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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5563

Issued 7-1-85
Revised

STEEL TUBING, SEAMLESS AND WELDED, CORROSION RESISTANT
19Cr - 9.5Ni (SAE 30304)
Cold Drawn, Quarter-Hard Temper

UNS S30400

1. SCOPE:

1.1 Form: This specification covers a corrosion-resistant steel in the form of two types of tubing.

1.2 Application: Primarily for use in the fabrication of aircraft structural parts requiring good corrosion resistance. This tubing is not suitable for use in applications requiring flaring or sharp bends. Welding or other exposure over 800°F (425°C) during fabrication may impair the 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 Either Type 1 or Type 2 may be supplied unless a specific type is specified by purchaser.

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

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

2.3.1 Military Specifications:

MIL-H-6875 - Heat Treatment of Steels, Process for

2.3.2 Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage
MIL-STD-753 - Corrosion-Resistant Steel Parts, Sampling, Inspection and Testing for Surface Passivation

3. TECHNICAL REQUIREMENTS:

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

	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 requirements of AMS 2248.

3.2 Condition: Solution heat treated free from continuous carbide network in accordance with MIL-H-6875 and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled, and cold worked to obtain the tensile properties of 3.4.1.

3.3 Fabrication: Tubing shall be produced by either a seamless or a welded and drawn process. The external and internal surfaces 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 a centerless ground finish is not acceptable. A light polish to improve surface appearance is permissible. Passivation shall follow any polishing treatment. Surfaces shall be passive, determined in accordance with MIL-STD-753, Methods 102 and 103.

3.3.1 Welded tubing (Type 2) shall be processed to remove the bead and 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 specified in Table I, determined in accordance with ASTM A370.

TABLE I

Nominal OD Inches	Tensile Strength psi, min	Yield Strength at 2% Offset psi, min	Elongation in 2 in. %, min	
			Strip	Full Tube
Up to 5/16, incl	120,000	75,000	10	12
Over 5/16	120,000	75,000	12	15

TABLE I (SI)

Nominal OD Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50 mm %, min	
			Strip	Full Tube
Up to 8, incl	825	515	10	12
Over 8	825	515	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, clean, 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.

3.6 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight tubes will be acceptable in mill lengths of 6 to 20 ft (2 to 6 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (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.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling: Shall be in accordance with AMS 2371 except as specified in 4.3.1.

4.3.1 When a statistical sampling plan and acceptance quality level (AQL) have been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3 and the report of 4.4.1 shall state that such plan was used.

4.3.1.1 For direct U.S. Military procurement, sampling shall be in accordance with MIL-STD-105, Sampling for Normal Inspection, Special Inspection Level S-4, with an AQL of 1.5. Sample unit shall be one length of tubing.

4.4 Reports:

4.4.1 The vendor of tubing shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for tensile properties of each lot and stating that the tubing conforms to the other technical requirements of this specification. This report shall include the purchase order number, heat number, AMS 5563, size, type of tubing (Type 1 or Type 2), and quantity from each heat.