Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE MATERIAL SPECIFICATION

AMS 5863

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Revised

STEEL SHEET, STRIP, AND PLATE, CORROSION RESISTANT
15Cr - 6.5Ni - 0.75Mo - 0.6(Cb+Ta) - 1.5Cu
Solution Heat Treated

1. SCOPE:

1.1 Form: This specification covers a precipitation-hardenable, corrosion resistant steel in the form of sheet, strip, and plate.

1.2 Application: Primarily for parts requiring corrosion resistance and high strength at service temperatures up to 700°F (371°C). It can be used in the solution heat treated condition and is capable of being precipitation heat treated to tensile strengths as high as 180,000 psi (1241 MPa).

1.2.1 Certain design and processing procedures may cause this material to be susceptible to stress-corrosion cracking after precipitation heat treatment; ARP 1110 recommends practices to minimize such conditions.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) and Aerospace Recommended Practices (ARP) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2242 - Tolerances, Corrosion and Heat Resistant Steel and Iron-Base Alloy Sheet, Strip, and Plate and Titanium and Titanium Alloy Sheet, Strip, and Plate
AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings

2.1.2 Aerospace Recommended Practices:

ARP 1110 - Minimizing Stress-Corrosion Cracking in Heat Treatable Wrought Low-Alloy and Martensitic Corrosion-Resistant Steels

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM A370 - Mechanical Testing of Steel Products
ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

2.3.1 Federal Standards: Federal Test Method Standard No. 151 - Metals; Test Methods

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	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 + Tantalum	8 x C	1.00
Copper	1.25	1.75

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Sheet: Cold rolled, solution heat treated, and descaled (No. 2D Finish).

3.2.2 Strip: Cold rolled, solution heat treated, and descaled (No. 1 Strip Finish).

3.2.3 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 (1037.8° C ± 14), holding at heat for 5 - 30 min., and quenching rapidly. Plate over 1.250 in. (31.75 mm) in nominal thickness shall be water or oil quenched.

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

3.4.1.1 Tensile Properties:

Tensile Strength, min	125,000 psi (862 MPa)
Yield Strength at 0.2% Offset, min	95,000 psi (655 MPa)
Elongation in 2 in. (50.8 mm) or 4D, min	4%

3.4.1.2 Hardness: Product 0.010 in. (0.25 mm) and over in nominal thickness should have hardness not higher than 33 HRC or equivalent but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.4.1.1 are met.

3.4.1.3 Bending: Product less than 0.1875 in. (4.763 mm) in nominal thickness shall withstand, without cracking, free bending through an angle of 180 deg (3.14 rad) around a diameter equal to 6 times the nominal thickness of the material with axis of bend parallel to the direction of rolling.

3.4.1.3.1 Bending requirements for product 0.1875 in. (4.763 mm) and over in nominal thickness shall be as agreed upon by purchaser and vendor.

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 (482.2° C ± 8.3), holding at heat for 4 to 8 hr, and cooling in air:

3.4.2.1 Tensile Properties: Shall be as specified in Table I:

TABLE I

Nominal Thickness Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
Up to 0.020, incl	180,000	170,000	3
Over 0.020 to 0.062, incl	180,000	170,000	4
Over 0.062	180,000	170,000	5

TABLE I (SI)

Nominal Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50.8 mm or 4D, %, min
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 in. (0.25 mm) and over in nominal thickness should have hardness not lower than 40 HRC or equivalent 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 After Other Precipitation Heat Treatment: Properties after precipitation heat treatment at temperatures other than 900°F ± 15 (482.2°C ± 8.3) shall be as agreed upon by purchaser and vendor.

3.5 Quality:

3.5.1 Steel shall be aircraft quality.

3.5.2 The product shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

3.6 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2242.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests of the product to determine conformance to all technical requirements of this specification are classified as acceptance or routine control tests.

4.3 Sampling: Shall be in accordance with AMS 2371 and the following:

4.3.1 Tensile test specimens from widths 9 in. (229 mm) and over shall be taken with the axis perpendicular to the direction of rolling; for widths less than 9 in. (229 mm), tensile test specimens shall be taken with the axis parallel to the direction of rolling.