# CLASS "T" – TRAY TYPE

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## MECHANICS OF DEAERATION

Extensive research proves that to inhibit corrosion in a steam system, the oxygen content must be limited to a maximum level of .01ppm (.0075 cc/1). A true deaerator will reduce the oxygen to the .005 cc/1 level and the carbon dioxide to zero. A further benefit of this process is the simultaneous pre-heating of the feed water. A tray type deaerator is tailored to fit the power cycle and operating conditions of the actual plant in which it will be installed. The quantity and size of the tray assemblies are determined by these conditions. Therefore, it is important that these maximum loads are not exceeded. Operating beyond these limits can cause flooding and serious damage to the trays and tray enclosure.

The modern deaerator has evolved into a two stage device. The effluent first enters the pre-heater stage where it is heated to a temperature approaching that of the operating steam pressure.

The feed water then enters the second stage, tray section where maximum contact time between steam and water is accomplished while constantly reversing the effluent flow. This forces the remaining oxygen and carbon dioxide to the surface of the liquid where they are liberated from the water.

Non-condensable gases must be evacuated from the deaerator at a rate equal to their liberation. A vent condenser is utilized to concentrate the non-condensables and condense the carrier steam, thereby avoiding unnecessary steam venting.

## OPERATION

Incoming water first enters the deaerator through the spray valves, directed downward into the steam atmosphere in the first stage pre-heater section. There the water is heated to within two degrees of the steam temperature in the deaerator. This is accomplished by spraying water through self-adjusting spray valves designed to produce a uniform, thin, continuous film thru all load conditions. These efficient valves assure a constant temperature and uniform gas removal.

From the first stage the pre-heated water, containing traces of dissolved gasses flows into the second stage or tray section. This section consists of stainless steel tray assemblies where the water flows from tray layer to tray layer while being brought into direct contact with an abundance of fresh, gas-free steam. The steam enters this stage at the base of the tray stack and is mixed with the pre-heated water as it rises up diametrically opposed to the falling water. The rate of deaeration is proportionate to the number of directional reversals occurring as the water makes its way through the tray stack. Each change in direction exposes another surface of water to the passing steam where direct physical contact shakes loose the dissolved gasses, separating them from the effluent. Very little steam is condensed here, as incoming pre-heated water has a temperature approaching that of the steam. The water leaving this stage, now completely deaerated and heated to the steam temperature corresponding to the pressure within the deaerator falls into the storage section where it remains ready for use.

The steam, after passing through the tray stack, continues upward into the vent condenser where most of it is condensed leaving the non-condensable gases to escape through the vent to atmosphere.