

THEORETICAL BURSTING AND BULGING

PRESSURES FOR TUBING

Corresponding to a fiber stress in wall of 10,000 PSI

Outside Diameter Inches	WALL THICKNESS—DECIMAL INCH																		
	BWG EQUIVALENT							FRACTION EQUIVALENT											
	.020 25	.028 22	.035 20	.049 18	.065 16	.095 13	.120 11	.156 5/32"	.187 3/16"	.210 7/32"	.250 1/4"	.313 5/16"	.375 3/8"	.500 1/2"	.625 5/8"	.750 3/4"	.875 7/8"	1.000 1	
1/8	3200	5200	5600	7840															
3/16	2133	2987	3933	5227															
1/4	1600	2240	2800	3920	5200	7600													
5/16	1280	1792	2240	3136	4160	6100													
3/8	1067	1493	1867	2613	3467	5067	6400												
1/2	800	1120	1400	1960	2600	3800	4800	6240	7480										
5/8	640	896	1120	1568	2080	3040	3840	4992	5984	7008									
3/4	533	747	933	1307	1733	2533	3200	4160	4987	5840	6667								
7/8	457	640	800	1120	1486	2171	2743	3566	4274	5006	5714	7154							
1	400	560	700	980	1300	1900	2400	3120	3740	4380	5000	6260	7500						
1 1/8	355	498	622	871	1156	1689	2133	2773	3324	3893	4444	5564	6667						
1 1/4	320	448	560	784	1040	1520	1920	2496	2992	3504	4000	5008	6000	8000					
1 3/8	290	407	509	713	945	1382	1745	2269	2720	3185	3636	4553	5455	7273					
1 1/2	267	393	467	653	867	1267	1600	2080	2493	2920	3333	4173	5000	6667	8333				
1 3/4	229	318	400	560	743	1086	1371	1783	2137	2503	2857	3577	4286	5714	7143				
2	200	280	350	490	650	950	1200	1560	1870	2190	2500	3130	3750	5000	6250	7500			
2 1/4	178	250	311	436	578	844	1067	1387	1662	1947	2222	2872	3333	4444	5556	6667			
2 1/2			280	392	520	760	960	1248	1496	1752	2000	2504	3000	4000	5000	6000	7000		
2 3/4			255	356	473	691	873	1135	1360	1593	1818	2276	2727	3636	4545	5455	6364	7273	
3				327	433	633	800	1040	1247	1460	1667	2087	2500	3333	4167	5000	5833	6667	
3 1/4				302	400	585	738	960	1151	1348	1538	1926	2308	3077	3846	4615	5385	6154	
3 1/2				280	371	543	686	891	1069	1251	1429	1789	2143	2857	3571	4286	5000	5714	
3 3/4				261	347	507	640	832	997	1168	1333	1669	2000	2667	3333	4000	4667	5333	
4				245	325	475	600	780	935	1095	1250	1565	1875	2500	3125	3750	4375	5000	
4 1/4					306	447	565	734	880	1031	1176	1473	1765	2353	2941	3529	4118	4706	
4 1/2					289	412	533	693	831	973	1111	1391	1667	2222	2778	3333	3889	4444	
4 3/4					274	400	505	657	787	922	1053	1318	1579	2105	2632	3158	3684	4211	
5					260	380	480	624	748	876	1000	1252	1500	2000	2500	3000	3500	4000	
5 1/2						345	436	567	680	796	909	1138	1364	1818	2273	2727	3182	3636	
6						317	400	520	623	730	833	1043	1250	1667	2083	2500	2917	3333	
6 1/2							369	480	575	674	769	993	1154	1538	1923	2308	2692	3077	
7								446	534	626	714	894	1071	1429	1786	2143	2500	2857	
7 1/2								416	499	584	667	835	1000	1333	1667	2000	2333	2667	
8									468	548	625	783	938	1250	1563	1875	2180	2500	
8 1/2										515	588	736	882	1176	1471	1765	2059	2353	
9												556	696	833	1111	1389	1667	1944	2222
9 1/2												526	659	789	1053	1316	1579	1842	2105
10												500	626	750	1000	1250	1500	1750	2000
10 1/2												476	596	714	952	1190	1429	1667	1905

The above table is based on the best known and most widely used formula for calculating the bursting pressure of tubes, namely

Barlow's: $P = \frac{2St}{D}$

P = Internal pressure in p.s.i. S = Fiber stress of tube in p.s.i. t = Wall thickness in inches D = Outside diameter in inches

The table (S = 10,000) affords easy calculations with appropriate multipliers shown below. For theoretical bursting pressures, use tensile values. For theoretical bulging pressures, use yield values. Working pressures will vary depending upon safety factors required for environmental conditions involved as determined by your design engineer and appropriate codes.

Material	Tensile (Multiplier)	Yield (Multiplier)
6061-T6 Aluminum	42,000 psi (x 4.2)	35,000 psi (x 3.5)
Annealed Low Carbon Steel	55,000 psi (x 5.5)	25,000 psi (x 2.5)
Annealed 18-8 Stainless	75,000 psi (x 7.5)	30,000 psi (x 3.0)
1/2 Hard 18-8 Stainless	105,000 psi (x 10.5)	75,000 psi (x 7.5)
Cold Dr. 21-6-9 Stainless	142,000 psi (x 14.2)	120,000 psi (x 12.0)

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