

Horsepower to Drive a Pump

Figures in the body of this table show the horsepower needed to drive a hydraulic pump having an efficiency of 85%. Most positive displacement pumps fall in the range of 80% to 90 % efficiency, so this chart should be accurate to within 5% for nearly any pump. The table was calculated from the formula: **HP = PSI x GPM ÷ (1714 x 0.85)**. For pumps with other than 85% efficiency, this formula can be used, substituting actual efficiency in place of 0.85.

Using the Table ...

The range of 500 to 5000 PSI covers most hydraulic systems, but power requirements can be determined for conditions outside the table, or for intermediate values, by combining values in the table: For example, power at 4000 PSI will be exactly twice the figures shown for 2000 PSI. At 77 GPM, power will be the sum of the figures shown in the 75 and 2 GPM lines, etc.

Rule – of – Thumb ...

Approximate power requirements can be figured with simple mental arithmetic with this rule of thumb:

1 HP is required for each 1 GPM @ 1500 PSI

For example, a 5 GPM pump operating at 1500 PSI would need 5 HP, or at 3000 would 10 HP. A 10 GPM pump at 1000 PSI would need $6\frac{2}{3}$ HP, or the same pump operating at 1500 PSI would need 10 HP, etc.

Another rule-of-thumb states that about 5% of the pump maximum rated horsepower is required to idle that pump when it is “unloaded” and the oil is circulating at zero PSI. This amount of power is consumed in flow losses plus mechanical friction losses in bearings and pumping elements.

Figures in table are HP's required to drive a hydraulic pump.

GPM	500 psi	750 psi	1000 psi	1250 psi	1500 psi	1750 psi	2000 psi	2500 psi	3000 psi	5000 psi
½	.172	.257	.343	.429	.515	.600	.686	.858	1.03	1.72
1	.343	.515	.686	.858	1.03	1.2	1.37	1.72	2.06	3.43
1½	.515	.772	1.03	1.29	1.54	1.8	2.06	2.57	3.09	5.15
2	.686	1.03	1.37	1.72	2.06	2.40	2.75	3.43	4.12	6.86
2½	.858	1.29	1.72	2.14	2.57	3.00	3.43	4.29	5.15	8.58
3	1.03	1.54	2.06	2.57	3.09	3.60	4.12	5.15	6.18	10.3
3½	1.20	1.80	2.40	3.00	3.60	4.20	4.80	6.00	7.21	12.0
4	1.37	2.06	2.75	3.43	4.12	4.80	5.49	6.86	8.24	13.7
5	1.72	2.57	3.43	4.29	5.15	6.00	6.86	8.58	10.3	17.2
6	2.06	3.09	4.12	5.15	6.18	7.21	8.24	10.3	12.4	20.6
7	2.40	3.60	4.80	6.00	7.21	8.41	9.61	12.0	14.4	24.0
8	2.75	4.12	5.49	6.86	8.24	9.61	11.0	13.7	16.5	27.5
9	3.09	4.63	6.18	7.72	9.27	10.8	12.4	15.4	18.5	30.9
10	3.43	5.15	6.86	8.58	10.3	12.0	13.7	17.2	20.6	34.3
12	4.12	6.18	8.24	10.3	12.4	14.4	16.5	20.6	24.7	41.2
15	5.15	7.72	10.3	12.9	15.4	18.0	20.6	25.7	30.9	51.5
20	6.86	10.3	13.7	17.2	20.6	24.0	27.5	34.3	41.2	68.6
25	8.58	12.9	17.2	21.4	25.7	30.0	34.3	42.9	51.5	85.8
30	10.3	15.4	20.6	25.7	30.9	36.0	41.2	51.5	61.8	103
35	12.0	18.0	24.0	30.0	36.0	42.0	48.0	60.0	72.1	120
40	13.7	20.6	27.5	34.3	41.2	48.0	54.9	68.6	82.4	137
45	15.4	23.2	30.9	38.6	46.3	54.1	61.8	77.2	92.7	154
50	17.2	25.7	34.3	42.9	51.5	60.0	68.6	85.8	103	172
55	18.9	28.3	37.8	47.2	56.6	66.1	75.5	94.4	113	189
60	20.6	30.9	41.2	51.5	61.8	72.1	82.4	103	124	206
65	22.3	33.5	44.6	55.8	66.9	78.1	89.2	112	134	223
70	24.0	36.0	48.0	60.0	72.1	84.1	96.1	120	144	240
75	25.7	38.6	51.5	64.3	77.2	90.1	103	129	154	257
80	27.5	41.2	54.9	68.6	82.4	96.1	110	137	165	275
85	29.2	43.8	58.3	72.9	87.5	102	117	146	175	292
90	30.9	46.3	61.8	77.2	92.7	108	124	154	185	309
95	32.6	48.9	65.2	81.5	97.8	114	130	163	196	326
100	34.3	51.5	68.6	85.8	103	120	137	172	206	343