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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5572F

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Superseding AMS 5572E

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

UNS S31008

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 requiring both corrosion and heat resistance and especially when such parts are welded during fabrication. For parts requiring oxidation resistance up to 2000°F (1093°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 shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

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, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock
AMS 2632 - Ultrasonic Inspection of Thin Materials, 0.5 Inch (13 mm) and Thinner
AMS 2645 - Fluorescent Penetrant Inspection

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

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

2.3.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, Ø determined by wet chemical methods in accordance with ASTM E353, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	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 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 Inches %, minimum	
		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 50.8 mm %, minimum	
		Strip	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 degrees 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 under 0.500 inch (12.70 mm) or over 2.000 inches (50.80 mm) in nominal OD shall be as agreed upon by purchaser and vendor.

3.4.3 Microstructure: Tubing shall reveal no continuous carbide precipitation Ø 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 of this specification are meet.

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 but removal of such imperfections is not required.

3.5.1 Tubing shall be free from grease or other foreign matter. Metallic flakes Ø or particles shall not be collected by a clean, white cloth when it is drawn through the length of 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 Ø penetrant inspection in accordance with AMS 2645, to ultrasonic inspection in accordance with AMS 2632, to electromagnetic (eddy-current) testing in accordance with ASTM E426, or to any combination thereof. Standards for acceptance shall be as agreed upon by purchaser and vendor.

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 feet (1.8 - 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 feet (3 m).

3.7 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 performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the tubing conforms to the requirements of this specification.