

(R) SEAMLESS COPPER-NICKEL 90-10 TUBING

1. **Scope**—This SAE Standard covers seamless copper-nickel tubing for use in hydraulic brake pressure conductors, general automotive applications, and other similar uses.
2. **References**
 - 2.1 **Applicable Publication**—The following publication forms a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.
 - 2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J533—Flares for Tubing
SAE J1677—Tests and Procedures for SAE Low Carbon Steel and Copper Nickel Tubing
 - 2.2 **Related Publication**—The following publication is provided for information purposes only and is not a required part of this document.
 - 2.2.1 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 466M—Seamless Copper-Nickel Pipe and Tube (METRIC)
3. **Manufacture**—This tubing shall be made from 90-10 copper-nickel and cold drawn to size. It shall then be annealed in such a manner as to produce product which will meet all of the requirements in this document.
4. **Dimensions and Tolerances**—The standard nominal diameters and the applicable dimensions and tolerances are shown in Table 1.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-8512 FAX: (412) 776-0243
TO PLACE A DOCUMENT ORDER: (412) 776-4970 FAX: (412) 776-0790
<http://www.sae.org>

Copyright 1994 Society of Automotive Engineers, Inc.
All rights reserved.

Printed in U.S.A.

TABLE 1—TUBING DIMENSIONS AND TOLERANCES⁽¹⁾

Dash Size	Nominal Tubing OD mm	Outside Diameter ⁽¹⁾ Basic mm	Outside Diameter ⁽¹⁾ Tolerance \pm mm	Wall Thickness Basic mm	Wall Thickness Tolerance ⁽²⁾
-2	3.18	3.18	0.05	0.64	0.13
-3	4.76	4.78	0.08	0.71	0.08
-4	6.35	6.35	0.08	0.71	0.08
-5	7.94	7.92	0.08	0.71	0.08
-6	9.53	9.53	0.08	0.71	0.08
-7	11.11	11.13	0.10	0.76	0.08
-8	12.70	12.70	0.10	0.89	0.09
-9	14.29	14.27	0.10	0.89	0.09
-10	15.88	15.88	0.10	0.89	0.09

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

5. **Quality**—Finished tubing shall be clean, smooth, and round, both inside and outside, and shall be free from scale and harmful imperfections. Surface imperfections such as handling marks, die marks, or shallow pits shall not be considered harmful provided such imperfections are within the tolerances specified for diameter and wall thickness and do not affect the servability of the tube.
6. **Material**—Tubing shall be made from copper-nickel alloy UNS 70600.
7. **Mechanical Properties**—The finished tubing shall have mechanical properties as tabulated in Table 2:

TABLE 2—MECHANICAL PROPERTIES

Properties	Values
Yield Strength, min (0.2% offset)	105 MPa
Tensile Strength, min	275 MPa
Elongation in 50 mm	14%
Hardness (Rockwell 30t scale), max	65

8. **Performance Requirements**—The tubing shall satisfactorily meet the following performance tests. All tests are to be conducted in accordance with the procedures in SAE J1677.
 - 8.1 **Flaring Test**—(See 5.5.2 of SAE J1677.)
 - 8.2 **Hardness Test**—(See 5.6 of SAE J1677.)
 - 8.3 **Bending Test**—(See 5.3 of SAE J1677.)
 - 8.4 **Pressure Proof Test**—(See 5.8 of SAE J1677.) Where allowable fiber stress of material = 72 MPa.
 - 8.5 **Nondestructive Electric Test**—(See 5.9 of SAE J1677.)
9. **Test Certificates**—A certificate of compliance to the performance requirements shall be furnished to the purchaser by the producer if requested in the purchase agreement.