

Welded Low-Carbon Steel Tubing

1. **Scope**—SAE J526 Standard covers welded single-wall low-carbon steel tubing intended for general automotive, refrigeration, hydraulic, and other similar applications requiring tubing of a quality suitable for bending, flaring, beading, forming, and brazing.
2. **References**
 - 2.1 **Applicable Publication**—The following publication forms 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, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

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 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

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

SAE J514—Hydraulic Tube Fittings

SAE J516—Hydraulic Hose Fittings

SAE J533—Flares for Tubing

SAE J1065—Pressure Ratings for Hydraulic Tubing and Fittings

SAE J1290—Automotive Hydraulic Brake System—Metric Tube Connection

SAE J1453—O-Ring Face Seal
3. **Manufacture**—The tubing shall be made from a single strip of steel shaped into a tubular form, the edges of which are joined and sealed by a suitable welding process. After welding, the bead shall be removed from the outside to provide a smooth round surface and the tubing shall be processed in such a manner as to produce a finished product which will meet all requirements of this document. 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.

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TABLE 1—TUBING DIMENSIONS AND TOLERANCES⁽¹⁾

Dash Size	Nominal Tubing OD mm	Outside Diameter ⁽²⁾ Basic mm	Outside Diameter ⁽²⁾ Tolerance \pm mm	Wall Thickness ⁽³⁾⁽⁴⁾ basic mm	Wall Thickness ⁽³⁾ Tolerance \pm mm
-2	3.18	3.18	0.05	0.64	0.13
-3	4.76	4.78	0.08	0.71	0.13
-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	0.76	0.08
-8	12.70	12.70	0.10	0.89	0.09
-9	14.29	14.27	0.10	0.76	0.08
-10	15.88	15.88	0.10	0.89	0.09

1. Other sizes may be specified by agreement between the supplier and the user.
2. 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.
3. The tolerances listed represent the maximum permissible deviation at any point.
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 will be produced using normal mill cut-off practices. This will include, but is not limited to single-cut ends, double-cut ends, saw cut, and rotary-cut ends. Care will be taken to minimize the distortion of the tube ends. Ends that require further processing will be by agreement between the producer and tube 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 weld bead and splatter on the inside surface shall be permissible but must be held to the minimum consistent with good welding practice. Special weld bead requirements must be agreed upon at time of purchase.

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 REQUIREMENTS

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	65

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.

8.1 Flaring Test—SAE J1677—(5.5.1 Double Flare)
(5.5.3 Single Flare)

- 8.2 **Hardness Test**—SAE J1677— 5.6
- 8.3 **Bending Test**—SAE J1677—5.3
- 8.4 **Pressure Proof Test**—SAE J1677—5.8
- 8.5 **Nondestructive Electric Test**—SAE J1677—5.9
- 8.6 **Flattening Test**—SAE J1677—5.1
- 8.7 **Expansion Test**—SAE J1677—5.4
- 8.8 **Tensile Test**—SAE J1677—5.7
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.
10. **Cleanliness**—The inside of tubing shall be clean and free from any contamination which will impair the processing or serviceability of the tubing.
11. **Corrosion Protection**—The inside and outside of the finished tubing shall be protected against corrosion during shipment and normal storage. If a corrosion preventive compound is applied, it shall be such that after normal storage periods it can readily be removed by cleaning agents normally used in manufacturing. Extended corrosion resistance coatings, such as tern coating, galvanizing, epoxy paint, etc., may be available.
12. **Packaging**—The tubing is to be packaged in such a way to allow it to be transported and stored, with normal care, without being damaged. Any special packaging will be by agreement between the producer and the purchaser.
13. **Notes**
- 13.1 **Marginal Indicia**—The change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE FLUID CONDUCTORS AND CONNECTORS TECHNICAL COMMITTEE SC5—
METALLIC TUBING