

ENGINEERING DATA SHEET

| <i>Discharge Orificing & Bypassing</i> | | |
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Discharge orificing is a modification used to control the flow rate of the pump by creating an artificial pressure drop in the discharge piping (see figure 1). The orifice acts as a restriction to limit the flow rate regardless of changes in process conditions which would tend to increase the flow beyond the maximum design point. Placing an orifice in the discharge flange will steepen the performance curve.

Care must be taken in sizing the motor because, in general, a larger impeller is required to achieve the desired performance. Even though the orifice decreases the output head, the input power to the motor is identical to a pump operating without an orifice.

Discharge orificing most commonly used under the following circumstances:

- a) The design point is at or near the motor overload rating.
- b) The system does not have a constant pressure to keep the capacity of the pump within an accepted flow range.
- c) Cavitation will result if the flow is not limited.
- d) A steep performance curve is required for automatic control of the system.
- e) Severe damage to the pump or motor will result if the pump operates at a higher capacity point than that for which it was designed.

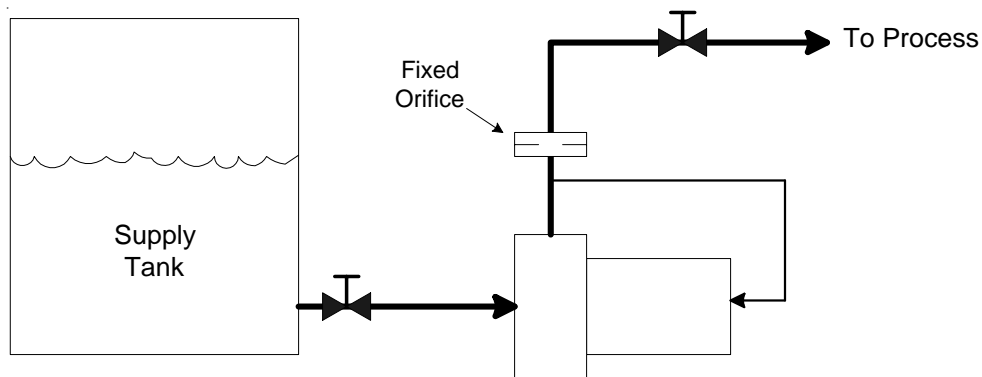


Figure 1

Pump bypassing is a modification which prevents operation of the pump against deadhead (no flow) conditions. Operating the pump against a closed discharge valve for any period of time increases the radial loads on the bearings along with raising the temperature of recirculating fluid through the rotor chamber to a point where flashing may occur resulting in excessive bearing wear or thermal damage to the motor. If the pumped fluid is heat sensitive the increase in temperature may cause the liquid to polymerize, decompose or crystallize.

To prevent a deadhead condition a line is piped directly from the discharge of the pump back to the suction vessel (see figure 2). The flow through this bypass line can be controlled by an orifice, a control valve or just by the size of the bypass line. With this addition, there will always be a circulating flow from the discharge of the pump back to the suction vessel of sufficient magnitude to prevent high radial loads on the bearings and to carry away any heat generated by the pump.

If the bypass line can not be routed back to the suction vessel it should be piped into the suction line as far away from the pump suction as possible. Returning the bypass line directly into the suction of the pump will cause turbulent flow into the impeller causing cavitation. Also, piping the bypass line directly into the pump suction may not allow the liquid to cool sufficiently to prevent bearing and motor damage.

In general, the minimum flow of a Chempump is 25% of the flow at the best efficiency point of the pump for the installed impeller. For applications requiring flow below this rating please contact the factory.

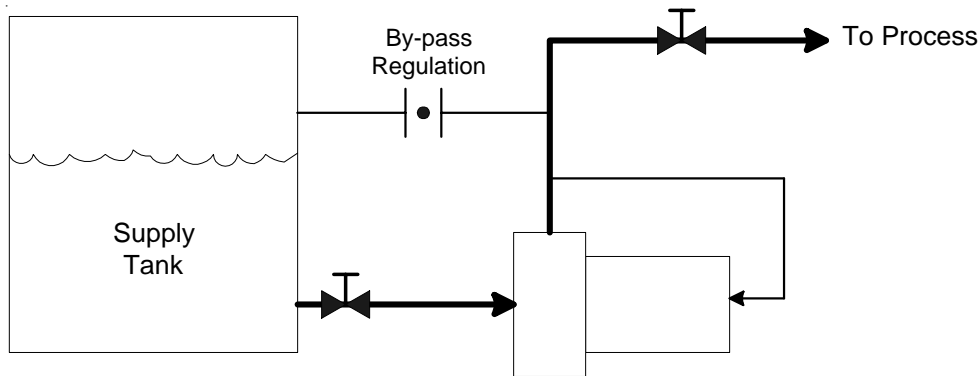


Figure 2