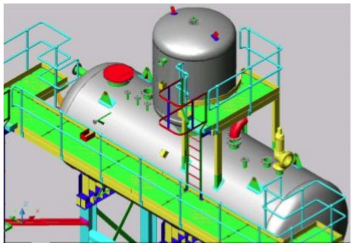
Pressurised Deaerator System
Fact Sheet



Introduction

The principle reason for the corrosion commonly found on steel boiler hotwells and condensate pipework is the constant introduction of Oxygen and Carbon Dioxide into the boiler feedwater.

An atmospheric hotwell or atmospheric deaerator can only partially remove these gases from the steam and condensate systems.

Objectives

Our pressurised deaerator:

- reduces the dissolved oxygen content in the boiler feed water to less than 0.02 ppm
- increases the feed water temperature above 100°C for improved boiler efficiency

Theory

The deaerator operates at a working pressure of between 0.3 to 0.7 barg, which corresponds to the steam saturation temperature of 107 to 115°C. The solubility of oxygen in water at these temperatures is at its minimum, hence most of the oxygen will be driven out and discharged to atmosphere. The remaining oxygen in the water is removed by chemical dosing.

Dissolved oxygen is removed from the make-up water and returned condensate by steam deaeration. The softened make-up water and condensate mixture are typically introduced into the specially constructed fixed elements within the deaerator dome. The water mixture trickles and cascades down the five stages of deaerating elements, forming optimum droplet size for scrubbing as it does so. The heating steam which it meets in the counter flow direction, increases the droplet temperature by approximately 20°C at each stage. This has the desired effect of reducing the solubility of gasses within the water droplets, thus diffusing the harmful oxygen and carbon dioxide out of the water and discharged via the dome vent at the top with some steam acting as a carrier.

If there are large quantities of very hot (and pressurised) condensate being returned, it is desirable to pipe the condensate directly into the deaerator storage vessel, via a properly designed sparge pipe arrangement below the water level in the vessel. This will maximise the heat recovery whilst helping to maintain the low dissolved oxygen level of the stored water.

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Comparisons

	A	B	C
Tank	**Atmospheric Feed Tank**	**Semi-Deaerator**	**Pressure Deaerator**
Temperature	Assume 50°C (112°F)	90°C (194°F)	107°C (225°F)
Dissolved Oxygen	5.6 ppm	1.6 ppm	0.02 ppm
To remove 1 ppm of Oxygen requires approximately 8 ppm of Sodium Sulphite and the boiler normally has a reserve of +4 ppm of Sodium Sulphite			
Chemical Required	**48.8 ppm** (5.6 x 8 = 44.8 + 4)	**16.8 ppm** (1.6 x 8 = 12.8 + 4)	**4.16 ppm** (00.02 x 8 = 0.16 + 4)
Saving	0	**66% on A**	**75% on B** **91% on A**

Benefits

- The boiler feedwater from the deaerator is supplied at a higher temperature, making the boiler more efficient
- Dissolved gases are liberated from the boiler feedwater in the deaerator, saving both sulphite and amine chemical costs
- Prevents boiler and pipeline corrosion as Oxygen and Carbon Dioxide are eliminated as far as possible from the boiler feedwater

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Examples of clients who have seen the benefits of installing a RTK Deaerator

Installation at a Pigmentation Company in Yanbu, Saudi Arabia

Installation at a Frozen Food Company in Wisbech, Cambs, UK

Installation at a MDF Company in Chirk, North Wales, UK

Installation at a Frozen Food Company in Worsted, Norfolk, UK

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