

Stainless Steel Tubing Pressure Ratings

Pressure Ratings, Stainless Steel Tubing for Hydraulic System Applications

The following chart lists the nominal pressure ratings for seamless or welded and drawn, fully annealed stainless steel tubing products conforming to ASTM A213, ASTM A249 or ASTM A269 respectively.

. These pressure ratings are derived from the Lamé formula with 18,800 psi (130MPa) allowable stress factors and approximately 4:1 design factor. Pressure

values shown in bold are for tubing wall thickness normally considered suitable for 37 degree single flaring to SAE J533. Many factors influence the pressure at which a hydraulic system will perform satisfactorily. The values shown below should not be used as a standard or specification and are not to be construed as guaranteed minimums.

Note: Pressure ratings are based on ASME B31.1 1998, TP304 and TP316 Maximum Allowable Stress values, -20° to 100° F.

Nominal Tube O.D. inch mm	Nominal Tube Wall Thickness											
	0.028 0.71mm	0.035 0.89mm	0.049 1.24mm	0.065 1.65mm	0.083 2.11mm	0.093 2.41mm	0.109 2.77mm	0.120 3.05mm	0.134 3.40mm	0.148 3.76mm	0.156 3.96mm	0.188 4.78mm
Reference Working Pressures at 4:1 Design Factor(psi/MPa)												
0.125	10002	12709										
3.18	69.2	88.0										
0.188	6392	8197										
4.77	44.4	56.4										
0.250	4662	5941	8648	11731								
6.35	32.3	40.6	59.4	81.2								
0.312	3685	4662	6768	9250								
7.92	25.3	32.3	46.6	63.9								
0.375	3008	3835	5490	7520	9851	11430						
9.53	20.8	26.5	37.6	51.9	67.7	79.0						
0.500		2782	4061	5490	7219	8347	9701	10829				
12.70		19.3	28.0	37.6	49.6	57.9	66.9	74.4				
0.625		2256	3158	4286	5640	6542	7595	8422				
15.88		15.6	21.8	29.5	39.1	45.1	52.6	57.9				
0.750		1805	2632	3534	4587	5339	6242	6918				
19.05		12.5	18.0	24.4	31.6	36.8	42.9	47.4				
0.875		1579	2256	3008	3910	4512	5264	5866				
22.23		10.8	15.6	20.8	27.1	30.8	36.1	40.6				
1.000		1354	1955	2632	3384	3910	4512	5038	5715	6317		
25.40		9.3	13.5	18.0	23.3	27.1	30.8	34.6	39.1	43.6		
1.125			1730	2331	3008	3459	3986	4437	4963	5565		
28.58			11.9	15.9	20.8	23.8	27.4	30.8	34.6	38.4		
1.250			1504	2030	2632	3083	3534	3986	4437	4963	5264	4300
31.75			10.4	14.0	18.0	21.4	24.4	27.4	30.8	34.6	36.1	29.5
1.500				1730	2181	2557	2933	3234	3685	4061	4286	3500
38.10				11.9	15.0	17.7	20.3	22.3	25.3	28.0	29.5	24.0
1.750				1429	1880	2181	2482	2782	3083	3459	3610	2950
44.45				9.9	12.9	15.0	17.1	19.3	21.4	23.8	25.0	20.5
2.000				1278	1654	1880	2181	2406	2707	3008	3158	2550
50.80				8.9	11.4	12.9	15.0	16.5	18.6	20.8	21.8	17.6

Calculation of Design Pressures for Alternate Tubing Materials

Design pressures for alternate tubing materials may be calculated using the Lamé formula as follows:

$$P = \frac{S(D^2 - d^2)}{D^2 + d^2} \quad \text{where:}$$

D= nominal outside diameter of tubing

d= nominal inside diameter of tubing

P= design pressure

S= allowable fiber stress of material at 4:1 design factor

Design stress and temperature derating factors for typical hydraulic system tubing materials and temperature ranges are listed below. Derating factors for TP304 and TP316 are derived from ASME B31.1-1998 Edition. Carbon steel tubing in these temperature ranges do not require derating.

Tubing Material	S= Allowable Fiber Stress@ 25% UTS Design Factor=4:1	Temperature Derating Factors		
		Temp.	SS304	SS316
C-1010	12,500 psi / 86MPa	100°F	1.00	1.00
C-1021	15,000 psi / 103 MPa	200°F	0.84	0.86
8630 GR	17,800 psi / 123 MPa	300°F	0.75	0.78
TP304	18,800 psi / 130MPa	400°F	0.69	0.71
TP316	18,800 psi / 130MPa	500°F	0.65	0.66



