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AEROSPACE MATERIAL SPECIFICATION

AMS 5750B

Issued 6-15-53
Revised 7- 1-81

ALLOY BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT
Nickel Base - 15.5Cr - 16Mo - 3.8W - 5.5Fe
Solution Heat Treated

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of 10-13-80. It is recommended that this specification not be specified for new designs.

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

REAFFIRMED
10/91, 5/95

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Superseding AMS 5750A
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1. SCOPE:

1.1 Form: This specification covers a corrosion and heat resistant nickel-base alloy in the form of bars, forgings, flash welded rings, and stock for forging or flash welded rings.

1.2 Application: Primarily for parts and assemblies, such as turbine rotors, shafts, blades, and bolts, requiring high strength up to 1500° F (816° C) and oxidation resistance up to 2000° F (1093° 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., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2261 - Tolerances, Nickel, Nickel-Base, and Cobalt-Base Alloy Bars and Forging Stock
AMS 2269 - Chemical Check Analysis Limits, Wrought Nickel and Nickel-Base 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
AMS 7490 - Rings, Flash Welded, Corrosion and Heat Resistant, Austenitic Steels and Austenitic-Type Alloys

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM E8 - Tension Testing of Metallic Materials
ASTM E10 - Brinell Hardness of Metallic Materials
ASTM E139 - Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials
ASTM E354 - Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt-Base Alloys

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

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3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E354, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	min	max
Carbon	--	0.08
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	14.50	16.50
Molybdenum	15.00	17.00
Tungsten	3.00	4.50
Iron	4.00	7.00
Cobalt (3.1.1)	--	2.50
Vanadium	--	0.35
Nickel + Cobalt	remainder	

3.1.1 Determination not required for routine acceptance.

3.1.2 Check Analysis: Composition variations shall meet the requirements of AMS 2269.

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Bars, Forgings, and Flash Welded Rings: Solution heat treated free of continuous grain boundary carbide network.

3.2.1.1 Bars less than 0.75 in. (19.0 mm) in diameter or distance between parallel sides shall be pickled.

3.2.1.2 Bars 0.75 in. (19.0 mm) and over in diameter or distance between parallel sides shall be centerless ground.

3.2.1.3 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 7490.

3.2.2 Stock for Forging or Flash Welded Rings: As ordered by the forging or flash welded ring manufacturer.

3.3 Properties: The product shall conform to the following requirements:

3.3.1 Bars, Forgings, and Flash Welded Rings:

3.3.1.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E8:

Tensile Strength, min	100,000 psi (690 MPa)
Yield Strength at 0.2% Offset, min	46,000 psi (317 MPa)
Elongation in 2 in. (50.8 mm) or 4D, min	20%

3.3.1.2 Hardness: Should be 163 - 217 HB or equivalent, determined in accordance with ASTM E10, but the product shall not be rejected on the basis of hardness if the tensile property requirements are met.

3.3.1.3 Stress Rupture Test at 1500° F (815.6° C): A tensile specimen, maintained at 1500° F ± 3° (815.6° C ± 1.7°) while a load sufficient to produce an initial axial stress of 20,000 psi (138 MPa) is applied continuously, shall not rupture in less than 24 hours. The test shall be continued to rupture without change of load. Elongation after rupture, measured at room temperature, shall be not less than 15% in 4D. Tests shall be conducted in accordance with ASTM E139.

3.3.1.3.1 The test of 3.3.1.3 may be conducted using a load higher than required to produce an initial axial stress of 20,000 psi (138 MPa) but load shall not be changed while test is in process. Time to rupture and elongation requirements shall be as specified in 3.3.1.3.

3.3.1.3.2 When permitted by purchaser, the test of 3.3.1.3 may be conducted using incremental loading. In such case, the load required to produce an initial axial stress of 20,000 psi (138 MPa) shall be used to rupture or for 48 hr, whichever occurs first. After the 48 hr and at intervals of 8 - 16 hr, preferably 8 - 10 hr, thereafter, the stress shall be increased in increments of 5000 psi (34.5 MPa). Elongation requirements shall be as specified in 3.3.1.3.

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 Tolerances: Unless otherwise specified, tolerances for bars and forging stock shall conform to all applicable requirements of AMS 2261.

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: Bars, flash welded rings, and stock for flash welded rings shall be sampled in accordance with AMS 2371. Forgings and forging stock shall be sampled as agreed upon by purchaser and vendor.

4.3.1 Flash Welded Rings: Specimens for tensile and stress-rupture tests from flash welded rings shall be cut from parent metal not including the weld heat affected zone.

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 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 other technical requirements of this specification. 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.

4.5.2 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 and its revision letter, 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.