Shippensburg Pump Company, Inc.
BOILER FEED ● CONDENSATE ● DEAERATOR ● VACUUM
1 Schwenk Drive
P.O. Box 279
Shippensburg, PA 17257-0279
Phone: 717-532-7321
Fax: 717-532-7704
www.shipcopumps.com

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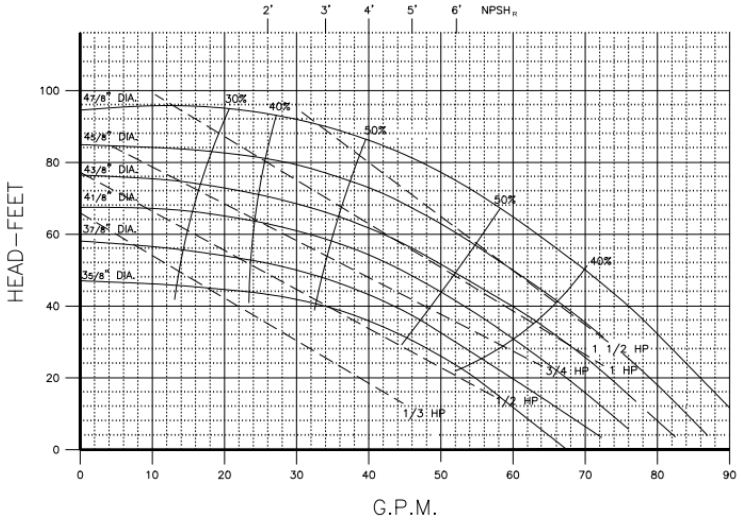
Should Centrifugal Pumps Be Throttled?

For a centrifugal pump to operate how it was designed and built, the user should throttle the pump discharge. This helps to ensure that the pump is operating correctly and maximizes the life of the pump.

Pumps are designed and built to produce a certain condition, or a range of acceptable conditions; consisting of flow produced and discharge pressure. A typical pump curve shows Flow, measured in GPM on the X-axis, and Discharge Pressure, measured in Feet of Head on the Y-axis. These measurements are inversely related. As GPM increases, discharge pressure decreases. As GPM lessens, discharge pressure increases.



Where on the curve a pump is operating at a given moment, is dependent on how much back pressure is present. All job sites and systems are unique to the back pressure on the pump. Variables such as vertical lift, pipe friction and elbows, traps, pressurized or atmospheric lines, leaks etc. affect back pressure. The more back pressure on the pump, the farther to the left on the curve the pump will operate, conversely the less back pressure, the farther to the right the pump will operate. Therefore, when a pump is throttled the flow from the pump discharge is slowed and discharge pressure increases.

If an automatic flow control valve is installed, a manual throttling valve still needs to be used. This allows the user to more precisely determine where on the curve the pump can operate. Since a pump is sized and selected based on multiple conditions, throttling the pump helps to ensure that the pump is operating within the target range of the pump curve.

Additionally both NPSHA (Net Positive Suction Head Available) and NPSHR (Net Positive Suction Head Required) for centrifugal pumps are important. NPSHA is the actual absolute head at the pump inlet less the vapor pressure head. NPSHR is the head required at the pump inlet for satisfactory operation of a pump. All centrifugal pumps operate at a lower pressure in the impeller eye than the pressure existing at the pump suction flange. The curve identifies the pressure over and above fluid flash point or vaporization pressure, which is needed at the pump impeller eye and considers decreased pressures within the pump.

If the NPSHA is less than the NPSHR the pump will cavitate. This can be avoided by increasing NPSHA and/or reducing NPSHR. The NPSHA may be increased by throttling the pump discharge using a throttling valve or a restriction orifice. This will increase the pump head by reducing the flow rate and operate the pump in a lower NPSHR region.

Shipco® Sales and Marketing Department

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