AEROSPACE
MATERIAL SPECIFICATIONS

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

AMS 5756A

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ALLOY, CORROSION AND HEAT RESISTANT
Nickel Base - 19Cr - 10Co - 10Mo - 1Al - 2.5Ti
Vacuum Melted, Solution Treated

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, flash welded rings, and stock for forging, flash welded rings, and heading.

3. APPLICATION: Primarily for parts such as turbine shafts, buckets, bolts, dowels, and fittings requiring high strength up to 1500 F (816 C) and oxidation resistance up to 1800 F (982 C).

4. COMPOSITION:

	min	max
Carbon	0.10	0.20
Manganese	--	0.75
Silicon	--	0.75
Phosphorus	--	0.015
Sulfur	--	0.015
Chromium	18.0	20.00
Cobalt	9.00	11.00
Molybdenum	9.00	11.00
Titanium	2.25	3.00
Aluminum	0.75	1.30
Boron	0.003	0.010
Iron	--	5.00
Nickel	remainder	

4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2269.

5. CONDITION:

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

5.1.1 Flash welded rings shall not be supplied unless specified on purchaser's part drawing. When supplied, they shall be manufactured in accordance with the latest issue of AMS 7490, unless otherwise specified.

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

5.3 Stock For Forgings, Flash Welded Rings, or Heading: As ordered by the forging, flash welded ring, or heading manufacturer.

6. TECHNICAL REQUIREMENTS: When ASTM methods are specified for determining conformance to the Ø following requirements, tests shall be conducted in accordance with the issue of the ASTM method listed in the latest issue of AMS 2350.

6.1 Bars, Forgings, and Flash Welded Rings:

6.1.1 Heat Treatment: The product shall be solution heat treated by heating to 1950 F ± 25 (1065.6 C ± 14), holding at heat for 4 hr, and quenching in oil, water, or air.

6.1.2 Properties After Precipitation Heat Treatment: Material shall conform to the following requirements after being heated to 1400 F ± 25 (760 C ± 14), held at heat for 15 hr, and cooled in air.

6.1.2.1 Tensile Properties: Tensile test specimens cut from bars and forgings and from parent metal of flash welded rings and tested at room temperature shall conform to the following requirements:

Tensile Strength, psi	165,000 min
Yield Strength at 0.2% Offset or at 0.0110 in. in 2 in. Extension Under Load (E = 31,500,000), psi	110,000 min
Elongation, % in 4D	15 min
Reduction of Area, %	18 min

6.1.2.1.1 When tensile test specimens are machined tangentially, from approximately the center of large disc forgings (over 50 sq in. cross sectional area), the elongation may be as low as 10% and the reduction of area as low as 12%. Specimens machined in other directions from this location are not required.

6.1.2.2 Hardness: Shall be Brinell 321 - 363 or equivalent.

6.1.2.3 Stress-Rupture Test at 1500 F (815.6 C): A combination smooth and notched test specimen, machined from bars and forgings and from parent metal of flash welded rings to the dimensions shown in Fig. 1 and Table I, maintained at 1500 F ± 3 (815.6 C ± 1.7) while an axial stress of ø 40,000 psi is applied continuously, shall not rupture in less than 25 hours. The test shall be continued to rupture, with fracture occurring in the smooth section. Tests shall be conducted in accordance with ASTM E139.

6.1.2.3.1 As an alternate procedure, separate smooth and notched 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. The notched specimen shall not rupture in less time than the companion smooth specimen.

6.1.2.4 Grain Size: Unless otherwise specified, grain size shall be predominantly 3 or finer with occasional grains as large as 1 permissible, as determined by comparison of a polished and etched specimen with the chart in ASTM E112.

6.2 Stock For Forgings, Flash Welded Rings, or Heading: When a sample of stock is forged to a test coupon and heat treated as in 6.1.1 and 6.1.2, specimens taken from the heat treated coupon shall conform to the requirements of 6.1.2.1, 6.1.2.2, and 6.1.2.3. If specimens taken from the stock after heat treatment as in 6.1.1 and 6.1.2 conform to the requirements of 6.1.2.1, 6.1.2.2, and 6.1.2.3, the tests shall be accepted as equivalent to tests of the forged coupon.

7. QUALITY: Material shall be produced by vacuum induction melting or by double vacuum melting. It 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 for bars shall conform to all applicable requirements of the latest issue of AMS 2261.

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, material specification number, heat 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 5756A, 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 Forgings, Flash Welded Rings, 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.