

AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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STEEL TUBING, CORROSION RESISTANT
Welded
18 Chromium 8 Nickel

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1. ACKNOWLEDGMENT: Vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.
2. USE: The material covered by this specification is intended for use in hydraulic systems.
3. COMPOSITION:

Carbon	0.10 max
Manganese	.020 - 2.50
Silicon	0.20 - 1.50
Copper	0.50 max
Phosphorus	0.04 max
Sulphur	0.04 max
Chromium	17.00 min
Nickel	8.00 min

4. CONDITION: (a) Solution heat treated and pickled.
(b) Test pieces pulled at the rate of .05 inch per inch per minute shall conform to the following physical properties:

Tensile Strength, lb per sq in.	115,000 max
Elongation, % in 2 in., Strip	35 min
Elongation, % in 2 in., Full Section	40 min

(c) The tubing shall be capable of being flared without formation of cracks or other visible defects. Specimens for flaring may be cut from any portion of the tube, or an entire tube may be used as a specimen. The end of the specimen to be flared shall be cut square, with the cut end smooth and free from burrs, but not rounded. The specimen shall, at room temperature, be forced axially with steady pressure over a hardened and polished tapered steel pin having a 74° included angle, until the end of the specimen has been enlarged to the dimensions specified in the following table. The specimen and pin shall be clean and dry during test.

Tube Size Nominal O.D.	Expanded Dia. Minimum O.D.	Tube Size Nominal O.D.	Expanded Dia. Minimum O.D.
1/8	.224	5/8	.781
3/16	.312	3/4	.937
1/4	.359	1	1.187
5/16	.421	1-1/4	1.500
3/8	.484	1-1/2	1.721
1/2	.656	1-3/4	2.106
		2	2.356

4. CONDITION: (c) cont'd

After flaring the inside surface of the tubing must be smooth and show no evidence of a bead that might prevent the assembly of pressure tight joints.

(d) The tubing shall show no bulging, leaking, pinholes, or other defects when subjected to an internal hydrostatic pressure sufficient to cause a tensile stress of 10,000 pounds per square inch in the tubing wall.

(e) Seamless tubing may be supplied provided it meets all the requirements of this specification.

5. QUALITY: (a) The tubing shall have a good workmanlike finish conforming to the best practice for high quality aircraft material. It shall be smooth, clean, and free from burrs, seams, tears, grooves, laminations, slivers, pits, and other injurious defects. Surface imperfections such as handling marks, straightening marks, light mandrel and die marks, shallow pits, and scale pattern will not be considered as injurious defects, provided the imperfections are removable within the tolerances specified herein for diameter and wall thickness. The removal of surface imperfections is not required.

(b) Cleanliness of Tubing.-The tubing shall be free from grease or other foreign matter and shall have a good workmanlike finish. The inner bore of the tubing shall show no metallic flakes or particles when a clean white cloth is drawn through the length of the bore of a test sample. The presence of metallic flakes or particles on the cloth shall be cause for rejection. Discoloration of the cloth, without the presence of flakes or grit, shall not be cause for rejection.

(c) When tubing is fabricated by welding, it shall be so processed as to completely remove the bead and any dimensional indication of the presence of welds.

6. EMBRITTLMENT: The material shall be capable of meeting the following test, but the actual conducting of the test is an option of the purchaser:

Embrittlement test specimens shall withstand a 48-hour boiling under a reflux condenser in a 10% copper sulphate, 10% sulphuric acid solution without evidence of intercrystalline surface attack. After such immersion, full cross-section specimens shall then be flattened to a total thickness of three times the wall thickness of the material, and section specimens shall be bent around a diameter equal to the wall thickness. In either flattening or bending, the fold shall be made parallel to the axis of the tube.

7. TOLERANCES: The following variations in nominal outside diameter and wall thickness are permissible.

Nominal Dimensions		Variation from Nominal	
Outside diameter	Wall Thickness	Outside Diameter	Wall Thickness
Inches	Inches	Inches	Per Cent
0.5 and under	All Thicknesses	±0.004	±10
Over 0.5 to 1.0 Incl.	" "	±0.005	±10
Over 1.0	" "	±0.008	±10