



## TECH TIP #28

### PUMP CAVITATION

Cavitation? What in the heck is cavitation?

**WHAT IS IT?** Cavitation occurs when the absolute inlet pressure of a fluid drops below what is required by the pump design to prevent the pumped fluid from vaporizing in the eye of the impeller. Essentially, what happens is the fluid begins to “boil” in the eye (suction inlet) of the impeller. When the partial vapor/fluid hits the higher pressure zone near the outer vanes of the impeller, it collapses back to a liquid. The collapsing, or imploding, is what causes the damage. This sounds like a growling, gurgling, or marbles moving through the pump.

**WHAT WILL HAPPEN IF IGNORED?** If the condition is not addressed, damage to the pump impeller and casing can happen quite quickly. Some pumps have even been ruined in a matter of a few minutes of severe cavitation. Typically, the impeller will look like it has been sandblasted; the pump volute (casing) may also look this way. The pump capacity will be reduced due to the cavitation. If the wear ring and/or impeller(s) have become eroded, the pump capacity will be greatly reduced. Even if the conditions which caused the cavitation problem are eliminated, the damage will already have been done.

**WHAT FACTORS CONTRIBUTE MOST TO CAVITATION?** In this TECH TIP we will limit our discussion to boiler feed pump factors.

1. **Temperature of the feedwater:** The hotter the water, the more problematic cavitation will be.
2. **Gauge pressure of the supply tank (feed-water tank or deaerator):** If the tank is pressurized as in a deaerator, a sudden pressure drop will immediately cause pump problems. Many times the problems are catastrophic. Provisions must be in place to ensure a 5 lb. deaeration stays at 5 lb. under all operating conditions.
3. **Height between the waterline in the tank and the pump suction:** The higher the waterline is above the pump, the better.
4. **Suction piping arrangement:** Sometimes a simple change in the pump suction piping will eliminate cavitation. Avoid 90's or other changes in piping direction within 10X pipe diameters of the pump inlet. For example, a 2" pump section should have 20" of straight inlet piping.
5. **Pump flow is too high:** If the feedwater pump is moving too much water and begins to make cavitation noise, throttling a discharge valve may help. Never throttle with a valve on the suction of the pump.

**ADVANCED TECHTIPS:** We have chosen not to get into the NPSH calculations in this discussion. See Tech Tip #29 for NPSH calculation help. Federal Corporation has years of experience fixing pump application problems. We can help you fix your feedwater systems, ours, and the other guys. Call us; we can help.