SAE International

SURFACE VEHICLE STANDARD

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Superseding J527 NOV2000

Brazed Double Wall Low-Carbon Steel Tubing

RATIONALE

This SAE standard has been revised as part of the SAE five year review process and to bring this document into line with global standardization. Added metric tube sizes, 6.00, 8.00 and 10.00. Eliminated paragraph numbers and issue dates for SAE J1677 and ASTM A254 requirements because these numbers become obsolete and incorrect when changes are made to SAE J1677 and ASTM A254, which are used extensively on other SAE tubing standards.

1. SCOPE

This SAE Standard covers brazed double wall low-carbon steel tubing intended for general automotive, refrigeration, hydraulic, and other similar applications requiring tubing of a suitable quality for bending, flaring, beading, forming, and brazing.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publication

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1677 Tests and Procedures for Carbon Steel and Low Alloy Steel Tubing

2.1.2 ASTM Publication

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org

ASTM A 254 Standard Specification for Copper Brazed Steel Tubing

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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Fax: 724-776-0790
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/J527_201306

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J409 Product Analysis - Permissible Variations from Specified Chemical Analysis of a Heat or Cast of Steel

SAE J512 Automotive Tube Fittings

SAE J513 Refrigeration Tube Fittings - General Specifications

SAE J514 Hydraulic Tube Fittings

SAE J516 Hydraulic Hose Fittings

SAE J533 Flares for Tubing

SAE J1065 Nominal Reference Working Pressures for Steel Hydraulic Tubing

SAE J1290 Automotive Hydraulic Brake System - Metric Tube Connections

SAE J1453 Fitting - O-Ring Face Seal

3. MANUFACTURE

The tubing shall be made from a single or double strip of steel shaped into the form of a double-wall tubing, the walls of which are secured and sealed by copper brazing in a controlled atmosphere. The braze shall be uniform with no evidence of a bead on either the inside or outside of the tubing. Typically this type of tubing is available in both coiled and straight condition. Straightness requirements should be agreed upon between supplier and purchaser.

4. DIMENSIONS AND TOLERANCES

The standard nominal diameters and the applicable dimensions and tolerances are shown in Table 1.

TABLE 1 - TUBING DIMENSIONS AND TOLERANCES[1]

Dash Size	Nominal Tube OD	Outside Diameter[1] Basic mm	Outside Diameter[1] Tolerance ±mm	Wall Thickness Basic mm	Wall Thickness Tolerance[2][3][4] ±mm
–2	3.18	3.18	0.05	0.64	0.13
–3	4.76	4.76	0.08	0.71	0.08
NA	6	6.00	0.08	0.71	0.08
–4	6.35	6.35	0.08	0.71	0.08
–5	7.94	7.94	0.08	0.71	0.08
NA	8	8.00	0.08	0.71	0.08
–6	9.53	9.53	0.08	0.71	0.08
NA	10	10.00	0.08	0.71	0.08
–7	11.11	11.11	0.1	0.76	0.08
–8	12.7	12.70	0.1	0.89	0.09
–9	14.29	14.29	0.1	0.89	0.09
–10	15.88	15.88	0.1	0.89	0.09

1. The actual outside diameter shall be the average of the maximum and minimum outside diameters at any one cross section through the tubing.
2. The tolerances listed represent the maximum permissible deviation at any point.
3. Other sizes may be specified by agreement between the supplier and the user.
4. For intermediate wall thickness, the tolerance for the next heavier wall thickness shall apply.

5. MANUFACTURING STANDARDS

5.1 Tubing End Condition

The tubing shall be produced using normal mill cut-off practices. These practices can, but is not limited to single-cut ends, double-cut ends, saw-cut ends, and rotary cut ends. Care shall be taken to minimize the distortion of the tube ends. Ends that require further processing shall be by agreement between the producer and purchaser.

5.2 Surface Finish

Surface imperfections such as handling marks, die marks, or shallow pits shall not be considered injurious defects provided such imperfections are not detrimental to the function of the tubing, and these imperfections are within the tolerances specified for diameter and wall thickness. The removal of such surface imperfections is not required. A slight seam lift or separation on the outside bevel edge of the outside or inside wall on double wall tubing is not considered an injurious defect during end forming operations, provided that the seam condition doesn't affect the sealing area of the end form. Sealing surfaces shall be smooth and free from nicks, pit marks, and any other defects that prevent sealing.

6. MATERIAL

Tubing shall be made from low carbon steel, such as UNS G10080 or UNS G10100.

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)	170 MPa
Tensile Strength, min	290 MPa
Elongation in 50 mm	14% min
Hardness (Rockwell 30 T scale), max	T65(1) (2)

1. Average of three readings not to exceed T65.
2. The hardness test shall not be required on tubing with a nominal wall thickness of less than 1.65 mm. Such tubing shall meet all other mechanical properties and performance requirements.

8. PERFORMANCE REQUIREMENTS

The finished tubing shall satisfactorily meet the following performance tests. All tests are to be conducted in accordance with the procedures in SAE J1677 or ASTM A 254 as designated.

8.1 Bending Test

See SAE J1677

8.2 Flaring Test

See SAE J1677

8.3 Pressure Proof Test

See SAE J1677 Performed by agreement between purchaser and producer, (where allowable unit stress of material(s) = 140 MPa (80% of minimum yield strength).

8.4 Nondestructive Electronic Test

See SAE J1677

8.5 Hardness Test

See SAE J1677

8.6 Flattening Test

See SAE J1677

8.7 Tensile Test

See SAE J1677

8.8 Inside Surface Cleanliness

See ASTM A 254