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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4674F

Issued MAY 1940
Revised JAN 1999

Superseding AMS 4674E

Submitted for recognition as an American National Standard

Nickel - Copper Alloy, Corrosion Resistant Bars and Forgings
67Ni - 30Cu - 0.04S
Free Machining

UNS N04405

1. SCOPE:

1.1 Form:

This specification covers a corrosion-resistant nickel-copper alloy in the form of bars, forgings, and forging stock.

1.2 Application:

These products have been used typically for fittings, such as cones, nipples, and unions, in fluid line assemblies using AMS 4574 or AMS 4575 tubing, but usage is not limited to such applications. These products can be machined more readily than AMS 4675.

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
MAM 2269	Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2374	Quality Assurance Sampling and Testing of Corrosion and Heat Resistant Steel and Alloy Forgings
AMS 2806	Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion Heat Resistant Steels and Alloys

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.1 (Continued):

AMS 2808 Identification, Forgings
AMS 4574 Nickel-Copper Alloy Tubing, Seamless, Corrosion Resistant 67Ni - 31Cu Annealed
AMS 4575 Nickel-Copper Alloy Tubing, Brazed, Corrosion Resistant 67Ni - 31Cu Annealed
AMS 4675 Alloy Bars and Forgings, Corrosion Resistant 67Ni - 30Cu

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 8 Tension Testing of Metallic Materials
ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E 76 Chemical Analysis of Nickel-Copper Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 76, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Nickel	63.00	70.00
Sulfur	0.025	0.06
Iron	--	2.50
Manganese	--	2.00
Cobalt	--	1.00
Silicon	--	0.50
Carbon	--	0.30
Copper	remainder	

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: Cold finished.

3.2.2 Forgings: As forged.

3.2.3 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties:

The product shall conform to the following requirements:

3.3.1 Bars:

3.3.1.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E 8:

3.3.1.1.1 Round Bars: Shall be as shown in Table 1.

TABLE 1A - Tensile Properties, Inch/Pound Units

Nominal Diameter Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi, min	Elongation in 2 inches or 4D %, min
Up to 0.50, excl	85.0 to 110.0	50.0	8
0.50 to 1.00, incl	85.0 to 110.0	50.0	15
Over 1.00 to 3.00, incl	85.0 to -	50.0	15

TABLE 1B - Tensile Properties, SI Units

Nominal Diameter Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa, min	Elongation in 50.8 mm or 4D %, min
Up to 12.7, excl	586 to 758	345	8
12.7 to 25.4, incl	586 to 758	345	15
Over 25.4 to 76.2, incl	586 to -	345	15

3.3.1.1.2 Hexagons, Squares, and Rectangles: Shall be as shown in Table 2.

TABLE 2A - Minimum Tensile Properties, Inch/Pound Units

Nominal Distance Between Parallel Sides Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 inches or 4D %
Up to 0.50, excl	85.0	50.0	10
0.50 to 2.00, incl	85.0	50.0	15

TABLE 2B - Minimum Tensile Properties, SI Units

Nominal Distance Between Parallel Sides Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 12.7, excl	585	345	10
12.7 to 50.8, incl	585	345	15

3.3.1.2 Hardness: Shall be not lower than as shown in Table 3, or equivalent (See 8.2), determined in accordance with ASTM E 18. Product shall not be rejected on the basis of hardness if the tensile properties of Table 2 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

TABLE 3 - Minimum Hardness

Shapes	Hardness, HRB
Rounds	84
Hexagons, Squares, Rectangles	80

3.3.2 Forgings: Shall have hardness of 78 to 96 HRB, or equivalent, determined in accordance with ASTM E 18.

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.

3.5 Tolerances:

3.5.1 Bars: Shall be in accordance with AMS 2261 or MAM 2261.

3.5.2 Forging Stock: Shall be as agreed upon by purchaser and vendor.