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

AEROSPACE MATERIAL SPECIFICATION

AMS 5665H
Superseding AMS 5665G
Issued 10-15-40
Revised 12-1-73

ALLOY BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT
Nickel Base - 15.5Cr - 8.0Fe

SAE Technical Board rules provide that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

SAENORM.COM : Click to view the full PDF of ams5665h

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 requiring both corrosion and oxidation resistance, and where such parts may require welding during fabrication. Parts and assemblies requiring oxidation resistance up to approximately 2000° F (1093° C), but useful at the higher temperatures only when stresses are low. Strength at elevated temperatures is similar to that of the 18-8 type of steel.

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 E8 - Tension Testing of Metallic Materials
ASTM E10 - Brinell Hardness 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

Copyright 1973 by Society of Automotive Engineers, Inc.
All rights reserved.

Printed in U.S.A.

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	--	0.15
Manganese	--	1.00
Silicon	--	0.50
Sulfur	--	0.015
Chromium	14.00	17.00
Nickel + Cobalt	72.00	--
Cobalt (3.1.1)	--	1.00
Iron	6.00	10.00
Columbium + Tantalum (3.1.1)	--	1.00
Titanium (3.1.1)	--	0.50
Aluminum (3.1.1)	--	0.35
Copper	--	0.50

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:

3.2.1.1 Rounds 2.50 In. (63.5 mm) and Under in Diameter: Cold drawn unless ordered hot finished.

3.2.1.2 Rounds Over 2.50 In. (63.5 mm) in Diameter: Hot finished. They may be turned, and shall be turned when so specified.

3.2.1.3 Squares, Hexagons, and Rectangles: Hot finished.

3.2.2 Forgings and Flash Welded Rings: Annealed.

3.2.2.1 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 AMS 7490.

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

3.3 Properties:

3.3.1 Tensile Properties: Specimens taken from round bars over 2.50 in. (63.5 mm) to 4.50 in. (114.3 mm), incl, in diameter and from forgings over 2.50 in. (63.5 mm) in thickness shall conform to the following requirements, determined in accordance with ASTM E8.

	Bars	Forgings
Tensile Strength, min	85,000 psi (586 MPa)	80,000 psi (552 MPa)
Yield Strength at 0.2% Offset, min	35,000 psi (241 MPa)	30,000 psi (207 MPa)
Elongation in 2 in. (50.8 mm) or 4D, min	30%	35%

3.3.2 Hardness: Shall be as follows, determined in accordance with ASTM E10, except that bars and forgings for which tensile properties are specified shall not be rejected on the basis of hardness if the tensile property requirements are met; hardness of bars shall be determined midway between surface and center.

SAENORM.COM : Click to view the full PDF of ams5665h

3.3.2.1 Bars:

	Nominal Diameter or Distance Between Parallel Sides		
	Inches	(Millimeters)	Hardness
Cold Drawn	Up to 1.00, incl	(Up to 25.4, incl)	229 - 311 HB
	Over 1.00 to 2.50, incl	(Over 25.4 to 63.5, incl)	207 - 285 HB
Hot Finished	Up to 0.50, incl	(Up to 12.7, incl)	134 - 241 HB
	Over 0.50	(Over 12.7)	134 - 217 HB

3.3.2.2 Forgings: Not higher than 187 HB or equivalent.

3.3.2.3 Flash Welded Rings: Not higher than 217 HB or equivalent.

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 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.

3.6 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: AMS 2371.

4.3.1.1 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 the results of tests on each size from each heat to determine conformance to the tensile property and hardness 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.

SAENORM.COM : Click to view the full PDF of ams5665h