

## Why Do I Need A Surge Tank?

Surge tanks are recommended for pressurized deaerator applications having pumped low pressure condensate returns in excess of 50% of the overall system load. We're often asked why we recommend surge systems for use with pressurized deaerators. The answer is simple; surge tanks even out the flow of water to the deaerator by eliminating excessive "surge loads" caused by condensate return systems.

Condensate pumps are typically sized for 2 to 3 times the actual rate of return. For example, for condensate load of 8,280#/hr, a 33,600 SQ FT EDR condensate unit would be used. The actual rate of return is 8,280#/hr (16.56 GPM) but because condensate return pumps are selected for intermittent service, the pumping rate is likely to be 2 to 3 times the return rate or 33 to 49 GPM.

Example:

400 HP Boiler system = 13,800 lbs/hr.

40% make-up = 11.04 GPM

60% pumped condensate return = 8,280 lbs/hr, or 16.56 GPM

Deaerating capacity: 13,800#/hr (max 27.6 GPM at any time)

Condensate pump rate: 16.56 GPM X 3 = 49.68GPM

In the above example, the deaerator has been selected to de-aerate a maximum 400 HP load (27.6 GPM max flow rate). Here, each time the condensate tank fills up, there is the potential for a total of 60.72 GPM influent water (11.04 GPM make-up + 49.68 GPM pumped condensate) entering the deaerator at any given time. As the lower temperature water enters the deaerator, the deaerator pressure is lowered causing the steam valve to open. However, since 60.72 GPM is much higher than the rated 27.6 GPM capacity of the deaerating system, the steam valve would not be large enough to offset the higher flow rates and the deaerator tank pressure will continue to drop suddenly. As a result, the sudden decrease in pressure creates an imbalance in the deaerator, and may cause the vessel to briefly go into a vacuum state. The deaerator vacuum breaker will open bringing the vessel pressure back to zero, but the effectiveness of the deaerator will be diminished because air has been reintroduced into the system. Increasing the size of the deaerator storage tank will reduce the chances of overflow but it does not eliminate the upset conditions caused by an inrush of water into the deaerator tank.

Atmospheric surge tanks even out the flow of condensate to the deaerator. Condensate is returned to the surge tank and blended with required make up water. The blended condensate and make-up is then pumped from the surge tank via a continuous run transfer pump to the deaerator make-up valve. The deaerator make-up valve modulates as the deaerator load changes, allowing water to enter the deaerator at a steady controlled rate not to exceed the rated capacity of the deaeration system. This eliminates the condensate "surge" experienced when handling heavy condensate return loads.