



## *Shippensburg Pump Company, Inc.*

**BOILER FEED • CONDENSATE • DEAERATOR • VACUUM**

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### **Re: Are Suction Strainers Necessary on Centrifugal Pumps?**

It is often asked whether a pump suction strainer is necessary or recommended. The purpose of a suction strainer is to act as a particulate strainer or filter ahead of the pump. This prevents large particles from entering the pump.

Before the introduction of the low-flow/high-head multi-stage centrifugal type pump, turbine type pumps were used almost exclusively for on/off boiler feed service for steam boilers. Back in the 1920's, a turbine pump was the only pump available for high-pressure pump applications since multistage, centrifugal pumps were not yet available. The turbine pump impeller was designed with very close tolerances within the pump. Any grit or sediment that entered the pump would result in accelerated erosion of these close-tolerance areas, leading to premature pump wear and loss of performance. These pump characteristics made the use of a strainer a necessity with a turbine type pump.

During the 1960s, ITT Domestic® and other manufacturers introduced multi-stage, centrifugal pumps into the high-pressure steam market. Then during the 1980s, manufacturers such as Grundfos, Gould, etc... started marketing multi-stage, centrifugal pumps and offering the pumps to boiler manufacturers who make feed tanks but not pumps. This strategy caused the boiler manufacturers to start specifying multi-stage, centrifugal pumps in lieu of turbines because the manufacturers now had a source for pumps.

Centrifugal pumps, by their design, are more durable. A centrifugal pump does not have the same close tolerances of a turbine pump—it has a more robust design that enables grit and sediment to pass through without clogging the impeller volute area. Therefore, the use of a suction strainer is neither mandatory nor recommended. Instead, an inlet basket on the return piping into the receiver and a wye strainer on the make up water piping are recommended.

Below is a list of considerations regarding the use of suction strainers with centrifugal pumps:

- **Suction Losses:** The addition of a strainer in the suction line of a pump increases the losses in the suction line, thereby decreasing the NPSH available to the pump. As the strainer fills with particles, the pressure drop across the strainer increases, further reducing the NPSH available. This situation becomes more critical as the temperature of the pumped water increases. When a feed water pump is pumping from a deaerator, the water is already at the flash point, and any increase in the suction losses could lead to a flashing condition and pump cavitations.

- **Increased system maintenance:** Because of the reason stated above, it is important that the strainer screen be checked and cleaned regularly. If the installation is in a remote area and maintenance checks are rare, a clogged strainer will eventually lead to pump failure and a low water condition in the boiler.
- **Can particles get into the pump without a strainer?** Shipco recommends use of inlet strainers on all deaerators and boiler feed tanks to help prevent particles from getting into the pump. In addition the suction piping typically extends 2" to 3" up into the receiver (often referred to as a vortex breaker). This extension helps prevent any sediment and large particles from leaving the tank through the suction opening. In Shipco® deaerators, the water entering the deaerator must travel through a series of spray valves, baffles, trays and other restricted flow paths before deaeration is complete and the water is ready for use. The number and size of the particles that will make it through this path and into the storage area is limited.

As a better understanding between centrifugal and turbine pumps becomes more widely understood throughout the engineering community, engineers are starting to remove requirements for suction strainers from specifications.

Shipco® believes that any *benefit of a suction strainer is far outweighed by the risks, which can lead to pump failures and other system problems.*

Sincerely,

Shipco® Marketing and Sales Department