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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5665K

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Superseding AMS 5665J

ALLOY BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT
74Ni - 15.5Cr - 8.0Fe

UNS N06600

1. SCOPE:

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

1.2 Application: Primarily for parts requiring both corrosion and oxidation resistance and where such parts may require welding during fabrication. For parts requiring oxidation resistance up to 2000°F (1095°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 shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2261 - Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars and Forging Stock
MAM 2261 - Tolerances, Metric, Nickel, Nickel Alloy, and Cobalt Alloy Bars and Forging Stock
AMS 2269 - Chemical Check Analysis Limits, Wrought Nickel Alloys and Cobalt Alloys
AMS 2350 - Standards and Test Methods

REAFFIRMED 10/91

2.1.1 Aerospace Material Specifications (Cont'd.):

AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock
AMS 2374 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Forgings and Forging Stock
AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys
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, PA 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 Alloys

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, Ø determined by wet chemical methods in accordance with ASTM E354 or by spectrographic or other analytical methods approved by purchaser:

	min	max
Carbon	--	0.15
Manganese	--	1.00
Silicon	--	0.50
Sulfur	--	0.015
Chromium	14.00	17.00
Nickel + Cobalt	72.00	--
Iron	6.00	10.00
Cobalt (3.1.1)	--	1.00
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. (62.5 mm) and Under in Nominal Diameter: Cold drawn unless ordered hot finished.

3.2.1.2 Rounds Over 2.50 In. (62.5 mm) in Nominal 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: 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 on specimens taken from round bars over 2.50 in. (62.5 mm) to 4.50 in. (112.5 mm), incl, in nominal diameter and from forgings over 2.50 in. (62.5 mm) in nominal thickness:

	Bars	Forgings
Tensile Strength, min	85,000 psi (585 MPa)	80,000 psi (520 MPa)
Yield Strength at 0.2% Offset, min	35,000 psi (240 MPa)	30,000 psi (205 MPa)
Elongation in 4D, min	30%	35%

3.3.1.1.1 Tensile property requirements for square, hexagonal, and rectangular bars, for round bars 2.50 in. (62.5 mm) and under in nominal diameter, and for forgings 2.50 in. (62.5 mm) and under in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.1.2 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.

3.3.1.2.1 Bars:

	Nominal Diameter or Distance Between Parallel Sides		
	Inches	Millimetres	Hardness
Cold Drawn	Up to 1.00, incl	Up to 25.0, incl	229 - 311 HB
	Over 1.00 to 2.50, incl	Over 25.0 to 62.5, incl	207 - 285 HB
Hot Finished	Up to 0.50, incl	Up to 12.5, incl	134 - 241 HB
	Over 0.50	Over 12.5	134 - 217 HB

3.3.1.2.2 Forgings: Not higher than 187 HB, or equivalent.

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

3.3.2 Stock for Forging or Flash Welded Rings: Shall be as agreed upon by purchaser and vendor.

3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

3.4.1 Ø Forgings shall have substantially uniform macrostructure. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.4.2 Ø Grain flow of die forgings, except in areas which contain flash-line end grain, shall follow the general contour of the forging, showing no evidence of re-entrant flow.

3.5 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight bars will be acceptable in mill lengths of 6 - 24 ft (2 - 7.5 m) but not more than 25% of any shipment shall be supplied in lengths of 6 - 9 ft (2 - 3 m) except that for bars weighing over 25 lb per ft (37 kg/m), short lengths down to 2 ft (600 mm) may be supplied.

3.6 Tolerances: Bars and forging stock shall conform to all applicable requirements of AMS 2261 or MAM 2261.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples for vendor's tests 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 sample and to perform any confirmatory testing deemed necessary to ensure 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 tests and shall be performed on each heat or lot as applicable.