



AEROSPACE MATERIAL SPECIFICATION

AMS5561™

REV. H

Issued	1974-12
Reaffirmed	2012-10
Revised	2021-10

Superseding AMS5561G

Steel, Corrosion and Heat-Resistant, Welded and Drawn or Seamless and Drawn
Tubing
9.0Mn - 20Cr - 6.5Ni - 0.28N
High-Pressure Hydraulic
(Composition similar to UNS S21900)

RATIONALE

AMS5561 has been revised and updated to comply with the SAE Five-Year Review policy. The revised document prohibits unauthorized exceptions (3.7, 4.4.1, 5.2.1, 8.5), updates composition testing (3.1), specifies passivation (3.3.1), updates cleanliness testing (3.5.2), revises NDT specification (3.5.4), adds country of origin (4.4), and allows prior revisions (8.4).

1. SCOPE

1.1 Form

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

1.2 Application

This tubing has been used typically for parts, such as fluid lines, subject to high pressures and requiring corrosion resistance, but usage is not limited to such applications. Tubing has good oxidation resistance up to 1100 °F (593 °C).

1.3 Classification

1.3.1 Tubing, covered by this specification, is classified by form of fabrication as follows:

Type 1 - Welded and drawn

Type 2 - Seamless and drawn

1.3.1.1 If no type is specified, Type 1 shall be supplied.

1.3.2 Tubing, covered by this specification, is classified by quality evaluation as follows:

Class 1 - 0.125 inch (3.18 mm) length Ultrasonic Calibration

Class 2 - 0.060 inch (1.52 mm) length Ultrasonic Calibration

Class 3 - Ultrasonic testing not required

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1.3.2.1 If no class or Class 1 is specified, Class 1 or Class 2 may be supplied. If Class 3 is specified, any of the three classes may be supplied.

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.

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
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
ARP1917	Clarification of 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, or www.astm.org.

ASTM A262	Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
ASTM A370	Mechanical Testing of Steel Products
ASTM A751	Chemical Analysis of Steel Products
ASTM A1016/ASTM A1016M	General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes
ASTM E112	Determining Average Grain Size
ASTM E426	Electromagnetic (Eddy-Current) Examination of Seamless and Welded Tubular Products, Titanium, Austenitic Stainless Steel and Similar Alloys

2.3 ASME Publications

Available from ASME International, 22 Law Drive, Box 2900, Fairfield, NJ 07007-2900 or www.asme.org.

ASME B46.1	Surface Texture
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3. TECHNICAL REQUIREMENTS

3.1 Composition

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

Table 1 - Composition

Element	Min	Max
Carbon	--	0.040
Manganese	8.00	10.00
Silicon	--	1.00
Phosphorus	--	0.030
Sulfur	--	0.030
Chromium	19.00	21.50
Nickel	5.50	7.50
Nitrogen	0.15	0.40
Molybdenum	--	0.75
Copper	--	0.75

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Condition

Cold drawn and pickled as required or passivated.

3.3 Fabrication

Type 1 tubing shall be produced by drawing of welded hollows, and Type 2 tubing shall be produced by drawing of seamless hollows. Tensile properties shall be obtained by cold working and not by heat treatment (annealing). The external and internal surface finishes shall be not rougher than 32 μin (0.8 μm) and 63 μin (1.6 μm) respectively, determined in accordance with ASME B46.1, and may be produced by any method yielding the specified surface condition and which will not affect limits of wall thickness or corrosion resistance, with the exception that centerless ground finish is not acceptable. Type 1 tubing shall be processed to remove the bead and any dimensional indication of the presence of welds. A light polish to improve surface appearance or meet surface finish requirements may be employed.

3.3.1 Tubing shall be passivated in accordance with AMS2700 after any ID or OD finishing that occurs after cold drawing.

3.4 Properties

Tubing shall conform to the following requirements:

3.4.1 Tensile Properties

Shall be as shown in Table 2, except as permitted by 3.4.1.1, determined in accordance with ASTM A370.

Table 2 - Tensile Properties

Property	Value
Tensile Strength	142 to 162 ksi (979 to 1117 MPa)
Yield Strength at 0.2% Offset, Minimum	120 ksi (827 MPa)
Elongation in 2 Inches (50 mm), Minimum	20%

3.4.1.1 Tubing under 0.50 inch (12.7 mm) in nominal OD and having wall thickness of 0.020 inch (0.51 mm) or under may have elongation as low as 16%.