LIGON HYDRAULICS

Formulas Used to Calculate Forces That Cylinders Must Withstand to Operate Most Efficiently

Extend Area (in^2)	=	$\frac{\pi * \text{Bore Diameter (in)}^2}{4}$
Extend Volume (in^3)	=	$\frac{\pi * \text{Bore Diameter (in)}^2 * \text{Stroke (in)}}{4}$
Extend Time (sec)	=	$\frac{\text{Extend Volume } (in^3) * 60}{\text{Flow (gpm)} * 231}$
Extend Rate (in/sec)	=	$\frac{\text{Flow (gpm)} * 231}{\text{Extend Area } (in^2) * 60}$
Extend Force (lbs)	=	Extend Area (in^2) * Pressure (psi)
Retract Area (in^2)	=	$\frac{\pi * (\text{Bore Diameter (in)}^2 - \text{Rod Diameter (in)}^2)}{4}$
Retract Volume (in^3)	=	$\frac{\pi * (\text{Bore Diameter (in)}^2 - \text{Rod Diameter (in)}^2) * \text{Stroke (in)}}{4}$
Retract Time (sec)	=	$\frac{\text{Retract Volume } (in^3) * 60}{\text{Flow (gpm)} * 231}$
Retract Force (lbs)	=	Retract Area (in^2) * Pressure (psi)
Retract Rate (in/sec)	=	$\frac{\text{Flow (gpm)} * 231}{\text{Retract Area } (in^2) * 60}$
Retract Rod Area (in^2)	=	Rod Diameter $(in)^2 * 0.7854$
Cylinder Ratio	=	$\frac{\text{Extend Area } (in^2)}{\text{Retract Area } (in^2)}$
Flow out rod (gpm)	=	$\frac{\text{Flow in base (gpm)}}{\text{Cylinder Ratio}}$
Flow out base (gpm)	=	Flow in rod (gpm) * Cylinder Ratio
Cycle Time (sec)	=	Extend time (sec) + Retract Time (sec)
Hydraulic Power (HP)	=	$\frac{\text{Pressure (psi)} * \text{Flow (gpm)}}{1714}$