

AEROSPACE
MATERIAL
SPECIFICATION

AMS 5628D

Issued 5-1-48
Revised 10-1-82

UNS S43100

STEEL BARS, FORGINGS, AND TUBING, CORROSION RESISTANT
16.2Cr - 2.5Ni (SAE 51431)

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of 10-1-82. It is recommended that this specification not be specified for new designs.

This cover sheet should be attached to the "D" revision of the subject specification.

This specification is under the jurisdiction of AMS Committee "F".

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AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 5628D
Superseding AMS 5628C

Issued 5-1-48
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STEEL BARS, FORGINGS, AND TUBING, CORROSION RESISTANT 16.2Cr - 2.5Ni (SAE 51431)

1. SCOPE:

- 1.1 Form: This specification covers a hardenable, corrosion resistant steel in the form of bars, wire, forgings, mechanical tubing, and stock for forging or heading.
- 1.2 Application: Primarily for parts requiring corrosion resistance at 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 Specifications (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., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

AMS 2241 - Tolerances, Corrosion and Heat Resistant Steel Bars and Wire and Titanium and Titanium Alloy Bars and Wire

AMS 2243 - Tolerances, Corrosion and Heat Resistant Steel Tubing

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

AMS 2375 - Approval and Control of Critical Forgings

AMS 2808 - Identification, 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 E112 - Estimating the Average Grain Size of Metals

ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

ASTM E381 - Rating Macroetched Steel

- 2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, 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	0.12	0.17
Manganese	0.30	0.80
Silicon	0.20	0.60
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	15.50	17.00
Nickel (3.1.1)	2.00	3.00
Molybdenum	--	0.50
Copper	--	0.50
Nitrogen	--	0.10

- Ø 3.1.1 For heading applications, nickel may be as low as 1.50.
- 3.1.2 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:
- Ø 3.2.1 Bars: Annealed having hardness not higher than 302 HB or equivalent.
- 3.2.1.1 Round bars shall be rough turned or ground.
- 3.2.1.2 Bars, other than rounds, 2.750 in. (69.85 mm) and under in distance between parallel sides and all hexagons shall be cold finished.
- 3.2.1.3 Bars, other than rounds and hexagons, over 2.750 in. (69.85 mm) in distance between parallel sides shall be hot finished and descaled.
- 3.2.2 Wire: Annealed and cold finished having tensile strength not higher than 140,000 psi (965 MPa) or equivalent hardness.
- 3.2.3 Forgings: As ordered.
- 3.2.4 Mechanical Tubing: Annealed and cold finished having hardness not higher than 285 HB or equivalent.
- Ø 3.2.5 Stock for Forging or Heading: As ordered by the forging or heading manufacturer.
- 3.3 Properties: The product shall conform to the following requirements; hardness testing shall be performed in accordance with ASTM A370:
- 3.3.1 Response to Heat Treatment: Specimens 1.000 in. \pm 0.010 (25.40 mm \pm 0.25) in thickness cut from the cross-section of the product, heated to 1875°F + 25 (1023.9°C + 14), held at heat for 25 - 30 min., and quenched in commercial paraffin-base oil (100 SUS at 100°F (37.8°C)) at room temperature, shall have hardness not lower than 40 HRC or equivalent.
- 3.3.2 Grain Size: Specimens, heat treated as in 3.3.1 and tempered for 3 hr \pm 15 min. at 1100° - 1200°F (593.3° - 648.9°C), shall have grain size of 3 or finer, determined by comparison of a polished and etched specimen with the chart in ASTM E112.
- 3.3.3 Microstructure: When specified, the microstructure of longitudinal specimens, heat treated as in 3.3.2, shall not show excessive segregation, banded free ferrite, or retained austenite. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.3.4 Macrostructure: Visual examination of transverse sections from bars, wire, billets, stock for forging or heading, and tube rounds, etched in accordance with ASTM E381 in hot hydrochloric acid (1:1) at 160° - 180°F (71.1° - 82.2°C) for sufficient time to develop a well-defined macrostructure, shall show no injurious imperfections such as pipe, porosity, segregation, and inclusions detrimental to fabrication or to performance of parts. Macrostructure shall be equal to or better than standards agreed upon by purchaser and vendor.

3.4 Quality: 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.

3.5 Sizes: Except when exact lengths or multiples of exact lengths are ordered, bars, straight wire, and tubing will be acceptable in mill lengths of 6 - 20 ft (1.8 - 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.6 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of the following:

3.6.1 Bars and Wire: AMS 2241.

3.6.2 Mechanical Tubing: AMS 2243.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product 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 4.5. 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 acceptance or routine control tests.

4.3 Sampling: Shall be in accordance with the following:

Ø 4.3.1 Bars, Wire, Mechanical Tubing, and Heading Stock: AMS 2371.

Ø 4.3.2 Forgings and Forging Stock: As agreed upon by purchaser and vendor.

Ø 4.4 Approval: When specified, approval and control of critical forgings shall be in accordance with AMS 2375.

4.5 Reports:

4.5.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests for chemical composition, response to heat treatment, grain size, macrostructure, and, when specified, tests for microstructure of each heat in the shipment. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat. If forgings are supplied, the part number and the size and melt source of stock used to make the forgings shall also be included.