



SURFACE VEHICLE STANDARD

SAE**J526 NOV2010**Issued 1952-01
Revised 2010-11

Superseding J526 JAN2000

(R) Welded Low-Carbon Steel Tubing Suitable for Bending, Flaring, Beading, Forming and Brazing

RATIONALE

The five-year review of this standard brings this document up to date in relation to similar SAE tube specifications and enhances the users awareness of the need to work closely with the tube producer to correlate end use requirements with this material specification.

1. SCOPE

The SAE J526 Standard covers electric-resistance welded single-wall low-carbon steel pressure tubing intended for general automotive, refrigeration, hydraulic, and other similar applications requiring tubing of a quality suitable for bending, flaring, beading, forming, and brazing. Material produced to this specification is not intended to be used for single flare applications due to the potential leak path that would be caused by the ID weld bead. The material produced to this specification is intended to service pressure applications where severe forming and bending is not required. As this material may exhibit mechanical properties that reduce some desired forming characteristics versus SAE J356, the severity of the forming requirements of the finished assembly should be considered when utilizing material produced to this specification.

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 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 J356	Welded Flash-Controlled Low-Carbon Steel Tubing Normalized for Bending, Double Flaring, and Beading
SAE J409	Product Analysis-Permissible Variations from Specified Chemical Analysis of a Heat or Cast of Steel
SAE J514	Hydraulic Tube Fittings
SAE J533	Flares for Tubing
SAE J1677	Tests and Procedures for Carbon Steel and Low Alloy Steel Tubing

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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 J516	Hydraulic Hose Fittings
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
SAE J2551	Recommended Practices for Fluid Conductor Carbon and Alloy Steel Tubing Applications
SAE J2658	Carbon and Steel Alloy Tube Conductor Assemblies for Fluid Power and General Use - Test Methods for Hydraulic Fluid Power Metallic Tube Assemblies

2.2.2 ISO Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 3305	Plain end welded precision steel tubes-Technical conditions for delivery
ISO 5598	Fluid power systems and components – Vocabulary
ISO 8434-2	Metallic tube connections for fluid power and general use – Part: 2 37o flare fittings
ISO 10583	Hydraulic fluid power – Test methods for tube connections
ISO 10763	Hydraulic fluid power – Plain-end, seamless and welded steel tubes – Dimensions and nominal working pressures
EN 10305-3	Welded Cold Sized Steel Tubes for Precision Applications
JIS G 3454	Welded Carbon Steel Pipes for Pressure Service

2.2.2 ASTM Publications

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 513	Electric-Resistance-Welded Carbon and Alloy Steel Tubing
ASTM A 450/A 450M	Standard Specifications for General Requirements for Carbon, Ferritic Alloy and Austenitic Alloy Steel Tubing

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 fused by electric resistance welding. After welding, the outside flash shall be removed to provide a smooth round surface and the tubing shall be processed in such a manner as to produce a finished product that 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 the producer and purchaser.

4. DIMENSIONS AND TOLERANCES

The tolerances applicable to tubing outside diameter are shown in Table 1. The tolerances applicable to tubing wall thickness are shown in Table 2. Particular attention should be given to areas adjacent to the weld to insure against thin spots and/or sharp indentations.

TABLE 1 - TUBE OUTSIDE DIAMETER TOLERANCES

Nominal Tubing OD (mm)	Outside Diameter tolerance (± mm)
3.18	0.05
over 3.18 to 11.10	0.08
over 11.10 to 19.05	0.10
over 19.05 to 50.80	0.13
over 50.80 to 63.50	0.15
over 63.50 to 76.20	0.20
over 76.20 to 88.90	0.23

- Other diameter sizes may be specified by agreement between the producer and purchaser.
- 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.

TABLE 2 - TUBE WALL THICKNESS TOLERANCES

Nominal Tubing Wall thickness (mm)	Nominal Tubing Wall tolerance (± m)
0.64 to 0.76	0.08
over 0.76 to 0.89	0.09
over 0.89 to 1.25	0.11
over 1.25 to 1.65	0.15
over 1.65 to 2.50	0.20

- The tolerances listed represent the maximum permissible deviation at any point.
- Diameters 3.18 mm up to and including 4.76 mm may have a wall tolerance of ± 0.13 mm

5. MANUFACTURING STANDARDS

5.1 Straightness

Tubing produced as straight lengths shall be straightened to a tolerance of 0.8 mm in 1000 mm. Straightness tolerances shall be measured by placing a 1000 mm straight edge against the tube while lying on its neutral axis. The point of maximum deflection of the tube from the straight edge should not be more than allowed by the specification when measured with a feeler gauge. This tolerance may be waived if agreed upon between the producer and purchaser as documented in the purchase agreement. This tolerance does not apply to tubing supplied as coiled product.

5.2 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 purchaser.

5.3 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 will be by agreement between the producer and purchaser.

6. MATERIAL.

Tubing shall be made from low-carbon, flat rolled sheet steel conforming to the chemical composition shown in Table 3. The steel shall be made by the open hearth basic oxygen or electric furnace process. A ladle analysis of each heat shall be made to determine the percentages of the elements specified. The chemical composition thus determined shall be reported to the purchaser, or representative, if requested. If a check analysis is required, the tolerances shall be specified in SAE J409, Table 3.

TABLE 3 - CHEMICAL REQUIREMENTS

Element	Cast or Heat Analysis, Weight %
Carbon	0.18 max
Manganese	0.60 max
Phosphorus	0.035 max
Sulfur	0.035 max

7. MECHANICAL PROPERTIES

The finished tubing shall have mechanical properties as tabulated in Table 4

TABLE 4 - MECHANICAL REQUIREMENTS⁽¹⁾

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

1. 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.