



Shippensburg Pump Company, Inc.

BOILER FEED • CONDENSATE • DEAERATOR • VACUUM

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Re: Understanding the operation of a two-chamber, atmospheric deaerator rated .005 cubic centimeters of oxygen per liter of feed water (i.e., model .005 DA-2C)?

A .005 two-chamber, atmospheric deaerator is designed to operate at atmospheric pressure. However, the direct-injection steam heating assembly (external to the receiver) is designed to operate under pressure. The heater assembly design depends on the various flows and the backpressure of both the spray nozzle and friction loss in the manifold piping.

The internal pressure of the direct injection heating assembly is greater than atmospheric pressure. This requires the temperature at saturation to be greater than 212°F. A five pound, internal pressure would require the temperature to be 227°F at saturation in the heater assembly. The spray nozzle has a fixed spring pressure. This spring pressure will vary slightly with flow. To understand the operation of this unit, disregard the variation in pressure. It is only important to realize that the pressure in the heater assembly is greater than atmospheric pressure and the saturation temperature is higher than 212°F. This unit will work with as little as .5 to 10 psig in the heater assembly.

The key operation to successful performance in this design is that the saturated water passes from the heater assembly, through the spray nozzle and into the deaerator chamber that is at a lower atmospheric pressure than the saturated water. Since the saturated water is under a pressure greater than atmospheric pressure, the water instantly changes in both temperature and pressure when the spray enters the atmospheric, deaerator chamber. This change in temperature and pressure causes a scrubbing action to occur in the sprayed feed water causing the removal of the non-condensable gases.

The resulting deaerated water is then stored in the deaerator chamber. Maintaining the saturation temperature in the deaerator chamber is critical to meet or exceed the rated performance of .005 cubic centimeters of oxygen per liter of makeup water. The deaerator's design for recirculating the feed water from the continuously running transfer pumps assures that heat is being added to maintain the saturation temperature in the deaerator chamber.

Sincerely,

Shipco® Marketing and Sales Department