SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5665L

Issued 15 OCT 1940
Revised 1 APR 1992

Submitted for recognition as an American National Standard

Superseding AMS 5665K

NICKEL ALLOY, CORROSION AND HEAT RESISTANT, BARS, FORGINGS, AND RINGS
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:

These products have been used typically for parts requiring both corrosion and oxidation resistance and where such parts may require welding during fabrication and for parts requiring oxidation resistance up to 2000 °F (1093 °C) but useful at the higher temperatures only when stresses are low, but usage is not limited to such applications. Strength at elevated temperatures is similar to that of the 18-8 type steels.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2261 Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire
MAM 2261 Tolerances, Metric, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire
AMS 2269 Chemical Check Analysis Limits, Wrought Nickel Alloys and Cobalt Alloys
AMS 2371 Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock

Printed in U.S.A.
91-0942/ EG

2.1 SAE Publications (Continued):

AMS 2374 Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steel and Alloy Forgings
AMS 2806 Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat Resistant Steels and Alloys
AMS 2808 Identification, Forgings
AMS 7490 Rings, Flash Welded, Corrosion and Heat Resistant Austenitic Steels and Austenitic-Type Alloys or Precipitation-Hardenable Alloys

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM E 8 Tension Testing of Metallic Materials
ASTM E 8M Tension Testing of Metallic Materials (Metric)
ASTM E 10 Brinell Hardness of Metallic Materials
ASTM E 354 Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition:
(R)

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 354, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	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	--	1.00
Columbium + Tantalum	--	1.00
Titanium	--	0.50
Aluminum	--	0.35
Copper	--	0.50

3.1.1 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 Inches (63.5 mm) and Under in Nominal Diameter: Cold drawn unless ordered hot finished.

3.2.1.2 Rounds Over 2.50 Inches (63.5 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, rings 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 shown in Table 2, determined in accordance with ASTM E 8 or ASTM E 8M on specimens taken from round bars over 2.50 to 4.50 inches (over 63.5 to 114.3 mm), inclusive, in nominal diameter and from forgings over 2.50 inches (63.5 mm) in nominal thickness.

TABLE 2 - Minimum Tensile Properties

Properties	Bars	Forgings
Tensile Strength	85.0 ksi (586 MPa)	80.0 ksi (552 MPa)
Yield Strength at 0.2% Offset	35.0 ksi (241 MPa)	30.0 ksi (207 MPa)
Elongation in 4D	30%	35%

3.3.1.1.1 Tensile property requirements for square, hexagonal, and rectangular bars, for round bars 2.50 inches (63.5 mm) and under in nominal diameter, for forgings 2.50 inches (63.5 mm) and under in nominal thickness, and flash welded rings, shall be as agreed upon by purchaser and vendor.

3.3.1.2 (R) Hardness: Shall be as follows, determined in accordance with ASTM E 10, except that bars for which tensile properties are specified or agreed upon 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: As shown in Table 3.

TABLE 3 - Hardness

Condition	Nominal Diameter or Distance Between Parallel Sides Inches	Nominal Diameter or Distance Between Parallel Sides 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

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

3.5 Tolerances:

Bars shall conform to all applicable requirements of AMS 2261 or MAM 2261.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:
(R)

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for performing all required tests. 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 for all technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing:
(R)

Shall be in accordance with the following:

4.3.1 Bars, Flash Welded Rings, and Stock for Forging or Flash Welded Rings: AMS 2371.

4.3.2 Forgings: AMS 2374.

4.4 Reports:

4.4.1 The vendor of bars, forgings, and flash welded rings shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and the results of tests on each lot to determine conformance to the tensile property and hardness requirements. This report shall include the purchase order number, lot number, AMS 5665L, size, and quantity. 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 stock for forging or flash welded rings shall furnish with each shipment a report showing the results of tests for chemical composition of each heat. This report shall include the purchase order number, heat number, AMS 5665L, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with the following:

4.5.1 Bars, Flash Welded Rings, and Stock for Forging or Flash Welded Rings: AMS 2371.

4.5.2 Forgings: AMS 2374.