



AEROSPACE MATERIAL SPECIFICATION

AMS5559™**REV. K**

Issued 1958-01
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Revised 2021-12

Superseding AMS5559J

Steel, Corrosion and Heat-Resistant, Welded Tubing
18Cr - 10.5Ni - 0.40Ti (SAE 30321)
Thin Wall, Solution Heat Treated
(Composition similar to UNS S32100)

RATIONALE

AMS5559K prohibits unauthorized exceptions (3.7, 4.4.5, 5.2.1, 8.4), updates composition specification (3.1), revises condition (3.2) and fabrication (3.3, 8.2.1, 8.2.2), updates tensile testing minimum size and method update (3.4.1.1, 3.4.1.2, 8.6), revises hydrostatic test method consistent with other committees (3.4.5.1), adds quality and non-destructive test provisions (3.5.6, 4.2.1, 4.4.2, 4.4.3), requires melter identification (4.4), clarifies marking (5.2), allows prior revisions (8.3), and is the result of a Five-Year Review and update of this specification.

1. SCOPE

1.1 Form

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

1.2 Application

This tubing has been used typically for high pressure air ducting requiring both corrosion and heat resistance, especially when such ducting is welded during fabrication, and when the wall thickness is approximately 2% of the OD or less, 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.

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

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Full document details: **SAE AMS5559K**

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Documents

Document Sharing Hub

AMS2634	Ultrasonic Inspection, Thin Wall Metal Tubing
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
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications
AS4194	Sheet and Strip Surface Finish Nomenclature

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 A262	Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
ASTM A370	Mechanical Testing of Steel Products
ASTM A480/A480M	Flat-Rolled Stainless and Heat-Resisting Steel, Plate, Sheet, and Strip
ASTM A751	Chemical Analysis of Steel Products
ASTM E1742/E1742M	Radiographic Examination

3. TECHNICAL REQUIREMENTS

3.1 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 purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.08
Manganese	--	2.00
Silicon	0.40	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	17.00	19.00
Nickel	9.00	12.00
Titanium	5x(C+N)	0.70
Molybdenum	--	0.75
Copper	--	0.75
Nitrogen	--	0.10

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Condition

Solution heat treated (see 8.2.1). 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. It is permissible to pickle prior to passivation. Passivation may take place after any final finishing (see 3.3.3). Tubing shall have been cold worked sufficiently to meet the dimensional requirements of 3.5.4 and 3.6.3.

3.3 Fabrication

3.3.1 Tubing shall be machine fusion welded, shall contain no more than one longitudinal weld, and no circumferential welds. Tube ends shall be cut square and deburred. Tubing, except for the weld reinforcement, shall have a surface appearance in accordance with ASTM A480/A480M and AS4194 comparable to a No. 2D sheet finish.

3.3.2 Bore conditioning is permitted after final heat treatment provided the tubing is not sized by metal removal methods beyond the allowable tolerances. (see 8.2.2). 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; tensile and bend testing shall be performed in accordance with ASTM A370:

3.4.1 Tensile Properties

Shall be as shown in Table 2.

Table 2A - Minimum tensile properties, inch/pound units

Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches, % Strip Specimen (4.3.1)	Elongation in 2 Inches, % Full Section
75 to 105	35.0	35	40

Table 2B - Minimum tensile properties, SI units

Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50 mm, % Strip Specimen (4.3.1)	Elongation in 50 mm, % Full Section
517 to 724	241	35	40

3.4.1.1 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 (or mm/mm/min) or equivalent crosshead speed as a function of gage length.

3.4.1.2 For tubing with an OD less than 1/8 inch (3.2mm) or wall thickness under 0.015 inch (0.38mm), alternate testing and acceptance methods may be agreed between the purchaser and the supplier (see 8.6)

3.4.2 Bending

A specimen as in 4.3.2 shall withstand, without showing cracks or other imperfections when examined using 8 to 12X magnification, bending at room temperature flat on itself with axis of bend perpendicular to axis of weld and bend of tube on either inside or outside of bend.