



AEROSPACE MATERIAL

AMS 5714

Society of Automotive Engineers, Inc. SPECIFICATION

TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

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Revised

ALLOY BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT
Nickel Base - 15.5Cr - 2.5Ti - 0.70Al - 7.0Fe

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. FORM: Bars, forgings, flash welded rings, and stock for forging or flash welded rings.
3. APPLICATION: Primarily for parts, such as flanges, cases, and turbine rotors, requiring high strength at temperatures in the range 800 - 1200 F (427 - 649 C), particularly where welding is involved.
4. COMPOSITION:

	min	max
Carbon	--	0.08
Manganese	--	1.00
Silicon	--	0.70
Sulfur	--	0.01
Chromium	14.00 - 17.00	
Nickel + Cobalt	70.00	--
Cobalt (1)	--	1.00
Titanium	2.20 - 2.75	
Aluminum	0.50 - 0.90	
Iron	5.00 - 9.00	
Copper	--	0.50

(1) Determination not required for routine acceptance.

- 4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2269.
5. CONDITION: Unless otherwise ordered, the product shall be supplied in the following condition:
 - 5.1 Bars: Hot finished, mill annealed, and descaled; round bars shall be ground or turned.
 - 5.2 Forgings and Flash Welded Rings: Solution heat treated as in 6.1.1 and descaled.
 - 5.2.1 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 the latest issue of AMS 7490, unless otherwise specified. During manufacture of flash welded rings, the stock shall not be heated to a temperature higher than 1825 F (996 C), unless otherwise agreed upon by purchaser and vendor.
 - 5.3 Stock for Forging or Flash Welded Rings: As ordered by the forging or flash welded ring manufacturer.

6. TECHNICAL REQUIREMENTS:6.1 Heat Treatment:

6.1.1 Solution Heat Treatment: Heat to $1800\text{ F} \pm 25$ ($982.2\text{ C} \pm 14$), hold at heat for 1 hr, and cool at a rate equivalent to air cool or faster.

6.1.2 Precipitation Heat Treatment: Heat to $1325\text{ F} \pm 15$ ($718.3\text{ C} \pm 8.3$), hold at heat for 8 hr, cool at a rate of 25 F deg (14 C deg) per hr to $1150\text{ F} \pm 15$ ($621.1\text{ C} \pm 8.3$), and air cool.

Note. Instead of the 25 F deg (14 C deg) per hr cooling rate to $1150\text{ F} \pm 15$ ($621.1\text{ C} \pm 8.3$), material may be furnace cooled at any rate provided the time at $1150\text{ F} \pm 15$ ($621.1\text{ C} \pm 8.3$) is adjusted to give a total precipitation heat treatment time of 16 hours.

6.2 Bars, Forgings, and Flash Welded Rings:

6.2.1 Hardness as Mill Annealed: Shall be not higher than Brinell 275 or equivalent.

6.2.2 Hardness as Solution Heat Treated: Shall be not higher than Brinell 229 or equivalent.

6.2.3 Properties After Heat Treatment: The product shall conform to the following requirements after heat treatment as in 6.1.1 and 6.1.2:

6.2.3.1 Tensile Properties: In determining applicability of the following requirements, size shall be taken as the diameter or least distance between parallel sides of bars, thickness of forgings, and radial thickness of flash welded rings:

Nominal Size Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated ($E = 31,000,000$)		Elongation % in 2 in. or 4D, min	Reduction of Area (round specimens) %, min
		psi, min	Extension Under Load in. in 2 in.		
Up to 2.50, excl	145,000	95,000	0.0101	18	20
2.50 to 4.00, excl	145,000	95,000	0.0101	15	15

6.2.3.1.1 Property requirements for product 4.00 in. and over in size shall be as agreed upon by purchaser and vendor.

6.2.3.2 Hardness: Not lower than Rockwell C 23 or equivalent.

6.2.3.3 Grain Size: Bars up to 4.00 in. in diameter or least distance between parallel sides, flash welded rings up to 4.00 in. in radial thickness, and forgings shall have grain size predominantly 4 or finer with occasional grains as large as 1 permissible, as determined by comparison of a polished and etched specimen with the chart in the issue of ASTM E112 specified in the latest issue of AMS 2350.

6.2.3.3.1 Grain size for bar stock and flash welded rings 4.00 in. and over in size shall be as agreed upon by purchaser and vendor.

6.3 Forging Stock: 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 6.2.3.1, 6.2.3.2 and 6.2.3.3. If specimens taken from the stock after heat treatment as in 6.1.1 and 6.1.2 conform to the requirements of 6.2.3.1 and 6.2.3.2, the tests shall be accepted as equivalent to tests of the forged coupon.

6.4 Stock for Flash Welded Rings: A sample of stock heat treated as in 6.1.1 and 6.1.2 shall conform to the requirements of 6.2.3.1, 6.2.3.2, and 6.2.3.3.