AEROSPACE MATERIAL SPECIFICATION

AMS5572™	REV. J

Issued 1949-11
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Superseding AMS5572H

(R) Steel, Corrosion and Heat-Resistant, Seamless Tubing 25Cr - 20Ni (SAE 30310S) Solution Heat Treated

(Composition similar to UNS S31008)

RATIONALE

AMS5572J is the result of a Five-Year Review and update of the specification. The revision adds definitions (see 2.3); updates composition and reporting (see 3.1 and 3.1.1); clarifies heat-treatment, bore conditioning, and passivation requirements (see 3.2 and 3.3); adds required NDT when one is specified (see 3.5.3); adds white plug or other tests for verification of cleanliness (see 3.5.1); updates acceptance requirements (see 4.2.1 and 4.2.1.1); clarifies tubing requirements (see 3.6 and 5.2); prohibits unauthorized exceptions (see 3.7, 4.4.4, 5.2.1, and 8.4); adds country of origin and NDT reporting requirements (see 4.4); and allows the use of prior revisions (see 8.3).

1. SCOPE

1.1 Form

This specification covers a corrosion- and heat-resistant steel in the form of seamless tubing.

1.2 Application

This tubing has been used typically for parts requiring both corrosion and heat resistance, especially when such parts are welded during fabrication, but usage is not limited to such applications. This steel provides oxidation resistance up to 2000 °F (1093 °C) but is useful at that temperature only when stresses are low.

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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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For more information on this standard, visit
https://www.sae.org/standards/content/AMS5572J/

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.

AMS2243 Tolerances, Corrosion and Heat-Resistant Steel Tubing

AMS2248 Chemical Check Analysis Limits, Corrosion- and Heat-Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron 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

AMS2645 Fluorescent Penetrant Inspection

AMS2700 Passivation of Corrosion Resistant Steels

AMS2761 Heat Treatment of Steel Raw Materials

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 A370 Mechanical Testing of Steel Products

ASTM A751 Chemical Analysis of Steel Products

ASTM A1016/A1016M General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes

ASTM E426 Electromagnetic (Eddy-Current) Testing of Seamless and Welded Tubular Products, Austenitic Stainless Steel and Similar Alloys

ASTM E1417/E1417M Liquid Penetrant Examination

2.3 Definitions

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

BORE CONDITIONING: Any mechanical 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.

SOLUTION HEAT TREATMENT: Heating of an alloy to a suitable temperature, holding it at that temperature long enough to cause one or more constituents to enter into a solid solution, and then cooling it rapidly enough to keep these constituents in solution. AMS2761 provides guidance but refers to this process as annealing with a quenching treatment.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Composition shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM A751 or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.08
Manganese	--	2.00
Silicon	--	1.50
Phosphorus	--	0.045
Sulfur	--	0.030
Chromium	24.00	26.00
Nickel	19.00	22.00
Molybdenum	--	0.75
Copper	--	0.75

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 AMS2248.

3.2 Condition

Tubing shall be solution heat treated (see 2.3). Solution heat treatment shall be performed in an atmosphere yielding a bright finish. Alternately, product shall be passivated in accordance with AMS2700 to produce a uniform finish. Tubing shall be free from continuous carbide networking. It is permissible to pickle prior to passivation. Passivation may take place after any final finishing (see 3.3.3).

3.3 Fabrication

3.3.1 Tubing shall be produced by a seamless process. Finishing operations for removal of surface blemishes shall be performed prior to final solution heat treatment. A light polish to improve surface appearance may be employed after solution heat treatment, and if performed, the product shall be subsequently passivated.

3.3.2 Bore conditioning (see 2.3) is permitted after final anneal provided the tubing is not sized by metal removal methods beyond the allowable 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, neither metallic nor nonmetallic in nature.

3.3.3 Tubing shall be passivated in accordance with AMS2700 after any ID or OD finishing that occurs after solution heat treatment.

3.4 Properties

Tubing shall conform to the following requirements:

3.4.1 Tensile Properties

Tensile properties shall be as shown in Table 2, determined in accordance with ASTM A370.

Table 2A - Tensile properties, inch/pound units

Nominal OD Inches	Tensile Strength ksi, max	Elongation in 2 Inches %, min Strip	Elongation in 2 Inches %, min Full Tube
Up to 0.312, incl	105	35	40
Over 0.312	100	35	40

Table 2B - Tensile properties, SI units

Nominal OD Millimeters	Tensile Strength MPa, max	Elongation in 50 mm %, min Strip	Elongation in 50 mm %, min Full Tube
Up to 7.92, incl	724	35	40
Over 7.92	689	35	40

3.4.2 Flarability

Specimens as in 4.3.1 shall withstand flaring, without formation of cracks or other visible defects, by being forced axially at room temperature with steady pressure over a hardened and polished tapered steel pin having a 74-degree included angle to produce a flare having a permanent expanded OD not less than shown in Table 3.

Table 3A - Minimum flarability, inch/pound units

Nominal OD Inches	Expanded OD Inches	Nominal OD Inches	Expanded OD Inches
0.500	0.656	1.250	1.500
0.625	0.781	1.500	1.721
0.750	0.937	1.750	2.106
1.000	1.187	2.000	2.356

Table 3B - Minimum flarability, SI units

Nominal OD Millimeters	Expanded OD Millimeters	Nominal OD Millimeters	Expanded OD Millimeters
12.70	16.66	31.75	38.10
15.88	19.84	38.10	43.71
19.05	23.80	44.45	53.49
25.40	30.15	50.80	59.84

3.4.2.1 Tubing with nominal OD between any two standard sizes shown in Table 3 shall take the same percentage flare as shown for the larger of the two sizes.

3.4.3 Microstructure

Tubing shall reveal no continuous carbide precipitation when electrolytically etched in a 10% sodium cyanide solution and examined microscopically at 500X magnification. The presence of some discontinuous intergranular carbide precipitation shall not be cause for rejection if other technical requirements are met.

3.5 Quality

Tubing, as received by the purchaser, shall be uniform in quality and condition and shall have a finish conforming to the best practice for high-quality aircraft tubing. It shall be smooth and free from heavy scale or oxide, burrs, seams, tears, grooves, laminations, slivers, pits, and other imperfections detrimental to usage of the tubing. Surface imperfections, such as handling marks, straightening marks, light mandrel and die marks, and scale pattern, will not be considered injurious if the imperfections are removable within the tolerances specified for wall thickness, but removal of such imperfections is not required.

3.5.1 Tubing shall be free from grease or other foreign matter. Metallic flakes or particles shall not be collected by a clean, white cloth or plug drawn or blown through the bore of a 12-inch (30-cm) length of sample tube. Discoloration of the cloth, without the presence of flakes or particles, is acceptable. Alternate methods, as agreed with the purchaser, for evaluating tube cleanliness may be used for tubing 0.500 inch (12.7 mm) and under ID.

3.5.2 When specified by the purchaser, tubing shall be subjected to fluorescent penetrant inspection in accordance with ASTM E1417/E1417M, to ultrasonic inspection in accordance with AMS2634, to electromagnetic (eddy current) testing in accordance with ASTM E426, or to any combination thereof. Tubing shall meet acceptance criteria established by the cognizant engineering organization.

3.5.3 When no inspection is specified by the purchaser, tubing shall be subjected to either ultrasonic or eddy current inspection in accordance with ASTM A1016/A1016M, except that suspect indications shall not be accepted based on visual observation; i.e., indications must be either rejected or reconditioned and retested to pass the test. Alternate methods of inspection may be performed when approved by the cognizant engineering organization for tube 0.25 inch (0.64 cm) and under in nominal diameter.

3.6 Tolerances

Tolerances shall conform to all applicable requirements of AMS2243 for hydraulic tubing.

3.7 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.4.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of tubing shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the tubing conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (see 3.1), tensile properties (see 3.4.1), microstructure (see 3.4.3), cleanliness of tubing (see 3.5.1), nondestructive inspection when specified (see 3.5.2), and tolerances (see 3.6) are acceptance tests and shall be performed on each heat or lot as applicable.

4.2.1.1 Nondestructive inspection (see 3.5.3) shall be performed on each finished length of tube or as specified (see 3.5.2). Inspection per 3.5.3 shall become effective 1 year after publication of this document.