Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE MATERIAL SPECIFICATION

AMS 5755B
Superseding AMS 5755A
Issued 1-15-57
Revised 12-1-73

ALLOY BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT
Nickel Base - 5.0Cr - 24.5Mo - 5.5Fe
Solution Heat Treated

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 shrouds and seals, requiring oxidation resistance up to 1600° F (871° C), good strength up to 1200° F (649° C), and low coefficient of expansion.

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 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 E10 - Brinell Hardness of Metallic Materials
ASTM E21 - Elevated Temperature Tension 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

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	--	0.12
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.050
Sulfur	--	0.050
Chromium	4.00	6.00
Molybdenum	23.00	26.00
Iron	4.00	7.00
Vanadium	--	0.60
Cobalt (3.1.1)	--	2.50
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; check analysis variation for molybdenum shall be 0.15 under min or over max and for vanadium shall be 0.04 over maximum.

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

3.2.1 Bars: Hot rolled, solution heat treated, and descaled. Rounds 0.750 in. (19.05 mm) and over in diameter shall be ground.

3.2.2 Forgings: Solution heat treated and descaled.

3.2.3 Flash Welded Rings: Solution heat treated.

3.2.3.1 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 AMS 7490.

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

3.3 Heat Treatment: Bars, forgings, and flash welded rings shall be solution heat treated by heating to 2150° F ± 25 (1176.7° C ± 14), holding at heat for a time commensurate with section thickness but not less than time indicated in Table I, and cooling at a rate equivalent to a rapid air cool or faster.

TABLE I

Nominal Diameter or Maximum Cross Section Inches	Time at Heat Minutes
Up to 0.500, incl	30
Over 0.500 to 1.000, incl	45
Over 1.000 to 2.000, incl	60
Over 2.000	75

TABLE I (SI)

Nominal Diameter or Maximum Cross Section Millimeters	Time at Heat Minutes
Up to 12.70	30
Over 12.70 to 25.40, incl	45
Over 25.40 to 50.80, incl	60
Over 50.80	75

3.4 Properties:

3.4.1 Bars, Forgings, and Flash Welded Rings:

3.4.1.1 Tensile Properties at 1500° F (815.6° C): Tensile test specimens, heated to 1500° F ± 5 (815.6° C ± 2.8), held at 1500° F ± 5 (815.6° C ± 2.8) for 30 min. before testing, and tested in accordance with ASTM E21 at 1500° F ± 5 (815.6° C ± 2.8) at a rate of 0.045 - 0.062 in. per min. (1.14 - 1.57 mm/min.), shall conform to the following requirements:

Tensile Strength, min	55,000 psi (379 MPa)
Elongation in 2 in. (50.8 mm) or 4D, min	10%

3.4.1.2 Hardness: Should be 170 - 241 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.

3.5 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.

3.6 Sizes: Except when exact lengths or multiples of exact lengths are ordered, bars will be acceptable in mill lengths of 6 - 24 ft (1.8 - 7.3 m) but not more than 25% of any shipment shall be supplied in lengths of 6 - 9 ft (1.8 - 2.7 m) except that for bars weighing over 25 lb per ft (37.2 kg/m), short lengths down to 2 ft (609 mm) may be supplied.

3.7 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 4.4. 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:

4.3.1 Bars, Flash Welded Rings, and Stock for Flash Welded Rings:

4.3.1.1 Tensile test specimens from flash welded rings shall be cut from parent metal not including the weld-heat-affected zone.

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

4.4 Reports:

4.4.1 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 for tensile properties and hardness of each size from each heat. 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.

4.4.2 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.

4.5 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification: The product shall be identified as follows:

5.1.1 Bars:

5.1.1.1 Each straight bar 0.500 in. (12.70 mm) and over in diameter or least width of flat surface shall be marked in a row of characters recurring at intervals not greater than 3 ft (914 mm) with AMS 5755B, heat number, and manufacturer's identification. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be capable of being removed in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the material or its performance and shall be sufficiently stable to withstand normal handling.

5.1.1.2 Straight bars less than 0.500 in. (12.70 mm) in diameter or least width of flat surface shall be securely bundled and identified by a metal or plastic tag embossed with the purchase order number, AMS 5755B, heat number, nominal size, and manufacturer's identification and attached to each bundle or shall be boxed and the box marked with the same information.

5.1.1.3 Coiled bars shall be securely bundled and identified by a metal or plastic tag embossed with the purchase order number, AMS 5755B, heat number, nominal size, and manufacturer's identification and attached to each coil or shall be boxed and the box marked with the same information.

5.1.2 Forgings: In accordance with AMS 2808.

5.1.3 Flash Welded Rings and Stock for Forging or Flash Welded Rings: As agreed upon by purchaser and vendor.

5.2 Packaging: The product shall be prepared for shipment in accordance with commercial practice to assure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.