

AEROSPACE MATERIAL SPECIFICATION

SAE AMS5563

REV. C

Issued 1985-07
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Reaffirmed 2012-10

Superseding AMS5563B

Steel, Corrosion Resistant, Seamless or Welded Tubing
19Cr - 9.5Ni (SAE 30304)
Cold Drawn, ¼ Hard Temper
(Composition similar to UNS S30400)

RATIONALE

AMS5563C has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Form:

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

1.2 Application:

This tubing has been used typically in the fabrication of parts requiring good corrosion resistance, but usage is not limited to such applications. This tubing is not suitable for use in applications requiring flaring or sharp bends. Welding or other exposure over 800 °F (427 °C) during fabrication may impair corrosion resistance.

1.3 Classification:

Tubing covered by this specification is classified as follows:

Type 1 - Seamless and drawn

Type 2 - Welded and drawn

1.3.1 Unless a specific type is ordered, either Type 1 or Type 2 may be supplied.

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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, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2243	Tolerances, Corrosion and Heat-Resistant Steel Tubing
MAM 2243	Tolerances, Metric, Corrosion and Heat-Resistant Steel Tubing
AMS 2248	Chemical Check Analysis Limits, Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2634	Ultrasonic Inspection, Thin Wall Metal Tubing
AMS 2807	Identification, Carbon and Low-Alloy Steels, Corrosion and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM A 370	Mechanical Testing of Steel Products
ASTM E 353	Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys
ASTM E 426	Electromagnetic (Eddy-Current) Testing of Seamless and Welded Tubular Products, Austenitic Stainless Steel and Similar Alloys
ASTM E 1417	Liquid Penetrant Examination

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 – Composition

Element	min	max
Carbon	--	0.08
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.045
Sulfur	--	0.030
Chromium	18.00	20.00
Nickel	8.00	11.00
Molybdenum	--	0.75
Copper	--	0.75

3.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2248.

3.2 Condition:

Solution heat treated, cold drawn and pickled as required or passivated.

3.3 Fabrication:

Tubing shall be produced by either a seamless and drawn process or a welded and drawn process. The specified tensile properties shall be obtained by cold working and not by heat treatment (annealing). Surface finishes may be produced by pickling, bright annealing, or any method which will provide the required surface condition and which will not affect the limits for wall thickness or corrosion resistance, with the exception that centerless, grinding is not acceptable. A light polish to improve external surface appearance may be employed.

3.3.1 Welded tubing (Type 2) shall be cold reduced after welding to remove any dimensional indication of the presence of welds.

3.4 Properties:

Tubing shall conform to the following requirements:

3.4.1 Tensile Properties: Shall be as shown in Table 2, determined in accordance with ASTM A 370.

TABLE 2A - Minimum Tensile Properties, Inch/Pound Units

Nominal OD Inches	Tensile Strength ksi	Yield Strength at 2% Offset ksi	Elongation in 2 Inches Strip %	Elongation in 2 Inches Full Tube %
Up to 5/16, incl	120	75	10	12
Over 5/16	120	75	12	15

TABLE 2B - Minimum Tensile Properties, SI Units

Nominal OD Millimeters	Tensile Strength MPa	Yield Strength at 2% Offset MPa	Elongation in 50.8 mm Strip %	Elongation in 50.8 mm Full Tube %
Up to 7.9, incl	827	517	10	12
Over 7.9	827	517	12	15

3.5 Quality:

Tubing, as received by 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, shallow pits, and scale pattern will not be considered injurious if the imperfections are removable within the tolerances specified for wall thickness; 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 on a clean white cloth drawn through the bore of a sample tube. Discoloration of the cloth, without the presence of flakes or particles, is acceptable.
- 3.5.2 When specified by purchaser, tubing shall be subjected to fluorescent penetrant inspection in accordance with ASTM E 1417, to ultrasonic inspection in accordance with AMS 2634, to electromagnetic (eddy-current) testing in accordance with ASTM E 426, or to any combination thereof. Tubing shall meet criteria established by the cognizant engineering organization.

3.6 Tolerances:

Shall conform to all applicable requirements of AMS 2243 or MAM 2243.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of tubing shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. 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:

All technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2371 except as specified in 4.3.1 and 4.3.1.1.

4.3.1 A statistical sampling plan, acceptable to purchaser, may be used in lieu of sampling as in 4.3 and the report of 4.4 shall state that such plan was used.

4.4 Reports:

The vendor of tubing shall furnish with each shipment a report showing the following results of tests and relevant information:

4.4.1 For each heat:

Composition.

4.4.2 For each lot:

Tensile properties
Fluorescent penetrant inspection, if specified
Ultrasonic inspection, if specified
Eddy-current inspection, if specified.

4.4.3 A statement that the product conforms to the other technical requirements.

4.4.4 Purchase order number Heat and lot numbers AMS 5563C Size Quantity.