AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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STEEL TUBING, WELDED
0.08-0.13C (SAE 1010)
Annealed

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

2. TYPE: Electric-resistance-welded, shielded-arc-welded, or gas-welded.

3. APPLICATION: Parts requiring superior quality welded tubing suitable for severe forming and for welding and brazing.

4. COMPOSITION:

		Check Analysis Under Min or Over Max	
Carbon	0.08 - 0.13	0.02	0.03
Manganese	0.30 - 0.60	0.03	0.03
Phosphorus	0.040 max	--	0.01
Sulfur	0.050 max	--	0.01

5. CONDITION: Normalized or annealed.

5.1 Fabrication: Any surface finishing operation applied to remove objectionable pits and surface blemishes shall be performed prior to the last annealing. A light polish to improve surface appearance may be employed after annealing.

6. TECHNICAL REQUIREMENTS:

6.1 Tensile Properties:

Nominal Outside Diameter Inches	Elongation % in 2 in. Full Tube	Strip
0.50 and under	32	--
Over 0.50 to 5.50, incl	35	25

6.2 Crushing Test: One sample or more shall be selected from each 1000 feet or less from each lot of tubing in the shipment. Test specimens shall have a length equal to 1-1/2 times the nominal outside diameter and shall withstand crushing under a gradually applied load until the cross sectional dimension is increased in one zone by 20 per cent, or until one complete fold is formed, or until the specimen is reduced in length to 2/3 of the original length, without failure of the weld occurring.

6.3 Flarability: 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-degree included angle, to produce a flare having the permanent percentage OD increase specified in the following table.

Nominal Wall Thickness	% OD Increase
7% of OD and under	35 min
Over 7% of OD	45 min

6.4 Non-destructive Test: Each length of tubing shall be subjected to a non-destructive test by the tube manufacturer for the detection of injurious imperfections. The method of testing shall be capable of detecting all imperfections, interior and exterior, with a length greater than 1/16 inch and a total depth equivalent to half the nominal wall thickness of the tube.

7. QUALITY:

7.1 Tubing shall be suitable for use in aircraft, shall be uniform in condition, and shall not reveal defects during fabrication processes.

7.2 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 heavy scale or oxide, 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 for diameter and wall thickness. The removal of surface imperfections is not required.

7.3 Steel used for manufacture of tubing shall be of a quality satisfactory for fabrication of parts which may be subjected to a method of inspection which will disclose injurious tubing defects as defined in 7.2.

8. TOLERANCES: Unless otherwise specified, tolerances shall conform to the latest issue of AMS 2253 as applicable to Aircraft Type - Welded. Straightness tolerance shall conform to Table VIII and flash tolerances shall conform to the following:

8.1 The outside surface shall be free from welding flash and the maximum height of the inside flash shall not exceed 0.007 inch.