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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5547E

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Superseding AMS 5547D

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

UNS S35500

1. SCOPE:

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

1.2 Application: Primarily for parts requiring oxidation resistance and high strength up to 800°F (425°C) and where such parts may require welding during fabrication.

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

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

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 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock

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2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 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 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, Ø determined by wet chemical methods in accordance with ASTM E353 or by spectrographic or other analytical methods approved by purchaser:

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

3.2.1 Sheet: Cold rolled or hot rolled, solution heat treated free from Ø 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.

3.2.2 Strip: Cold rolled, solution heat treated free from continuous carbide Ø 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.

3.3 Solution Heat Treatment: The product shall be solution heat treated by heating to 1900°F + 25 (1040°C + 15), holding at heat for not less than 45 min. per inch (25 mm) of nominal thickness, and quenching in water or otherwise cooling as rapidly as possible to room temperature.

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

3.4.1 As Solution Heat Treated:

3.4.1.1 Hardness: Shall be not higher than 35 HRC, or equivalent.

3.4.1.2 Bending: The product shall withstand, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to three times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

3.4.2 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°F + 25 (1040°C + 15), holding at heat for not less than 45 min. per inch (25 mm) of nominal thickness, and quenching in water; cool to -100°F (-75°C) or colder, hold at this temperature for not less than 3 hr, and warm in air to room temperature; austenite condition by heating to 1750°F + 10 (955°C + 5), holding at heat for 10 - 60 min. and quenching in water, cool to -100°F (-75°C) or colder, hold at this temperature for not less than 3 hr, and warm in air to room temperature; temper by heating to 1000°F + 25 (540°C + 15), holding at heat for not less than 3 hr, and cooling in air:

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

TABLE I

Nominal Thickness Inch	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
Up to 0.010, incl	165,000	140,000	As agreed upon
Over 0.010 to 0.1875, excl	165,000	140,000	10

TABLE I (SI)

Nominal Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50 mm or 4D %, min
Up to 0.25, incl	1140	965	As agreed upon
Over 0.25 to 4.75, excl	1140	965	10

3.4.2.2 Hardness: Should be 37 - 44 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.

3.5 Quality:

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

3.5.2 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.

3.6 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 performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. 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 to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling: Shall be in accordance with AMS 2371; a heat shall be the consumable electrode remelted ingots produced from steel originally melted as a single furnace charge.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and the results of tests on each lot to determine conformance to the other technical requirements of this specification. This report shall include the purchase order number, heat number, AMS 5547E, size, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 5547E, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification and shall include in the report either a statement that the material conforms or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2371.