Battle of the Bilge

Steve Pemberton, Fast Flow Pump Systems, LLC

During an emergency situation, this new submersible double suction pump technology can pump significantly more water from the bilge. With promises to revolutionize dewatering applications – is this the perfect pump for the perfect storm?

Most major leaks or hull ruptures occur while the vessel is under way.

It is logical to utilize the tremendous power of the vessel's own drive system for pumping in the event of such an emergency. It is imperative that an emergency pumping system always be ready to respond, and thus be as maintenance-free as possible.

One new pump system technology meets all of these requirements by attaching the pump impeller directly to the vessel's existing propeller shaft.

How It Works

With the Emergency Bilge Pump, a split impeller is installed on the shaft in a spaced, non-contacting relationship with the housing. Because the pump impeller has no contact with the pump housing, it should not create any electrolysis problems.

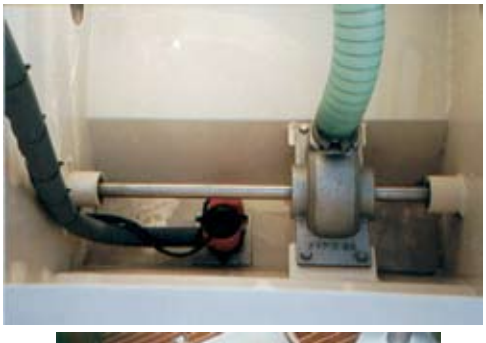
As the vessel's propeller shaft turns and the vessel begins to take on more water than the bilge pumps can remove, this new pump automatically primes itself and begins pumping within seconds of the time that the water enters the pump inlets. It takes suction from both sides of the impeller and harnesses the tremendous power of the engine drive system.

This emergency pump can potentially save the vessel – or at least buy valuable time until help arrives or the leak source is discovered and repairs made. It is permanently installed and is in operation any time the propeller shaft of the vessel is turning.

With a shaft turning approximately 600-rpm to 3000-rpm on a 5-ft head, a 3-in model can pump roughly 50,000-gph, or 900-gpm! The higher the rpm of the boat shaft, the more the unit will pump.

Under normal operating conditions, this emergency bilge

The emergency bilge pump uses a split impeller which comes in a variety of different sizes.



Two different installations of the emergency bilge pump. In each case, the split impeller is installed on the shaft of the vessel in a spaced, non-contacting relationship with the housing.

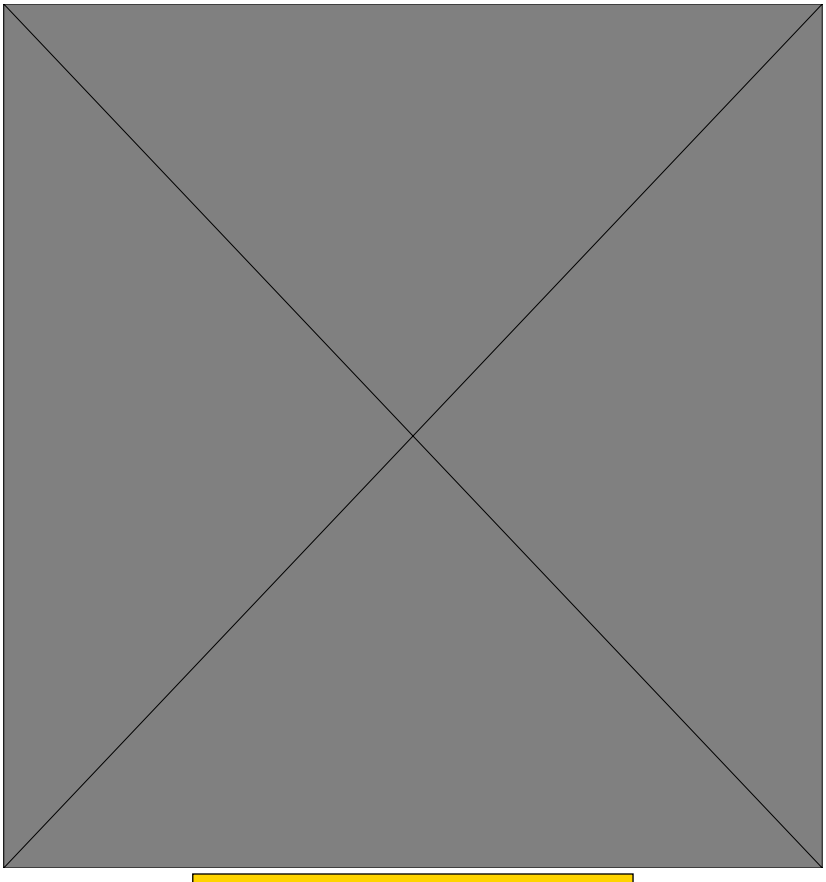
A Unique Submersible Hydraulic Pump

- Aluminum or stainless steel casting
- Marine aluminum frame
- Unique double inlet flow centrifugal pump
- 5-3/8-in impeller
- Maximum flow: 350-gpm
- Maximum head: 150-ft
- Normal operating range: 4-gpm to 14-gpm at 2900-psi hydraulic pressure
- Discharge size: 2-in
- Maximum hydraulic input: 14-gpm
- Maximum hydraulic pressure: 3500-psi
- Dimensions: 14-in (L) x 10-in (W) x 7-in (H)
- Weight: 25-lb

pump acts as a ventilator fan, using a fraction of available engine power to serve as a high volume blower in the dry mode, ventilating heat and fumes from the engine room.

Under engine compartment flooding conditions, the pump automatically primes itself and begins pumping. It continues to pump without any action on the part of the crew as long as the propeller shaft is turning, meaning it requires no activation of electrical float switching systems found with other convention bilge systems. When the impeller is spinning backwards as the vessel is in reverse, the pump will move approximately 50 percent of the normal flow rate – still a significant amount of flooding from the vessel.

The pump is frictionless and (theoretically) maintenance-free because, technically, it has no moving parts. It fact, because it consists of only three basic components, this pump has no seals, gaskets, gears, belts, pulleys, valves, switches, rubber impeller, bearings, or electrical devices, and requires absolutely no lubrication.



The power behind the double suction pump design is shown here by a 2-in submersible hydraulic unit being used to pump drilling mud solids.

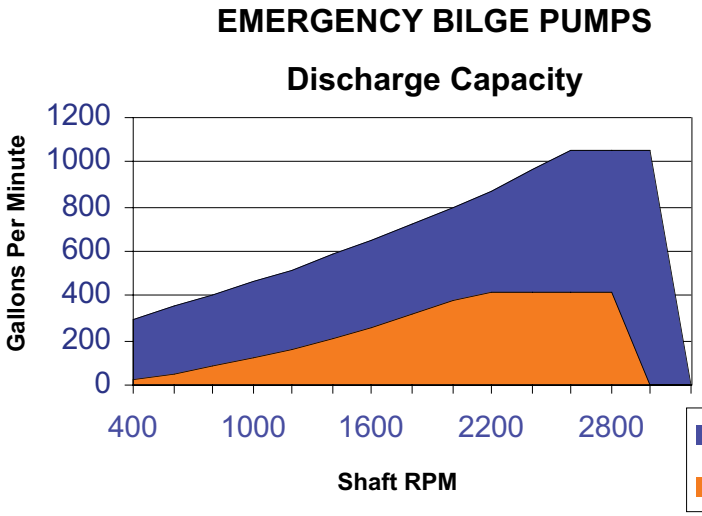
The same submersible double suction pump design is ideal for construction applications, such as dewatering.

There is also no heat build-up and no filters to clog. The factory-balanced impeller is shaped like a harmonic balancer, it should not create shaft vibration problems for the vessel. This pump is designed to run dry infinitely. Annual system inspection of the pump, discharge hose, and fittings is important.

Normally, when pumping air, the pump only uses fractional horsepower. Under full load condition it will use about 10-hp to 15-hp.

Conventional 12-volt bilge pumps typically remove 1,000-gph to 1,200-gph. But the smallest Fast Flow emergency bilge pump will remove 12,000-gph to 20,000-gph, depending on the engine shaft speed, and larger units will move 2,200-gpm.

This means the emergency pump will remove a large ingress of water in the vessel which the standard bilge pump cannot remove. For example, if there is a 4-in hole in a vessel 2-ft below the water line, it will flood in at a rate of approximately 15,960-gal/hr and sink the vessel in a matter of minutes. But



a small 2-in emergency bilge pump will pump 20,000-gph at 2000-rpm, which can save the vessel – and the life on board.

How It Mounts

This pump functions as an emergency bilge pump system and, as such, is not meant to replace conventional bilge pumps. It is mounted above normal bilge height and is meant to be a "life and property saving device."

The pump case and split impeller, which is shaped like a flywheel, are designed to allow installation without removal of the boat shaft. The pump has a shaft bushing insert that fits the most common shaft diameters. If the insert is not the correct size, it can be bored to fit the specific shaft diameter.

Because every boat engine compartment is different, there are several approved methods for installing the pump system. The ideal location for the emergency bilge pump is between the stuffing box and gear box in the engine compartment, making sure that there is sufficient room for the pump system and tie-down. An alternate installation can be accomplished wherever there is room available on the propeller shaft.

The first step involves installing the lower pump case and measuring for the mounting bracket. It is best to "check fit" with the lower pump case, then mount the impeller to insure that there is plenty room for the installation. For the impeller installation, the exact shaft size must be measured and the correct impeller bushing selected to provide a tight compression fit. The bushing is inserted into the impeller, then the impeller is tightened with Allen screws alternately for a equal compression fit. To validate correct impeller installation, measure and match the gap between the impeller halves with a feeler gauge.

To install the pump case, the rotation of the shaft should be checked to make sure the impeller blades are turning toward the pump discharge. The pump case is centered to the impeller, but the impeller must not touch the housing. Then the pump case bolts are tightened evenly and alternately.

The emergency bilge pump case is then firmly secured to either the engine, the transmission, or the boat structure, using

one of several methods.

The ideal method is to attach the pump with an aluminum angle bracket to the engine or gear box. However, some installations attach the housing to the engine foundation using an aluminum angle, while others attach the bracket to the keelson stringer supports. Brackets can be slotted to be moved up or down, and on an angle, to align with the shaft height. Another method is to install fiberglass marine grade hardwood blocks to permanently hold the pump case in proper position.

Caution must be taken to secure the pump housing and double-check that the impeller is not touching the pump case. Before starting the engine and turning the shaft, insure that the impeller is not touching the pump case, and verify that the rotation is correct so that the pump blades spin toward the discharge of the pump.

Discharge Connections

The discharge hose can be attached with either hard piping or with a flexible hose.

Camlock safety hose fittings or high quality Tee-clamps are recommended for installation on the male pipe threaded pump outlet. The hose could also be permanently band clamped to the discharge fitting. All fittings should be stainless steel or marine grade aluminum.

The discharge hose hull fitting must attach above the water line. A stainless steel thru-hull fitting can be installed and attached to the hose. Below water line thru-hull fittings with non-return valves are not an approved or acceptable installation.

P&S

Steve Pemberton is president of Fast Flow Pump Systems, LLC, 2612 Rolling Meadows Road, Gautier, MS 39553, 228-497-5330, emergencypump@bellsouth.net, www.fastflowpump.com.