

Cylinder Speed

This chart will help you calculate the time required for an Enerpac cylinder to lift a load when powered by a 10,000 psi Enerpac hydraulic pump. The Cylinder Speed Chart can also be used to determine the pump type and model best suited for an application when you know the plunger speed required.

To determine:

Cylinder plunger speed

30 ton		50 ton		75 ton		100 ton		Pump Type
No Load	Load	No Load	Load	No Load	Load	No Load	Load	
1.9	19.5	3.3	33.2	4.8	47.7	6.2	61.9	.5 hp Economy
.63	6.5	1.1	11.1	1.6	15.9	2.0	20.6	Titan
2.6	19.5	4.4	33.2	6.4	47.7	8.3	61.9	.5 hp Submerged
1.6	9.3	2.8	15.8	4.0	22.7	5.2	29.5	20-Series
.61	6.5	1.0	11.1	1.5	15.9	1.9	20.6	3-Series Hushh
.61	3.2	1.0	6.5	1.5	8.0	1.9	10.3	5-Series Hushh
.38	.84	.65	1.4	.94	2.1	1.2	2.7	8000-Series
6.5	39.0	11.0	66.3	15.9	95.5	20.6	123.9	Turbo II Pump
7.8	48.7	13.3	82.9	19.1	119.3	24.8	154.7	PA-133
.60	43.3	1.0	73.7	1.5	106.0	1.9	137.5	10-Series
.46	13.0	.80	22.1	1.1	31.8	1.5	41.3	Modular Air
1.9	9.7	3.3	16.6	4.8	23.9	6.2	30.9	Atlas Pump 2.5 hp
.81	7.1	1.4	12.1	2.0	17.3	2.6	22.5	Atlas Pump 5.0 hp

An RC-308 cylinder (30 ton) is powered by a 5-Series Hushh pump. While lifting the load, the cylinder plunger will require 3.2 seconds to travel 1 inch. While extending towards the load, the cylinder plunger travels at .61 sec/in.

To determine:

Cylinder plunger speed

30 ton		50 ton		75 ton		100 ton		Pump Type
No Load	Load	No Load	Load	No Load	Load	No Load	Load	
1.9	19.5	3.3	33.2	4.8	47.7	6.2	61.9	.5 hp Economy
.63	6.5	1.1	11.1	1.6	15.9	2.0	20.6	Titan
2.6	19.5	4.4	33.2	6.4	47.7	8.3	61.9	.5 hp Submerged
1.6	9.3	2.8	15.8	4.0	22.7	5.2	29.5	20-Series
.61	6.5	1.0	11.1	1.5	15.9	1.9	20.6	3-Series Hushh
.61	3.2	1.0	6.5	1.5	8.0	1.9	10.3	5-Series Hushh
.38	.84	.65	1.4	.94	2.1	1.2	2.7	8000-Series
6.5	39.0	11.0	66.3	15.9	95.5	20.6	123.9	Turbo II Pump
7.8	48.7	13.3	82.9	19.1	119.3	24.8	154.7	PA-133
.60	43.3	1.0	73.7	1.5	106.0	1.9	137.5	10-Series
.46	13.0	.80	22.1	1.1	31.8	1.5	41.3	Modular Air

Your 30 ton cylinder needs to move a load at a speed of 6.50 sec/in. Simply go down from the top of the chart, to the value of 6.50 sec/in. Then follow the chart to the right to find that the 3-Series Hushh pump or Titan most suitable for your application.

Number of Pump Handle Strokes per Inch of Cylinder Plunger Travel

Cyl. Capacity ▶	5 ton		10 ton		15 ton		25 ton		30 ton		50 ton		75 ton		100 ton		Pump Type
	No Load	Load	No Load	Load	No Load	Load	No Load	Load	No Load	Load	No Load	Load	No Load	Load	No Load	Load	
Manual	7	7	15	15	21	21	34	34	43	43	73	73	105	105	137	137	P-391
	2	7	4	15	5	21	8	34	10	43	16	73	24	105	30	137	P-392
	1	7	2	15	3	21	5	34	7	43	11	73	16	105	21	137	P-80/84/801
	1	7	1	15	1	21	2	34	3	43	5	73	7	105	9	137	P-802/842
	1	3	1	8	1	11	1	18	1	23	2	38	2	55	3	71	P-462/464

Seconds per Inch of Cylinder Plunger Travel

Cyl. Capacity ▶	5 ton		10 ton		15 ton		25 ton		30 ton		50 ton		75 ton		100 ton		Pump Type
	No Load	Load	No Load	Load	No Load	Load	No Load	Load	No Load	Load	No Load	Load	No Load	Load	No Load	Load	
Electric (speed based on 60 Hz)	.30	3.0	.67	6.7	.94	9.4	1.5	15.5	1.9	19.5	3.3	33.2	4.8	47.7	6.2	61.9	0.5 hp Economy
	.09	1.0	.22	2.2	.31	3.1	.50	5.2	.63	6.5	1.1	11.1	1.6	15.9	2.0	20.6	Titan
	.40	3.0	.90	6.7	1.3	9.4	2.1	15.5	2.6	19.5	4.4	33.2	6.4	47.7	8.3	61.9	.5 hp Submerged
	.25	1.4	.56	3.2	.79	4.5	1.3	7.4	1.6	9.3	2.8	15.8	4.0	22.7	5.2	29.5	20-Series
	.09	1.0	.21	2.2	.29	3.1	.48	5.2	.61	6.5	1.0	11.1	1.5	15.9	1.9	20.6	3-Series Hushh
	.09	.50	.21	1.1	.29	1.6	.48	2.6	.61	3.2	1.0	5.5	1.5	8.0	1.9	10.3	5-Series Hushh
	.06	.13	.13	.29	.19	.41	.30	.67	.38	.84	.65	1.4	.94	2.1	1.2	2.7	8000-Series
Air (speed based on 100 psi air pressure)	1.0	5.9	2.2	13.4	3.1	18.8	5.2	30.9	6.5	39.0	11.0	66.3	15.9	95.5	20.6	123.9	Turbo II Pump
	1.2	7.4	2.7	16.8	3.8	23.6	6.2	38.6	7.8	48.7	13.3	82.9	19.1	119.3	24.8	154.7	PA-133
	.09	6.6	.21	14.9	.29	20.9	.48	34.3	.60	43.3	1.0	73.7	1.5	106.0	1.9	137.5	10-Series
Gasoline	.07	2.0	.16	4.5	.22	6.3	.36	10.3	.46	13.0	.80	22.1	1.1	31.8	1.5	41.3	Modular Air
	.30	1.5	.67	3.4	.94	4.7	1.5	7.7	1.9	9.7	3.3	16.6	4.8	23.9	6.2	30.9	Atlas Pump 2.5 hp
	.12	1.1	.28	2.4	.39	3.4	.64	5.6	.81	7.1	1.4	12.1	2.0	17.3	2.6	22.5	Atlas Pump 5.0 hp
	.12	.59	.28	1.3	.39	1.9	.64	3.1	.81	3.9	1.4	6.6	2.0	9.5	2.6	12.4	Atlas Pump 5.5 hp
	.06	.30	.13	.67	.19	.94	.31	1.5	.39	1.9	.66	3.3	.95	4.7	1.2	6.2	Atlas Pump 13 hp

No Load indicates the plunger speed as the plunger extends toward the load (1st stage).

Load indicates the plunger speed as the load is lifted at a system pressure of 10,000 psi (2nd stage).

Formula $V = A \div Q$

V (sec/in) = A (in²) \div Q (in³/min)

V = Cylinder plunger speed in seconds per inch

A = Cylinder effective area in square inches

Q = Pump oil flow in cubic inches

Example

At what speed (V) will the RC-308 (30 ton) cylinder move when powered by a 20-Series electric driven pump?

20-Series pump:

Oil flow Q , (no load) is 240 in³/min

RC-308 cylinder:

Effective area A is 6.50 in²

$V = 6.50 \text{ in}^2 \div 240 \text{ in}^3/\text{min} \times 60 = 1.60 \text{ sec/in}$

Cylinder Plunger Speed (sec/in)

=

$\frac{\text{Cylinder Effective Area (in}^2\text{)}}{\text{Pump Flow Rate (in}^3\text{/min)}}$

=

$\frac{60 \text{ sec}}{1}$

