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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5573J

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Submitted for recognition as an American National Standard

Superseding AMS 5573H

STEEL, CORROSION AND HEAT RESISTANT, SEAMLESS TUBING
17Cr - 12.5Ni - 2.5Mo (SAE 30316)
Solution Heat Treated

UNS S31600

1. SCOPE:

1.1 Form:

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

1.2 Application:

This tubing has been used typically for parts requiring resistance to corrosion and pitting and heat resistance up to 1600 °F (871 °C), but usage is not limited to such applications. At elevated temperatures, strength of this steel is slightly higher than, and oxidation resistance similar to, that of 18-8 type steels.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

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 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

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM A 262	Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
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

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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

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	1.25	2.00
Silicon	--	1.00
Phosphorus	--	0.04
Sulfur	--	0.03
Chromium	16.00	18.00
Nickel	10.00	14.00
Molybdenum	2.00	3.00
Copper	--	0.75

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

3.2 Condition:

(R)

Solution heat treated, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, pickled as required or passivated, free from continuous carbide network.

3.3 Fabrication:

(R)

Tubing shall be produced by a seamless process. Finishing operations for removal of 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.

3.4 Properties:

The product shall conform to the following requirements; tensile testing shall be performed in accordance with ASTM A 370:

3.4.1 Tensile Properties: Shall be as specified in Table 2.

TABLE 2A - Tensile Properties, Inch/Pound Units

Nominal OD Inches	Nominal Wall Thickness Inch	Tensile Strength ksi, max	Elongation in 2 inches %, min Strip	Elongation in 2 inches %, min Full Tube
Up to 0.188, incl	Up to 0.016, incl	115	--	35
	Over 0.016	100	--	40
Over 0.188 to 0.500, incl	Up to 0.010, incl	110	32	37
	Over 0.010	100	35	40
Over 0.500	Up to 0.010, incl	100	27	32
	Over 0.010	100	30	35

TABLE 2B - Tensile Properties, SI Units

Nominal OD Millimeters	Nominal Wall Thickness Millimeters	Tensile Strength MPa, max	Elongation in 50.8 mm %, min Strip	Elongation in 50.8 mm %, min Full Tube
Up to 4.78, incl	Up to 0.41, incl	793	--	35
	Over 0.41	689	--	40
Over 4.78 to 12.70, incl	Up to 0.25, incl	758	32	37
	Over 0.25	689	35	40
Over 12.70	Up to 0.25, incl	689	27	32
	Over 0.25	689	30	35

3.4.2 Flarability: Specimens as in 4.3.1 shall withstand flaring at room temperature, without formation of cracks or other visible defects, by being forced axially with steady pressure over a hardened and polished tapered steel pin having a 74-degree included angle to produce a flare having a permanent expanded OD not less than specified in Table 3.

TABLE 3A - Minimum Flarability, Inch/Pound Units

Nominal OD Inches	Expanded OD Inches	Nominal OD Inches	Expanded OD Inches
0.125	0.200	0.750	0.937
0.188	0.302	1.000	1.187
0.250	0.359	1.250	1.500
0.312	0.421	1.500	1.721
0.375	0.484	1.750	2.106
0.500	0.656	2.000	2.356
0.625	0.781		

TABLE 3B - Minimum Flarability, SI Units

Nominal OD Millimeters	Expanded OD Millimeters	Nominal OD Millimeters	Expanded OD Millimeters
3.18	5.08	19.05	23.80
4.78	7.67	25.40	30.15
6.35	9.12	31.75	38.10
7.92	10.69	38.10	43.71
9.52	12.29	44.45	53.49
12.70	16.66	50.80	59.84
15.88	19.84		

3.4.2.1 Tubing with nominal OD between any two standard sizes given in Table 3 shall take the same percentage flare as that for the larger of the two sizes.

3.4.3 Susceptibility to Intergranular Attack: Specimens from the product shall pass the intergranular corrosion test of ASTM A 262, Practice E.

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 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 (R) When specified, 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 the requirements of 3.5 and other acceptance 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 performing all required tests. 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:

4.2.1 (R) Acceptance Tests: Composition (3.1), tensile properties (3.4.1), cleanliness of tubing (3.5.1), nondestructive inspection of tubing when specified (3.5.2), and tolerances (3.6) are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 (R) Periodic Tests: Flarability (3.4.2) and susceptibility to intergranular attack (3.4.3) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.