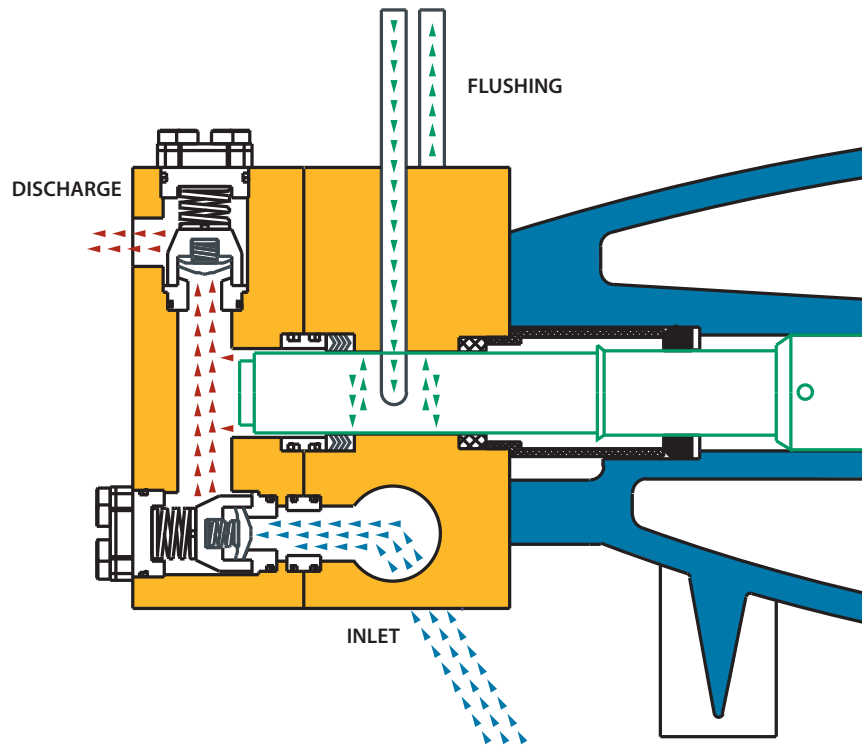


Flush-Style Plunger Pump System Design Guide



Flush-Style Pump Operation:

Like all standard plunger pumps, a flush-style pump liquid manifold is configured with an inlet and outlet port. However, on a flush-style pump the manifold is also designed with an inlet and outlet port allowing a flushing liquid to circulate between the high pressure and low pressure seals extending seal life and reducing ongoing pump maintenance over the life of the pump. Cat Pumps offers a broad flow and pressure range of flush-style pumps from 3.0 – 240.0 gpm and up to 10,000 psi (15 – 908 lpm up to 690 bar).



Standard vs. Flush-Style Plunger Pump Application Fit

Deionized Water (DI):

Flush-style pumps are always used for supplying Deionized water (DI) due to its low lubricity. Tap water is typically used as the flushing liquid.

Liquids at Elevated Temperatures (Glycol/Boiler Feed Water):

CatPumps have a variety of seal options to meet temperatures as high as 160F using standard plunger pumps. Using flush style pumps can increase seal life substantially. Special seals can be used when pumped liquid is up to 200F. Heated glycol and boiler feed water are two common fluids where a flush-style pump is used. Tap water and glycol are common flushing liquids for this application.

Flushing Liquids:

Other flushing liquids may be used with flush-style pumps. Flushing liquids must be chemically compatible with the primary pumps wetted components and the primary pump liquid. Flushing liquids should also have lubricating properties to enhance seal life.

Local and State Environmental and Hazardous Waste Regulations:

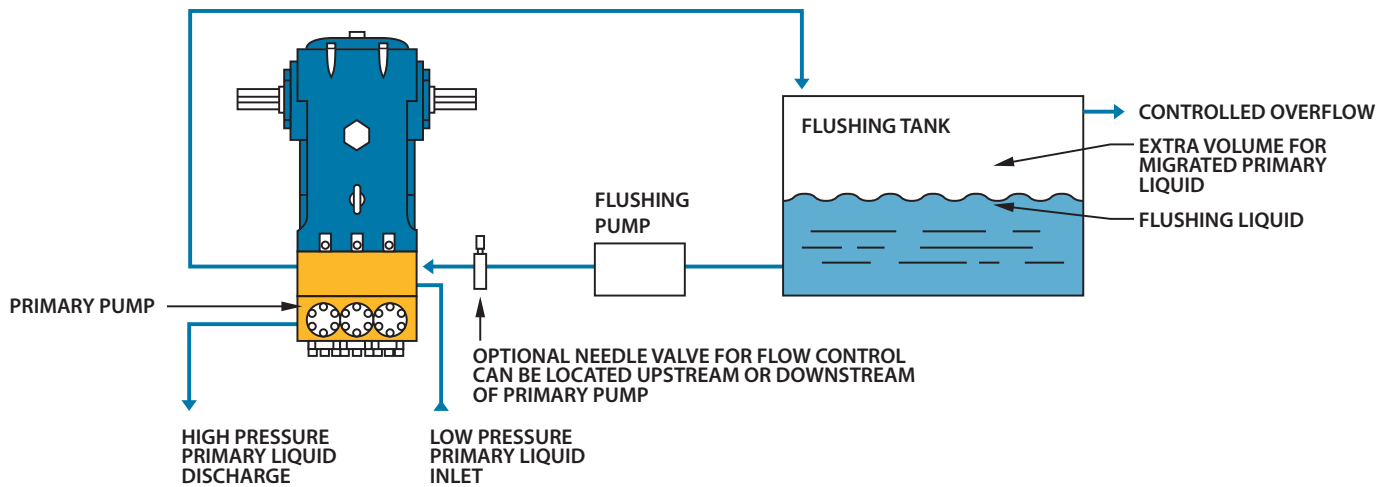
The end user must validate the flushing system design for compliance with all local and state environmental and hazardous waste regulations.

Flushing System Design

System Components:

A re-circulating system allows the best control of the primary and flushing liquids. Major flushing system components are listed below.

- Primary flush-style plunger pump
- Flushing pump
- Flushing liquid tank
- Flush feed and return lines
- A means to collect and drain off liquid as it seeps into the flushing side of the system.
- Optional needle valve either upstream or downstream of primary pump



Flow and Pressure Control:

A low flushing flow (about 5 gph) and pressure is typical when flushing at fluids near ambient temperatures. The flushing liquid pressure does not need to be regulated as long as it's less than the system inlet pressure of the primary pump. Only a small amount of pressure is required to move the flushing liquid back to the tank.

Flushing flow rates may be higher for liquids being pumped at elevated temperatures. If the flush is being used to cool the pump, there must be sufficient flow to remove enough heat to keep the pump at its specified operating temperature. The maximum operating temperature of the primary pump will vary based on the model selected.

Fluid Migration:

As the system operates, the primary liquid will migrate past the pump seals and into the flushing liquid. The tank should only be partially filled with the flushing liquid allowing space in the tank for the extra volume that will mix with the flush liquid over time. This extra tank capacity will increase the time interval for maintaining the quality of the flushing liquid and the tank level. Monitoring flush inlet flow and comparing it to flush discharge flow can also give an indication of high pressure seal leakage if the discharge volume is greater than the inlet volume.

If the primary pump is shut-down, DO NOT run the flush pump as trace amounts of the flushing liquid can migrate past the primary pumps high pressure seals contaminating the primary liquid.

Controls and Sensors:

The flushing system can be manually or automatically controlled based on customer preference. Automated controls might include a PLC interface with various sensors and programming to monitor and control the flushing system.

IMPORTANT: THE FLUSHING PUMP MUST BE OPERATING WHEN THE PRIMARY PUMP IS OPERATING OTHERWISE THE PRIMARY PUMP SEALS WILL FAIL PREMATURELY.

Filtering:

Filtering of the flushing liquid is not required unless a potential for contamination is possible in the application environment.