

PRESSURE RATING OF HYDRAULIC TUBING

Burst pressure

There are three commonly used formulas for calculating the burst pressure of seamless hydraulic tubing:

Barlow formula

$$P = \frac{2 \times T \times S}{D}$$

Boardman formula

$$P = \frac{2 \times T \times S}{D - (0.8 \times T)}$$

Lame formula

$$P = \frac{S \times (D^2 - d^2)}{(D^2 + d^2)}$$

Where

P	=	burst pressure in PSI
T	=	nominal wall thickness of tubing in inches
S	=	minimum ultimate tensile strength of tube material in PSI
D	=	nominal outside diameter of tubing in inches
d	=	nominal inside diameter of tubing in inches

Working pressure

Once the burst pressure of the tube has been calculated, working pressure is calculated using the following formula:

$$WP = P \div sf$$

Where

WP	=	working pressure in PSI
P	=	burst pressure in PSI
sf	=	design safety factor (3 minimum recommended)

Reference working pressures

The following table lists working pressures in PSI of seamless steel tube calculated using Barlow's formula, based on a minimum ultimate tensile strength of 50,000 PSI and a design safety factor of 4:1:

Nominal tube OD (in)		Nominal tube wall thickness (in)								
		0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.120	0.134
1/8	0.125	5600	7000							
3/16	0.188	3750	4650							
1/4	0.250	2800	3500	4900	6500					
5/16	0.312	2250	2800	3900	5200					
3/8	0.375	1850	2350	3250	4350					
1/2	0.500		1750	2450	3250	4150				
5/8	0.625		1400	1950	2600	3300	3800			
3/4	0.750		1150	1650	2150	2750	3150	3650		
7/8	0.875		1000	1400	1850	2350	2700	3100		
1	1.000		875	1200	1600	2050	2350	2700	3000	
1-1/8	1.125			1100	1450	1850	2100	2400	2650	
1-1/4	1.250			1000	1300	1650	1900	2200	2400	
1-1/2	1.500				1100	1400	1600	1800	2000	
1-3/4	1.750				925	1200	1350	1550	1700	
2	2.000				800	1050	1200	1350	1500	1650