

NACHI AMERICA INC. Hydraulic Division

Conversions

TO CONVERT	INTO	MULTIPLY BY
Bar	PSI	14.5
cc	Cu. In.	0.06102
°C	°F	$(^{\circ}\text{C} \times \frac{9}{5}) + 32$
Kg	lbs.	2.205
KW	HP	1.341
Liters	Gallons	0.2642
mm	inches	0.03937
Nm	Lb. - ft.	0.7375
N	Lbs.	0.22481
Cu. In.	cc	16.39
°F	°C	$(^{\circ}\text{F} - 32) / 1.8$
Gallons	Liters	3.785
HP	KW	0.7457
Inches	mm	25.4
Lbs.	Kg	0.4535
Lb.-ft.	Nm	1.356
PSI	Bar	0.06896
In. of HG	PSI	0.4912
In. of H ₂ O	PSI	0.03613
Lbs.	Nm	4.4482

Formulas

CYLINDERS	Cylinder Area = diameter ² x .7854	Tube Area = $\frac{\text{GPM} \times .3208}{\text{oil velocity}}$
	Cylinder Force = pressure x area	Adjust GPM on Return = $\frac{\text{cyl area} \times \text{GPM}}{\text{area}}$
	Cylinder Time (in seconds) = $\frac{\text{area} \times \text{stroke} \times .26}{\text{GPM}}$	Cylinder Speed (Ft/Min) = $\frac{\text{stroke} \times 5}{\text{time (in secs)}}$
	Pneumatic HP = $\frac{\text{compressed CFM} \times \text{PSI} \times 144}{33,000}$	Cylinder Speed (Ft/Min) = $\frac{\text{GPM} \times 19.25}{\text{area}}$
	Cylinder HP = $\frac{\text{cyl speed} \times \text{cyl force}}{33,000}$	Comp CFM = $\frac{\text{area} \times \text{stroke} \times 60}{\text{time (in secs)} \times 1728}$

PUMPS MOTORS	HP Out = $\frac{\text{HP IN} \times \text{overall Eff.}}{100}$	GPM = $\frac{\text{RPM} \times \text{disp. (in inches)}^3}{231}$
	Actual Torque = $\frac{\text{theo. torque} \times \text{mech. eff.}}{100}$	Hyd. HP = $\frac{\text{GPM} \times \text{PSI}}{1714}$
	Actual Motor RPM = $\frac{\text{theo. RPM} \times \text{vol. eff.}}{100}$	Torque (in lbs.) = $\frac{\text{PSI} \times \text{disp. (in inches)}^3}{6.28}$
	Overall Efficiency = $\frac{\text{mech. eff.} \times \text{vol. eff.}}{100}$	Torque (in lbs.) = $\frac{\text{HP} \times 63025}{\text{RPM}}$
	Actual Pump GPM = $\frac{\text{theo. GPM} \times \text{vol. eff.}}{100}$	

VEHICLE SIZING	RPM = $\frac{\text{MPH} \times 168}{\text{LR}}$
	Torque = TE x LR
	Wheel Slip Torque = WD x ADC x LR
	TE = RR + GR + DP
	RR = $\frac{\text{GVW} \times \text{R}}{1000}$
	GR = $\frac{\% \text{Grade} \times \text{GVW}}{100}$

LEND	G = Gear Reduction Ratio	GR = Grade Resistance
	LR = Load Radius	DP = Draw Bar Pull Desired
	TE = Tractive Effort	TE = RR + GR + DP
	WD = Weight on Drive Wheels	R = Rolling Resistance Coefficient
	ADC = Adhesion Coefficient	GVW = Gross Vehicle Weight
	RR = Rolling Resistance	