



AEROSPACE MATERIAL

Society of Automotive Engineers, Inc.

TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

SPECIFICATION

AMS 5860

Issued 11-15-71
Revised

STEEL SHEET, STRIP, AND PLATE, CORROSION AND MODERATE HEAT RESISTANT

12Cr - 8.5Ni - 0.30 (Cb + Ta) - 1.1Ti - 2.0Cu

Consumable Electrode or Vacuum Induction Melted

1525 F (829.4 C) Solution Heat Treated

1. SCOPE:

1.1 Form: This specification covers a corrosion and moderate heat 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 800 F (427 C).

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specification (AMS) 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

2.2 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 Ave., 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.

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	min	max
Carbon	--	0.05
Manganese	--	0.50
Silicon	--	0.50
Phosphorus	--	0.025
Sulphur	--	0.025
Chromium	11.00 - 12.50	
Nickel	7.50 - 9.50	
Columbium & Tantalum	0.10 - 0.50	
Titanium	0.80 - 1.40	
Copper	1.50 - 2.50	
Molybdenum	--	0.50

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 $1525\text{ F} \pm 25$ ($829.4\text{ C} \pm 14$), holding at heat for 5 - 30 min., and quenching rapidly. Plate more than 1.25 in. (3.75 mm) thick shall be water 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 As Solution Heat Treated:

3.4.1.1 Tensile Properties:

Tensile strength, max	175,000 psi (1207 MN/m ²)
Yield Strength at 0.2% Offset, max	160,000 psi (1103 MN/m ²)
Elongation in 2 in. (50.8 mm) or 4D, min	3%

3.4.1.2 Hardness: Product 0.010 in. (0.254 mm) and over in thickness should have hardness not higher than 35 HRC or equivalent but 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 0.1875 in. (4.763 mm) and under in thickness shall withstand, without cracking, free bending through an angle of 90 deg (1.57 rad) around a diameter equal to 2-1/2 times the nominal thickness of the material with axis of bend parallel to 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 $950\text{ F} \pm 10$ ($510\text{ C} \pm 5.6$), holding at heat for 4 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	225,000	210,000	As agreed upon
Over 0.020 to 0.062, incl	225,000	210,000	3
Over 0.062	225,000	210,000	4

TABLE I (SI)

Nominal Thickness Millimeters	Tensile Strength MN/m ² , min	Yield Strength at 0.2% Offset, MN/m ² , min	Elongation in 50.8 mm or 4D %, min
Up to 0.510, incl	1551	1448	As agreed upon
Over 0.510 to 1.575, incl	1551	1448	3
Over 1.575	1551	1448	4

- 3.4.2.2 Hardness: Product 0.010 in. (0.254 mm) and over in thickness should have hardness not lower than 44 HRC or equivalent but shall not be rejected on the basis of hardness if the tensile property requirements are met.
- 3.4.3 After Other Precipitation Heat Treatment: Properties after precipitation heat treatment at temperatures other than $950\text{ F} \pm 10$ ($510\text{ C} \pm 5.6$) shall be as agreed upon by purchaser and vendor.
- 3.5 Quality: Material shall be produced by multiple melting using consumable electrode practice in the remelt cycle or shall be induction melted under vacuum. 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 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 to determine conformance to all technical requirements of this specification are classified as 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), specimens shall be taken with the axis parallel to the direction of rolling.
- 4.4 Reports:
- 4.4.1 The vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and the results of tests on each thickness from each heat to determine conformance to the other technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number, size, and quantity from each heat.