

	<b>SURFACE VEHICLE STANDARD</b>	<b>SAE J525</b>	<b>REV. DEC2007</b>
		Issued 1958-04 Revised 2007-12	
		Superseding J525 MAY1999	
<b>Welded and Cold Drawn Low-Carbon Steel Tubing Annealed for Bending and Flaring</b>			

## RATIONALE

This five year review of this standard resulted in changes identified by the bar on the left side of the page and are described as follows:

- a. Added SAE and other international standards to the "Related Publications" section because these documents are related to SAE J525 tubing.
- b. In Section 8, Performance Requirements, removed un-needed SAE J1677 paragraph numbering to eliminate unnecessary confusion.
- c. In Section 8, Performance Requirements, added elongation test.

### 1. SCOPE

This SAE Standard covers normalized electric-resistance welded, cold-drawn, single-wall, low-carbon steel pressure tubing intended for use as pressure lines and in other applications requiring tubing of a quality suitable for bending, flaring, forming, and brazing.

### 2. REFERENCES

#### 2.1 Applicable Publications

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version 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](http://www.sae.org).

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

SAE J1677 Tests and Procedures for Steel and Copper Nickel Tubing

#### 2.2 Related Publications

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

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### 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](http://www.sae.org).

SAE J514	Hydraulic Tube Fittings
SAE J533	Flares for Tubing
SAE J1065	Nominal Reference Working Pressures for Steel Hydraulic Tubing
SAE J1453	Fitting—O-Ring Face Seal
SAE J2551	Recommended Practices for Fluid Conductor Metallic Tubing Applications
SAE J2592	Carbon Steel Tubing for General Use—Understanding Nondestructive Testing for Carbon Steel Tubing
SAE J2658	Metallic 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 ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, [www.ansi.org](http://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 37° flare fittings
ISO 8434-3	Metallic tube connections for fluid power and general use—Part: 3 ORFS 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

### 2.2.3 ASTM Publications

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, [www.astm.org](http://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 flat-rolled steel shaped into a tubular form, the edges of which are joined and fused together by electric-resistance welding. After forming and welding, the tubing shall be normalized and subjected to a cold-drawing operation that shall result in a 15% minimum reduction in cross-sectional area, of which 8% shall consist in a reduction in wall thickness. Subsequent to cold working, the tubing shall be normalized via an atmospherically controlled method to produce a finished product that will meet all requirements of this document.

### 4. DIMENSIONS AND TOLERANCES

The tolerances applicable to the tubing outside diameter and inside diameter are shown in Table 1. The tolerances applicable to tubing wall thickness are shown in Table 2. Dimensional tolerances can only apply to two of the three tubing dimensions (OD, ID, or wall). Unless otherwise agreed upon between the purchaser and tube producer, dimensional tolerances shall apply to the tube OD and wall dimension.

TABLE 1 - TUBING OUTSIDE DIAMETER TOLERANCE

Nominal Tubing OD <sup>(1)(2)</sup> mm	Tube Tolerance OD ± mm	Tube Tolerance ID ± mm
Up to 9.50	0.05	0.05
Over 9.50 to 15.88 inclusive	0.06	0.06
Over 15.88 to 50.80 inclusive	0.08	0.08
Over 50.80 to 63.50 inclusive	0.10	0.10
Over 63.50 to 76.20 inclusive	0.13	0.13
Over 76.20 to 100.00 inclusive	0.15	0.15

1. OD measurements shall be taken at least 50 mm from the end of the tubing.
2. Refer to SAE J514 for nominal tubing OD to be used in conjunction with standard hydraulic tube fittings and SAE J533 for recommended maximum nominal wall thickness for double flaring.

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TABLE 2 - TUBING WALL THICKNESS TOLERANCES

Nominal Wall Thickness <sup>(1)</sup>	Nominal Tubing Outside Diameter Through 22 mm ± mm	Nominal Tubing Outside Diameter Over 22 mm Through 48 mm ± mm	Nominal Tubing Outside Diameter Over 48 mm Through 100 mm ± mm
0.89	0.05/0.05	0.05/0.05	0.05/0.05
1.00	0.05/0.05	0.05/0.08	0.05/0.08
1.25	0.05/0.05	0.05/0.08	0.05/0.08
1.50	0.05/0.05	0.05/0.08	0.05/0.08
1.65	0.05/0.05	0.05/0.08	0.05/0.08
2.00	0.05/0.05	0.05/0.08	0.08/0.08
2.11	0.05/0.05	0.05/0.08	0.08/0.08
2.41	0.05/0.05	0.05/0.08	0.08/0.08
2.50	0.05/0.08	0.05/0.10	0.08/0.08
2.77	0.05/0.08	0.05/0.10	0.08/0.08
3.00	0.08/0.08	0.05/0.10	0.08/0.08
3.05	0.08/0.08	0.05/0.10	0.08/0.08
3.40	—	0.05/0.10	0.08/0.08
3.75	—	0.05/0.10	0.08/0.08
4.00	—	0.08/0.10	0.08/0.10
4.19	—	0.08/0.10	0.08/0.10
4.57	—	0.10/0.10	0.08/0.13
5.00	—	0.10/0.13	0.10/0.13
5.16	—	0.10/0.13	0.10/0.13
5.59	—	0.10/0.15	0.10/0.15
6.00	—	0.13/0.15	0.13/0.15
6.05	—	0.13/0.15	0.13/0.15
6.58	—	0.13/0.15	0.13/0.15

1. For intermediate wall thickness, the tolerance for the next heavier wall thickness shall apply.

## 5. MANUFACTURING STANDARDS

### 5.1 Straightness

Tubing 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.

### 5.2 Tubing End Condition

The tubing will be produced using normal mill cut-off practices. This will include, but is not limited to double-cut ends, saw-cut, and rotary-cut ends. Care will be taken to minimize the distortion of the tube ends. Distortion of the tube ends must not affect the normal re-cutting processes that will be performed by the end user. Ends that require further processing will be by agreement between the producer and tube purchaser.