

AEROSPACE MATERIAL SPECIFICATION

AMS 5526F

Superseding AMS 5526E

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

19.5Cr - 9.5Ni - 1.4Mo - 1.4W - 0.42(Cb+Ta) - 0.22Ti

Solution Heat Treated

UNS K63198

1. SCOPE:

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

1.2 Application: Primarily for parts, such as turbine nozzles, tail pipes, and exhaust cones, requiring high strength up to 1150°F (620°C) and oxidation resistance up to 1600°F (870°C).

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 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 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, 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 analytical methods approved by purchaser:

| | min | max |
|----------------------|-------|-------|
| Carbon | 0.28 | 0.35 |
| Manganese | 0.75 | 1.50 |
| Silicon | 0.30 | 0.80 |
| Phosphorus | -- | 0.040 |
| Sulfur | -- | 0.030 |
| Chromium | 18.00 | 21.00 |
| Nickel | 8.00 | 11.00 |
| Molybdenum | 1.00 | 1.75 |
| Tungsten | 1.00 | 1.75 |
| Columbium + Tantalum | 0.25 | 0.60 |
| Titanium | 0.10 | 0.35 |
| Copper | -- | 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: Hot rolled, solution heat treated, and descaled, having a surface finish comparable to a commercial corrosion-resistant steel No. 2D finish; standards for acceptance shall be as agreed upon by purchaser and vendor.

3.2.2 Strip: Cold rolled, solution heat treated, and descaled unless solution heat treatment is performed in an atmosphere yielding a bright finish, having a surface appearance comparable to a commercial corrosion-resistant steel No. 1 Strip finish; standards for acceptance shall be as agreed upon by purchaser and vendor.

3.2.3 Plate: Hot rolled, solution heat treated, and descaled.

3.3 Solution Heat Treatment: The product shall be solution heat treated by heating to $1800^{\circ}\text{F} \pm 25$ ($980^{\circ}\text{C} \pm 15$), holding at heat for a time commensurate with thickness, and cooling in air.

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

3.4.1 Tensile Properties: Shall be as follows:

| | |
|--|--------------------------------------|
| Tensile Strength | 95,000 - 120,000 psi (655 - 825 MPa) |
| Yield Strength at 0.2% Offset, min | 45,000 psi (310 MPa) |
| Elongation in 2 in. (50 mm) or 4D, min | 30% |

3.4.2 Bending: Product 0.749 in. (18.75 mm) and under in nominal thickness shall withstand, without cracking, bending through the angle indicated below around a diameter equal to the bend factor times the nominal thickness of the product with axis of bend parallel to the direction of rolling. Only one type of test will be required in routine inspection; in case of dispute, results of tests using the V-block procedure shall govern.

| Nominal Thickness | | Type of Bend | Angle deg, min | Bend Factor |
|----------------------|---------------------|--------------|----------------|-------------|
| Inch | Millimetres | | | |
| Up to 0.050, excl | Up to 1.25, excl | Free Bend | 180 | 2 |
| Up to 0.050, excl | Up to 1.25, excl | V-Block | 135 | 2 |
| 0.050 to 0.749, incl | 1.25 to 18.75, incl | Free Bend | 90 | 2 |
| 0.050 to 0.749, incl | 1.25 to 18.75, incl | V-Block | 135 | 4 |

3.4.2.1 Bending requirements for plate over 0.749 in. (18.75 mm) in nominal thickness shall be as 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: Unless otherwise specified, 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.

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 for tensile and bending properties of each lot. This report shall include the purchase order number, heat number, AMS 5526F, size, and quantity from each heat.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 5526F, 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.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Each sheet, strip, and plate shall be marked on one face, in the respective location indicated below, with AMS 5526F, heat number, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be legible, shall be applied using a suitable marking fluid, and shall be removable in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the product or its performance and shall be sufficiently stable to withstand normal handling.

5.1.1 Flat Strip 6 In. (150 mm) and Under in Width: Shall be marked in one or more lengthwise rows of characters recurring at intervals not greater than 3 ft (900 mm).