



AEROSPACE MATERIAL SPECIFICATION

AMS5586™**REV. J**

Issued 1964-06
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Revised 2024-12

Superseding AMS5586H

(R) Nickel Alloy, Corrosion- and Heat-Resistant, Welded Tubing
57Ni - 19.5Cr - 13.5Co - 4.2Mo - 2.9Ti - 1.4Al - 0.006B - 0.08Zr (Waspaloy)
Consumable Electrode Remelted or Vacuum Induction Melted, Annealed
(Composition similar to UNS N07001)

RATIONALE

AMS5586J is the result of a Five-Year Review and update of the specification. The revision adds the common alloy name to the Title, updates composition testing and reporting (see 3.1 and 3.1.2), clarifies processing requirements including bore conditioning and cleanliness evaluations (see 3.3 and 3.4), adds strain rate control to tensile testing (see 3.5.1.1.1 and 3.5.2.1.1), adds white cloth/plug requirements (see 3.6.2), adds NDT requirements (see 3.6.3, 4.2.1, and 4.4), clarifies tubing type (see 5.2), and updates the prohibition of exceptions requirements (see 3.5.3 and 8.5).

1. SCOPE

1.1 Form

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

1.2 Application

This tubing has been used typically for parts requiring high strength up to 1500 °F (816 °C) and oxidation resistance up to 1750 °F (954 °C), 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), or www.sae.org.

AMS2263 Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Aircraft Tubing

AMS2269 Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys

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Full document details: SAE AMS5586J

For more information on this standard, visit
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Documents

Standard, visit Sharing Hub

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
AMS2634	Ultrasonic Inspection, Thin Wall Metal Tubing
AMS2700	Passivation of Corrosion Resistant Steels
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 B751	Standard Specification for General Requirements for Nickel and Nickel Alloy Welded Tube
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
ASTM E426	Electromagnetic (Eddy-Current) Examination of Seamless and Welded Tubular Products, Austenitic Stainless Steel and Similar Alloys
ASTM E1417/E1417M	Liquid Penetrant Testing

2.3 Definitions

Terms used in AMS are defined in AS7766 and the following:

2.3.1 BORE CONDITIONING

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	0.02	0.10
Manganese	--	0.10
Silicon	--	0.15
Phosphorus	--	0.015
Sulfur	--	0.015
Chromium	18.00	21.00
Cobalt	12.00	15.00
Molybdenum	3.50	5.00
Titanium	2.50	3.25
Aluminum	1.20	1.60
Boron (see 3.1.1)	0.003	0.010
Zirconium	0.02	0.15
Iron	--	2.00
Copper	--	0.10
Nickel	remainder	

3.1.1 Boron may be less than 0.003% by weight, determined on tubing having nominal wall thickness under 0.050 inch (1.27 mm), provided the specified requirement is met on the stock from which sheet or strip for making tubing is rolled.

3.1.2 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.

3.1.3 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 annealed. Cooling from the annealing temperature shall be at a rate equivalent to an air cool or faster. Annealing 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 3.4.4). After final chemical cleaning, tube cleanliness shall be verified using the corrosion-resistance test methods specified in AMS2700 for class 2 parts, or alternate method acceptable to the purchaser.

3.4 Fabrication

Tubing 2.00 inches (50.8 mm) and under in nominal OD shall be produced by a welded and drawn process.

3.4.1 Any surface finishing operation applied to remove objectionable pits and surface blemishes shall be performed prior to final annealing heat treatment. A light polish to improve external surface appearance may be employed after annealing, and if performed, the product shall be subsequently chemically cleaned.

3.4.2 Tubing 2.00 inches (50.8 mm) and under shall have been cold worked sufficiently to ensure proper weld reinforcement height and roundness in the weld reinforcement area.