

General Procedure for Centrifugal Pumps

Pump Priming and Warming Up

PRIMING

A pump must never run dry since it will cause premature wear and may even permanently damage a pump. Before operating a pump, the pump's casing and the suction pipe must first be filled with liquid thru a process known as priming. When the liquid is over the pump's centerline, priming is accomplished by opening the suction and discharge valves. When the liquid gets in, it takes the air out, filling the suction line, the pump casing and the discharge line to the supply level.

If the pump is operating under a suction lift, priming can be accomplished in several ways:

Priming by suction pressure

When operating under a suction pressure, priming may be accomplished by bleeding all of the air out of the pump by opening the petcock located at the top of the casing.

A pump operating under a suction lift may be primed by any of the following methods, as may be best suited to the conditions. The discharge valve should be closed during priming operation.

Priming by ejector or exhauster

This method is used when steam, high pressure water, or compressed air is available.

1. Attach an air ejector to the highest point in the pump casing. This will remove the air from the pump and suction line.
2. As soon as the ejector waste pipe throws water continuously, the pump may be started. After starting, a steady stream of water from the waste pipe indicates the pump is primed. If this stream of water is not obtained, the pump must be stopped at once and the process of priming repeated. A foot valve is unnecessary when this kind of device is used.
3. Open the discharge valve slowly and close off the ejector.

Priming by foot valve

When it is not practical to prime by ejector or exhauster, the pump may be primed by the use of a foot valve. The foot valve will prevent liquid running out through the suction inlet and the pump can be completely filled with liquid from some outside source. Pet cocks on the top of the pump should be opened during filling to allow the air to escape. A tight foot valve will keep the pump constantly primed so that the pump may be used for automatic operation. However, the valve must be inspected frequently to make sure it does not develop leaks and thus the pump could be started dry.

Priming by vacuum pump

When none of the above methods of priming is practical, the pump may be primed by the use of the vacuum pump to exhaust the air from the pump casing and suction line. A wet vacuum pump is preferable, as it will not be damaged if water enters it. When a dry vacuum pump is used, the installation must be such as to prevent liquid being taken into the air pump. The vacuum pump manufacturer's instructions should be followed.

WARMING UP

Pumps handling hot ($>500\text{ }^{\circ}\text{F}$, $>260\text{ }^{\circ}\text{C}$) fluids must be gradually preheated to operating temperature. The most common method used for warming a pump, or maintaining a standby pump in a warm condition, is the use of a warming line and orifice, thus circulating the hot pumpage through the idle pump.

ATTENTION

- It is recommended that the pump be warmed at the rate of $100\text{ }^{\circ}\text{F}$ ($55\text{ }^{\circ}\text{C}$) rise per hour for normal warming, or $268\text{ }^{\circ}\text{F}$ ($149\text{ }^{\circ}\text{C}$) rise per hour for emergency warming.

ATTENTION

- It is recommended that the idle pump temperature be maintained within $36\text{ }^{\circ}\text{F}$ ($20\text{ }^{\circ}\text{C}$) of the system operating temperature.

Circulation can be easily accomplished by guiding a small amount of flow from the discharge side of the system beyond the check valve via a multiple breakdown orifice into the bottom of the pump case. The hot liquid will then pass through the case and out the suction and return to some low pressure point in the system. In many cases, the pump drain line is used for the warming connection.

NOTE: *Many variations are possible and one that is compatible with the customer's particular installation should be considered.*