure used, and cooling at a rate equivalent to an air cool or faster. Pyrometry shall be in accordance with AMS2750.

3.3.1 Continuous Heat Treating

When continuous heat treating is used, process parameters (i.e., 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 3.4.

3.4 Properties

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

3.4.1 As Solution Heat Treated

3.4.1.1 Tensile Properties

Tensile properties shall be as shown in Table 2:

Table 2A - Tensile properties, inch/pound units

Nominal Thickness Inches	Tensile Strength ksi, Max	Yield Strength at 0.2% Offset ksi, Max	Elongation in 2 Inches or 4D %, Min
0.005 to 0.010, incl	150	65	20
Over 0.010	150	55	20

Table 2B - Tensile properties, SI units

Nominal Thickness Millimeters	Tensile Strength MPa, Max	Yield Strength at 0.2% Offset MPa, Max	Elongation in 50 mm or 4D %, Min
0.13 to 0.25, incl	1034	448	20
Over 0.25	1034	379	20

3.4.1.2 Hardness

Hardness shall be not higher than 92 HRB, or equivalent (see 8.2).

3.4.1.3 Bending

Product 0.275 inch (6.98 mm) and under in nominal thickness shall be tested in accordance with ASTM E290 using a sample prepared nominally 0.75 inch (19.0 mm) in width with its axis of bending parallel to the direction of rolling. Bending shall be performed at room temperature in accordance with Table 3. The specimen shall exhibit no cracking when visually inspected. In case of dispute, the results of tests using the guided bend test of ASTM E290 shall govern. When guided bend testing is required, it shall be around a diameter equal to the bend factor times the nominal thickness of the product.

Table 3 - Bending requirements

Nominal Thickness Inches	Nominal Thickness Millimeters	Type of Bend	Angle Deg/Min	Bend Factor
Up to 0.1874, incl	Up to 4.760, incl	Free Bend	180	1
Over 0.1874 to 0.275, incl	Over 4.760 to 6.98, incl	Free Bend	180	3

3.4.2 Response to Heat Treatment

Specimens cut from product 0.005 to 1.000 inch (0.13 to 25.40 mm), inclusive, in nominal thickness shall have the following properties after being austenite-conditioned by heating to 1400 °F ± 25 °F (760 °C ± 14 °C), holding at heat for 90 minutes ± 5 minutes, cooling to 55 °F ± 5 °F (13 °C ± 3 °C) within 1 hour, holding at that temperature for not less than 30 minutes, and precipitation heat treated by heating to 1050 °F ± 10 °F (566 °C ± 6 °C), holding at heat for 90 minutes ± 5 minutes, and cooling to room temperature. Pyrometry shall be in accordance with AMS2750.

3.4.2.1 Tensile Properties - Response to Heat Treatment

Response to heat-treatment tensile properties shall be as shown in Table 4:

Table 4A - Tensile properties - response to heat treatment, inch/pound units

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi, Min	Elongation in 2 Inches or 4D %, Min
0.005 to 0.010, incl	180 to 210	150	4
Over 0.010 to 0.019, incl	180 to 210	150	5
Over 0.019 to 1.000, incl	180 to 210	150	6

Table 4B - Tensile properties - response to heat treatment, SI units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa, Min	Elongation in 50 mm or 4D %, Min
0.13 to 0.25, incl	1241 to 1448	1035	4
Over 0.25 to 0.48, incl	1241 to 1448	1035	5
Over 0.48 to 25.40, incl	1241 to 1448	1035	6

3.4.2.1.1 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 in/in and 0.5 in/in (0.05 mm/mm 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 in/in/min and 0.5 in/in/min (0.05 mm/mm/min and 0.5 mm/mm/min). The requirement for compliance becomes effective for material produced 1 year after the publication date of this specification.

3.4.2.2 Hardness - Response to Heat Treatment

Hardness shall be 38 to 46 HRC, or equivalent (see 8.2), but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.4.2.1 are met.

3.4.3 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between the producer and purchaser and reported per 4.4.1.

3.5 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.

3.6 Tolerances

Tolerances shall conform to all applicable requirements of AMS2242.

3.7 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.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (see 3.1), tensile properties (see 3.4.1.1), hardness (see 3.4.1.2), bending for product 0.1874 inch (4.762 mm) and under in nominal thickness (see 3.4.1.3), response to heat treatment (see 3.4.2), and tolerances (see 3.6) are acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests

Bending for product over 0.1874 to 0.275 inch (4.762 to 6.98 mm), inclusive, in nominal thickness (see 3.4.1.3) is a periodic test and shall be performed at a frequency selected by the producer unless frequency of testing is specified by the purchaser.

4.3 Sampling and Testing

Sampling shall be in accordance with AMS2371.

4.4 Reports

The producer of the product shall furnish with each shipment a report showing the producer's name, country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations), the results of tests for composition of each heat and tensile properties (solution heat treated and after precipitation heat treatment), bending properties, hardness of each lot, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot number, AMS5528K, size, and quantity.

4.4.1 When material produced to this specification is outside the size range stated in 1.1, or has exceptions taken to the technical requirements listed in Section 3 (see 5.1.1), the report shall contain a statement "This material is certified as AMS5528K(EXC) because of the following exceptions:" and the specific exceptions shall be listed.