

**Seamless Copper Tube**

1. **Scope**—This SAE Standard covers minimum requirements for soft (061) annealed seamless copper tube intended for automotive and general purposes. (Comparable specification is ASTM B 75. Other copper tube is covered in SAE J463.)
  - 1.1 **Rationale**—This standard has not been updated in approximately fifteen years and is most likely considerably out of date. FCCTC—SC5 Metallic Tubing Subcommittee is not currently populated with members from the user or manufacturing community to offer expertise to accomplish this task. It is the FCCTC—SC5 Subcommittee decision to ballot this document for cancellation.
2. **References**
  - 2.1 **Applicable Publications**—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.
    - 2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).  
  
SAE J463—Wrought Copper and Copper Alloys
    - 2.1.2 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, [www.astm.org](http://www.astm.org).  
  
ASTM B 75—Specification for Seamless Copper Tube
3. **Manufacture**—The tube shall be cold drawn to size and after forming shall be annealed in such a manner as to produce a finished product which will meet all requirements of this document.
4. **Dimensions and Tolerances**—Tube furnished to this standard shall conform to the dimensional tolerances shown in Table 1 for the size of tube specified by the purchaser. (Standard nominal sizes are listed.)
5. **Quality**—The finished tube shall be clean, smooth, and round, free from internal and external mechanical imperfections, and shall have a bright appearance.

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TABLE 1—TUBING DIMENSIONS AND TOLERANCES

Nominal Tubing OD		Outside Diameter <sup>(1)</sup> Basic		Outside Diameter <sup>(2)</sup> Tolerance		Wall Thickness Basic		Wall Thickness <sup>(2)</sup> Tolerance	
mm	in	mm	in	± mm	± in	mm	in	± mm	± in
3.18	1/8	3.18	0.125	0.05	0.0020	0.76	0.030	0.08	0.0030
4.76	3/16	4.78	0.188	0.05	0.0020	0.76	0.030	0.063	0.0025
6.35	1/4	6.35	0.250	0.05	0.0020	0.76	0.030	0.063	0.0025
7.94	5/16	7.92	0.312	0.05	0.0020	0.81	0.032	0.063	0.0025
9.53	3/8	9.53	0.375	0.05	0.0020	0.81	0.032	0.063	0.0025
12.70	1/2	12.70	0.500	0.05	0.0020	0.81	0.032	0.063	0.0025
15.88	5/8	15.88	0.625	0.05	0.0020	0.89	0.035	0.063	0.0025
19.05	3/4	19.05	0.750	0.063	0.0025	0.89	0.035	0.063	0.0025

- The actual outside diameter shall be the average of the maximum and minimum outside diameters as described at any one cross section through the tubing.
- The tolerances listed represent the maximum permissible deviation at any point.

6. **Material**—Unless otherwise specified by purchaser, tube shall be made from any one of the materials listed in Table 2. (UNS C12200 is most commonly used.) Average grain size of the tube shall be 0.040 mm, minimum.

TABLE 2—CHEMICAL COMPOSITION, WEIGHT %

SAE Alloy No. <sup>(1)</sup>	UNS No. <sup>(2)</sup>	Similar ASTM Copper No. <sup>(3)</sup>	Copper, min	Phosphorus	Arsenic
CA102	C10200	102 (was OF)	99.95	—	—
CA120	C12000	120 (was DLP)	99.90	0.004–0.012	—
CA122	C12200	122 (was DHP)	99.90	0.015–0.040	—
—	—	142 (was DPA)	99.40	0.015–0.040	0.15–0.50

- SAE J463.
- Unified Numbering System.
- ASTM B 75.

7. **Mechanical Properties**—Tube shall conform to Table 3:

TABLE 3—MECHANICAL PROPERTIES

Ultimate Strength (Tensile), min	205 MPa (30 000 psi)
Yield Strength (Tensile), min <sup>(1)</sup>	62.0 MPa (9 000 psi)

- At 0.5% extension under load.

8. **Expansion Test**—Samples of tube (selected from sections which have not been subjected to cold working after anneal of the finished sized tube) shall be cut square and deburred. These shall be expanded on a hardened and ground tapered steel pin having an included angle of 60 degrees until the outside diameter is increased 40%. Care should be taken to keep the axes of the pin and the tube in line during the expansion operation. The test may be made in a die to restrict the expansion to 40%. The expanded tube shall show no cracking or rupture visible to the unaided eye.