

PUMP GLOSSARY

Affinity Laws	Predict how capacity, head and horse power are affected by changes in impeller diameter and shaft speed.
A.N.S.I Standards	American National Standards Institute. Set of specifications for centrifugal pump manufactured in the U.S. A
Air Ingestion	Air entering the stuffing box due to negative suction pressure
Adapter	Connects and aligns the power end of a pump to wet-end
Atmospheric Pressure	Pressure of the atmosphere on earth. Sea level is 14.7 PSI
Alignment	When centreline of pump is perfectly aligned to centreline of driver
Application	Description of the fluid and operating conditions you are trying to pump
B.E.P.	The best efficiency point. It is the point where the power coming out of the pump (water horse power) is the closest to the power coming into the pump (brake horse power) from the driver. This is also the point where there is no radial deflection of the shaft cause by unequal hydraulic forces acting on the impeller.
Back Plate	Used in some centrifugal pumps to position stuffing box and provide a wear surface for the impeller
B.H.P.	Brake horse power. The actual amount of horsepower being consumed by the pump as measured on a pony brake or dynamometer.
Bernoulli's Law	A moving stream of liquid or gas exerts less sideway pressure than if it were at rest. The result is that material appears to be drawn into the stream, but are being pushed in by higher pressure from outside
Brinnell Hardness	method of measuring hardness of metal parts. Hardness higher than 350 can be difficult to machine
Base Plate	The pump and motor mount on this unit
Booster Pump	Surface pump used to increase pressure in a fluid line or to pull from a storage tank or pit. Also, used to pressurize a water system
Bypass Line	Recirculates fluid from pump discharge to stuffing box
Beneficiation	The process of refining ores and raw materials.
Concentrates	The valuable portions of ores and raw materials obtained by a beneficiation process.
Concentration by Weight (or Mass)	The weight (mass) of solids present in a two-phase mixture taken as a percentage of the weight (mass) of the total mixture.

Concentration by Volume	The volume of solids present in a two-phase mixture taken as a percentage of the volume of the total mixture.
Check Valve	Valve that allows solution to flow in one direction only
Capacity	Fluid flow measured in gpm, litres/min, M ³ /hr. etc.
Cut water	Directs pumped solution to the discharge port. May be a high wear point
Cavitation	Vacuum created when discharge capacity of pump exceeds the replacement in the suction line. Cavitation can occur when diameter of the input line is too small or too long. These bubbles vibrate and can damage pump
Compression Set	Change to elastic shape when exposed to heat. Round O-ring becomes flat
Centrifugal Pump	Pump that mechanically spins solution to push it out by centrifugal force
Close Coupled	Pump impeller mounts directly to drive mechanism shaft
Critical Speed	Any object of elastic material has a natural period of vibration. At this speed, minor vibrations will be magnified
Characteristic Curve	A curve showing the relationship between pump heads and flow rates at a given speed.
Comminution	The reduction of size of solids particles by means of mill grinding, attrition or any other size reduction process.
Damping	Touching of a component to dissipate vibration
Double Volute	This design incorporates two cut waters to prevent shaft deflection when pump is running off-B.E.P. Lowers efficiency and not used in smaller pumps
Deflection	Movement or displacement of a shaft in the radial dimension. (run-out)
Diffuser	Housing or part that fits around impeller. Strips solution from the rotating impeller & forces it out the discharge line, reducing solution velocity while increasing static pressure. Sometimes this feature is designed into volute
Dial Indicator	Precise tool used to measure deflection or shape of shaft
Ductility	Property of a metal allowing deformation without cracking
Dynamic Head	The pump head created by friction in the piping system
Density of Material	Mass of material in kilograms per cubic metre. Material may refer to fluid, solid or mixture.
Drag Coefficient	A measure of the forces resisting the movement of a solid particle in a fluid.
Efficiency	Power in / power put
Eye of the Impeller	The centre of the impeller where fluid enters
Elastomer	A rubber like material that when compressed, will return to 90% of original shape in less than five seconds
Expeller	A second impeller used to lower the stuffing box pressure.
Flotation	A continuous process in which cells are arranged in series forming a bank. Pulp enters the first cell of the bank and gives up some of its valuable mineral as a froth. Air bubbles overflow from this cell taking the desired mineral with them. The underflow from this cell passes to the second cell where more mineralized froth is removed, continuing down the bank, until barren tailings overflow and the underflow passes to the last cell in the bank. Pulp passing through each cell is drawn upwards into the rotor by the suction created by the rotation. Slurries are thoroughly mixed with the air before being broken into small, firm bubbles by the disperser, which surrounds the rotor, by abruptly diverting the whirling motion of the pulp.
Float Valve	Responds to changes in fluid level, preventing overflow by blocking input flow

Fines	Small particles of ore or metal.
Flow Rate	Volume of fluid moving past a given point, in a unit time. (gal/min)
Flocculation	The use of high molecular weight synthetic organic polymers which are added to a suspension of finely divided solids in water, in very small quantities, which increase the settling rate of the suspended material by combining fine particles together to form a larger agglomerate.
Foot	Part of frame that supports wet end and power end of pump. Attaches to base plate
Francis' Vane	Common impeller shape used in the range of 1500-4000 rpm
Friction Loss	The resistance to flow within a pipe and fittings. It is a function of the rate of flow, viscosity of the liquid, and pipe diameter and is expressed in metres of fluid pumped
Gland	The part that holds one half of the mechanical seal to the stuffing box
Galvanic Series	List of metals where in a certain medium (e.g.: salt water) the more noble metals will be attacked by the less noble
Head Pressure	The equivalent height of the liquid. 20° C. water is used as the standard where 10 meters (33.9 ft.) of water equals one atmosphere (14.7 psi. or 1 bar). The term head is used instead of pressure in the centrifugal pump business
Head	The potential and/or kinetic energy that exists in a fluid. It is usually expressed in metres of fluid pumped.
Horse Power	3,000-foot pound / min
Homogenous Mixture or Slurry	A two-phase mixture of solid particles and fluid in which the two phases cannot be separated by mechanical means and in which the distribution or concentration of solid particles is uniform across the section of the pipe. In practice this is really a "model" slurry with uniform properties that we assume in order to simplify system calculations.
Heterogeneous Slurry	A flowing slurry in which the concentration of solid particles is not uniform but increases towards the bottom of the pipe.
Hydraulic Gradient	The friction head loss per unit length of pipe.
Impeller	Rotating centrifugal pump part with vanes propelling solution outward creating centrifugal force and driving solution to the discharge. Three basic design types: Closed / open and semi-open
Open	Open eye with water wheel shape
Semi-Open	Eye in centre with vane on one side only
Closed impeller	Open eye in centre with vanes on both sides
Impeller Setting	Open impellers require a clearance between the volute or the pump back plate depending upon design. This clearance must be set when the pump is at operating temperature and must be reset to compensate for wear. (0.015" to 0.020" or 0,04 mm to 0,05 mm is typical)
Impeller Shroud	Plates located on both sides of impeller to prevent solids from penetrating
Impeller Vane	Blade between eye and outside diameter of impeller directing solution flow
Inducer	Small axial flow vane attached to impeller to increase N.P.S.H. available
Intergranular Corrosion	Corrosion at the grain boundaries of a body of material
Internal Recirculation	Loss of efficiency caused by solution flow between wear rings or impeller/volute clearance.
Low Flow	Can cause excess heat inside pump. Rise of 10 degrees C is excessive. Usually caused by throttling discharge valve or reduced pipe ID due to residue build-up

Lantern Ring	A device used to supply lubricant to packing. Usually located in the middle of the packing ring set.
Laminar Flow	In laminar flow, all the fluid particles proceed along parallel paths and there is no transverse component of velocity. The orderly progression is such that each particle follows exactly the path of the particle proceeding it without any deviation. Three-dimensional laminar flow can be viewed as concentric thin shells along the pipe axis. Laminar flow is associated with low velocities and viscous sluggish fluids.
Liner, Drive side (also Liner, Frame Plate)	A cast hard alloy or moulded rubber component lining the drive side of the pump casing.
Limiting settling velocity	The velocity of heterogeneous slurry in a horizontal pipeline, according to Durand's studies, below which solids of a certain size, density and concentration begin to settle along the bottom.
Liner, Volute (also Liner, Casing Shell)	A cast hard alloy or moulded rubber component lining the volute of the pump casing.
Liner, Suction side (also Throat bush)	– A cast hard alloy or moulded rubber component lining the suction side of the pump casing.
Minimum Flow	A condition that can cause excessive heat inside the pump volute. A temperature rise of 10°C (18°F) across the operating pump is considered excessive. Normally caused by throttling a pump discharge valve.
N.P.S.H.A.	The net positive suction head available to prevent cavitation of the pump. It is defined as: Atmospheric pressure + gage pressure + static pressure - vapor pressure - friction loss in the suction piping
N.P.S.H.R.	Net Positive Suction Head required to stop a pump from cavitating, Number Is usually supplied by manufacturer
Newton	The force which imparts an acceleration of one metre per second squared to a mass of one kilogram.
Newtonian Fluid	A fluid exhibiting a direct relationship between shearing stress and rate of shear in laminar flow. The flow of Newtonian fluids is completely characterized by a single property, the viscosity, which is the ratio of shear stress and velocity gradient at any flow.
Non-Newtonian Fluid	A fluid exhibiting a variable relationship between shearing stress and either the rate of shearing strain (Bingham Plastic, Pseudo plastic and Dilatant fluids) or the duration of shear, i.e. time dependence (Thixotropic and Rheopectic fluids). The flow of non-Newtonian fluids cannot be characterized by a unique property. The apparent viscosity of a non-Newtonian fluid is the ratio of shear stress and velocity gradient at one flow rate. It has no meaning at any other flow rate. Most solutions and suspensions at low concentrations behave as a Newtonian fluid, changing to non-Newtonian behaviour when certain critical solids concentrations are reached. In the case of suspensions, critical concentrations depend on particle size and shape and on the degree of dispersion of the particles. For meaningful results, laboratory tests of Non-Newtonian samples should be carried out only with fresh slurry samples from the actual system being evaluated.
O.E.M	Original Equipment Manufacturer of the pump, not the distributor

pH	potential Hydrogen) Measure of acidity or alkalinity of a solution. Where 7 is neutral, a higher number is alkaline and a lower number is acidic
Pipe Strain	Strain put on a pump which can change the shape causing impeller contact
Pump Curve	A diagram supplied by the pump manufacture to describe the relationship between the head and the capacity of a particular pump using various size impellers. The curve also includes information about efficiency, horse power consumption, N.P.S.H. required, etc.
Pitting	Surface voids in metal caused by corrosion, erosion or cavitation
Priming	Initiating solution flow in a dry pump by manually filling volute
Particle Settling Velocity	The terminal, free-fall velocity of a solid particle falling in calm, clear water. The particle settling velocity is also used to describe the settling of slurries with low concentration of solids.
Repeller/Expeller	Repeller/Expeller A second impeller used to lower the stuffing box pressure.
Self-Priming Pump	Self-priming pump Centrifugal pump is designed to remove air from the suction vs. "flood" pump requiring manual priming
Shut-off head	Max head that can be generated with a given impeller design and horsepower
Series Operation	The pumps are connected with the discharge of the first pump discharging to the suction of the other. The speed and impeller must be matched or the difference in capacities could cause cavitation or over heating problems.
Slurry	Solids present in a liquid
Specific Gravity	Density (weight/ unit area) vs. water (1.0)
Specific speed	Formula to describe the shape of an impeller. Higher specific speed = lower N.P.S.H.
Static head	Max height a liquid can be pumped
Submersible pump	Motor/pump combination designed to be placed entirely below solution level
Submergence	Distance below static water level where a pump is set
Shaft Sleeve	A tubular hardened metal piece fitted over the shaft to protect it from wear by the gland packing in the stuffing box.
Suction Head	Head on the suction side of pump. Subtract suction head from discharge to determine actual head
Suction Lift	Total vertical distance from the surface of a liquid to pump body
T.D.H.	Total discharge head. A combination of suction head and the head produced by the pump
Thermo Set Plastic	Can be softened & melted, but not re-usable
Thermo Plastic	Material that can be softened or melted repeatedly without losing properties (injection moulding)
Total Head	The amount of head produced by the pump. Discharge head minus suction head. If suction head is a negative number, it is added to the discharge head
Thrust	Axial movement of shaft (forward & back)
Turbulence	Disturbance in fluid causing cavitation problem. Often caused by elbow too close to pump suction input.
Variable Speed Motor	Used to control flow in a system by varying the frequency of the motor. Recommended for circulating systems and any other system where the main head is friction losses in the piping system.
Vane passing syndrome	Type of cavitation caused by impeller / cutwater clearance too small

Vapor pressure	Pressure and temperature coordinate where liquid will vaporize
Vent	Used to remove gas or air from system
Velocity	Distance travelled by a body in a unit of time (feet/min)
Viscosity	Resistance to pouring. Higher viscosities can restrict seal movement. Centrifugal pumps can handle a maximum viscosity similar to 30 weight oil at room temperature. Above this viscosity, a positive displacement pump should be used
Volute shape	Spiral shape of volute that converts velocity energy to pressure energy
Volute / Casing	Housing that contains impeller & diffuser. Solution is propelled through the volute's enlarging spiral chamber, increasing the centrifugal effects of the impeller
Vortexing liquid	Creating a "whirlpool effect" that can draw air into the suction of the pump.
Water horse power	(WHP) head X GPM / 3960
Wear ring	Used with closed impellers to resist leakage from high pressure side of pump to low. Normally replaced when clearance is doubled original
Wet end	Parts of pump that sees solution, including: volute, casing, stuffing box, impeller, wear rings and shaft