

AEROSPACE MATERIAL SPECIFICATION



AMS 5863D

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Superseding AMS 5863C

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)

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

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
AMS 2248	Chemical Check Analysis Limits, Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
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
ARP1110	Minimizing Stress Corrosion Cracking in Wrought Forms of Steels and Corrosion Resistant Steels and Alloys

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A 370	Mechanical Testing of Steel Products
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 AMS 2248.

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 3.2.1.1 or 3.2.1.2 as applicable (See 8.2).

3.2.1.1 Sheet: No. 2D finish.

3.2.1.2 Strip: 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 $1900^{\circ}\text{F} \pm 25$ ($1038^{\circ}\text{C} \pm 14$), 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, hardness, and bend 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 8.3), 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 withstand, without cracking, free bending at room temperature through an angle of 180 degrees around a diameter equal to six times the nominal thickness of the product, with axis of bend parallel to the direction of rolling.

3.4.2 After Precipitation Heat Treatment: The product shall conform to the following requirements after being precipitation heat treated by heating to $900^{\circ}\text{F} \pm 15$ ($482^{\circ}\text{C} \pm 8$), 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 8.3), 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 AMS 2242 or MAM 2242.

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.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2371.