



AEROSPACE MATERIAL SPECIFICATION

AMS5589™**REV. H**Issued 1966-09
Revised 2026-03

Superseding AMS5589G

(R) Nickel Alloy, Corrosion- and Heat-Resistant, Seamless Tubing,
52.5Ni - 19Cr - 3.0Mo - 5.1Cb (Nb) 0.90Ti - 0.50Al - 18Fe (Inconel® 718),
Consumable Electrode Remelted or Vacuum Induction Melted,
1775 °F (968 °C) Solution Heat Treated
(Composition similar to UNS N07718)

RATIONALE

AMS5589H is the result of a Five-Year Review and update of the specification. The revision adds the trade name to the Title (see 8.6), updates definitions (see 2.3.1), revises composition testing and reporting requirements (see 3.1 and 3.1.1), updates condition and fabrication methods consistent with other tubing specs (see 3.3 and 3.4), adds strain rate control during tensile testing (see 3.6.2.1.1), updates exceptions requirements (see 3.6.3, 4.4.1, and 8.5), updates quality and inspection requirements and addresses small sizes (see 3.7), adds NDT frequency (see 4.2.2), clarifies reporting adding NDT (see 4.4), updates identification (see 5.2), and revises ordering information based on the above changes (see 8.7).

1. SCOPE

1.1 Form

This specification covers a corrosion- and heat-resistant nickel alloy in the form of seamless tubing 0.125 inch (3.18 mm) and over in nominal OD with nominal wall thickness 0.015 inch (0.38 mm) and over.

1.2 Application

This tubing has been used typically for fluid lines and components requiring resistance to creep and stress rupture up to 1300 °F (704 °C) and oxidation resistance up to 1800 °F (982 °C), particularly those parts that are formed or welded and then heat treated to develop desired properties, 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.

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2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (U.S. and Canada only) or +1 724-776-4970 (outside U.S. and Canada), www.sae.org.

AMS2263	Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Aircraft Tubing
AMS2269	Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys
AMS2283	Composition Testing Methods for Nickel- and Cobalt-Based Alloys
AMS2371	Quality Assurance Sampling and Testing, Corrosion- and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS2750	Pyrometry
AMS2807	Identification, Carbon and Low-Alloy Steels, Corrosion- and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing
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 B829	Nickel and Nickel Alloys Seamless Pipe and Tube
ASTM E8/E8M	Tension Testing of Metallic Materials
ASTM E18	Rockwell Hardness of Metallic Materials
ASTM E112	Determining Average Grain Size
ASTM E139	Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials
ASTM E140	Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

2.3 Definitions

Terms used in AMS are defined in AS7766 and as follows:

- 2.3.1 Bore conditioning is any mechanical cleaning method that is used in the bore of tubing to improve the final surface appearance with no resultant change in tubing size beyond the allowable tolerances.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Composition shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2283 or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.08
Manganese	--	0.35
Silicon	--	0.35
Phosphorus	--	0.015
Sulfur	--	0.015
Chromium	17.00	21.00
Nickel	50.00	55.00
Molybdenum	2.80	3.30
Columbium (Niobium)	4.75	5.50
Titanium	0.65	1.15
Aluminum	0.20	0.80
Cobalt	--	1.00
Tantalum	--	0.05
Boron	--	0.006
Copper	--	0.30
Iron	remainder	

3.1.1 The 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 Melting Practice

Alloy shall be produced by multiple melting using consumable electrode practice in the remelt cycle or shall be induction melted under vacuum. If consumable electrode remelting is not performed in vacuum, electrodes that have been produced by vacuum induction melting shall be used for remelting.

3.3 Condition

Tubing shall be cold drawn or pilgered, solution heat treated, and descaled.

3.3.1 Solution heat treatment shall be performed in an atmosphere yielding a bright finish. Alternately, product shall be chemically cleaned to produce a uniform finish. It is permissible to pickle prior to final cleaning treatment. Final chemical cleaning may take place after any final finishing (see 3.4.3).

3.4 Fabrication

3.4.1 Tubing shall be produced by a seamless process. A light polish to improve external surface appearance may be employed after solution heat treatment. If performed, the product shall be subsequently chemically cleaned. Tubing shall not be centerless ground.

3.4.2 Bore conditioning is permitted after final anneal provided the tubing is not sized by metal removal methods beyond the original tolerances. If bore conditioning is used, 100% visual inspection of each tube shall be performed. The tube ID shall be uniformly shiny with no evidence of remnant material.

3.4.3 Tubing shall be chemically cleaned after any ID or OD finishing that occurs after heat treatment.