Telephone: (626) 359-1944
Fax: (626) 359-4055
Email: info@machconsult.com
Website: http://www.machconsult.com
Machinery Consultants, Inc.
1854 Business Center Dr., Duarte, CA 91010

Hole Punching Tonnage Material Thickness

(*Without Shear)

Hole Dia.	24 GA .0239"	20 GA .0359"	18 GA .0478"	16 GA .0598"	14 GA .0747"	12 GA .1046"	10 GA .1345"	3/16"	1/4"
1/16"	0.117	0.176	0.235	0.294	0.366	0.513	0.660	0.920	1.22
1/8"	0.234	0.352	0.469	0.587	0.733	1.02	1.32	1.84	2.45
1/4"	0.47	0.70	0.94	1.17	1.47	2.05	2.64	3.68	4.91
3/8"	0.70	1.06	1.41	1.76	2.20	3.08	3.96	5.52	7.36
1/2"	0.94	1.41	1.88	2.35	2.93	4.11	5.28	7.36	9.82
5/8"	1.17	1.76	2.35	2.93	3.67	5.13	6.60	9.20	12.3
3/4"	1.41	2.11	2.81	3.52	4.40	6.16	7.92	11.0	14.7
7/8"	1.65	2.47	3.35	4.11	5.13	7.19	9.24	12.9	17.2
1"	1.88	2.82	3.75	4.69	5.87	8.21	10.6	14.7	19.6
1-1/4"	2.34	3.52	4.69	5.89	7.33	10.3	13.2	18.4	24.5
1-1/2"	2.81	4.23	5.63	7.04	8.80	12.3	15.8	22.1	29.5
1-3/4"	3.28	4.93	6.57	9.22	10.3	14.4	18.5	25.8	34.4
2"	3.75	5.64	7.51	9.39	11.7	16.4	21.1	29.5	39.3
2-1/4"	4.22	6.34	8.45	10.6	13.2	18.5	23.8	33.1	44.2
2-1/2"	4.69	7.05	9.38	11.7	14.7	20.5	26.4	36.8	49.1
2-3/4"	5.16	7.75	10.3	12.9	16.1	22.6	29.0	40.5	54.0
3"	5.63	8.46	11.3	14.1	17.6	24.5	31.7	44.2	58.9
3-1/2"	6.56	9.86	13.1	16.4	20.5	28.8	37.0	51.5	68.7
4"	7.51	11.3	15.0	18.8	23.5	32.8	42.2	58.9	78.5

PUNCHES WITH SHEAR:

Tonnage (chart above) x shear factor (table below) = required pressure in tons for punches with shear.

Shear Factor Chart

Material Thickness

Shear Depth	18 GA .0478"	16 GA .0598"	14 GA .0747"	12 GA .1046"	10 GA .1345"	8 GA .1644"	3/16"	1/4"
1/16"	0.50	0.50	0.58	0.72	0.78	0.83	0.86	0.90
3/32"	0.50	0.50	0.50	0.56	0.67	0.73	0.78	0.83
3/16"	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.64

For piercing materials with a different strength than 50,000 P.S.I. (as listed in the chart below), use a multiplier for calculating required force to punch the hole.

EXAMPLE: To pierce a 7/8" Dia. Hole thru 10 GA 18-8 stainless steel (70,000 PSI Shear strength), the pressure required (table above) is 9.2 tons. The multiplier is 1.4 - therefore, 9.2 x 1.4 = 13 tons, actual force.

Chart Multiplier

Type of Material	Tons Per Sq. Inch	Shear Strength Per Sq. Inch	Chart Multiplier
Aluminum (1/2 hard sheet)	9.5	19,000 P.S.I.	0.38
Brass (1/2) hard sheet)	17.5	35,000 P.S.I.	0.70
Copper (rolled)	14.0	28,000 P.S.I.	0.56
Steel, mild	25.0	50,000 P.S.I.	1.00
Steel, ASTM-A36	30.0	60,000 P.S.I.	1.20
Steel, 50 carbon	35.0	70,000 P.S.I.	1.40
Steel, cold drawn	30.0	60,000 P.S.I.	1.20
Steel, stainless (18-8)	35.0	70,000 P.S.I.	1.40