STEEL CITIES
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HYDRAULIC TUBING

- AVAILABLITIY CHART
- PRODUCT INFORMATION

HYDRAULIC TUBING

SAE J-524
SAE J-525b
NFPA STD T3.15.67.1
ANSI B93.4-1969

Outside Diameter (OD) and Gage Inches	Wall Dec.-In.	Inside Diameter (ID)	Weight Lbs/Ft	Seamless	Welded
1/8 OD					
22	0.028	0.069	0.0290	X	X
3/16					
22	0.028	0.131	0.0478	X	-
20	0.035	0.117	0.0572	X	X
18	0.049	0.089	0.0727	X	-
1/4 OD					
22	0.028	0.194	0.0664	X	X
20	0.035	0.180	0.0804	X	X
18	0.049	0.152	0.1052	X	X
16	0.065	0.120	0.1284	X	-
5/16 OD					
20	0.035	0.242	0.1039	X	X
18	0.049	0.215	0.1382	-	X
16	0.065	0.182	0.1722	X	-
14	0.083	0.146	0.2039	X	-
3/8 OD					
22	0.028	0.319	0.1038	X	-
20	0.035	0.305	0.1271	X	X
18	0.049	0.277	0.1706	X	X
17	0.058	0.259	0.1964	X	X
16	0.065	0.245	0.2152	X	X

If you do not see a size listed, please ask.

HYDRAULIC TUBING - Continued

Outside Diameter (OD) and Gage Inches	Wall Dec.-In.	Inside Diameter (ID)	Weight Lbs/Ft	Seamless	Welded
1/2 OD					
20	0.035	0.430	0.1738	X	X
18	0.049	0.402	0.2360	X	X
16	0.065	0.370	0.3020	X	X
14	0.083	0.334	0.3696	X	X
13	0.095	0.310	0.4109	X	-
5/8 OD					
20	0.035	0.555	0.2205	X	X
18	0.049	0.527	0.3014	X	X
16	0.065	0.495	0.3888	X	X
14	0.083	0.459	0.4805	X	X
13	0.095	0.435	0.5377	-	X
3/4 OD					
20	0.035	0.680	0.2673	X	X
18	0.049	0.652	0.3668	X	X
16	0.065	0.620	0.4755	X	X
15	0.072	0.606	0.5214	-	X
14	0.083	0.584	0.5913	X	X
13	0.095	0.560	0.6646	X	X
12	0.109	0.532	0.7462	X	X
11	0.120	0.510	0.8074	X	X
7/8 OD					
20	0.035	0.805	0.3140	X	-
18	0.049	0.777	0.4323	X	X
16	0.065	0.745	0.5623	X	X
14	0.083	0.709	0.7021	X	X
13	0.095	0.685	0.7914	X	X
12	0.109	0.657	0.8917	X	X
11	0.120	0.635	0.9676	X	-

If you do not see a size listed, please ask.

HYDRAULIC TUBING - Continued

Outside Diameter (OD) and Gage Inches	Wall Dec.-In.	Inside Diameter (ID)	Weight Lbs/Ft	Seamless	Welded
1 OD					
20	0.035	0.930	0.3607	X	-
18	0.049	0.902	0.4977	X	X
16	0.065	0.870	0.6491	X	X
14	0.083	0.834	0.8129	X	X
13	0.095	0.810	0.9182	X	X
12	0.109	0.782	1.0370	X	X
11	0.120	0.760	1.1280	X	X
1-1/8 OD					
16	0.065	0.995	0.7359	-	X
11	0.120	0.885	1.2880	-	X
1-1/4 OD					
18	0.049	1.152	0.6285	-	X
16	0.065	1.120	0.8226	-	X
14	0.083	1.084	1.0340	-	X
13	0.095	1.060	1.1720	-	X
12	0.109	1.032	1.3280	-	X
11	0.120	1.010	1.4480	-	X
1-1/2 OD					
16	0.065	1.370	0.9962	-	X
14	0.083	1.334	1.2560	-	X
13	0.095	1.310	1.4260	-	X
12	0.109	1.282	1.6190	-	X
11	0.120	1.260	1.7690	-	X
10	0.134	1.232	1.9550	-	X
2 OD					
16	0.065	1.870	1.3430	-	X
13	0.095	1.810	1.9330	-	X
11	0.095	1.760	2.4090	-	X
10	0.134	1.732	2.6700	-	X

If you do not see a size listed, please ask.

WELDED HYDRAULIC TUBING

SAE J-525b
NFPA STD T3.15.67.1
ANSI B93.4-1969

GENERAL

This specification covers cold worked and annealed electric resistance welded low carbon steel pressure tubing with outside diameter 3/8 inch to 2-1/2 inch, inclusive, for use as hydraulic lines for industrial equip- ment or other applications requiring flaring and bending.

CHEMICAL COMPOSITION (percentage by weight)

Carbon	0.18 maximum
Manganese	0.30-0.60
Phosphorus	0.050 maximum
Sulphur	0.055 maximum

MECHANICAL PROPERTIES

The tubing shall conform to the following requirements:

Tensile Strength	45,000 psi minimum
Yield	25,000 minimum
Elongation in 2 inch	35 percent* minimum
Rockwell Hardness	B65 maximum

*For tubes with OD of 3/8 inch and/or wall thickness of 0.035, a minimum elongation of 30 percent is permitted.

FLATTENING TEST - A section at least three inches in length shall be taken from every 1500 feet or less of finished tubing and shall be flat- tened between parallel plates to three times the wall thickness of the tube. The weld shall be placed at a point of 90 degrees from the direc- tion of applied force. Any cracking or flaws revealed by this test shall be cause for rejection. Superficial ruptures resulting from minor surface imperfections shall not be cause for rejection.

REVERSE FLATTENING TEST - A section at least four inches in length shall be taken from every 1500 feet or less of finished tubing and split longitudinally 90 degrees on each side of the weld and the sample opened and flattened. There shall be no evidence of cracks or lack of penetration or overlaps resulting from flash removal in the weld.

WELDED HYDRAULIC TUBING

- Continued

EXPANSION TEST - A suitable specimen shall be taken from each 1500 feet or less of tubing and subjected to an expansion over a plug. The outside diameter must be expanded 25 percent through- out a length equal to the outside diameter of the tubing or one inch, whichever is greater. There shall be no evidence of cracking in this test.

PRESSURE OR ELECTRICAL TEST - Tubing supplied under this specification shall have been hydrostatically tested at a fiber stress of 20,000 psi or at an actual pressure of 5,000 psi, whichev- er is less, based on the applicable minimum wall, or tested by use of a nondestructive electrical test approved by purchaser.

DIMENSIONS

When tubing is specified by outside diameter and inside diameter, the tolerances shown in the table shall apply.

Nominal Outside Diameter, Inches	OD Inches	ID Inches
3/8	±0.00	±0.005
Over 3/8 to 5/8 inclusive	±0.0025	± 0.0025
Over 5/8 to 2 inclusive	±0.003	±0.003
Over 2 to 2-1/2 inclusive	±0.004	±0.004

When tubing is specified by the outside diameter (or the inside diam- eter) and the nominal wall thickness, the tolerances for the specified diameter shall apply and the wall thickness shall not vary more than plus or minus 10 percent.

QUALITY

MANUFACTURE - The tubing shall be normalized and followed by a cold working operation. The cold working shall result in minimum reduction of areas of 15 percent of which at least 8 percent shall be reduction of wall thickness. After cold working, the tubing shall be annealed in such a manner that the resultant product will meet all requirements of this specification.

SEAMLESS HYDRAULIC TUBING

SAE J524 AMS 5050 E

Hydraulic Standards for Industrial Equipment

SCOPE

This specification covers cold drawn and annealed seamless low carbon steel pressure tubing for use as hydraulic lines.

HYDROSTATIC TEST

Tubing supplied under this specification shall have been tested at not less than 1,000 lbs. hydrostatic pressure or higher in case working conditions require.

CLEANLINESS

It is desired that the inside of tubing shall be bright, clean, and free from grease, drawing compounds, oxide, scale, carbon deposits, and any contamination that cannot be readily removed by cleaning with alkaline cleaners or benzine.

CORROSION PROTECTION OF INTERIOR OF TUBES

The inside of the tubing having open ends shall be protected by a coat- ing of clean oil to protect the interior of the tubing against corrosion during shipment and normal storage periods.

The corrosion preventive oil used shall be such that, after extended stor- age periods, it can readily be removed with an alkaline cleaning solution or with benzine (Stoddard Solvent).

QUALITY

Tubing shall be free from defects and in accordance with the best com- mercial practice.

CHEMICAL COMPOSITION (percentage by weight)

The tubing shall conform to the following chemical analysis:

Phosphorus	0.050 max.
Carbon	0.080 - 0.18
Sulphur	0.055 max.
Manganese	0.30 - 0.60

Seamless low carbon steel tubing annealed for bending- Pressure type.

PHYSICAL PROPERTIES

The tubing shall conform to the following physical requirements:

Tensile strength Lb/Sq. inch, maximum	55,000
Elongation in 2 inches, minimum	40 percent*

*For tubes with an OD of 3/8 inch and less and wall thickness of 0.035 inch and less, a minimum elongation of 30 percent is permitted.

SEAMLESS HYDRAULIC TUBING - Continued

A three inch section cut from the tubing shall not crack or show any flaws when flattened between parallel plates to three times the wall thickness of the tube.

A section of tube approximately four inches in length with the ends burred shall withstand being expanded at one end over a polished tapered mandrel having an included angle of 60 degrees until the actual average inside diameter is increased 30 percent.

The expansion test shall be made in a die in order to restrict the expansion of 30 percent. The axis of the mandrel should be paralled to the axis of the tube during the expansion tests.

VARIATIONS
The diameter of the tubing shall not vary from that specified more than the following amounts:

OD Sizes Inches	Outside Diameter, In		Inside Diameter, In.	
	Plus	Minus	Plus	Minus
Below 3-1/2 to 1-1/2 incl.	0.010	0.010	0.010	0.010
Below 1-1/2 to 1/2 ID Incl.	0.005	0.005	0.005	0.005
Below 1/2 ID	0.003	0.003	0.005	0.005

When the outside diameter and wall thickness of 1/2 inch to 3-1/2 inch OD tubes are specified, the outside diameter shall conform to the tolerances given in the above table, and the wall thicknesses shall not vary from that specified more than plus or minus 10 percent. When less than 1/2 inch ID, the outside diameter shall conform to the tolerances given in the above table. The wall thickness shall not vary from that specified more than plus or minus 15 percent.

PICKLE BRITTLENESS
Tubing which is pickled to remove scale shall be treated to eliminate pickle brittleness.