Pump Formulas

FORMULA FOR:	WORD FORMULA:	LETTER FORMULA:
PUMP OUTLET FLOW In Gallons/Minute	$\text{Flow} = \dfrac{\text{RPM x Pump Displacement (Cu. In./Ref.)}}{231}$	$Q = nd/231$
PUMP INPUT POWER In Horsepower Required	$\text{Horsepower Input} = \dfrac{\text{Flow Rate Output (GPM) x Pressure (psi)}}{\text{1714 Efficiency (Overall)}}$	$Hp_{in} = QP/1714Eff.$ or $(GPM \times psi)/1714Eff.$
PUMP EFFICIENCY Overall in Percent	$\text{Overall Efficiency} = \left(\dfrac{\text{Output Horsepower}}{\text{Input Horsepower}}\right) \times 100$	$Eff_{OV} = (HP_{out}/HP_{in}) \times 100$
	Overall Efficiency = Volumetric Eff. x Mechanical Eff.	$Eff_{ov} = Eff_{vol} \times Eff_{mech}$
PUMP EFFICIENCY Volumetric in Percent	$\text{Volumetric Efficiency} = \dfrac{\text{Actual Flow Rate Output (GPM)}}{\text{Theoretical Flow Rate Output (GPM)}} \times 100$	$Eff_{vol} = (Q_{act}/Q_{theo}) \times 100$
PUMP EFFICIENCY Mechanical in Percent	$\text{Mechanical Efficiency} = \dfrac{\text{Theoretical Torque to Drive}}{\text{Actual Torque to Drive}} \times 100$	$Eff_{mech} = (T_{theo}/T_{act}) \times 100$
PUMP LIFE B_{10} Bearing Life	$B_{10}\text{ Hrs. Bearing Life} = \text{Rated Life Hrs.} \times \dfrac{\text{Rated Speed (RPM)}}{\text{New Speed (RPM)}} \times \dfrac{\text{Rated Pressure (psi)}}{\text{New Pressure (psi)}}$	$B_{10} = \text{Rated Hrs} \times (RPM_r/RPM_n) \times (P^r/P_n)^3$