



The deaerator uses a mechanical scrubbing method to eliminate the harmful gases from a feedwater supply.

- Untreated boiler water can result in overheating, failure to produce hot water or steam, a drop in the boiler flow rate and reduced efficiency
- Boiler feedwater is best treated by a combination of mechanical and chemical solutions
- The most important piece of water treatment equipment is a water softener

Treat Boiler Feedwater to Ensure Operational Efficiency and Longevity

To ensure a boiler runs properly over the course of its lifetime, treating the water that circulates within the system is mandatory. If the water is not treated properly, the boiler will begin to have problems within the first year, and its useful life will be significantly shortened. Boiler symptoms resulting from untreated water include overheating, failure to produce hot water or steam, a drop in the boiler flow rate and an overall loss of efficiency.

Untreated water, even water coming from a municipal water utility, can contain dissolved solids, which form scale on the heat transfer surfaces as the water is heated. The main disadvantage of this deposited scale is that it drastically reduces the heat transfer capability of the boiler, which leads to overheating, tube failure and efficiency loss. Scale also reduces the flow area, which increases the pressure drop in boiler tubes and piping, resulting in low steam volume and potential equipment failure.

To protect the integrity of the boiler and ensure it continues to produce good steam quality, it is important to properly treat the feedwater, or the water going into the boiler. A water treatment system will:

- prevent deposits on boiler surfaces that weaken metal and cause heat transfer losses,
- prevent oxygen corrosion, which causes pitting of boiler tubes and rust deposits,
- prevent low pH (below 9 causes corrosion), and
- prevent steam condensate contamination.

There are mechanical equipment and chemical solutions available to treat boiler feedwater easily and cost-effectively. The best solution is to use a combination of both approaches. Treating boiler feedwater mechanically removes only 90 – 95 percent of the impurities, so this approach must be supplemented by a chemical program. Using a chemical-only approach is expensive due to the cost of the chemicals and can be environmentally hazardous since the facility will be flushing excess chemicals into its waste stream.

Perhaps the most important piece of water treatment equipment is a water softener, which ensures good boiler water quality. Water softeners use a process called ion exchange to remove calcium and magnesium from the water. The hardness minerals are replaced with a highly soluble sodium or potassium ion that will not cause scale buildup, helping a boiler maintain efficiency throughout its life.

By preventing scale buildup, a water softener also reduces a boiler's fuel consumption. A 1/16" thick layer of hardness scale can reduce heat transfer by about 12 percent, which is directly proportional to the increased amount of fuel required to compensate for the loss. The recommended hardness of boiler feedwater is less than 1 ppm, so a water softener is required for nearly all boilers.

If the boiler feedwater contains a high level of bicarbonate alkalinity and sulfates, a dealkalizer is recommended. Alkalinity is a measure of the capacity of water to neutralize strong acids such as carbonic acid, which is carbon dioxide dissolved in water. A dealkalizer keeps boiler and process equipment scale-free and also reduces corrosive condensate. This prevents scaling and reduces potential steel corrosion within the steam system.

Another piece of equipment commonly used for boiler water treatment is a deaerator or heated feedwater tank, which reduces oxygen and carbon dioxide to minute levels. The deaerator uses a mechanical scrubbing method to eliminate the harmful gases from a feedwater supply. It removes almost all harmful gases, with the remainder being removed by chemical means. For smaller facilities, a heated feedwater tank provides similar results and is more cost-effective. A stainless steel tank is recommended to ensure long life.

A chemical feed system is typically required to remove the last 5 – 10 percent of impurities from boiler feedwater. Working with a chemical water treatment company makes the last stage of treating boiler feedwater easy to manage.

An engineered water treatment system is essential to protect a facility's boiler investment. Properly treated water provides efficient equipment operation, increases boiler life expectancy, reduces fuel use, decreases chemical use, optimizes water use and minimizes waste. It also provides considerable savings on maintenance and labor over the life of the equipment. Probably the best benefit is the peace of mind end users have knowing that their entire boiler room investment is correctly maintained and safe.