

# SUBMERSIBLE PUMP APPLICATION

The submersible pump is a type of construction in which the driving motor is coupled directly to the turbine bowl assembly and is designed to be submerged in the fluid pumped. Power is supplied to the motor by means of waterproof electrical cable running from the motor to the power source.

Submersible pumps are suitable for most applications.

Since the complete unit is either enclosed or below the surface of the ground, there are several applications where the submersible pump has many advantages. Some of the more important are: (1) extremely deep wells which may present problems with shafting, especially if the well is crooked, (2) installation subjected to surface flooding which may be damaging to electric motors, (3) applications such as booster pumps that are in locations that require quiet operation, (4) installations where there is little or no floor space to install the unit, such as under a street or sidewalk, (5) horizontal pipe line booster pumps placed directly in the pipe line, and (6) agriculture installations where time consuming maintenance operations offers a great savings and security from ever rising vandalism of irrigation pumping units.

## OPERATION

These pumps may be operated and controlled in the same manner as any other type of turbine pump in similar applications. No special consideration peculiar to the submersible is generally necessary, with the exception of the motor starting equipment. This is due to the fact that the motor, being installed in the pumped fluid, may not be subjected to the same ambient temperature as the overload relays in the starter. Overload protection is a must for submersibles. Unless the correct overload protection is used on all three motor legs, the motor warranty is void. Why? For two reasons: (1) for running protection and (2) if the motor stalls, power must be cut within 10 seconds or you may damage the motor windings. In three-phase submersible motors, use ambient compensated, quick trip heaters.

## CONSIDERATIONS

Submersible pumps can be built in sizes up to several hundred horsepower for most applications where this type of construction is practical. However, there are some uses that do not lend themselves too well to this pump. Among these are high fluid temperatures, unusually corrosive applications, or a large amount of abrasives.

## SUB MOTOR COOLING

It is important that the motor have an adequate flow of water passing it to maintain proper operating temperature and avoid premature failure. If the well casing is "oversize" or the motor is installed in a "pit" or "pond", or the inflow from the well is above the pump, a closed top shroud of the proper size must be installed above the pump suction inlet to force the liquid to pass the motor before entering the pump. Since recommendations vary between motor manufacturers and temperature of liquid and installation configurations, it is important that the application be reviewed with the particular motor manufacturer involved for proper sizing of the motor shroud.

## CROOKED WELLS

A submersible pump will give better service in a crooked well than a lineshaft type pump since the length of the rotating parts are much shorter. Where the well is known to be crooked, a gage of the same length and diameter of the motor and bowl section assembly should be lowered into the well on at least 40 feet of pipe of the size to be installed on the unit. If the gage with pipe can be lowered to the depth at which the pump will be set, a submersible pump can be installed. Never install a pump in a well known to be crooked without gaging the well.

## BOOSTERS

The submersible pump has been designed for pipe line booster service for industry, municipal water systems, petroleum products pipe lines, and other booster applications. The unique design enables the submersible, ordinarily operated in a vertical setting, to be suspended horizontally within the pipe line, and furnish a powerful booster to the liquid being carried by the line. The many advantages of noiseless operation, close-coupled motor and bowl assembly, totally enclosed motor operating completely immersed in the line liquid, economy of operation, and completely new ease of access to the pump and motor all combine to make this new concept of submersible booster operation the engineered answer to pipe line booster problems. Costly pump houses to maintain and keep clean, additional property to purchase, motor damage from heat, dust and moisture, possibility of vandalism, stuffing boxes and packing gland maintenance are completely eliminated. The submersible installation makes all of these obsolete.

The horizontal application enables the submersible unit to be fitted into a special section of the pipe line. This section is flanged at each end and becomes an integral part of the line. Within this section, the motor is centered and firmly held by special spiders. The line liquid is drawn past the motor and into the bowl assembly which passes it along at a greatly increased pressure. The submersible power cable is clamped firmly to the bowl assembly and leads to a terminal box mounted on the outside of the special section and from there to a control box.

The vertical application enables the submersible unit to be fitted into a canister used as a booster in many places.