HIXSON
ARCHITECTURE ENGINEERING INTERIORS

MARCH 2022

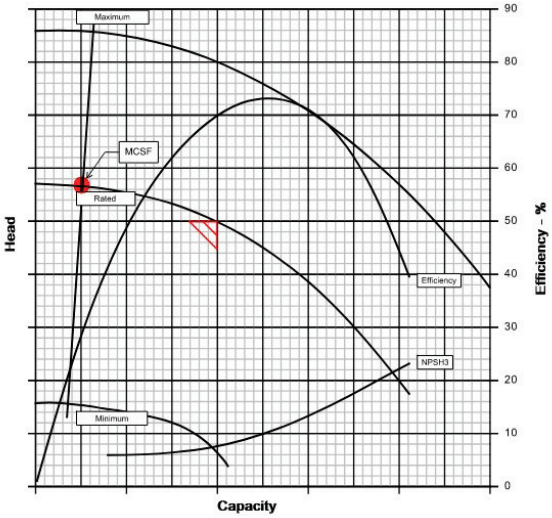
From Experience

Minimum Flow in Centrifugal Pumps

When operating centrifugal pumps, it is important to understand the limitations of the pump for a given system. Pumps are generally designed and selected to operate near their highest efficiency point. If the pump operates either too far to the right or too far to the left of the pump curve, damage to the pump can occur, and its operating life can be greatly reduced. When reading a centrifugal pump curve, the point to the left of the curve is described as the Minimum Continuous Safe Flow (MCSF). This is the flow at which a pump can operate continuously without excessive wear from hydraulic anomalies and temperature rise associated with low flow conditions. Consequences of not meeting the minimum flow requirement can include the following:

- Excessive noise or vibration
- Broken shafts
- Pitted or worn impeller vanes
- Overheated casings and bearings
- Mechanical Seal Failures
- Poor performance efficiency

Oversizing or using too many pumps for a service are common causes of operating a pump below its allowable operating range.



Example pump curve showing the Minimum Continuous Safe Flow (MCSF).

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EXPERIENCE IN BRIEF

To accurately size a pump, the total hydraulic head for the system is required. The hydraulic head is the combination of the static head, h_z, due to changes in elevation of the fluid in the system, and the dynamic head, h_p, due to pressure losses as a result of friction within pipes and fittings and changes in direction.

$$h_{total}=h_z + h_p$$

Three main methods of flow protection can protect fixed-speed pumps from operating below their allowable operating range: Continuous bypass, automated flow-controlled recirculation, and self-contained automatic recirculation valves. (Make sure to look for an upcoming issue of From Experience that will explain each of these methods in more detail.) A fourth option is to convert the pump to operation on a Variable Frequency Drive (VFD) as discussed in prior From Experience articles. Please contact Hixson for further information regarding this option.

CONTINUING EDUCATION

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CONTACT US

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