

## Useful Formulas

$$\text{Cost of operation} = \frac{\text{brake horsepower} \times .746 \times \text{cost/kwh} \times \text{hours}}{\text{motor efficiency}}$$

$$\text{BTU/hour heat rejection} = \frac{\text{brake horsepower} \times 746}{.2931}$$

$$\text{Compressor rpm} = \frac{\text{motor pulley p.d.} \times \text{motor rpm}}{\text{compressor pulley p.d.}}$$

$$\text{Pump up time} = \frac{\text{tank size [gal.]} \times (\text{psig off} - \text{psig on})}{7.48 \times 14.7 \times \text{cfm capacity}}$$

$$\text{CFM required for single acting air cylinder}^* = \text{Volume of cylinder [ft.}^3\text{]} \times \text{cycles/min.} \times \frac{(\text{psig} + 14.7)}{14.7}$$

\*Multiply by 2 for double acting cylinders

Brake horsepower varies directly 0.5% per PSI with increasing and decreasing pressures.  
Air delivery varies inversely 0.075% per PSI with increasing and decreasing pressures.

### Recommended Minimum Electrical Services

Horsepower	5	7 1/2	10	15	20	25	30	40	50	60	75	100	125	150	200	
<b>208 Volts</b>	Typical Full Load Amperage	17	24	31	45	59	71	85	110	138	166	206	266			
	Wire Size (FEP, FEPB, XHHW)	10	10	8	6	4	3	2	1/0	3/0	4/0	300	2x2/0			
	Recommended Breaker Size	40	50	60	80	90	110	125	175	225	250	300	400			
	Recommended Dual Element Fuse	25	30	40	60	80	100	125	150	200	225	250	350			
	Suggested Starter Size	1	1	1.5	2	3	3	3	4	4	5	5	5			
<b>240 Volts</b>	Typical Full Load Amperage	14	22	28	40	54	60	80	96	120	146	178	238	282	334	450
	Wire Size (FEP, FEPB, XHHW)	12	10	8	6	4	3	3	1	2/0	3/0	250	350	2x3/0	2x4/0	2x350
	Recommended Breaker Size	30	40	50	70	80	100	110	150	200	225	250	350	450	600	800
	Recommended Dual Element Fuse	25	30	40	60	80	100	100	150	175	200	250	350	400	500	600
	Suggested Starter Size	1	1	1.5	2	3	3	3	4	4	5	5	5	6	6	6
<b>480 Volts</b>	Typical Full Load Amperage	7	10	14	20	26	31	37	48	60	73	89	119	141	167	225
	Wire Size (FEP, FEPB, XHHW)	12	12	12	10	8	6	6	6	4	3	1	2/0	3/0	4/0	350
	Recommended Breaker Size	15	20	25	40	50	60	70	90	100	110	150	200	225	250	350
	Recommended Dual Element Fuse	15	20	20	30	40	50	60	80	100	100	150	175	200	250	300
	Suggested Starter Size	0	1	1	2	2	3	3	3	3	4	4	4	5	5	5

### Recommended Pipe Size Chart

Equivalent Length of Pipe (Ft.)	Capacity of Air System (CFM)															
	25	50	75	100	125	150	175	200	250	300	350	400	450	500	750	1000
25	1/2	3/4	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	2	2	2	2	2 1/2	2 1/2	2 1/2	3
50	1/2	3/4	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	2	2	2	2	2 1/2	2 1/2	2 1/2	3
100	3/4	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2	2	2 1/2	2 1/2	3	3
150	3/4	1	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	3	3
200	3/4	1	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	3	3
250	3/4	1	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2	2	2 1/2	2 1/2	2 1/2	3	3	4
300	1	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2	2	2 1/2	2 1/2	2 1/2	3	3	4
400	1	1 1/4	1 1/2	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	4	4
500	1	1 1/4	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3	3	3	4	4

### Equivalent Length of Pipe (Ft.) for Fittings

Pipe Size	Long radius ell, or run of tee	Std. ell or run of reducing tee	Tee thru side outlet	Globe valve	Gate valve
1/2	.62	1.55	3.10	17.3	.36
3/4	.82	2.06	4.12	22.9	.48
1	1.05	2.62	5.24	29.1	.61
1 1/4	1.38	3.45	6.90	38.3	.81
1 1/2	1.61	4.02	8.04	44.7	.94
2	2.07	5.17	10.3	57.4	1.21
2 1/2	2.47	6.16	12.3	68.5	1.44
3	3.07	6.16	15.3	85.2	1.79
4	4.03	7.67	20.2	112.0	2.35