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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5580J

Issued DEC 1939
Revised DEC 2000

Superseding AMS 5580H

Nickel Alloy, Corrosion and Heat Resistant, Seamless Tubing
74Ni - 15.5Cr - 8.0Fe
Annealed

UNS N06600

1. SCOPE:

1.1 Form:

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

1.2 Application:

This tubing has been used typically for parts requiring corrosion and oxidation resistance up to 2000 °F (1093 °C), particularly where such parts may require welding during fabrication, but usage is not limited to such applications.

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

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 2263	Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Tubing
MAM 2263	Tolerances, Metric, Nickel, Nickel Alloy, and Cobalt Alloy Tubing
AMS 2269	Chemical Check Analysis Limits, Nickel, Nickel Alloys and Cobalt Alloys
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2807	Identification, Carbon and Low-Alloy Steels, Corrosion and Heat Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 8 Tension Testing of Metallic Materials
ASTM E 8M Tension Testing of Metallic Materials (Metric)
ASTM E 354 Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt 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 354, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Carbon	--	0.15
Manganese	--	1.00
Silicon	--	0.50
Sulfur	--	0.015
Chromium	14.00	17.00
Nickel	72.00	--
Iron	6.00	10.00
Cobalt	--	1.00
Columbium	--	1.00
Titanium	--	0.50
Aluminum	--	0.35
Copper	--	0.50

3.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2269.

3.2 Condition:

Tubing shall be supplied in the following condition:

3.2.1 Tubing 6.625 inches (168.28 mm) and under in nominal OD with nominal wall thickness 0.382 inch (9.70 mm) and under shall be cold drawn, annealed, and unless anneal is performed in an atmosphere yielding a bright finish, pickled as required.

3.2.2 Tubing over 6.625 inches (168.28 mm) in nominal OD or over 0.382 inch (9.70 mm) in nominal wall thickness shall be hot finished and annealed, and unless anneal is performed in an atmosphere yielding a bright finish, pickled as required.

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 anneal. A light polish to improve external surface appearance may be employed after anneal.

3.4 Properties:

Tubing shall conform to the following requirements:

3.4.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E 8 or ASTM E 8M.

3.4.1.1 Cold Drawn and Annealed: Shall be as shown in Table 2.

TABLE 2A - Minimum Tensile Properties, Inch/Pound Units

Nominal OD Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 inches or 4D %
Up to 5.000, incl	80.0	35.0	30
Over 5.000 to 6.625, incl	80.0	30.0	35

TABLE 2B - Minimum Tensile Properties, SI Units

Nominal OD Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 127.00, incl	552	241	30
Over 127.00 to 168.28, incl	552	207	35

3.4.1.2 Hot Finished and Annealed: Shall be as shown in Table 3.

TABLE 3A - Minimum Tensile Properties, Inch/Pound Units

Nominal OD Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 inches or 4D %
2.500 to 5.000, incl	80.0	30.0	35
Over 5.000 to 9.250, incl	75.0	25.0	35

TABLE 3B - Minimum Tensile Properties, SI Units

Nominal OD Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
63.50 to 127.00, incl	552	207	35
Over 127.00 to 234.95, incl	517	172	35

3.4.2 Flarability: Specimens as in 4.3.1 from cold drawn tubing with nominal OD of 0.188 to 2.000 inches (4.78 to 50.80 mm), inclusive, having nominal wall thickness of 0.125 inch (3.18 mm) and under shall withstand, without formation of cracks or other visible defects, flaring at room temperature 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 1.2 times the original nominal OD.

3.5 Quality:

3.5.1 Cold drawn and annealed 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 grease, oil and other foreign matter, 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.

3.5.2 Hot finished and annealed tubing, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the tubing.

3.6 Tolerances:

Shall be as follows:

3.6.1 Cold Drawn and Annealed Tubing: Shall conform to all applicable requirements of AMS 2263 or MAM 2263.

3.6.2 Hot Finished and Annealed Tubing:

3.6.2.1 Length and Straightness: Shall conform to all applicable requirements of AMS 2243 or MAM 2243.

3.6.2.2 Diameter and Wall Thickness: Shall be as shown in Table 4.

TABLE 4A - Tolerances, Inch/Pound Units

Nominal OD Inches	OD Tolerance Inch Plus and Minus	Wall Thickness Tolerance % of Nominal Wall Thickness Plus and Minus
2.500 to 5.000, excl	0.031	12.5
5.000 to 9.250, incl	0.047	12.5

TABLE 4B - Tolerances, SI Units

Nominal OD Millimeters	OD Tolerance Millimeters Plus and Minus	Wall Thickness Tolerance % of Nominal Wall Thickness Plus and Minus
63.50 to 127.00, excl	0.79	12.5
127.00 to 234.95, incl	1.19	12.5

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.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), tensile properties (3.4.1), and tolerances (3.6) are acceptance tests and shall be performed on each heat or lot as applicable.