



Pump Power Calculator

Calculate pump hydraulic and shaft power

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Pipe Flow & Pressure Drop Calculator

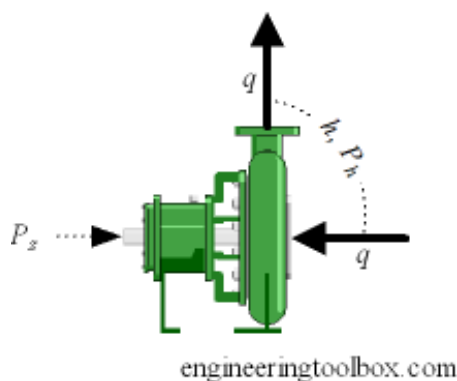
Pipe Flow Software - Flow Rate
& Pressure Drop Calculations

Pipe Flow Software

Hydraulic Pump Power

The ideal hydraulic power to drive a pump depends on

- the mass flow rate the
- liquid density
- the differential height



- either it is the static lift from one height to an other or the **total head loss** component of the system - and can be calculated like

$$P_{h(kW)} = q \rho g h / (3.6 \cdot 10^6)$$

$$= q \rho / (3.6 \cdot 10^6) \quad (1)$$

where

$P_{h(kW)}$ = hydraulic power (kW)

q = flow (m^3/h)

ρ = density of fluid (kg/m^3)

g = acceleration of gravity ($9.81 m/s^2$)

h = differential head (m)

p = differeential pressure (N/m^2 , Pa)

The hydraulic Horse Power can be calculated as:

$$P_{h(hp)} = P_{h(kW)} / 0.746 \quad (2)$$

where

$P_{h(hp)}$ = hydraulic horsepower (hp)

Or - alternatively

$$P_{h(hp)} = q_{gpm} h_{ft} SG / (3960 \eta) \quad (2b)$$

where

q_{gpm} = flow (gpm)

h_{ft} = differential head (ft)

SG = Specific Gravity (1 for water)

η = pump efficiency

Example - Power pumping Water

1 m^3/h of water is pumped a head of 10 m. The theoretical pump power can be calculated as

$$\begin{aligned} P_{h(kW)} &= (1 m^3/h) (1000 kg/m^3) (9.81 m/s^2) (10 m) / (3.6 \cdot 10^6) \\ &= \underline{0.027 kW} \end{aligned}$$

Shaft Pump Power

The shaft power - the power required transferred from the motor to the shaft of the pump - depends on the efficiency of the pump and can be calculated as

$$P_{s(kW)} = P_{h(kW)} / \eta \quad (3)$$

where

$P_{s(kW)}$ = shaft power (kW)

η = pump efficiency

Online Pump Calculator - SI-units

The calculator below can used to calculate the hydraulic and shaft power of a pump:

q - flow (m^3/h)

ρ - *density of fluid* (kg/m^3)

g - gravity (m/s^2)

h - differential head (m)

η - pump efficiency

Online Pump Calculator - Imperial units

The calculator below can used to calculate the hydraulic and shaft power of a pump using Imperial units:

q - flow capacity (gpm)

γ - *specific weight of fluid* (lb/ft^3)

g - gravity (ft/s^2)

h - differential head (ft)

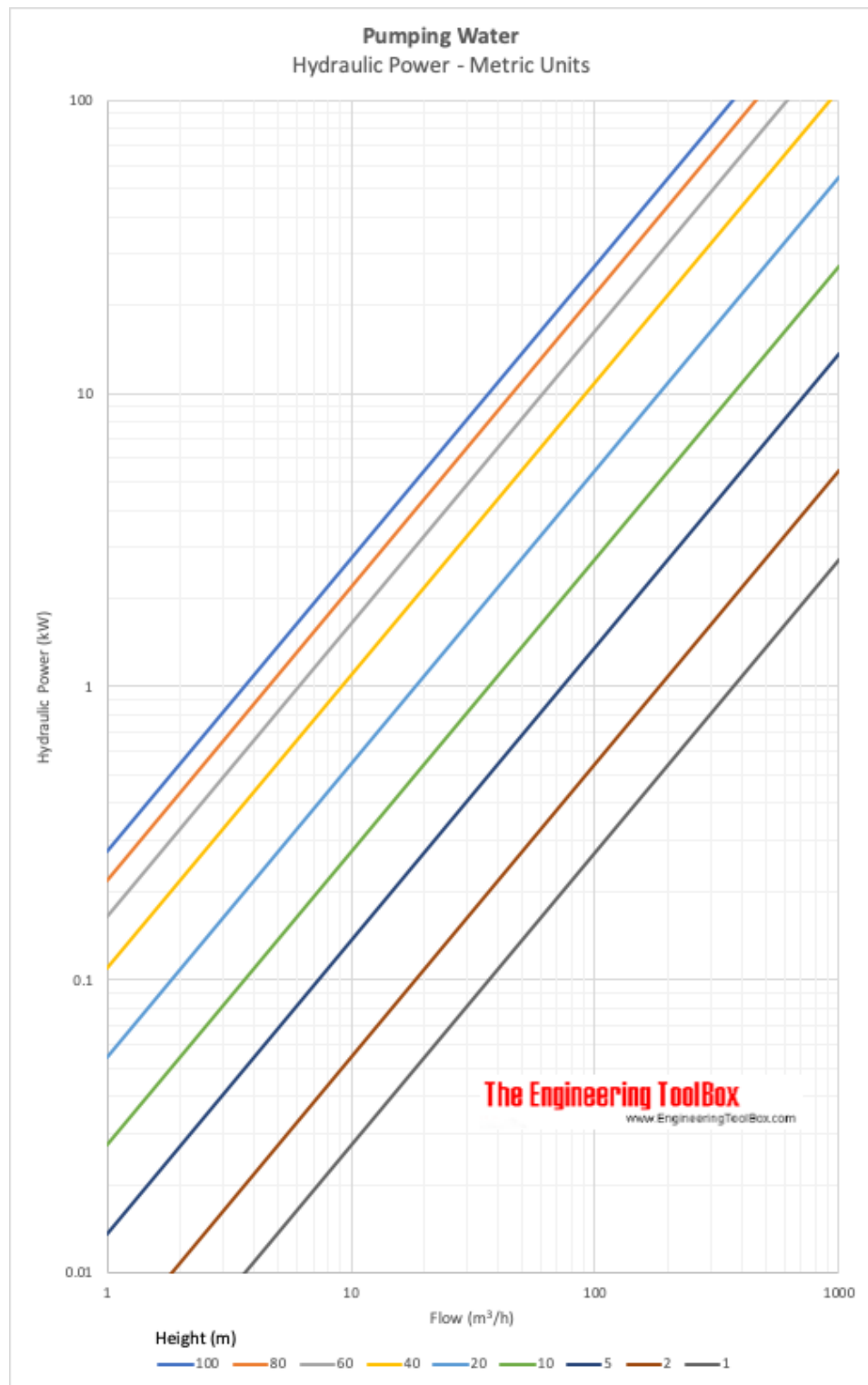
η - pump efficiency

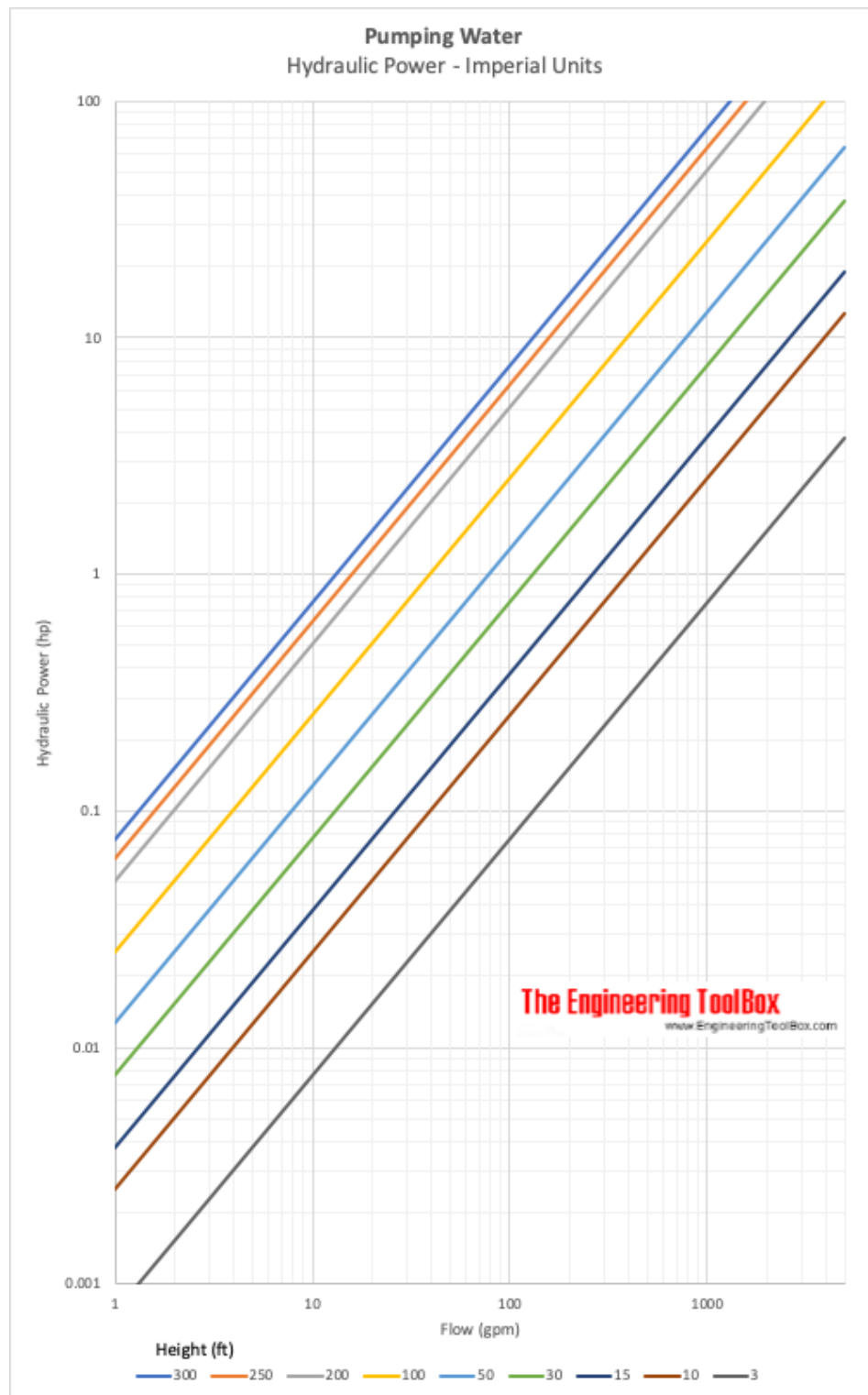
- Check the relation between [Density, Specific Weight and Specific Gravity](#)

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- [Pump Calculator App](#)

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Related Documents

- **Centrifugal Pumps** - An introduction to Centrifugal Pumps
- **Centrifugal Pumps and Influence from Viscosity** - When a liquid flow through a pump, hydrodynamic losses depends on fluid viscosity
- **Centrifugal Pumps and Shut-Off Head** - Centrifugal pumps and maximum (shut-off) head
- **Electrical Motor Shaft Power** - Electrical motors are rated in horsepower or watt
- **Hydraulic Pumps and Motor Sizing** - Motor size versus flow rate, shaft torque, shaft power and hydraulic power
- **Positive Displacement Pumps** - Introduction tutorial to positive displacement pumps basic operating principles
- **Power** - Power is the rate at which work is done or energy converted
- **Power Gained by Fluid from Pump or Fan** - The power gained by fluid from an operating pump or fan
- **Pump - Volume Flow and Temperature Rise** - Calculate temperature rise in pumps
- **Pump and Fan Efficiency** - Overall pump and fan efficiency is the ratio power actually gained by the fluid to the shaft power supplied
- **Pumping Water - Energy Cost Calculator** - The energy costs of pumping water
- **Pumping Water - Required Horsepower** - Horsepower required to pump water
- **Pumps, Fans and Turbines - Horsepower** - British Horse Power in pumps, fans and turbines - and how to convert to other units
- **Specific Work done by Turbo Machines - Pumps, Compressors and Fans** - Specific work from pumps, fans, compressors and turbines
- **System Curve and Pump Performance Curve** - Utilize the system curve and the pump performance curve to select the proper pump for a particular application
- **Work done by a Force** - Work done by force acting on an object

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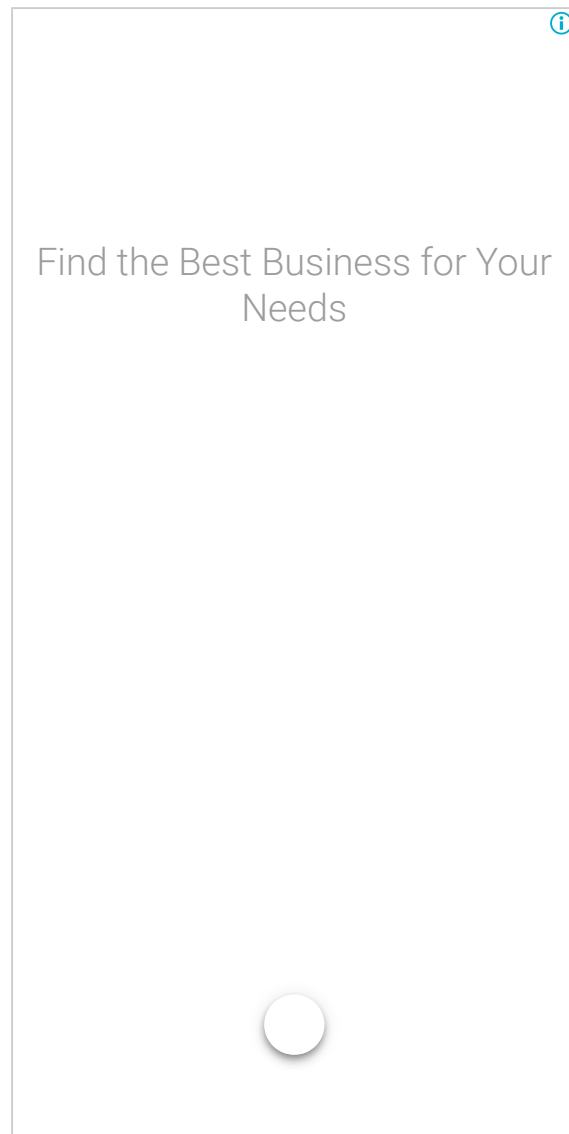
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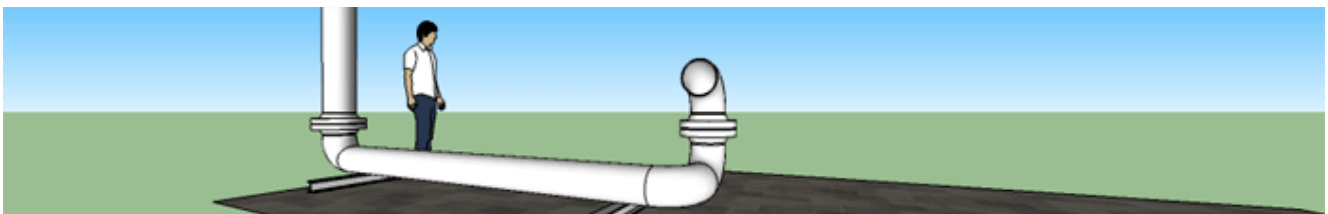
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1 hp water pump

hydraulic pump

Unit Converter

Temperature

☒ °C☐ °F

Length

☒ *m*☐ *km*☐ *in*☐ *ft*☐ *yards*☐ *miles*☐ *naut miles*

Area

☒ *m²*☐ *km²*☐ *in²*☐ *ft²*☐ *miles²*☐ *acres*

Volume

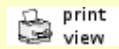
☒ *m³*☐ *liters*☐ *in³*☐ *ft³*☐ *us gal*

Weight

☒ kg_f ☐ N ☐ lb_f **Convert!****Velocity****1.0**☒ m/s ☐ km/h ☐ ft/min ☐ ft/s ☐ mph ☐ $knots$ **Convert!****Pressure****1.0**☒ $Pa (N/m^2)$ ☐ bar ☐ $mm H_2O$ ☐ kg/cm^2 ☐ psi ☐ $inches$ H_2O **Convert!****Flow****1.0**☒ m^3/s ☐ m^3/h ☐ $US gpm$ ☐ cfm **Convert!****Scientific Online Calculator**

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