



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 5572D

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STEEL TUBING, SEAMLESS, CORROSION AND HEAT RESISTANT
25Cr - 20Ni (SAE 30310)

1. SCOPE:

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

1.2 Application: Primarily for parts and assemblies requiring both corrosion and heat resistance, especially when such parts and assemblies are welded during fabrication. For parts and assemblies requiring oxidation resistance up to 2000°F (1095°C), but useful at that temperature only when stresses are low.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2243 - Tolerances, Corrosion and Heat Resistant Steel Tubing

AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys

AMS 2350 - Standards and Test Methods

AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM A370 - Mechanical Testing of Steel Products

ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

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3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Carbon	--	0.08
Manganese	--	2.00
Silicon	--	0.75
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	24.00 - 26.00	
Nickel	19.00 - 22.00	
Molybdenum	--	0.75
Copper	--	0.50

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

3.2 Condition: Solution heat treated free from continuous carbide network and descaled.

3.3 Fabrication: Tubing shall be produced by a seamless process. Any surface finishing operation applied to remove objectionable pits and 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. Passivation treatment shall follow any polishing operation.

3.4 Properties: Tubing shall conform to the following requirements:

3.4.1 Tensile Properties: Shall be as specified in Table I, determined in accordance with ASTM A370.

TABLE I

Nominal OD Inches	Tensile Strength psi, max	Elongation in 2 in. %, min	
		Strip	Full Tube
Up to 0.312, incl	105,000	35	40
Over 0.312	100,000	35	40

TABLE I (SI)

Nominal OD Millimetres	Tensile Strength MPa, max	Elongation in 50 mm %, min	
		Strip	Full Tube
Up to 7.92, incl	724	35	40
Over 7.92	690	35	40

3.4.2 Flarability: Tubing 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 deg included angle to produce a flare having a permanent expanded OD not less than specified in Table II.

TABLE II

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 II (SI)

Nominal OD Millimetres	Expanded OD Millimetres	Nominal OD Millimetres	Expanded OD Millimetres
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 II shall take the same percentage flare as shown for the larger of the two sizes.

3.4.2.2 Flarability requirements for tubing having nominal OD less than 0.500 in. (12.70 mm) or greater than 2.000 in. (50.80 mm) shall be as agreed upon by purchaser and vendor.

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 tubing. It shall be smooth, clean, and free from heavy scale or oxide, burrs, seams, tears, grooves, laminations, slivers, pits, and other injurious conditions. 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 but removal of such surface imperfections is not required.

3.6 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight tubing will be acceptable in mill lengths of 6 - 20 ft (1.8 - 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.7 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2243.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of tubing shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the tubing conforms to the requirements of this specification.

4.2 Classification of Tests:

- 4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), condition (3.2), tensile properties (3.4.1), and tolerances (3.7) are classified as acceptance tests and shall be performed on each lot.
- 4.2.2 Periodic Tests: Tests to determine conformance to requirements for flarability (3.4.2) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.
- 4.3 Sampling: Shall be in accordance with AMS 2371 and the following:
- 4.3.1 Specimens for flarability test (3.4.2) shall be full tubes or sections cut from tubes. The end of the specimen to be flared shall be cut square, with the cut end smooth and free from burrs, but not rounded.
- 4.4 Reports:
- 4.4.1 The vendor of tubing shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of each heat and for tensile properties of each size from each heat. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat.
- 4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of tubing, part number, and quantity. When tubing for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of tubing to determine conformance to the requirements of this specification, and shall include in the report a statement that the tubing conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.
- 4.5 Resampling and Retesting: Shall be in accordance with AMS 2371.
5. PREPARATION FOR DELIVERY:
- 5.1 Identification: Tubing shall be identified as follows:
- 5.1.1 Straight Tubes 0.029 In. (0.74 mm) and Over in Nominal Wall Thickness and 0.500 In. (12.70 mm) and Over in Nominal OD, Minor Axis, or Least Width of Flat Surface: Shall be marked in a row of characters recurring at intervals not greater than 3 ft (914 mm) with AMS 5572D, heat number, manufacturer's identification, and nominal wall thickness. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be removable in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the tubing or its performance and shall be sufficiently stable to withstand normal handling.
- 5.1.2 Straight Tubes Under 0.029 In. (0.74 mm) in Nominal Wall Thickness or Under 0.500 In. (12.70 mm) in Nominal OD, Minor Axis, or Least Width of Flat Surface: Shall be securely bundled and identified by a durable tag marked with the information of 5.1.1 and the nominal OD and attached to each bundle or shall be boxed and the box marked with the same information.
- 5.1.3 Coiled Tubing: Shall be securely bundled and identified by a durable tag marked with the purchase order number, AMS 5572D, heat number, nominal OD and wall thickness, and manufacturer's identification and attached to each coil or shall be boxed and the box marked with the same information.