Phone : 253-351-0777 219 Frontage Rd N Suite A, Pacific, WA 98047 Info@hydraulic-industries.com

Hydraulic Formulas

Pressure, Force and Horsepower Relationships:

Pressure (psi) = force (lbs) / area (in^2)
Force (lbs) = area (in^2) x pressure (psi)
Area (in^2) = force (lbs) / pressure (psi)

Fluid Power Horsepower:

Fluid Power Horsepower (hp) = pressure (psi) x pump flow (gpm) / 1,714

Torque and Horsepower Relationships:

Torque (ft lbs) = horsepower (hp) x 5,252 / speed (rpm)
Horsepower (hp) = torque (ft lbs) x speed (rpm) / 5,252
Speed (rpm) = horsepower (hp) x 5,252 / torque (ft lbs)

Basic Hydraulic Motor Calculations:

Motor Torque (in lbs) = pressure (psi) x motor displacement (cu ins/rev) / 6.28
(Can also use horsepower (hp) x 63,025 / speed (rpm)
Motor Speed (rpm) = 231 x flow rate (gpm) / motor displacement (cu ins/rev)
Motor Horsepower (hp) = torque (in lbs) x motor speed (rpm) / 63,025
Motor Flow Rate (gpm) = motor speed (rpm) x motor displacement (cu ins/rev) / 231
Motor Displacement (cu ins/rev) = torque (in lbs) x 6.28 / pressure (psi)

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Hydraulic Formulas

Basic Cylinder Calculations:

Piston Cylinder Area (in²) = diameter squared x .7854

(Can also use 3.1416 x radius squared (ins))

Piston Rod End (annulus end) Area (in²) = piston cylinder area (in²) – rod area (in²)

Cylinder Force (lbs) = pressure (psi) x area (in²)

Cylinder Speed (ft/min) = 19.25 x flow rate (gpm) / area (in²)

(Divide by 60 to convert speed to ft/sec)

Cylinder Speed (in/min) = flow rate (cu ins/min) / area (in²)

(Note that 1 US gallon = 231 cu ins)

Cylinder Time (secs) = area (in²) x cylinder stroke (ins) x .26 / flow rate (gpm)

Cylinder Flow Rate (gpm) = 12 x 60 x cylinder speed (ft/sec) x area (in²) / 231

Cylinder Volume Capacity (gals) = cylinder area (in²) x cylinder stroke (ins) / 231