

Basic Compressed Air Formulas

Electrical Cost = HP x .746 x hours x Kw cost / motor efficiency

Example: 50 HP air compressor that runs 8 hours a day 5 days a week for a year with a \$.06 Kw electric rate and a 90% efficient electric motor.

$$50 \text{ HP} \times .746 \times 2,080 \text{ hours} \times \$.06 / .90 = \$5,172.26 \text{ per year}$$

Compressor RPM = motor pulley diameter x motor RPM / compressor pulley diameter

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Gallons = cubic feet / .134

Cubic Feet = gallons x .134

$$\text{Pump Up Time (Minutes)} = \frac{V \text{ (tank size)} \times (\text{final pressure} - \text{initial pressure})}{7.48 \times \text{atmospheric pressure} \times \text{pump delivery (CFM)}}$$

Example: 7.5 HP compressor rated at 24 CFM with an 80-gallon tank, unit starts at 100 PSI and turns off at 150 PSI

$$\frac{80 \text{ gallons} \times (150 \text{ PSI} - 100 \text{ PSI})}{7.48 \times 14.7 \times 24 \text{ CFM}} = \frac{4000}{2638} = 1.51 \text{ minutes}$$

Pressure Drop and Horsepower = every 1 PSI of pressure drop equals 0.5% in horsepower

Heat and Horsepower = rejected heat from an air-cooled compressor is equal to total machine horsepower x 2,545 BTU per hour

Example: 50 HP compressor with 3 HP fan motor will produce:

$$53 \text{ HP} \times 2,545 = 134,885 \text{ BTU per hour}$$

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