SAE The Engineering Resource For Advancing Mobility

400 COMMONWEALTH DRIVE WARRENDALE PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5741D

Issued 6-15-59
Revised 10-1-82

UNS K66545

STEEL BARS AND FORGINGS, CORROSION AND HEAT RESISTANT
13.5Cr - 26Ni - 1.8Mo - 3.0Ti - 0.02B
Consumable Electrode Vacuum Melted
Solution, Stabilization, and Precipitation Heat Treated

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of 10-1-82. This cover sheet should be attached to the "D" revision of the subject specification.

This alloy is obsolete and no longer available. This alloy was deleted from MIL-HDBK-5 by Change Notice 1, dated 15 December 1978.

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

AEROSPACE MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc 485 Lexington Ave., New York, N.Y. 10017

AMS 5741D

Issued 6-15-59
Revised 3-15-66

STEEL BARS AND FORGINGS, CORROSION AND HEAT RESISTANT
13.5Cr - 26Ni - 1.75Mo - 3Ti
Consumable Electrode Vacuum Melted

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. FORM: Bars, forgings, forging stock, and heading stock.

3. APPLICATION: Primarily for parts, such as turbine discs and rotors, shafts, buckets or blades, vanes, bolts, dowels, flanges, and fittings, requiring high strength up to 1350 F (732 C) and oxidation resistance up to 1500 F (816 C).

4. COMPOSITION:

	min	max
Carbon	--	0.08
Manganese	1.25	2.00
Silicon	0.10	0.80
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	12.00	15.00
Nickel	24.00	28.00
Molybdenum	1.25	2.25
Titanium	2.80	3.30
Boron	0.010	0.030
Aluminum	--	0.25
Copper	--	0.25

4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2248.

5. CONDITION:

5.1 Bars: Solution and precipitation heat treated, unless otherwise specified. Bars 2.75 in. and less in diameter or distance between parallel sides shall be cold finished.

5.2 Forgings: Solution and precipitation heat treated and descaled, unless otherwise specified.

5.3 Stock for Forging or Heading: As ordered by the forging or heading manufacturer.

6. TECHNICAL REQUIREMENTS:

6.1 Bars and Forgings:

6.1.1 Heat Treatment: Unless otherwise specified, the product shall be heat treated as follows to produce the properties specified in 6.1.2, 6.1.3, and 6.1.4.

6.1.1.1 Solution Heat Treatment: Heat to a temperature within the range of 1800 - 1950 F (982.2 - 1065.6 C), hold at the selected temperature within ± 25 F (± 14 C) for 1 - 3 hr, and quench in oil or water. Bars 0.25 in. and less in diameter or distance between parallel sides may be air cooled rapidly.

6.1.1.2 Stabilization Heat Treatment: Heat to a temperature within the range of 1400 - 1450 F (760 - 787.8 C), hold at the selected temperature within ± 10 F (± 5.6 C) for 2 - 4 hr, cool rapidly in air or quench in oil or water.

6.1.1.3 Precipitation Heat Treat: Heat to a temperature within the range of 1325 - 1375 F (718.3 - 746.1 C), hold at the selected temperature within ± 10 F (± 5.6 C) for not less than 20 hr, and cool in air.

6.1.2 Tensile Properties: Tensile test specimens cut from the product and tested at room temperature shall conform to the following requirements:

Tensile Strength, psi	155,000 min
Yield Strength at 0.2% Offset or at 0.0122 in. in 2 in. Extension Under Load (E = 29,100,000), psi	120,000 min
Elongation, % in 4D	12 min
Reduction of Area, %	15 min

6.1.2.1 Large Disc Forgings: When tensile test specimens are machined from approximately the center of large disc forgings (over 50 sq in. in cross sectional area), the elongation may be as low as 10% and the reduction of area as low as 12%. Specimens shall be cut with axis of specimens in any plane perpendicular to the axis of the forging and perpendicular to a radius in the selected plane.

6.1.2.2 When a dispute occurs between purchaser and vendor over the yield strength values, yield strength determined by the offset method shall apply.

6.1.3 Hardness: Shall be Brinell 311 - 375 or equivalent.

6.1.4 Stress-Rupture Test at 1300 F (704.4 C): A combination smooth and notched test specimen machined to the dimensions shown in Fig. 1 and Table I, maintained at 1300 F ± 3 (704.4 C ± 1.7) while an axial stress of 65,000 psi is applied continuously, shall not rupture in less than 23 hr. The test shall be continued to rupture, either maintaining the same stress or increasing the stress in 5000 psi increments Ø after 48 hr and at intervals of not less than 8 hr thereafter. Rupture shall occur in the smooth section and elongation of this section after rupture, measured at room temperature, shall be not less than 5% in 4D if the specimen ruptures in 48 hr or less and not less than 3% in 4D if the specimen ruptures in more than 48 hours. Tests shall be conducted in accordance with the issue of ASTM E139 specified in the latest issue of AMS 2350.

6.1.4.1 As an alternate procedure, separate smooth and notched test specimens, machined from adjacent sections of the same piece, with gage sections conforming to the respective dimensions of Table I may be tested individually under the above conditions, including increase of stress after 48 hours. The smooth specimen shall not rupture in less than 23 hr and elongation after rupture, measured at room temperature, shall be as specified above. The notched specimen need not be tested to rupture but shall not rupture in less time than the companion smooth specimen.

6.2 Stock for Forging or Heading: When a sample of stock is forged to a test coupon and heat treated as in 6.1.1, specimens taken from the heat treated coupon shall conform to the requirements of 6.1.2, 6.1.3, and 6.1.4. If specimens taken from the stock after heat treatment as in 6.1.1 conform to the requirements of 6.1.2, 6.1.3, and 6.1.4, the tests shall be accepted as equivalent to tests of the forged coupon.

7. QUALITY: Material shall be multiple melted using vacuum consumable electrode practice in the remelt cycle, unless otherwise permitted. 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.

8. TOLERANCES: Unless otherwise specified, tolerances shall conform to all applicable requirements of the latest issue of AMS 2241.

9. REPORTS:

9.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and the results of tests on each size from each heat to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number, size, and quantity from each heat. If forgings are supplied, the part number and size of stock used to make the forgings shall also be included.

9.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, 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 a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

10. IDENTIFICATION:

10.1 Bars: Individual pieces or bundles shall have attached a metal or plastic tag embossed with the purchase order number, AMS 5741D, nominal size, and heat number, or shall be boxed and the box marked with the same information. In addition to the above identification, flats 2 x 1 in. and larger and other bars 1 in. and over in diameter or distance between parallel sides shall be stamped with the heat number within 2 in. of one end.

10.2 Forgings: Shall be identified in accordance with the latest issue of AMS 2808.

10.3 Stock for Forging or Heading: Shall be identified as agreed upon by purchaser and vendor.

11. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.