

Useful Formulae

1. Compressor R.P.M. =

$$\text{Motor Pulley Pitch Diameter} \times \text{Motor R.P.M.} / \text{Compressor Pulley Pitch Diameter}$$

2. Motor Pulley Pitch Diameter =

$$\text{Compressor Pulley Pitch Diameter} \times \text{Compressor R.P.M.} / \text{Motor R.P.M.}$$

3. Compressor Pulley Pitch Diameter =

$$\text{Motor Pulley Pitch Diameter} \times \text{Motor R.P.M.} / \text{Compressor R.P.M.}$$

4. Motor R.P.M. =

$$\text{Compressor Pulley Pitch Diameter} \times \text{Compressor R.P.M.} / \text{Motor Pulley Pitch Diameter}$$

5. Free Air =

$$\text{Piston Displacement} \times \text{Volumetric Efficiency (\%)}$$

6. Required Piston Displacement =

$$\text{Free Air} / \text{Volumetric Efficiency}$$

7. Piston Displacement in C.F.M.* =

$$\text{Cylinder Bore} \times \text{Cylinder Bore} \times \text{Stroke in In.} \times \text{R.P.M.} / 2200$$

8. Cubic Feet Compressed Air =

$$\text{Cubic Feet Free Air Atmospheric Pressure} / (\text{psig} + 14.7)$$

9. Cubic Feet Free Air =

$$\text{Cubic Feet Compressed Air} \times (\text{psig} + 14.7) / \text{Atmospheric Pressure}$$

10. Cubic Feet Free Air Required to Raise Receiver from Opsig to Final Pressure =

$$\text{Volume of Receiver in Cubic Feet} \times \text{psig} / \text{Atmospheric Pressure}$$

11. Cubic Feet Free Air Required to Raise Receiver Pressure from Some Pressure Greater than Opsig to a Final Higher Pressure =

$$\text{Volume of Receiver in Cubic Feet} \times (\text{Final psig} - \text{Initial psig} / \text{Atmospheric Pressure})$$

12. Piston Speed in Feet per Minute =

$$2 \times (\text{Stroke in In.}) \times \text{R.P.M.} / 12$$

13. Gallons =

$$\text{Cubic Feet} / .13368$$

14. Cubic Feet =

$$\text{Gallons} \times .13368$$

15. Total Force in Lbs. of Air Cylinder =

$$\text{Area of Cylinder Diameter in Square inches} \times \text{PSIG of Air Pressure Used}$$

16. CFM of Free Air Required to Operate Air Cylinder (Single-Acting) =

$$\text{Volume of Cylinder in Cubic Feet} \times \text{Cycles per Minute} \times (\text{Gage Pressure} + 14.7 / 14.7)$$

For Double Acting Cylinders Multiply by 2

*Piston Displacement for Multi-Stage Compressors – Only the Low Pressure Cylinder is considered

Electrical Formulae

17a. H.P. = kW X 1.34

17b. kW = H.P. X .7457

17c. 3-ph.HP = V x A x Eff x PF x 1.732 / 746

17d. 3-ph.KWh = Actual HP x .746 / Eff.

17e. 1-ph.HP = V x A x Eff x PF / 746 **17f.** 1-ph.KWh = V x A x PF / 1000