AEROSPACE MATERIAL SPECIFICATION

AMS5863	REV. E

Issued 1974-06
Revised 2009-05
Reaffirmed 2015-04

Superseding AMS5863D

Steel, Corrosion Resistant, Sheet, Strip, and Plate 15Cr - 6.5Ni - 0.75Mo - 0.60Cb - 1.5Cu Solution Heat Treated, Precipitation Hardenable (Composition similar to UNS S45000)

RATIONALE

AMS5863E 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 corrosion resistance and high strength in service up to 700 °F (371 °C), but usage is not limited to such application. Product can be used in the solution heat treated condition and is capable of being precipitation heat treated to tensile strengths as high as 180 ksi (1241 MPa).

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking after precipitation heat treatment; 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 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

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
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS5863E

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ARP1110 Minimizing Stress Corrosion Cracking in Wrought Forms of Steels and Corrosion Resistant Steels and Alloys

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 370 Mechanical Testing of Steel Products

ASTM A 480/A 480M Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

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	--	0.05
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.030
Sulfur	--	0.030
Chromium	14.00	16.00
Nickel	6.00	7.00
Molybdenum	0.50	1.00
Columbium	8xC	1.00
Copper	1.25	1.75
Tantalum	--	0.05

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 finish comparable to the following commercial corrosion-resistant steel finishes in accordance with ASTM A 480 and AS4194, and 3.2.1.1 or 3.2.1.2 as applicable.

3.2.1.1 Sheet

Shall be No. 2D finish.

3.2.1.2 Strip

Shall be No. 1 strip finish.

3.2.2 Plate

Hot rolled, solution heat treated, and descaled.

3.3 Heat Treatment

The product shall be solution heat treated by heating to 1900 °F ± 25 (1038 °C ± 14), holding at heat for a time commensurate with section thickness, and cooling as required. Plate over 1.250 inch (31.25 mm) in nominal thickness shall be quenched in a suitable medium.

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 As Solution Heat Treated

3.4.1.1 Tensile Properties

Shall be as shown in Table 2.

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	125 ksi (862 MPa)
Yield Strength at 0.2% Offset	95 ksi (655 MPa)
Elongation in 2 Inches (50.8 mm) or 4D	4%

3.4.1.2 Hardness

Product 0.010 inch (0.25 mm) and over in nominal thickness should have hardness not higher than 33 HRC, or equivalent (See 8.2), but the product shall not be rejected on the basis of hardness if the tensile properties of 3.4.1.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

3.4.1.3 Bending

Product 0.1874 inch (4.760 mm) and under in nominal thickness shall be tested in accordance with ASTM E 290 using specimens prepared nominally 0.75 inch (19.0 mm) in width, with the axis of bend parallel to the direction of rolling, and shall withstand, without cracking, when bending at room temperature through an angle of 180 degrees around a diameter equal to six 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.

3.4.2 After Precipitation Heat Treatment

The product shall conform to the following requirements after being precipitation heat treated by heating to 900 °F ± 15 (482 °C ± 8), holding at heat for 4 to 8 hours, and cooling in air:

3.4.2.1 Tensile Properties

Shall be as shown in Table 3; requirements apply in both the longitudinal and transverse directions but tests in the transverse direction need be made only on product from which a specimen not less than 2.50 inches (63.5 mm) in length can be taken. Tests in the longitudinal direction are not required on product tested in the transverse direction.

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

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.020, incl	180	170	3
Over 0.020 to 0.062, incl	180	170	4
Over 0.062	180	170	5

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 0.51, incl	1241	1172	3
Over 0.51 to 1.57, incl	1241	1172	4
Over 1.57	1241	1172	5

3.4.2.2 Hardness

Product 0.010 inch (0.25 mm) and over in nominal thickness should have hardness not lower than 40 HRC, or equivalent (See 8.2), but the product shall not be rejected on the basis of hardness if the tensile properties of 3.4.2.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

3.4.3 After Other Precipitation Heat Treatment

Properties after precipitation heat treatment at temperatures other than 900 °F ± 15 (482 °C ± 8) shall be agreed upon by purchaser and vendor.

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.

3.6 Tolerances

Shall conform to all applicable requirements of AMS2242.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. 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

All technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.