SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS4675 REV. D

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Superseding AMS4675C

Nickel-Copper Alloy, Corrosion-Resistant, Bars and Forgings
67Ni - 30Cu

(Composition similar to UNS N04400)

RATIONALE

AMS4675D corrects an error in the hardness requirements of 3.3.2.1.

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 AMS4574 or AMS4575 tubing, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), or www.sae.org.

AMS2261	Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire
AMS2269	Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys
AMS2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS2374	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steel and Alloy Forgings

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit http://www.sae.org/technical/standards/AMS4675D

AMS2806 Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys

AMS2808 Identification, Forgings

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, or www.astm.org.

ASTM E 8/E 8M Tension Testing of Metallic Materials

ASTM E 18 Rockwell 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
Carbon	--	0.30
Manganese	--	2.00
Silicon	--	0.50
Copper	28.0	34.00
Iron	--	2.50
Nickel	remainder	

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2269.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Bars

Cold drawn and stress relieved by heating to a temperature within the range 1000 to 1100 °F (538 to 593 °C), holding at the selected temperature within ±25 °F (±14 °C) for 1 hour ± 0.25, and cooling at a rate equivalent to cooling in air.

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 Tensile Properties

Shall be as follows, determined in accordance with ASTM E 8 or ASTM E 8M:

3.3.1.1 Round Bars

Shall be as shown in Table 2.

TABLE 2A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Diameter Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
0.093 to 0.500, excl	84	50	10
0.500 to 3.500, incl	87	60	22
Over 3.500 to 4.000, incl	84	55	25

TABLE 2B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Diameter Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
2.35 to 12.50, excl	579	345	10
12.50 to 87.50, incl	600	414	22
Over 87.50 to 100.00, incl	579	379	25

3.3.1.2 Hexagonal, Square, and Rectangular Bars

Shall be as shown in Table 3.

TABLE 3A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Distance Between Parallel Sides Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
0.093 to 0.500, incl	84	50	10
0.500 and over	84	50	22

TABLE 3B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Distance Between Parallel Sides Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
2.35 to 12.50, excl	579	345	10
12.50 and over	579	345	22

3.3.2 Hardness

3.3.2.1 Bars

Should be not lower than the values shown, 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 or Table 3 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

Minimum Hardness, HRB
Rounds 84
Hexagons, Squares, and Rectangles 80

3.3.2.2 Forgings

Shall have hardness of 78 to 96 HRB, or equivalent (See 8.2), 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.

3.4.1 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 reentrant grain flow.

3.5 Tolerances

3.5.1 Bars shall conform to all applicable requirements of AMS2261.

3.5.2 Tolerances for forgings and forging stock shall be as acceptable to purchaser.

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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), tensile properties (3.3.1), hardness (3.3.2), and tolerances (3.5) are acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests

Grain flow of die forgings (3.4.1) is a periodic test and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling

Shall be as follows: