Compressed Air Systems

USEFUL FORMULAS

1. COMP. RPM = $\frac{\text{motor pulley p.d. x motor r.p.m}}{\text{comp. pulley p.d.}}$

2. MOTOR PULLEY p.d. = $\frac{\text{comp. pulley p.d. x comp. r.p.m.}}{\text{motor r.p.m.}}$

3. COMP. PULLEY p.d. = $\frac{\text{motor pulley p.d. x motor r.p.m.}}{\text{comp. r.p.m.}}$

4. MOTOR RPM = $\frac{\text{comp. pulley p.d. x comp. r.p.m.}}{\text{motor pulley p.d.}}$

5. FREE AIR = piston displacement x volumetric eff (%)

6. REQUIRED PISTON DISCPLACEMENT = $\frac{\text{free air}}{\text{vol. eff.}}$

7. PISTON DISPLACEMENT IN CU FT MIN = $\frac{\text{cyl. bore in In. x cyl. bore x stroke in IN. x r.p.m.}}{2200}$

   Note: Piston displacement for multi stage compressors - only the low pressure cylinders are considered

8. CU. FT. COMPRESSED AIR = $\frac{\text{c.u. ft. free air x 14.7}}{\text{(psig + 14.7)}}$

9. CU. FT. FREE AIR = $\frac{\text{cu. ft. compressed air x (psig + 14.7)}}{14.7}$

10. CU. FT. FREE AIR REQ'D TO RAISE REC. FROM 0 GAGE TO FINAL PRESSURE = $\frac{\text{vol. of rec. in cu. ft x psig}}{\text{(atmopheric pressure) psia}}$

11. CU. FT. FREE AIR REQ'D TO RAISE REC FROM SOME PRESS. GREATER THAN 0 GAGE TO FINAL HIGHER PRESSURE = $\frac{\text{vol. of rec in cu ft x (final psig - initial psig)}}{\text{(atmopheric pressure) psia}}$

12. PISTON SPEED IN FT PER MIN. = $\frac{\text{2 x stroke (in inches) x r.p.m.}}{12}$

13. GALLONS = $\frac{\text{C.U. FT}}{0.134}$

14. CU. FT. = Gallons x 0.134

15. TOTAL FORCE IN LBS. of Air CYLINDER = Area of the cylinder dia. in square inches x psig of air pressure used

16. C.F.M. OF FREE AIR REQ'D TO OPERATE AIR CYLINDER (SINGLE ACTING) =

    $$\frac{\text{Vol. of Cyl. in cu. ft x cycles per min. x (gage pressure psig + 14.7)}}{(14.7)}$$

17. PUMP UP TIME (MIN) = $\frac{\text{V (tank size in gal.) x (final tank pressure - initial tank pressure)}}{\text{7/48 x atmos. pressure (psia) x pump delivery (c.f.m.)}}$

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