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Common Hydraulic Formulas

Property	Word Formula	Mathematic Equation
Cylinder Force lbs (Pounds of Force)	Force =Pressure (psi) x Net Area (in ²)	$F=PA$
Fluid Motor Speed RPM (Revolutions per Minute)	Speed = $\frac{231 \times \text{Flow Rate (GPM)}}{\text{F.M. Displacement (in}^3\text{/rev.)}}$	$n = \frac{231 Q}{d}$
Fluid Pressure psi (Pounds per Square Inch)	Pressure = $\frac{\text{Force (lbs)}}{\text{Area (in}^2\text{)}}$	$P = \frac{F}{A}$
Fluid Motor Torque lb-in (Inch Pounds)	Torque = $\frac{\text{Pressure (psi)} \times \text{F.M. Displacement (in}^3\text{/rev.)}}{2\pi}$ Torque = $\frac{\text{Horsepower} \times 63025}{\text{RPM}}$ Torque = $\frac{\text{Flow Rate (GPM)} \times \text{Pressure (psi)} \times 36.77}{\text{RPM}}$	$T = \frac{Pd}{2\pi}$ $T = \frac{63025 \text{ hp}}{n}$ $T = \frac{36.77 Q P}{N}$
Fluid Motor Power hp (Horsepower)	Horsepower = $\frac{\text{Torque (lbs-in)} \times \text{RPM}}{63025}$	$hp = \frac{Tn}{63025}$
Cylinder Area Extend in ² (Square Inches)	Area = $\pi(4 \times \text{Bore Diameter}^2)$	$A = .7854 D^2$
Cylinder Area Retract (w/rod) in ² (Square Inches)	Area = $(\pi/4 \times \text{Bore Diameter}^2) - (\pi/4 \times \text{Rod Diameter}^2)$	$A = (.7854 D_b^2) - (.7854 D_r^2)$
Cylinder Volume G (Gallons of Fluid)	Volume = $\frac{\text{Net Area (in}^2\text{)} \times \text{Stroke (in)}}{231}$	$V = \frac{A L}{231}$
Cylinder Power hp (Horsepower)	Horsepower = $\frac{\text{Pressure (psi)} \times \text{Flow Rate (GPM)}}{1714}$	$hp = \frac{P Q}{1714}$
Cylinder Velocity ft/s (Feet per Second)	Velocity = $\frac{231 \times \text{Flow Rate (GPM)}}{12 \times 60 \times \text{Net Area (in}^2\text{)}}$	$v = \frac{.3208 Q}{A}$
Pump Outlet Flow GPM (Gallons per Minute)	Flow = $\frac{\text{RPM} \times \text{Pump Displacement (in}^3\text{/rev.)}}{231}$	$Q = \frac{nd}{231}$
Flow Rate Through Piping ft/s Velocity (Feet per Second)	Velocity = $\frac{.3208 \times \text{Flow Rate Through I.D. (GPM)}}{\text{Internal Area (in}^2\text{)}}$	$v = \frac{.3208 Q}{A}$