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Cylinder Force Chart

Force = Area x Pressure

Bore	Piston Area (in^2)	Operating Pressure (psi)					
		25 psi	50 psi	75 psi	100 psi	125 psi	150 psi
1/4" (6mm)	0.04	1 lbf	2 lbf	3 lbf	4 lbf	5 lbf	6 lbf
8mm	0.08	2	4	6	8	10	12
3/8" (10mm)	0.12	3	6	9	12	15	18
5/8" (16mm)	0.27	7	14	20	27	34	41
3/4" (20mm)	0.44	11	22	33	44	55	66
1" (25mm)	0.79	20	40	59	79	99	119
1 1/8"	0.99	25	50	74	99	124	149
30mm	1.10	28	55	83	110	138	165
1 ¼" (32mm)	1.23	31	62	92	123	154	185
1 ½" (40mm)	1.77	44	89	133	177	221	266
1 ¾"	2.41	60	121	181	241	301	362
2" (50mm)	3.14	79	157	236	314	393	471
2 ½" (63mm)	4.91	123	246	368	491	614	737
3 ¼ (80mm)	8.3	208	415	623	830	1038	1245
4" (100mm)	12.57	314	629	943	1257	1571	1886
4 ½"	15.9	398	795	1196	1590	1988	2385
5" (125mm)	19.64	491	982	1473	1964	2455	2946
140mm	23.85	596	1193	1789	2385	2981	3576
6"	28.27	707	1414	2120	2827	3534	4241
160mm	31.15	779	1558	2336	3115	3894	4673
7" (180mm)	38.48	962	1924	2886	3848	4810	5772
8" (200mm)	50.27	1256	2514	3770	5027	6284	7541
10" (250mm)	78.54	1963	3927	5891	7854	9818	11781
12"	113.1	2827	5655	8482	11310	14137	16965

Figuring Cv for Valve Sizing

$$C_v = \frac{\text{Piston Area (in2) x Stroke (in) x Compression Factor}}{\text{Pressure Drop Factor x Cycle Time (sec) x 29}}$$

EXAMPLE

We want to extend a 3 1/4" bore cylinder 12" in one second. We have a supply pressure of 80 psi.

Piston area: **8.3**
Cylinder Stroke: **12 in**
Compression Factor: **6.4**
Pressure drop factor: **20.5**
Cycle time (sec): **1**
X 29

$$\frac{\textbf{8.3 x 12 x 6.4}}{\textbf{20.5 x 1 x 29}} = \textbf{1.05 Cv}$$

Inlet Pressure	Compression Factor	Pressure Drop Factors for Various Pressure Drops				
		2 psi	5 psi	10 psi	15 psi	20 psi
10	1.7	6.5				
20	2.4	7.8	11.8			
30	3.0	8.9	13.6	18.0		
40	3.7	9.9	15.3	20.5	23.6	
50	4.4	10.8	16.7	22.6	26.4	29.0
60	5.1	11.7	18.1	24.6	29.0	32.0
70	5.8	12.5	19.3	26.5	31.3	34.8
80	6.4	13.2	20.5	28.2	33.5	37.4
90	7.1	13.9	21.6	29.8	35.5	39.9
100	7.8	14.5	22.7	31.3	37.4	42.1
110	8.5	15.2	23.7	32.8	39.3	44.3
120	9.2	15.8	24.7	34.2	41.0	46.4
130	9.8	16.4	25.6	35.5	42.7	48.4
140	10.5	16.9	26.5	36.8	44.3	50.3

Note: Pressure drop factor is based on the inlet pressure of the valve and the allowable pressure drop across the valve. For average conditions use a 70 psi inlet pressure and a 10 psi pressure drop