

AERONAUTICAL MATERIAL SPECIFICATION

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STEEL TUBING, CORROSION RESISTANT WELDED

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1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. USE: The tubing covered by this specification is intended for use in hydraulic systems.

3. COMPOSITION:

Carbon	0.10 max
Manganese	0.20 - 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, psi	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	.234	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

After flaring, the inside surface of the tubing shall be smooth and shall 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 psi in the welded seam.

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

5. **QUALITY:** (a) The tubing shall be uniform in quality and temper, free from surface and internal defects and shall not reveal material defects during fabrication.

(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. **EMBRIITLEMENT:** The tubing shall be capable of meeting the following test at the 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:** Unless otherwise ordered, the following variations in nominal outside diameter and wall thickness are permissible.

Nominal Dimensions		Variations from Nominal	
Outside Diameter	Wall Thickness	Outside Diameter	Wall Thickness
Inch	Inch	Inch	Per Cent
0.5 and under	All Thicknesses	+ 0.004	+ 10
Over 0.5 to 1.0, inc.	" "	+ 0.005	+ 10
Over 1.0	" "	+ 0.008	+ 10