Pump Guide

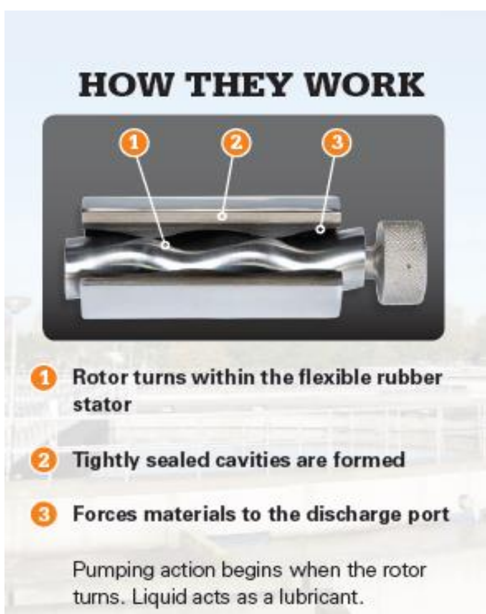
How Progressive Cavity Pumps work:

Progressive Cavity Pumps have similar characteristics to rotary or reciprocating pumps, such as piston, diaphragm, lobe, and screw pumps. They are also known as an eccentric screw pump due to the motion of the rotor. The one common feature being the sealed cavities with operational similarities like being able to pump at extremely low rates, to even high pressures. The similarity between other pumps and progressive cavity pumps generally ends there. Of all the types of pumps available, progressive cavity pumps are able to handle a wider range of fluid viscosities and properties than any other type of pump. The unique design of the pump makes them useful for a variety of pumping applications, such as transferring and metering while handling shear sensitive, abrasive and viscous fluids.

The rotors are made of hardened alloy steel or stainless steel and are covered with a chrome plating to give resistance to corrosive and abrasive materials. Some types of liquids affect the chrome plating and in those applications a non-plated rotor should be used.

Stators are metal tubes with internally molded cavities of synthetic or natural rubber.

The rotor seals tightly against the flexible rubber inside the stator as it rotates, forming tightly sealed cavities which carry the liquid toward the discharge port. The liquid does not change in shape or size when pumped due to the tightly sealed cavities. The effect of the progressive cavity design is that the fluid is moved at a very predictable and steady rate. Positive displacement of the pump starts the instant the rotor turns. The liquid acts as the lubricant between the pumping elements and should not run dry.



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29425 State Hwy B | Warrenton, Missouri 63383| Tel: 636-456-6006 | Fax: 636-456-4337| Email: sales@con-pump.com
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The reason progressive cavity pumps are used are because they are durable with only one moving part, rated for longevity. In operation our pumps are primarily a fixed flow rate pump and offers long life and reliable service transporting thick, viscous fluids. Abrasive fluids can shorten the life of the stator, but by slowing down the RPM's will help reduce the wear. Slurries can also be pumped reliably if the slurry is viscous enough to maintain a lubrication layer around the particles and protect the stator.

At the points where the rotor touches the stator, the surfaces are generally traveling diagonally, so these areas need to be lubricated by the fluid being pumped. This means that more torque is required for starting. Rapid deterioration of the stator can happen as a result of the pump operating without fluid, this is called "Run Dry".

The 7 key advantages Progressive Cavity Pumps:

Positive Displacement

This occurs at the turning of the rotor which develops a positive pumping action similar to a piston moving through a cylinder. The pump pressure developed does not depend upon the speed of the rotating rotor. The capacity of the pump, the approximate viscosity, and pressure can be projected for particular operating conditions.

Uniform Discharge Flow

Fluids are uniformly discharged without pulsation in a constant steady flow. Displacement remains the same with each revolution of the rotor permitting accurate and predictable metering relative to the fluid being pumped. Because of the unique flow characteristics, these pumps are well suited for low-shear applications.

Internal Velocity of Fluids

When the pump is in process, all fluids are pumped with a minimum amount of turbulence, agitation, pulsation or separation disturbance.

Self-Priming

Pumping action starts at the time the Rotor is turned and it is capable of 28 feet of suction lift based on water in an appropriate installation. The liquid being pumped acts as a lubricant between the rotor and stator, and forms a continuous seal to create good suction and discharge capabilities. Do Not Run Dry.

Solids in Suspension

Solid particles over a wide range of size and shapes, as large as 1 1/8 inches in diameter, are pumped with no difficulty.

Reversible

Our pumps can be operated clockwise or counter-clockwise with effective performance in most installations. Contact us to see if your application is suitable for reverse operation.

Installation

Our pumps can be purchased separately or built into complete units. These units can be mounted on welded steel bases with specified couplings or belt guards and can either be driven by flexible couplings, v belts, gearbox reducers, or hydraulic motor adapters. If variable speed drives are needed the units can be driven by either electric motors, gasoline engines, diesel engines or air motors. Our pumps can also be mounted horizontally or vertically and the Suction Port can be rotated up to 270 ° position for appropriate entry of the liquid.

Pump Selection Guide

Understanding the pump terminology helps to properly select the best performing Continental Progressive Cavity Pump to fit your pumping needs. Here are a few things you should know:

The **Capacity or Volume** is the rate of flow in gallons per minute or GPM.

Pressure is determined by how much is required to move the liquid that is being pumped through the piping system and the kind of liquid being handled. The difference between the pressure required at the pump discharge and the pressure being introduced into the pump suction is the differential pressure and is expressed as pounds per square inch or PSI

Viscosity is the resistance to flow as expressed by various scales of measurement; however, the most commonly used is centipoise. The viscosity usually changes with temperature and should always be considered.

For conversion purposes the formulas below are of value:

Centipoises = centistokes x specific gravity

Centipoises = $\frac{SSU}{5}$ x specific gravity

SSU= saybolt seconds universal

<u>Temperature</u> refers to the maximum and minimum temperatures at which the fluid is to be pumped. This is a highly important factor in pump selection. High temperatures can cause distortion and swelling of the stator materials and low temperatures can affect viscosity that reflects in flow characteristics and horsepower requirements.

<u>Operating Time or Operating Cycle</u> of the pump should also be considered; whether the pump is to run continuously or intermittently can be a factor in the selection of the drive.

<u>Corrosion</u> depends on whether the fluid being pumped is neutral, acid or alkaline. All should be considered when selecting the proper materials of pump construction. The pH value of the fluid should be known or determined. A pH of 7 is neutral, below 7 is acid and above 7 is alkaline.

<u>Abrasion</u> depends on the abrasive properties of the fluid to be pumped and how they are classified. Abrasives can look alike and appear to have similar properties; however, they can produce different wearing characteristics. You must classify the fluid in order to select the proper pump construction and operating speed. These 4 classifications will serve as a guide and help in the determination of the necessary materials needed in the pump construction:

No Abrasives

Example: Clear Water, Gasoline, Fuel Oil, Lubricating Oil.

Light Abrasives

Example: Dirty Water containing Silt and/or small amounts of Sand or Earth.

Medium Abrasives

Example: Clay Slurries, Potters Glazes, Porcelain Enamel, Frit, Sludge, Wood Dust in Water.

Heavy Abrasives

Example: Slurries containing large amounts of Sand, Emery Dust, Lapping Compounds, Mill Scale, Plaster, Grout, Roof Gypsum.

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Pump failure is a possibility if inaccurate pump application information is given.

The **pump application data sheet** is a convenient tool used to relay the required information to the application specialists to help them assist in making the proper pump selection.

There are **6 key components** that should be known about your pumping application. They are: flow rate, pressure, pH, viscosity, temperature, and the material being pumped. All components are necessary for proper sizing of pump for your specific application requirements.

Continental Progressive Cavity Pump Models

Rigid Stator Pumps

CL Model- Suitable for a wide variety of applications and are the most frequently used. When properly applied they give excellent long life performance at the most economical cost. This model's suction housing can be rotated from 90° to 270° upon request.

CM Model- Similar to the CL Model, except has a larger drive head to handle the increase horsepower that is needed to produce the higher pressures that can be developed by these pumps. This model's suction housing can be rotated from 90° to 270° upon request.

Rigid Stator Pump with Crown Gear Joint Connections

CG Model- Designed to handle the heavier applications of sewage, industrial waste, polluted liquids and slurries. Incorporated into this more rugged pump is a drive train using crown gear joint connections to the rotor and drive shaft. This model's suction housing can be rotated from 90° to 270° upon request.

Wobble Stator Pumps

CP Model- The CP Model, also known as a bare shaft pump, operates with low costs and are compact making them ideal for light duty use. This model is available with horizontal or vertical suction.

CPM Model- Similar to the CP Model, except it is a closed coupled type pump that is driven by a Continental spec. motor that is directly bolted to the pump. This model is available with horizontal or vertical suction.

CPML Model- Similar to the CPM Model, except it is driven by a standard motor attached by specific motor coupling for different drive arrangements. This model is available with horizontal or vertical suction.

CP Model Number Nomenclature:

Materials used in the pumps are based on the fluid to be handled and are indicated in the model number nomenclature.

CPML56 - CSQMTV

1 2 3 4 5 6 7 8

(1): Indicates the pump model designation (CP, CPM, CPML Model)

(2): Indicates the pump frame size designation

(3): Indicates the pump body casting material

(4): Indicates the rotor material

(5): Indicates the stator material

(6): Indicates seal type: mechanical seal or packed seal (For mechanical use M, for packed use D)

(7): Indicates if the drive shaft, flex joint, and rotor is pinned or threaded. (For pinned use P, for threaded use T)

(8): Indicates if the pump has vertical suction housing. If horizontal is preferred no designation will be used.

Material of Construction

Continental Part Description	Continental Letter Designation	Part Materials
Pump Body	C	Cast Iron
	S	316 Stainless Steel (CF8M)
Rotor	D	Chrome Plated Alloy Steel
	S	Chrome Plated Stainless Steel
Stator	Q	Buna Nitrile
	B	EPDM
	F	Viton®
Seal Type	M	Mechanical Seal

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	D	Packed Seal

CL, CM and CG Model Number Nomenclature:

Materials used in the pumps are based on the fluid to be handled and are indicated in the model number nomenclature.

2CL8 - CDQ

1 2 3 4 5 6

(1): Indicates the number of stages for the rotor and stator

(2): Indicates the pump model designation (CL, CM, CG Model)

(3): Indicates the size of the rotor and stator

(4): Indicates the pump body casting material

(5): Indicates the rotor and internal parts material

(6): Indicates the stator material

Material of Construction

Continental Part Description	Continental Letter Designation	Part Materials
Pump Body	C	Cast Iron
	S	316 Stainless Steel (CF8M)
Rotor	D	Chrome Plated Alloy Steel
	S	Chrome Plated Stainless Steel
Stator	Q	Buna Nitrile
	R	Natural Rubber
	B	EPDM
	F	Viton®
Internal Parts	CS	Carbon Steel
	S	Stainless Steel

Liquids that can be handled by Continental Progressive Cavity Pumps

The various materials used in the manufacturing of Continental Pumps allows our pumps to handle almost any fluid. If it will push through pipe, you can pump it with Continental Progressive Cavity Pumps. Whether it be acidic, abrasive or viscous, we can help you with your application needs.

Set forth in the accompanying chart is a partial list of liquids that have been successfully handled along with an indication of the basic materials for the pump body, the rotor and the stator.

Rotors are made of hardened alloy steel (D) or stainless steel (S) and are covered with a chrome plating to give resistance to corrosive and abrasive materials. Some liquids affect the chrome plating and in those applications a non-plated rotor should be used.

Stators are metal tubes with internally molded cavities of synthetic or natural rubber.

When 'D' rotors are used the drive shaft and connecting rod will be carbon steel (CS). When 'S' rotors are used the drive shaft and connecting rod will be stainless steel (S). Maximum allowable temperatures for stators: B (EPDM) 240°F, F (Viton®) 400°F, Q (Buna) 250°F, R (Natural Rubber) 175°

Please see the compatibility chart below for a few of the liquids that can be handled by our progressive cavity pumps. Your liquid not listed? Please contact us for assistance.

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Liquid Compatibility Chart for Continental Progressive Cavity Pumps

Liquid	Pump Body		Rotor		Stators			
Acetic Acid (cold dilute)		S		S*	B		Q	R
Acetone	C	S	D	S	B			
Acid Mine Water	C			S			Q	R
Alcohol, Ethyl (grain)	C		D				Q	R
Alcohol, Methyl (wood)	C		D				Q	R
Alum (paper mill)		S		S	B	F	Q	R
Aluminum Hydroxide	C		D				Q	R
Aluminum Sulphate		S		S	B	F	Q	R
Ammonium Bicarbonate	C	S	D	S	B			R
Ammonium Chloride		S		S*	B		Q	R
Ammonium Phosphate	C	S	D	S	B		Q	R
Ammonuim Nitrate	C	S	D	S	B		Q	R
Ammonium Sulphate	C	S		S*	B		Q	R
Aromatic Hydrocarbons	C	S	D	S		F		
Asphalt	C	S	D	S		F		
Barium Chloride	C	S		S	B	F	Q	R
Barium Hydroxide	C	S	D	S	B	F	Q	R
Barium Nitrate	C	S	D	S			Q	R
Barium Sulphate	C	S	D	S			Q	R
Beer		S		S			Q	R
Beer Wort		S		S				R
Beer Sugar Liquor		S		S	B	F	Q	R
Benzene (coal tar product)	C		D	S		F		
Benzine (petroleum product)	C	S	D			F	Q	
Black Liquor	C	S	D	S		F	Q	
Boiler Feed Water	C		D				Q	
Bordeaux Mixture	C		D				Q	R
Boric Acid		S		S		F	Q	R
Brine, Calcium Chloride	C	S		S*	B	F	Q	R
Brine, Sodium Chloride	C	S		S*	B	F	Q	R
Calcium Chlorate	C	S	D	S		F		
Calcium Chloride	C	S	D	S	B	F	Q	R
Calcium Hypochlorite	C	S		S	B	F		
Calgon (sodium hexametaphosphate)		S		S			Q	R
Carbon Bisulfide	C	S	D	S		F		
Carbon Disulphide	C	S	D	S		F		
Carbonic Acid	C			S			Q	R
Castor Oil	C	S	D	S		F	Q	R
Caustic Potash (lye)	C	S	D	S			Q	R
Caustic Soda (lye)	C	S	D	S	B		Q	R
Caustic Zinc Chloride		S		S			Q	R

Note: *non-plated rotor

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Liquid	Pump Body		Rotor		Stators			
China Wood or Tung Oil								
-Drying Oil	C		D				Q	
-Vegetable Oils	C		D				Q	
Chlorinated Hydrocarbons								
-Chloroform		S		S		F		
-Dichloroethylene	C	S	D	S			Q	
-Methyl Chloride	C	S	D	S		F		
-Tri Chloroethyline		S		S		F		
Chromic Acid (diluted)		S		S		F		
Citric Acid		S		S	B	F	Q	R
Clay Slip	C		D			F	Q	R
Copper Nitrate		S		S			Q	R
Copper Sulphate		S		S*		F	Q	R
Copperas		S		S*			Q	R
Corn Oil	C	S	D	S		F	Q	
Cotton Seed Oil	C	S		S		F	Q	
Creosote	C	S	D	S		F	Q	
Cyanide	C		D				Q	R
Cyanide of Potassium	C		D		B	F	Q	R
Diethylene Glycol (alcohol)	C	S	D	S		F	Q	R
Distilled Water or Deionized	C	S		S			Q	R
Distillery Wort	C	S	D	S			Q	R
Epsom Salts	C	S	D	S	B	F	Q	
Ethyl Alcohol	C	S	D	S	B	F		
Fatty Acids	C	S	D	S		F		
Ferric Hydroxide		S		S	B		Q	R
Ferrous Sulphate		S		S*			Q	R
Formaldehyde		S		S		F	Q	
Formic Acid		S		S		F		
Fuel Oils	C	S	D	S		F	Q	
Furural	C	S	D	S	B			
Fusel Oils	C		D				Q	
Gasoline	C		D				Q	
Glucose	C	S	D	S	B	F	Q	R
Glue	C	S	D	S	B	F	Q	R
Glycerine	C	S	D	S	B	F	Q	R
Glycerol	C	S	D	S	B	F	Q	R
Grain Alcohol	C		D				Q	R
Hops	C	S	D	S			Q	R
Hydrocyanic Acid		S		S	B	F		
Hydrogen Peroxide		S		S		F		
Hydrogen Sulfide		S		S	B	F		

Note: *non-plated rotor

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Liquid	Pump Body		Rotor		Stators			
Kerosene	C		D				Q	
Lard	C	S	D	S		F	Q	
Lime Water	C		D				Q	R
Linseed Oil	C	S	D	S	B	F	Q	
Lubricating Oils	C		D				Q	
Lye (sodium hydroxide)	C	S	D	S	B	F	Q	R
Magnesium Chloride	C	S	D	S	B	F	Q	R
Magnesium Sulphate	C	S	D	S*	B	F	Q	
Mercury	C	S	D	S			Q	R
Methanol	C	S	D	S	B		Q	R
Methyl Chloride	C		D				Q	R
Milk of Lime	C			S			Q	R
Mine Water	C			S			Q	R
Molasses	C		D	S	B	F	Q	R
Naphtha	C		D				Q	
Nickel Chloride		S		S	B	F	Q	R
Nickel Sulphate		S		S*	B	F	Q	
Oil - Paraffin Base	C		D				Q	
Oil - Vegetable	C		D				Q	
Paints - Water Base	C		D				Q	R
Palmitic Acid	C		D			F	Q	
Phosphoric Acid		S		S		F		
Potassium Carbonate	C		D				Q	R
Potassium Chloride	C		D		B	F	Q	R
Potassium Nitrate	C		D		B	F	Q	R
Potassium Phosphate	C		D				Q	R
Potassium Sulphate	C		D		B	F	Q	
Salammoniac		S		S	B		Q	R
Salt Brine (to 30%)	C	S		S			Q	R
Sea Water	C			S			Q	R
Sewage	C		D				Q	R
Shellac	C		D				Q	
Soap Liquor (thin)	C	S	D	S	B	F	Q	
Sodium Aluminate	C		D		B		Q	R
Sodium Bicarbonate	C			S	B	F	Q	R
Sodium Bisulfite		S		S	B		Q	R
Soduim Carbonate	C			S	B	F	Q	R
Sodium Chloride	C	S		S*	B	F	Q	R
Sodium Hydroxide	C	S	D	S	B		Q	R
Sodium Nitrate	C		D		B			
Sodium Silicate	C		D		B	F	Q	R

Note: *non-plated rotor

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Liquid	Pump Body		Rotor		Stators			
Sodium Sulfate		S		S	B	F	Q	
Soy Bean Oil	C		D			F	Q	
Starch	C	S	D	S	B		Q	R
Steric Acid		S	D				Q	
Sugar	C		D				Q	R
Tar	C		D				Q	
Tar & Ammonia in Water	C		D				Q	
Titanium Chloride		S		S		F		
Toluene (toluol)	C		D			F		
Trub Sludge	C		D				Q	R
Turpentine	C		D			F	Q	
Varnish	C		D			F		
Vinegar		S		S*	B	F	Q	
Vitriol - Blue		S		S	B	F	Q	
Vitriol - Green		S		S			Q	R
Waste Water	C		D				Q	R
Whiskey	C	S	D	S			Q	R
Wine		S		S	B		Q	R
Wood Pulp	C		D				Q	R
Yeast		S		S	B		Q	R
Zinc Chloride		S		S*	B	F	Q	R
Zinc Nitrate		S		S			Q	R
Zinc Sulfate		S		S*	B		Q	R

Note: *non-plated rotor