



The Sump Pump ... A Home's Hidden Ally

(As published in the November 1999 issue of Reeves Journal)

Ask most homeowners what's the most important equipment to their daily living and proper functioning of the home and answers could vary from water heaters, heating furnaces, air conditioning systems, bathroom, or kitchen fixtures or possibly appliances. When a basement is involved, an ally fighting daily on the homeowner's behalf is forgotten: THE SUMP PUMP. The sump pumps job is a major part of a basement survival from flooding water or foundation cracks. To strengthen this point, think of the damage a failed sump pump causes. If the basement is finished, then carpet, furniture, paneling, baseboard trim and other items could be ruined. If the basement is not finished out, areas of concern could be the furnace, hot water heater or personal items. Think of the time and money to clean up the mess! Let's address why a sump pump is important and features that will enhance your protection from water.

Hard at Work on the Front Line

A sump pump is used in basement applications to prevent the build up of water around the concrete foundation. If water builds around or under a basement foundation, the water pressure can cause the concrete to crack resulting in possible leaks. To prevent the water pressure, perforated drain tile is placed around the basement foundation and along the basement walls allowing water to seep into the tile and gravity feed to the sump pit. The sump pit will have a pump installed that discharges the water into a sanitary main or storm water pipe. Some sump pits will be perforated with rock around the pit to catch the water that builds up under the foundation. Either application rather drain tile pipe or a sump pit with perforation, both will have small rock surrounding them to filter the water entering the pit from mud or particles. Most sump pits will be between 15" to 18" in diameter and have a depth of around 24". Anything smaller could cause the pump to run too often or not handle the volume of demand.

There are two types of pumps: Pedestal and Submersible. A Pedestal pump has a motor outside the sump pit, and a shaft extending into the pit to pump water. A float switch that is attached to the electrical circuitry of the pump will control the pumps on and off levels. Pedestal pumps are still used, however, the majority of applications today will have a submersible pump. Submersible pumps are quieter and more efficient than the Pedestal pumps and allow for a completely enclosed pit.

Submersible pumps can be found in various designs and make-up. Most submersible pumps are made of cast iron, plastic and stainless-steel parts. These materials are more desirable than components such as sheet metal parts, due to the potential of extreme rust and corrosion. An important component of the sump pump is its switch. The switch should be rated for at least six starts per hour and free from obstructions (i.e. the switch hanging up on the side of the sump pit). The most commonly used switch is the type that travels vertically using a buoyant float that will rise with the water level and turn on the pump. Hint: for easy installation a vertical switch that is preset by the manufacturer is the most desirable.

Sizing up the troops

When sizing a sump pump the areas of concern are the vertical lift of the discharge line and the distance the line runs before discharging. When the vertical lift and the discharge line are added together, and the fixtures are accounted for the amount is called total dynamic head or TDH. The other factor is known as gallons per minute or GPM. The GPM is the amount of water that enters the pit under normal conditions. The pump must be sized to handle the water under normal conditions.

A good formula to use in sizing GPM is:

- **For clay soil:** Basement square footage/100 X 1.25= gallons per minute (GPM)
- **For sandy soil:** Basement square footage/100 X 2.50= gallons per minute (GPM)

Once the GPM is known the vertical lift must be measured to the highest point and as long as the distance being pumped is not further than 50', the vertical lift should be adequate for sizing purposes. In situations where the horizontal distance is greater than 50', contact the pump manufacturer's technical services department for proper sizing.

Once the GPM and the vertical lift is known, you will need to select a pump to meet the lift yet give the GPM needed. Most sump pump applications will fall in the 20-40 GPM range with a lift of 8' to 15'. The most popular horsepower pumps are ¼ HP, 1/3 and ½ HP depending on the demand. Do not try to oversize or undersize the sump pump because both can cause problems.

Important Support

Other important items that are essential to the sump pump's operation are the discharge line and the check valve. The most common sump pump discharge line is 1 ½" but some systems have 1 ¼" or 2" depending on the installer's preference. A good determination of the discharge line is the pump's discharge size. If the pump chosen is 1 ½" then the pipe should be the same.

Most manufacturers do not recommend reducing discharge line sizes smaller than the pump discharge. An extreme reduction (i.e. 1" discharge line and a 1 ½" discharge pump) can produce excess pressure and reduce the pump's capabilities.

The check valve is essential so that once the water is pumped out and the pump shuts off, the water is prevented from running back into the pit. If a backup occurs in the sanitary line or storm water main, the check valve could prevent the water from entering your discharge line. If there is a slight vertical lift in the discharge line's horizontal run allowing water to run in the direction of the pump, the check valve will prevent the water that's left in the pipe from running back into the pit. Each time the pump shuts off gallons of water are left in the line. Without a check valve, water in the line could run back into the pit causing the sump pump to turn back on, resulting in excess wear on the pump and switch. This can easily be prevented with the minimal cost of a check valve.

Reinforcements for Back-up

It is highly recommended that any sump pit application has a back-up system to the sump pump. It is amazing that most homeowners will spend thousands of dollars to finish or remodel a basement, yet not install a back-up system for extra insurance in the event of a failure. Sump pumps are an excellent source for protection from water and it is recommended that a pump with a reputable name in the industry be used. However, the pump is an Electro/mechanical product and will one day fail to operate. Because pumps are electrical a storm causing an electrical outage, can hinder the pump inoperable. Both situations can be combated with a back-up system. **There are two major types:** water-powered, which runs off municipal water and battery-powered systems. The water-powered system works well in low water volume applications and has proven to be very reliable. Water-powered systems use municipal water pressure to cause a suction action through a pump body that is installed side by side or above the sump pump and pulls the water from the sump pit. A float mounted above the electrical pumps on level, controls the on and off level of the water-powered pump. If the water level reaches a point that causes the switch to raise, a valve will open and allow water to generate the suction action.

The battery-back-up system uses a DC type pump that mounts side by side the electrical sump pump or just above the sump pump. The DC pump will have a float switch that will be activated above the electrical pumps on level and will run off a 12-volt marine battery. A battery charger supplied with the system will maintain the marine battery and charge the battery after the pump has ran. Most battery back-up systems will have a high-water alarm, monitoring lights for power and battery status, and all hardware to install the system. Remember that both systems will require periodic inspection by unplugging the electrical sump pump and letting the back-up system run (check manufacturers recommendations). On battery operated systems remember to check the battery water level - unless the battery is maintenance free.

In conclusion, the sump pump is sometimes forgotten but is an important part of any homes' basement. The sump pump provides a service of preventing basement structural damage and water from entering the home. When building a home, remodeling, or replacing a pump, the sump pump is no place to cut corners. Planning your attack by going the extra mile can help keep you dry and headache free.