

# AIR BRAKE TUBING AND PIPE—SAE J844

SAE Standard

Report of Tube, Pipe, Hose and Lubrication Fittings Committee approved June 1963.

**Scope**—The following specifications cover minimum requirements for tubing or pipe used in automotive air brake systems. It covers corrosion precautions, installation, and material specifications.

**Corrosion Precautions**—Adequate provision shall be made to control corrosion due to galvanic coupling of widely dissimilar metals and alloys when dissimilar materials used for tubing, pipe, fittings, and attaching parts are in intimate contact with each other. Adequate provision shall be made to protect the tubing, pipe, and fittings from oxygen concentration cell type of corrosion. When soft nonmetallic cushions are used to prevent metal-to-metal contact between support clamps and the tubing, pipe, or fittings, the cushion shall be made of material which will not absorb and retain significant amounts of water.

**Installation**—Tubing or pipe shall be supported in such a manner as to minimize fatigue. Metal-to-metal contact should be avoided in order to control chafing and fretting. Soft nonmetallic cushions shall be used to protect the tubing or pipe from support clamps. Tubing or pipe shall be protected against road hazards either by installing in a protected location or by providing adequate shielding to protect vulnerable areas. Protecting loom, when used, shall be water and acid resistant.

## Material Specifications

### Copper Tubing

**Scope**—This material specification covers the minimum requirements for seamless annealed copper tubing manufactured for automotive air brake lines.

**Dimensions**—The tubing shall conform to the dimensions and tolerances listed below for the nominal diameter specified by the purchaser.

Nominal Size, in.	OD, in.	OD Tolerance, in.	Wall Thickness, min, in.
1/4	0.250	±0.002	0.0295
5/16	0.312	±0.002	0.0295
3/8	0.375	±0.002	0.0295
7/16	0.437	±0.002	0.0455
1/2	0.500	±0.002	0.0455
5/8	0.625	±0.002	0.0455
3/4	0.750	±0.0025	0.0455
1	1.000	±0.0025	0.0455

**Manufacture**—The tube shall be cold drawn to size and bright annealed as a final operation. The finished tube shall be clean and smooth, free from internal and external mechanical imperfections, corrosion, scale, seams, and cracks.

**Chemical Requirement**—The material shall conform to the following composition: Type DHP Copper—Copper, 99.90, min, %  
Phosphorus, 0.015, min, %  
0.040, max, %

**NOTE: Reference**—ASTM B 68-60, Specification for Seamless Copper Tube, Bright Annealed.

**Mechanical Requirement**—The tube shall conform to the following minimum mechanical properties:

Tensile Strength, psi, min—	30,000
Yield Strength, psi, min (at 0.5% extension under load) —	9,000
Elongation in 2 in., min, %— $\frac{3}{4}$ dia and under—	30
over $\frac{3}{4}$ dia—	40

Test specimens must be taken from tubing which has not been subjected to cold working.

The tubing shall be capable of being expanded, without visible cracking or rupture, on a hardened and ground steel mandrel having a 60 deg included angle until the outside diameter has been increased 40% over its original diameter.

The tubing shall be capable of withstanding a hydrostatic pressure equivalent to a yield strength of 9000 psi stress with no evidence of failure. The test pressure shall be determined by the following formula:

$$p = \frac{2 t s}{d}$$

Where p = Hydrostatic test pressure, psi  
t = Minimum wall thickness, in.  
s = 9000 psi stress  
d = Outside diameter, in.

The pressure at a yield strength of 9000 psi for minimum wall thicknesses allowed is as follows:

Nominal Size	Hydrostatic Test Pressure, psi	Nominal Size	Hydrostatic Test Pressure, psi
1/4	2100	1/2	1600
5/16	1700	5/8	1300
3/8	1400	3/4	1000
7/16	1800	1	800

Each length of tubing shall be tested at the maximum operating air pressure, as specified by the purchaser. The tubing shall show no leakage at the test pressure. An eddy current test may be substituted for the air pressure test, if the rejection limits are such that the hydrostatic and air pressure requirements can be guaranteed.

**Grain Size**—The tubing shall be furnished in either of two annealed tempers, as follows:

Temper	Grain Size, mm
Light Annealed	0.015–0.040
Soft Annealed	0.040 min