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PUMPS 101

<u>Liquid Type</u>	<u>Specifically:</u>	<u>Application</u>	<u>Pump Type</u>
<u>Water</u>	De-ionized →→	Transfer→→→→	ANSI/Multi-Stage/AOD
	_____	Metering→→→→	Gear/Diaphragm
	Clean →→	Transfer→→→→	Centrifugal/Axial/Turbine
		Metering→→→→	Gear/Hose/Diaphragm
<u>Corrosives</u>	Acid or Base→→	Transfer→→→→	Centrifugal/Alloy/Plastic
		Metering→→→→	Gear/Mag-Drive Hose/Diaphragm
<u>Slurries</u>	Abrasive →→	Transfer→→→→	Hose/Centrifugal/AOD
	_____	Metering→→→→	Hose/AOD
	Non-Abrasive→→	Transfer→→→→	Hose/Gear/Lobe/AOD
		Metering→→→→	Hose/Gear/Lobe/AOD
<u>Polymers</u>	“Neat” →→	Transfer→→→→	Gear/Hose/Lobe/AOD
	_____	Metering→→→→	Gear/Diaphragm/Hose
	“Aged” →→	Transfer→→→→	Gear/Diaphragm/Hose/AOD
		Metering→→→→	Gear/Diaphragm/Hose
<u>Organic Solvents</u>	Non-Lubricating→→	Transfer→→→→	Centrifugal/Mag-Drive /AOD/Alloy/Plastic
		Metering→→→→	Gear/Mag-Drive/Diaphragm

Important Formulas:

$$\text{PSI required} = \text{TDH} \times \text{SG} / 2.31$$

$$\text{Estimated HP} = (\text{GPM} \times 8.33 \times \text{TDH} \times \text{SG}) / 33,000 \times \text{Pump Efficiency}$$

Important Definitions:

PSI = Pounds per square inch; **GPM** = Gallons per minute of liquid to be pumped

Viscosity = Internal Friction of a liquid (usually measured in centipoises (CPS))

Total Dynamic Head (TDH) = Total head required minus the total suction head (usually measured in feet)

Specific Gravity (SG) = The “density” of a liquid, relative to water, at a specific temperature

Main Types of Pumps:

Centrifugal (Horizontal (ANSI, Self-Priming, API); Vertical (Turbine, Submersible, Split-Case Axial))

Positive Displacement (Gear, Rotary Lobe, AOD, Peristaltic Hose, Diaphragm, Progressive Cavity, Rotary)

In General: Centrifugals are more efficient on 0-100 CPS liquids, Positive Displacements on viscosities > 100 CPS.

*Pumps & Accessories * Liquid Mixers-Agitators * Liquid Filtration * High-Shear Mixers-Mills * Liquid and Gas Samplers/Systems
Fume-Gas Scrubbers-FRP/PVC Fans * Heat Transfer Equipment * Electric & Gas Heaters * Direct Steam Injection Heaters
Processing and CIP Modular Systems * Package Slurry Systems * SS & FRP-PE Tanks * Corrosion-Resistant Duct/Vent Systems*