

## Sump, Sewage and Effluent Pump Selection Guide

This guide is designed to assist individuals with selecting the proper style and size pump for a submersible pumping application. There are a few considerations to factor in when selecting a pump, pump operation, horsepower, voltage and phase, and GPM total (gallons a pump will move in 1 minute). This guide will provide information for the basic residential or light commercial/industrial submersible pump selection process.

### Pump Operation Selection:

**Submersible Pump-** A pump that has its motor and electrical components sealed in a protective housing to permit use under water or other liquid conditions.

**Sump Pump-** Manufactured to remove unwanted drain water from a basement sump pit and drain tile systems; parking lots and low land areas where lack of a gravity drain allows water to pool. Sump pumps are rated for ground or waste water mostly clear of solids (nothing more than silt and ground water solids less than ¼" diameter). Mostly installed where basement flooding is a problem, and to remove moisture from around foundations in order to prevent mold/mildew build-up. Discharge pipe size ranges from 1" and up, based on existing drain line applications.

**Effluent Pump-** Engineered for "gray" water or waste water (mostly liquid) applications that contains solids of ¾" in diameter or less. This is often waste water that has passed through a septic or settling tank and needs to be pumped into an additional system or treatment area. Discharge pipe size ranges from 1 ½" and up, based on existing drain line applications.

**Sewage Pump-** Mostly used in raw sewage applications or dewatering where up to 2" diameter solids must be passed through the pump. Sewage pumps are often called "ejector pumps" and are used to pump biodegradable waste and water into an existing sewer treatment facility or sewer piping system. Not recommended for household or business that need to pump large amounts of non-biodegradable waste which includes plastics, fibrous materials such as cleaning wipes and hygiene products. Discharge pipe ranges from 2" and up, based on existing sewage pipe drainage applications.

**Grinder Pumps-** Designed to grind raw sewage material, hygiene products, and non-biodegradable materials more efficiently and into much smaller pieces than standard sewage ejector pumps. Grinder pumps are used in large networks of waste water treatment piping. Typically these pumps have a bolted flange for a discharge connection, outlet sizes range from 1¼" and up.



[Click Here for more information about Horsepower, GPM, and Controls.](#)

Information sources include Flotech Pumps, Scottish Plumber, ehow.com, and WW Grainger

If you are still having difficulty choosing a Submersible Pump,  
please contact us at [askzoro@zoro.com](mailto:askzoro@zoro.com) or 855-289-9676



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## Horsepower Selection

When selecting the horsepower of a submersible pump there are two main factors that should be considered: GPM and Total Head.

**GPM-** Gallons of liquid A pump can remove per minute at the specified head limit.

**Total Head (head pressure)-** Total maximum height at which a pump can perform before it begins to lose flow. Typically the higher the horsepower, the more powerful the pump will be. The higher the increment of horsepower typically means the pump will have a higher Total Head and GPM. This makes it possible to pump over long distances in a pressurized non-gravity fed system. A residential application requires the measurement from the bottom of the collection pit to the point where gravity takes over and the liquid can freely flow. Typically this gravity point is a turn to exit the home or a connection to a larger drain pipe.

**Example:** A basement with the pump emptying into the drainage system just above 8' ceilings and a pit that is 18" deep will have a measurement of 114" or 9 1/2' of head needed by the pump to perform at its specified GPM.

Most sump pumps require a motor range of 3/10hp and up for residential or light commercial/industrial applications. Knowing the flow into the pit is important and can be estimated by the simple equation below. Remember, the GPM of the chosen pump must be larger than the GPM into the pit or the pump will not keep up.

**Sandy soil-** Basement's square footage divided by 100 and multiplied by 2.50 equals GPM  
(i.e., basement's sq. ft./100 x 2.50 = GPM)

**Clay soil-** Basement's square footage divided by 100 and multiplied by 1.25 equals GPM  
(i.e., basement's sq. ft./100 x 1.25 = GPM)

Effluent, sewage ejection and grinder pumps start at 4/10hp through 2hp and up for the grinding and solids transfer capabilities. Typically they are a higher horsepower than residential sump pumps. It is important to know the maximum head limit and the amount of water being pumped per cycle (collection pit gallon rating) when choosing horsepower for a submersible pump.

<u>Fixture description</u>	<u>GPM</u>
Bathtub, 1 1/2" P-Trap	2
Bathtub, 2" P-Trap	3
Drinking Fountain	1
Dishwasher, Residential	2
Kitchen Sink	2
Lavatory Sink, 1 1/2" P-Trap	1
Laundry sink/basin/tray	2
Shower	2
Sink, Service Type	3
Swimming Pool, per 100 gallons	1
Urinal	4
Washing Machine	2
Water Closet (toilet)	3
Water Softner	4

**This table will help determine the GPM into the pit for residential sewage applications. Remember the GPM of the pump being installed must be larger than the GPM velocity into the pit or the pump will not keep up.**

**[Click Here for more information about power requirements and controls.](#)**



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### Power Supply Selection

Submersible pumps come in either single phase or three phase wiring for the motor, the most common is the single phase but all pump styles are available with three phase motors.

**Single phase motors-** These are the most common residential power applications. It will run a pump with a single AC cycle at one continuous speed. Single phase pump motors operate on 120V or 240V power supply.

**Three phase motors-** Operates pump with a continuous series of three overlapping AC cycles. Used for higher horsepower AC submersible pumps, and can be used in the home and light commercial/industrial application if pre-wired for three phase use.

**Existing pumps-** Existing pumps will have a motor plate which specifies hp, voltage, phase and discharge. These plates or tags are a good reference for replacing an existing pump.



### Pump Switch Style and Function Selection

Choosing the correct switch for a pump is important in extending the longevity and operation efficiency of a submersible pump.

**Tethered Switch-** Liquid/sewage entering the collection pit raises the sealed plastic ball attached to the discharge or vent pipe. When raised to certain angle, the switch inside the float activates running the pump and empties the collection pit until the floating switch end has dropped down almost completely. Tether switches provide an adjustable range for larger pits. They can also be used for fine tuning pump operation and rest time between cycles. Easily adjustable length makes tether switches great for submersible pumps in residential and light commercial/industrial application.



**Vertical Float Switch-** Liquid level raises the float along a single brass, stainless steel or plastic rod straight up to a switch or stopper which triggers the pump. When the float drops down with the liquid level it will stop on the rod base or at a pre-set stopper pulling rod and switch down shutting off the pump. Vertical float switches are great for narrow collection pit applications and where on/off points for the switch need to be adjustable for operation.



**Electronic Sensor Switch-** These switches contain no moving parts to get stuck or hung up inside collection pit. Often used when pits are smaller in size and the pump does not require a long operation range. Metal sensing probes detect any liquid present and are usually 10" or less in length.



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