PORTER'S ELECTRIC MOTOR SERVICE, INC.

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Electrical/Mechanical Application Formulas

ELECTRICAL / MECHANICAL APPLICATION FORMULAS

OHMS LAW

Volts (E) = Amps (I) x Ohms (R)
Amps (I) = Volts (E) / Ohms (R)
Ohms (R) = Volts (E) / Amps (I)

R=Ohms, E=Volts, I=Amperes

POWER - AC CIRCUITS

Eff. = Efficiency, PF = Power Factor, KW = Kilowatts, HP = Horsepower

$$\text{Efficiency} = \frac{\text{746 x Output HP}}{\text{Input Watts}}$$

$$3\text{ø KW} = \frac{\text{Volts x Amps x PF x 1.732}}{1000}$$

$$3\text{ø Amps} = \frac{\text{746 x HP}}{\text{1.732 x Eff. x PF}}$$

$$3\text{ø Eff.} = \frac{\text{746 x HP}}{\text{1.732 x Volts x Amps x PF}}$$

$$3\text{ø PF} = \frac{\text{Input Watts}}{\text{Volts x Amps x 1.732}}$$

$$1\text{ø KW} = \frac{\text{Volts x Amps x PF}}{1000}$$

$$1\text{ø Amps} = \frac{\text{746 x HP}}{\text{Volts x Eff. x PF}}$$

$$1\text{ø Eff.} = \frac{\text{746 x HP}}{\text{Volts x Amps x PF}}$$

$$1\text{ø PF} = \frac{\text{Input Watts}}{\text{Volts x Amps}}$$

$$\text{HP (3ø)} = \frac{\text{Volts x Amps x 1.732 x Eff. x PF}}{746}$$

$$\text{HP (1ø)} = \frac{\text{Volts x Amps x Eff. x PF}}{746}$$

1 KW = 1000 Watts

POWER - DC CIRCUITS

Eff. = Efficiency, HP = Horsepower

$$\text{Watts} = \text{Volts} \times \text{Amps}$$

$$\text{Amps} = \frac{\text{Watts}}{\text{Volts}}$$

$$\text{HP} = \frac{\text{Volts} \times \text{Amps} \times \text{Eff.}}{746}$$

MECHANICAL

Torque in lb. ft., RPM=Revolutions Per Minute, HP = Horsepower

$$\text{Torque} = \frac{\text{HP} \times 5250}{\text{RPM}}$$

Result is lb.ft. Multiply by 12 for lb.in.

$$\text{HP} = \frac{\text{Torque X RPM}}{5250}$$

1 HP = 36 lb.in. @ 1750 RPM

1 HP = 3 lb. ft. @ 1750 RPM

FAN AND BLOWER MOTORS

CPM = Cubic Feet per Minute, Pressure in lb. / sg. ft., Eff. = Efficiency

$$\text{HP} = \frac{\text{CFM} \times \text{Pressure}}{33000 \times \text{Eff.}}$$

PUMP MOTORS

GPM = Gallons per Minute, S.G. = Specific Gravity, Eff. = Efficiency of Pump

$$\text{HP} = \frac{\text{GPM} \times \text{Head in Feet} \times \text{S.G.}}{3960 \times \text{Eff.}}$$

Head in Feet = 2.31 P.S.I.G.