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400 Commonwealth Drive, Warrendale, PA 15096-0001

# AEROSPACE MATERIAL SPECIFICATION

**SAE**

**AMS 5547F**

Issued 15 SEP 1957  
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Superseding AMS 5547E

Submitted for recognition as an American National Standard

**STEEL, CORROSION AND HEAT RESISTANT, SHEET AND STRIP**  
**15.5 Cr - 4.5Ni - 2.9Mo - 0.10N**  
**Solution Heat Treated**

**UNS S35500**

**1. SCOPE:**

**1.1 Form:**

This specification covers a corrosion and heat resistant steel in the form of sheet and strip.

**1.2 Application:**

These products have been used typically for parts requiring oxidation resistance and high strength up to 800 °F (427 °C) and where such parts may require welding during fabrication, but usage is not limited to such applications.

**2. APPLICABLE DOCUMENTS:**

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

**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, Wrought 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

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**2.2 ASTM Publications:**

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

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

**2.3 U.S. Government Publications:**

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins  
 Avenue, Philadelphia, PA 19111-5094.

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

**3. TECHNICAL REQUIREMENTS:****3.1 Composition:****(R)**

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	0.10	0.15
Manganese	0.50	1.25
Silicon	--	0.50
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	15.00	16.00
Nickel	4.00	5.00
Molybdenum	2.50	3.25
Nitrogen	0.07	0.13

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

**3.2 Melting Practice:**

Steel shall be multiple melted using consumable electrode practice in the  
 remelt cycle and using only one electrode to produce a single ingot.

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### 3.3 Condition:

The product shall be supplied in the following condition:

- 3.3.1 Sheet: Cold rolled or hot rolled, solution heat treated free from continuous carbide network, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled having a surface appearance comparable to a No. 2D finish (See 8.2).
- 3.3.2 Strip: Cold rolled, solution heat treated free from continuous carbide network, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled having a surface appearance comparable to a No. 1 strip finish (See 8.2).

### 3.4 Solution Heat Treatment:

The product shall be solution heat treated by heating to  $1900\text{ }^{\circ}\text{F} \pm 25$  ( $1038\text{ }^{\circ}\text{C} \pm 14$ ), holding at heat for not less than 45 minutes per inch (1772 minutes/m) of nominal thickness, and quenching in water or otherwise cooling as rapidly as possible to room temperature.

### 3.5 Properties:

The product shall conform to the following requirements: tensile, hardness, and bend testing shall be performed in accordance with ASTM A 370:

#### 3.5.1 As Solution Heat Treated:

- 3.5.1.1 Hardness: Shall be not higher than 35 HRC, or equivalent (See 8.3).
- 3.5.1.2 Bending: The product shall withstand, without cracking, bending at room temperature through an angle of 180 degrees around a diameter equal to three times the nominal thickness of the product with axis of bend parallel to the direction of rolling.
- 3.5.2 As Re-solution Heat Treated, Sub-Zero Cooled, Austenite Conditioned, Sub-Zero Cooled, and Tempered: The product shall have the following properties after being heat treated as follows: Re-solution heat treat by heating to  $1900\text{ }^{\circ}\text{F} \pm 25$  ( $1038\text{ }^{\circ}\text{C} \pm 14$ ), holding at heat for not less than 45 minutes per inch (1772 minutes/m) of nominal thickness, and quenching in water; cool to  $-100\text{ }^{\circ}\text{F}$  ( $-73\text{ }^{\circ}\text{C}$ ) or colder, hold at this temperature for not less than three hours, and warm in air to room temperature; austenite condition by heating to  $1750\text{ }^{\circ}\text{F} \pm 10$  ( $954\text{ }^{\circ}\text{C} \pm 6$ ), holding at heat for 10 to 60 minutes, and quenching in water, cool to  $-100\text{ }^{\circ}\text{F}$  ( $-73\text{ }^{\circ}\text{C}$ ) or colder, hold at this temperature for not less than three hours, and warm in air to room temperature; temper by heating to  $1000\text{ }^{\circ}\text{F} \pm 25$  ( $538\text{ }^{\circ}\text{C} \pm 14$ ), holding at heat for not less than three hours, and cooling in air:

- 3.5.2.1 Tensile Properties: Shall be as specified in Table 2.

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TABLE 2A - Minimum Tensile Properties, Inch/Pound Units

Nominal Thickness Inch	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.010, incl	165	140	As agreed upon 10
Over 0.010 to 0.1875, excl	165	140	

TABLE 2B - 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 0.25, incl	1138	965	As agreed upon 10
Over 0.25 to 4.762, excl	1138	965	

3.5.2.2 Hardness: Shall be 37 to 44 HRC, or equivalent, but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.5.2.1 are met (See 8.3).

### 3.6 Quality:

The product, as received by purchaser, shall be uniform in quality and condition, free of grain boundary carbides, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

### 3.7 Tolerances:

Shall conform to all applicable requirements of AMS 2242 or MAM 2242.

## 4. QUALITY ASSURANCE PROVISIONS:

### 4.1 Responsibility for Inspection:

(R)

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

### 4.2 Classification of Tests:

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