



## ***Shippensburg Pump Company, Inc.***

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

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### **Re: Understanding Deaeration**

1. Deaeration for boiler system plants is the mechanical removal of oxygen and carbon dioxide from the boiler feed water. The correct design of deaerator, properly operated and maintained, will remove all carbon dioxide and control oxygen levels down to .005 cc/l. This mechanical approach to deaeration combined with the addition of chemical scavengers will eliminate oxygen in the boiler feed water. Mechanical deaeration consists mainly of spraying the water into fine a fine mist and scrubbing out the released oxygen with clean steam.
2. The elimination of carbon dioxide and oxygen in boiler feed water is necessary to protect the steam boiler plant system from the very costly problem of corrosion due to the presence of these gases. It must be understood the problems related to these gases does occur only in the boiler but also through both the process and return systems and back to the deaerator if preventive measures are not taken.

The dissolved carbon dioxide and oxygen that is found in a boiler system gains entry into the system by the follow means: 1) the raw make-up water, liberation in the boiler, and 3) leakage into the condensate and return systems. For these reasons, all boiler feed water should be deaerated.

3. A deaerator has been defined as a pressurized or atmospheric unit capable of removing from the water all dissolved oxygen in excess of ppm. A boiler feed unit with preheat can reduce oxygen content down to .5-1.0 ppm. A .005 deaerator is 143 times as effective as an open heater in a boiler feed tank but can cost from 20%-50% more than a preheat boiler feed unit.

The resulting advantages of a deaerator over a preheat boiler feed unit with preheat can be listed as follows:

- The deaerator will maintain 7ppb even with erratic loads and high deaerator turndown requirements.
- In most instances, the feed water heater tank system shown will not react to a feed water system turndown of 7 to 1 maintain .7 to 1 ppm of oxygen. This results in increased system maintenance and higher fuel costs.

The boiler room operator will be forced to feed excessive amounts of oxygen scavenging compounds in an attempt to maintain minimum oxygen levels.

Hopefully he will succeed. This added treatment will result in higher boiler water blowdown, resulting in lower boiler efficiency and higher chemical costs.

- The deaerator is constructed with stainless steel in only those areas exposed to high concentrations of dissolved oxygen. The feed water tank must have its total storage tank surface protected. Various types of coatings are used for this protection. They are expensive and increase maintenance cost. Without this protection, feed water tank life is drastically shortened.
- The deaerator guarantees a constant temperature hot water source of feed water for the boiler. This will prevent cold water shocking to the boiler and reduce boiler maintenance, and also increase boiler efficiency.

Sincerely,

Shipco® Marketing and Sales Department