

**AEROSPACE
MATERIAL
SPECIFICATION**

Submitted for recognition as an American National Standard

AMS 5627D

Issued 2-15-52
Revised 1-1-87

Superseding AMS 5627C

**STEEL BARS, FORGINGS, TUBING, AND RINGS, CORROSION AND MODERATE HEAT RESISTANT
17Cr (SAE 51430)
Annealed**

UNS S43000

1. SCOPE:

1.1 **Form:** This specification covers a corrosion and moderate heat resistant steel in the form of bars, wire, forgings, mechanical tubing, flash welded rings, and stock for forging or flash welded rings.

1.2 **Application:** Primarily for parts, such as turbine air seals, requiring oxidation resistance up to 1600°F (870°C) but useful at the higher temperatures only when strength requirements are moderately low.

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 2241 - Tolerance, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire

MAM 2241 - Tolerances, Metric, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire

AMS 2243 - Tolerances, Corrosion and Heat Resistant Steel Tubing

MAM 2243 - Tolerances, Metric, Corrosion and Heat Resistant Steel Tubing

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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2.1.1 (Continued):

AMS 2374 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Forgings and Forging Stock

AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys

AMS 2808 - Identification, Forgings

AMS 7493 - Rings, Flash Welded, Non-Austenitic Corrosion Resistant Steels

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 E112 - Determining Average Grain Size

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, determined by wet chemical methods in accordance with ASTM E353 or by other analytical methods approved by purchaser:

	min	max
Carbon	--	0.12
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	16.00 -	18.00
Nickel	--	0.75
Molybdenum	--	0.50
Copper	--	0.50
Aluminum	--	0.05
Tin	--	0.05

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; hardness and tensile strength shall be determined in accordance with ASTM A370:

3.2.1 Bars: Annealed having hardness not higher than 202 HB or equivalent.

- 3.2.1.1 All hexagons and other bars 0.500 - 2.750 in. (12.50 - 70 mm), incl, in nominal diameter or distance between parallel sides shall be cold finished.
- 3.2.1.2 Bars, other than hexagons, over 2.750 in. (70 mm) in nominal diameter or distance between parallel sides shall be hot finished.
- 3.2.2 Wire: Cold drawn and annealed having tensile strength not higher than 100,000 psi (690 MPa) or equivalent hardness.
- 3.2.3 Forgings and Flash Welded Rings: Annealed having hardness not higher than 183 HB, or equivalent.
- 3.2.3.1 Flash welded rings shall not be supplied unless specified or permitted on purchaser's part drawing. When supplied, they shall be manufactured in accordance with AMS 7493.
- 3.2.4 Mechanical Tubing: Annealed and cold finished having hardness not higher than 202 HB, or equivalent.
- 3.2.5 Stock for Forging or Flash Welded Rings: As ordered by the forging or flash ring manufacturer.
- 3.3 Properties: The product shall conform to the following requirements:
- 3.3.1 Grain Size: Bars, wire, forgings, tubing, and stock for flash welded rings shall have grain size not larger than 0, determined by comparison of a polished and etched specimen with the chart in ASTM E112. Grain size of flash welded rings shall be as agreed upon by purchaser and vendor.
- 3.4 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.
- 3.4.1 Forgings shall have substantially uniform macrostructure. Standards for acceptance shall be as agreed upon by purchaser and vendor.
- 3.4.2 Grain flow of die forgings, except in areas which contain flash-line end grain, shall follow the general contour of the forging, showing no evidence of re-entrant flow.
- 3.5 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight bars, wire, and tubing will be acceptable in mill lengths of 6 - 20 ft (2 - 6 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).
- 3.6 Tolerances: Shall conform to all applicable requirements of the following:
- 3.6.1 Bars and Wire: AMS 2241 or MAM 2241.
- 3.6.2 Mechanical Tubing: AMS 2243 or MAM 2243.

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 4.5. 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 the following:
- 4.3.1 Bars, Wire, Mechanical Tubing, Flash Welded Rings, and Stock for Flash Welded Rings: AMS 2371.
- 4.3.2 Forgings and Forging Stock: AMS 2374.
- 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 and grain size of each heat. This report shall include the purchase order number, AMS 5627D, heat number, size, and quantity. If forgings are supplied, the part number and the size and melt source of stock used to make the forgings shall also be included.
- 4.4.2 The vendor of forging stock shall furnish with each shipment a report showing the results of tests for chemical composition of each heat. This report shall include the purchase order, heat number, AMS 5627D, size, and quantity.
- 4.4.3 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 5627D, 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 the following:
- 4.5.1 Bars, Mechanical Tubing, Flash Welded Rings, and Stock for Flash Welded Rings: AMS 2371.
- 4.5.2 Forgings and Forging Stock: AMS 2374.