



## HOW-TO BOOKLET #3016

# SUMP PUMPS



### TOOL & MATERIAL CHECKLIST

- Jackhammer (Rental or Hired)
- Cold Chisel
- Gloves
- Safety Glasses
- Sump Pump
- Sump Liner
- Pipe for Discharge
- Pipe Connection Materials
- Plywood Sump Cover
- How-To Booklet #3003
- Small Sledgehammer

*Read This Entire How-To Booklet for Specific Tools and Materials Not Noted in the Basics Listed Above*

Sump pumps are rated in gallons per minute (GPM). They also are rated by motor capacity. A high capacity pump with at least a 1/2-horsepower (hp) rated motor will handle most flooding conditions easily. Or, follow the advice of the salesperson at the store or the information on the containers in which the pumps are packaged. Go one size larger than recommended. The price is worth it.

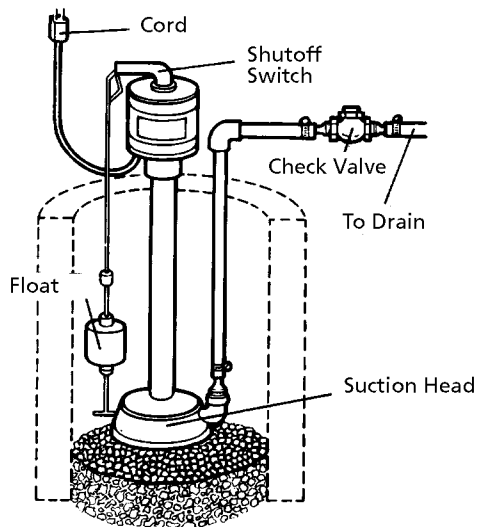
### TYPES OF SUMP PUMPS

There are two types of sump pumps (**Fig. 1A & 1B**): the upright/pedestal type and the submersible type.

**Upright Sump Pumps.** The upright or vertical model consists of a motor mounted on a pedestal. The base of the pedestal rests on the bottom of the sump pit. The motor, at the top of the pedestal, should never be under water. This is the most common and least expensive type of sump pump.

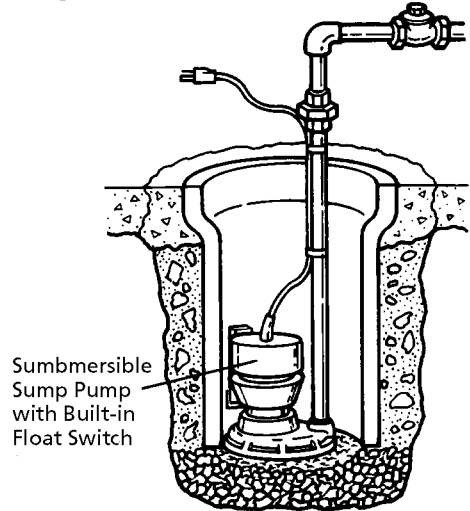
The on-off switch of an upright sump pump is controlled by the position of a ball float. When the water rises in the pit, it lifts the ball float up, causing the motor to switch on. Water is then drawn through an intake valve in the pump base and pumped up through a discharge pipe and out to the drain. As the water is pumped out of the sump pit, the float drops down and switches the motor off. The water level in the sump pit should never go lower than 6" or the level of the intake screen. A dry-running pump could be seriously damaged. Always check the pump if you hear it running continuously.

**Fig. 1A**



**Upright/Pedestal Sump Pump**

Fig. 1B



Submersible Sump Pump with Built-in Float Switch

### Submersible Sump Pump

**Submersible Sump Pumps.** The submersible type of sump pump is usually more expensive than the upright, but cannot be damaged by flooding and requires little maintenance. The submersible type can also run for a long continuous period without damage to the motor.

This type has two different switch mechanisms. In one type, the pressure of a certain level of water in the sump pit forces a pressure-sensitive switch to click on. After enough water is pumped out, the switch turns the pump off. These switches are easy to replace.

Other submersible pumps have a switch encased in the tank float. If you buy this type, be sure to keep the pump and the well clean. Sand, dirt, or gravel will interfere with the pump switch and may cause it to run too long, sucking the well dry. If this happens, the pump must be repaired by a professional.

When purchasing a sump pump, look for the Underwriter's Laboratory label and the Sump Pump Manufacturer's Association certification. They will assure that the pump is electrically safe and will handle the load of pumping water.

### SUMP PUMP INSTALLATION

Installation of a pump and its location will depend on the type of water problems you have and what the local plumbing and electrical codes require. If you install a pump only as a safeguard against an unexpected flooding situation, and have only a slight amount of water under normal conditions, locate the sump pump in the lowest part of the basement near an outside wall. Locating the sump in a low spot will assure that water will run to the sump.

**1** The first step when installing a sump pump is to prepare the pit. To do this, it is necessary to make a hole in the basement concrete floor for a plastic, concrete, or terracotta pit liner. The hole in the floor should be approximately 2" more in diameter than the liner so the liner can be dropped into the hole and the top of the floor finished around the edges of the liner.

If the water problem is really serious, you may need to cut out small channels in the floor to funnel the water into the sump. These channels should be more like depressions rather than trenches. Make them approximately 2" wide by about 1" deep. Draw the position of the channels on the floor at the same time you lay out the floor for the sump system.

A sledgehammer and cold chisel can be used to break the concrete for the sump pit. But, it is far better to rent a jackhammer (**Fig. 2**) or hire a contractor to do the job.

The secret to using a jackhammer is to let the jackhammer do all the work. You just steer. Hold the handles of the jackhammer lightly, just guiding it into the concrete. You don't have to push down on the jackhammer or manhandle it.

**2** Once the concrete is broken away, remove it. Then with a small sledgehammer and cold chisel, dress the edge of the concrete, making it as smooth and even as you can.

**CAUTION:** When working with concrete and concrete removal tools, be sure to wear gloves and safety glasses. Pieces of concrete can fly when hit with a sledgehammer and cause injury.

The hole for the sump pump line should be approximately 3" to 4" deeper than the liner.

Fill the bottom of the hole with about 4" of fairly coarse gravel. The gravel will form a base for the bottom of the pump and help prevent mud and other debris from clogging the pump's action. The pump should be placed on bricks or a concrete pad on top of the gravel base.

Now set the liner in the hole (**Fig. 3**) and level it. There should be a small space between the outside of the liner and the hole. Fill this space with some of the dirt you removed from the hole, packing it between the liner and the ground with the end of a piece of 1X3 scrap. The dirt should be packed as tight as you can get it.

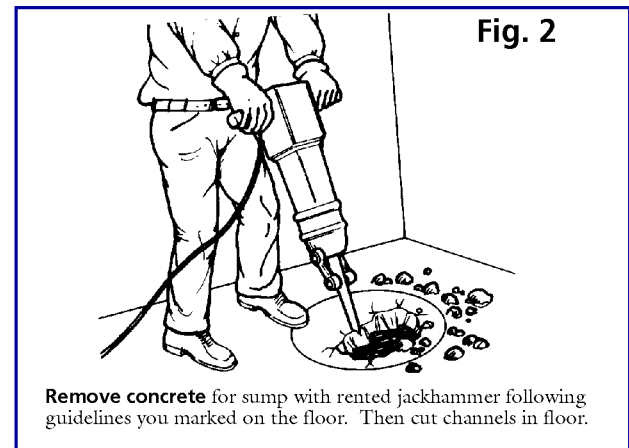


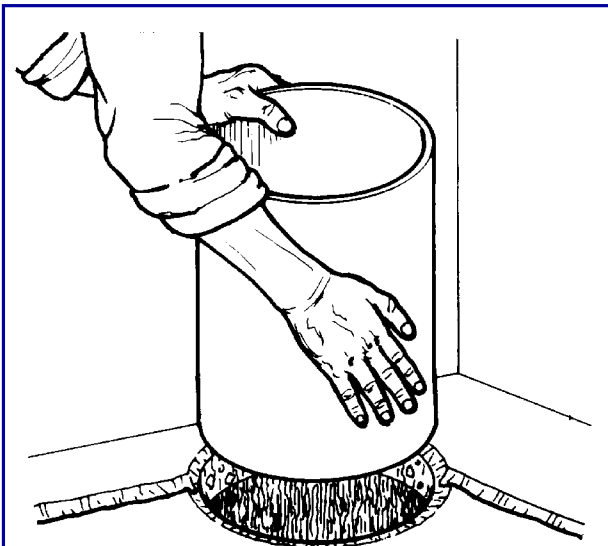
Fig. 2

**Remove concrete** for sump with rented jackhammer following guidelines you marked on the floor. Then cut channels in floor.

Bring the level of the dirt to about 2" from the top edge of the liner and level the dirt around the liner as best you can. Then mix a batch of cement to fill the space between the top of the dirt pack to the top of the concrete floor. An 80-pound bag of ready-to-mix "cement mix" is about enough cement for this job.

Fill and pack the cement mixture into the space, and then trowel the cement smooth around the liner and edge of the concrete floor.

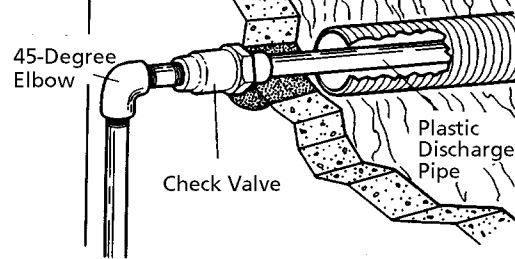
If you have cut channels in the floor, smooth these channels as best as you can with a cold chisel and sledgehammer, clean out the debris, and wet down the concrete with water. Mix up a tub of cement that contains a latex or epoxy bonder. You can buy this type of cement already mixed, or you can buy the bonder and add it to the mix.



**Fig. 3**

Insert sump liner in hole after you fill the bottom of the hole with gravel. Level the liner. Finish top of liner/concrete with cement.

**Fig. 4**



The illustration shows the pipe going outside. The trench outside should be about 10" deep for the perforated drainage pipe and its connection with the plastic pipe or use standard drainage pipe if you connect it to a dry well.

When the mix is fairly stiff, trowel it into the channels you cut, forming a smooth surface.

Let all concrete set for several days before you continue with the project.

**3** To drain the sump, a discharge pipe must be connected from the pump to the soil outside the house (Fig. 4). There are two "don'ts" to keep in mind:

🏠 Never allow the sump discharge in a septic tank. You don't want to fill your septic tank with groundwater or rainwater because it doesn't need to be treated.

🏠 Never allow the sump discharge to flow into the sewer line; most plumbing codes don't permit it. In fact, some areas of the country put smoke bombs into the sewer system to see if any smoke comes out of homes using it. If discovered, you have 30 to 60 days to disconnect your sump pump from the sewer hookup.

The most common practice for the sump discharge is to run a pipe through the foundation wall. Use a cold chisel and a small sledgehammer to drill a 3" hole in the wall so that it will open into the ground about 10" below the top of the ground outside. Although the discharge pipe can be copper or galvanized steel, we recommend 1"

plastic pipe for the piping system because plastic pipe is easy to assemble and it is plenty good enough for the job. Or, follow the pump manufacturer's recommendations for pipe, or choose a pipe that will be the same size as the pipe needed for the discharge opening on the pump.

Once the hole is through the foundation wall, insert a length of plastic pipe in the hole — a 4-footer is about right—and position the pipe so about 1-1/2' of it is outside the foundation wall and 1-1/2' of it is inside the foundation wall. Fill around the pipe with a cement mixture, packing it tightly in the hole.

**NOTE:** You may want to cut the hole at the same time you install the sump so you can complete all concrete work at the same time.

Assemble the pipe outside by digging a trench and inserting the pipe into a length of drainage pipe or clay pipe. Plastic drainage pipe is a good product for this; it has holes in the walls of the pipe so the water is distributed in the ground as it is pumped from the basement sump. The pipe should be sloped down and away from the foundation. If the soil doesn't have good drainage, you may want to install the outdoor drainage system so it runs into a dry well.

Inside, connect the pipe to sump via a straight connector, 45-degree elbow, and check valve. The pipe is rigid enough to support itself in short runs. If a long run, you can hold it to a ceiling joist with wire or pipe hangers.

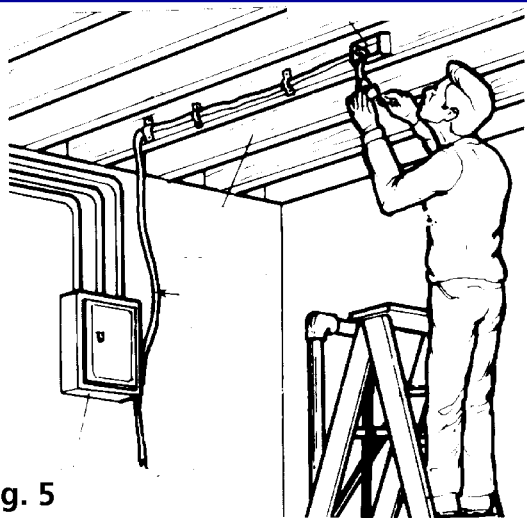
It is very important to install a check valve to stop the backflow of water into the sump. A check valve works with the water pressure and closes against the pressure. The valve should be installed in the horizontal pipe run. Or, follow the manufacturer's installation instructions.

The drainage pipe should go approximately to the top of the floor at the sump liner. At this point it will be connected via a sleeve connector to another length of pipe that connects to the base of the pump.

Before the plastic pipe is cemented, assemble it without cementing the joints so you make sure that the lengths of pipe are correct. Once the connections are connected with cement, you cannot pull them apart.

**4** Electric power for the pump is supplied usually by a simple cord with a male plug connected to an outlet (**Fig. 5**). If there is an outlet near the pump, it is just a matter of plugging in the pump. If not, you can either create a new special circuit for the pump, or tap into an outlet or switch box in the basement and run a new power line into a new box.

Use No. 12 gauge plastic-sheathed wire with ground for the connections—either new or from an outlet/switch. The connection must be grounded. How to install the outlet is the subject of How-To Booklet No. 3003. If the power will be supplied by a brand new circuit, it is strongly recommended that you call in a professional electrician to make the connections.



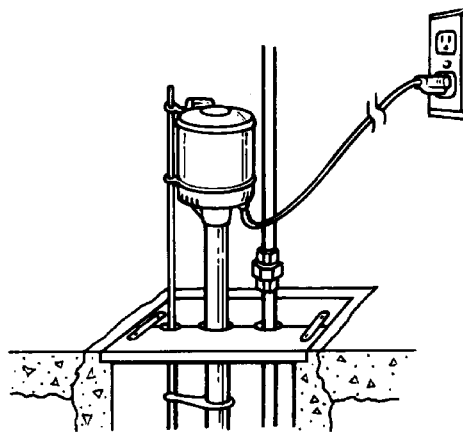
**Fig. 5**

The pump is plugged into a power outlet, like a lamp, so you can remove the pump easily for cleaning. Use 12/3 wire for hook-up.

It is against code to splice wire outside a junction, switch, or outlet box. Codes now require No. 12 gauge wire for all residential wiring circuits of the type needed to power a sump pump.

**5** Fit the discharge pipe onto the pump. It will require an adaptor that usually is supplied by the pump manufacturer. But check the package before you leave the store. Cut the pipe so that it goes an inch or so above the sump liner when the pump is in position in the sump (hole). This pipe will be connected to the drainage pipe that goes outside.

Carefully set the sump pump into the sump liner so it rests on the bricks or concrete pad in the bottom of the sump pit. Then, with a flexible plastic pipe connection or a short piece of rubber hose and clamps, join the two pipes. The pipes may be slightly out of alignment; the hose will take up any misfit, if the misfit is not severe. If it is, you may be able to reposition the sump pump in the bottom of the sump slightly to align the two pipes.



**Fig. 6**

Cover sump with plywood or metal top. Adjust float on pump, according to manufacturer's directions, and test the pump.

Make a cover for the sump pit from 3/4" exterior grade plywood (**Fig. 6**). Drill three holes in the cover for an upright pump: one for the pedestal, one for the float rod, and one for the discharge pipe. Submersible pump covers need only a hole for the discharge pipe. Saw the cover in half, cutting through the middle of the hole or holes. Fit the halves around the projecting pieces. Hold the cover together with straps of aluminum or wood held with screws.

**6** To test the installation, plug the pump cord in a power outlet. Then fill the pit with water via a bucket or garden hose. The first time the sump is filled will take extra water since the ground will absorb some of it. As you check the pump, also check the drainage pipe at the connections and outdoors. If you find leaks in welded connections, you will have to replace a section of pipe and the connections. If the system leaks at the hose connection, try tightening the hose clamps to stop the leak.

## SUMP PUMP MAINTENANCE

A sump pump may sit idle for months and then suddenly be needed. Before leaving your home for a period of time, like on a vacation, carry out these checks:

### Every 3 months

1. Make sure the pump inlet screen is clean.
2. Check the electric cord and make certain the pump is plugged in.
3. Operate the pump to be sure it runs.

### Once a year

1. Take the pump out of the sump and clean it.
2. Clean the sump.
3. Examine both the pump and sump for wear or damage.
4. Oil or grease the pump as specified in the owner's manual.
5. Replace the pump and run it, and adjust the float level, if necessary.