AEROSPACE MATERIAL SPECIFICATION

AMS4675™	REV. F

Issued 1963-07
Reaffirmed 2003-05
Revised 2022-10

Superseding AMS4675E

Nickel-Copper Alloy, Corrosion-Resistant, Bars and Forgings
67Ni - 30Cu
(Composition similar to UNS N04400)

RATIONALE

AMS4675F is the result of a Five-Year Review and update of the specification. The revision prohibits unauthorized exceptions (3.3.1.4, 3.6, 4.4.3, 5.1.1.1, 8.5), updates composition and reporting requirements (3.1, 3.1.1), adds strain rate control (3.3.1.3), and allows prior revisions (8.4).

1. SCOPE

1.1 Form

This specification covers a corrosion-resistant nickel-copper alloy in the form of bars 0.093 to 4.000 inches (2.35 to 100.00 mm) in diameter or distance between parallel sides, and forgings and forging stock of any size.

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 +1 724-776-4970 (outside USA), 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

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**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS4675F/

AMS2374 Quality Assurance Sampling and Testing, Corrosion- and Heat-Resistant Steel and Alloy, Forgings

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

AMS2808 Identification, Forgings

AMS4574 Nickel-Copper Alloy, Corrosion-Resistant, Tubing, Seamless, 67Ni - 31Cu

AMS4575 Nickel-Copper Alloy Tubing, Brazed Corrosion-Resistant, 67Ni - 31Cu, Annealed

AS7766 Terms Used in Aerospace Metals Specifications

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, www.astm.org.

ASTM E8/E8M Tension Testing of Metallic Materials

ASTM E18 Rockwell Hardness of Metallic Materials

ASTM E140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness Rockwell Hardness

ASTM E1473 Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM E1473 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 Producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection, unless limits of acceptability are specified by the purchaser.

3.1.2 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 hour, and cooling at a rate equivalent to cooling in air.

3.2.1.1 Bars shall not be cut from plate (also see 4.4.2).

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 E8/E8M:

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

3.3.1.3 Unless otherwise specified, the strain rate shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ±0.002 in/in/min (0.002 mm/mm/min) through 0.2% offset yield strain. The strain rate after yield may be increased to any value up to 0.5 in/in/min (0.5 mm/mm/min) or equivalent crosshead speed as a function of gage length. The requirement for compliance becomes effective for material produced 1 year after the publication date of this document.

3.3.1.4 Mechanical property requirements for product outside the range covered by Tables 2 and 3 shall be agreed upon between purchaser and producer and reported as in 4.4.3.

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 E18. Product shall not be rejected on the basis of hardness if the tensile properties of Tables 2 or 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 E18.

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.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.3.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for producer'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 producer unless frequency of testing is specified by purchaser.

4.3 Sampling

Shall be as follows:

4.3.1 Bars and Forging Stock

In accordance with AMS2371.

4.3.2 Forgings

In accordance with AMS2374.

4.4 Reports

4.4.1 The producer of the product shall furnish with each shipment a report showing the producer's name and country where the metal was melted (e.g., the final melt in the case of metal processed by multiple melting operations) and the results of tests for composition of each heat and for the tensile properties of bars and hardness of bars and forgings from each lot and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS4675F, size, and quantity from each heat. If forgings are supplied, the size and melt source of stock used to make the forgings shall also be included.

4.4.2 Report the nominal metallurgically worked cross sectional size and the cut size, if different (also see 3.2.1.1).

4.4.3 When material produced to this specification is beyond the sizes allowed in the scope or tables, or other exceptions are taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS4675F(EXC) because of the following exceptions:" and the specific exceptions shall be listed (also see 5.1.1.1).

4.4.4 The producer of forging stock shall furnish with each shipment a report showing the producer's name and country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations) and the results of test for composition of each heat and of any additional property requirements imposed by 8.6. The report shall include the purchase order number, heat number, AMS4675F, size, and quantity.