SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

AMS 5571H

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Superseding AMS 5571G

Steel, Corrosion and Heat-Resistant, Seamless Tubing 18Cr - 10.5Ni - 0.70Cb (Nb) (SAE 30347) Solution Heat Treated

(Composition similar to UNS S34700)

RATIONALE

AMS 5571H is a Five Year Review and update of this specification.

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 both corrosion and heat resistance, especially when such parts are welded during fabrication, but usage is not limited to such applications. Also for parts requiring oxidation resistance up to 1500 °F (816 °C), but useful at that temperature only when stresses are low.

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 International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS 2243	Tolerances, 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 2632	Ultrasonic Inspection of Thin Materials, 0.5 Inch (13 mm) and Thinner
AMS 2645	Fluorescent Penetrant Inspection
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 International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

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

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	0.30	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	17.00	19.00
Nickel	9.00	12.00
Columbium (Niobium)	10XC	1.10
Molybdenum	--	0.75
Tantalum	--	0.05
Copper	--	0.75

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS 2248.

3.2 Condition

Solution heat treated 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.

3.4 Properties

Tubing shall conform to the following requirements; tensile and flarability testing shall be performed in accordance with ASTM A 370:

3.4.1 Tensile Properties

Shall be as shown in Table 2.

TABLE 2A - TENSILE PROPERTIES, INCH/POUND UNITS

Nominal OD Inches	Wall Thickness Inches	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	120	-	33
	Over 0.016	105	-	35
Over 0.188 to 0.500, incl	Up to 0.010, incl	115	30	35
	Over 0.010	105	30	35
Over 0.500	Up to 0.010, incl	120	25	30
	Over 0.010	105	30	35

TABLE 2B - TENSILE PROPERTIES, SI UNITS

Nominal OD mm	Wall Thickness mm	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	827	-	33
	Over 0.41	724	-	35
Over 4.78 to 12.70, incl	Up to 0.25, incl	793	30	35
	Over 0.25	724	30	35
Over 12.70	Up to 0.25, incl	827	25	30
	Over 0.25	724	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 - 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 - FLARABILITY, SI UNITS

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

3.4.2.2 Flarability requirements for tubing over 2.000 inches (50.80 mm) or under 0.125 inch (3.18 mm) in nominal OD shall be as agreed upon by purchaser and vendor.

3.4.3 Susceptibility to Intergranular Attack

Tubing, after sensitizing treatment in accordance with ASTM A 262, Practice E, shall pass the intergranular corrosion test performed in accordance with 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 are acceptable if the imperfections are removable within the tolerances specified for wall thickness.

3.5.1 Tubing shall be free from grease or other foreign matter. Metallic flakes or particles shall not be collected by a clean white cloth 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 penetrant inspection in accordance with AMS 2645, to ultrasonic inspection in accordance with AMS 2632, to electromagnetic (Eddy-Current) testing in accordance with ASTM E 426, or to any combination thereof. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.6 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 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.