

Choosing the correct water softener for your needs



Electrode boiler head showing scale build up.

WATER softeners are used to treat water for various industries and applications, from pharmaceuticals, cosmetics and healthcare to food and beverages, water bottling, hospitality (such as hotels and lodges), and domestic settings (to deal with hard water).

All boilers need a softener, as well as cooling towers, as boilers help to prevent scale on heat transfer surfaces.

JP Thyse, Senior Technician at Allmech, a South African manufacturer of boilers and supplier of water treatment components, explains that water is treated for several reasons: to protect plant and equipment, to prevent scale and corrosion, to increase boiler efficiency, to reduce downtime and to reduce maintenance costs.

"Scale causes poor heat transfer, hot spots and tube failure, under deposit corrosion and reduced boiler efficiency, and process contamination," says Thyse.

"You get different types of scale deposits, such as hardness

deposits of calcium carbonate and magnesium carbonate, as well as phosphate, silica, and iron deposits. Aside from scale, water treatment can also help to prevent corrosion issues."

He notes that it is important to choose the correct water treatment solution for your particular requirements, as there's no one-size-fits-all option that will work in the long-term.

"Before you can consider a solution, you need to test your water to see what you're dealing with."

A trustworthy supplier

A trustworthy supplier can then help you to choose the right softener and system, taking into account your hours of operation, maximum demand (e.g. some boiler applications have peaks and troughs, such as in a mine change-house), your flow rate and your water hardness. "An experienced water treatment technician can also help to solve specific problems related to your water supply.

For example, by softening the raw water and using scale inhibitors you can address hardness deposits. Silica deposits can be dealt with by maintaining boiler water alkalinity at a 3x silica level, or using a demineralisation plant."

The Allmech team believes that the pre-treatment system is the most critical part of the total boiler water system, as it ensures water impurities are either removed or reduced to acceptable levels.

"Our softeners are based on salt regenerated ion exchange resin technology," says Thyse.

"Basically, the resin is a polymer that removes calcium and replaces it with water soluble sodium. But, if your sodium content is too high, it affects the resin's ability to regenerate. Instead of regenerating in cycles, it does so constantly, and will become ineffective. The resin requires saturated brine to regenerate and the salt needs eight hours in water to dissolve to saturation level."

The volume of water you're dealing with, coupled with your maximum demand, will dictate the valve you need. The softener size will depend on your operating times, required water volumes and a site assessment.

"We look at everything from pipe size to pressure and any major foulants in the water," says Thyse. He notes that sometimes a filter is also required. Carbon filters are used to remove chlorines and smells, whereas silica filters deal with turbidity issues.

When you have a problem

"In a properly specified system that's working as it's meant to,

the resin in a softener can run up to 10 years, depending on site conditions," Thyse says.

"If you're changing your resin more regularly you know you have a problem. That's why we suggest monthly water treatment services to all our customers where we test softener equipment and water sources."

Importantly, Thyse says, high-quality salt needs to be used in the softener to keep it in tip-top condition.

"If you have a softener that is working well and it is being maintained properly, you don't need to acid wash your boiler and you won't battle with high levels of corrosion. This ultimately cuts down on cost and down-time."

He adds that borehole and spring water quality may be affected by rainfall or other factors, so it's important to regularly test it and adjust your system as required. Softeners can regenerate from between every eight hours or once a month – depending on the interval required, which is determined by water quality and size.

"You want maximum steam output for minimum energy input," says Thyse.

"To achieve that, you not only need to think about implementing an effective and well-controlled water treatment programme to prevent scale / corrosion – you also need to employ sound boiler operating procedures, take care of your water softener, keep the boiler TDS at specified levels, heat the feed water and undertake preventative maintenance. That's why you need an expert partner – someone who understands every part of the process."

For more information, visit www.allmech.co.za.

Combustion Technology steam boiler system results in a 40% reduction in gas consumption

By Larry Claasen

WHEN a large industrial bakery in Gauteng needed to replace its boiler and awarded the tender to Combustion Technology, a market leader in oil and gas burners and steam boiler installations, sales, and service in the Southern Hemisphere, it got a lot more than it bargained for. Combustion Technology won the contract when the multinational company needed a new boiler after its old one had failed.

"...the combination of the boilers' efficiency, the Limpfield burner design and Autoflame control system are the key factors in achieving the huge gas savings."

The steam boiler Combustion Technology put in place was the new I.VAR BHP 3000 boiler, complete with a new Limpfield Natural Gas burner, did more than meet its objectives. It resulted in a gas savings of up to 40% at times after the conversion.

The savings was way more than the 12% projected in its tender bid, says Dewald Lubbe Autoflame, technical sales engineer. Autoflame is an Exclusive product of Combustion Technology.

As the I.VAR BHP 3000 boiler is a newer design than the one that failed; it is more efficient.

"The crux of the technology came from the Limpfield burner side, as this burner design burns the gas in

an extremely efficient manner."

An example of the modern design feature is the Autoflame control system, which controls the burner and all the boiler functions, it marries the two and can swiftly increase and decrease steam supply based on the process demand.

Lubbe says the combination of the boilers' efficiency, the Limpfield burner design and Autoflame control system are the key factors in achieving the huge gas savings.

"Aside from the massive gas savings, there is also a notable drop in greenhouse gas emissions with the introduction of our Steam Plant."

The burner's ability to operate at a lower % oxygen content on the combustion side makes it more efficient and slows the velocity at which the gas goes through the boiler and exits through the chimney.

"The burner design allows us to combust at sub 3% oxygen in our exhaust gases throughout the 6:1 turndown rate of the burner, with carbon monoxide less than 10 ppm [Parts Per Million]. There is no other burner on the market that has such a performance," Lubbe says.

The performance of the I.VAR BHP 3000 boiler, Limpfield Burner and the Autoflame control system has opened multiple opportunities for Combustion Technology.

"We have recently completed a burner conversion at another one of the client's

plants. We are doing one more [early in 2024], and we have also sold another new steam boiler to one of its other plants," Lubbe says.

He says that this project has opened a door for the group to fully Optimise all its Steam Boiler Plants.

"By installing Combustion Technology's equipment massive energy savings is achieved, as such, the cost of the equipment may be at a slightly higher price than its competitors."

"Many companies looking to install boilers and burners, merely look at the initial Capital expense and generally decide on the lowest cost option. They believe the equipment being offered all have the same efficiencies. However, this is just a perception, and not reality."

"These decisions need to have a sound basis and a quick ROI (return on Investment); with our equipment is usually just over one year. In the life expectancy of Steam Boilers (minimum 15 Years) it would be a serious oversight not to consider the future Gas consumption."

"You pay a small premium for the best equipment available, which is recovered in a year and future savings for the next 14 Years," notes Lubbe.

Aside from offering energy-saving technology, Combustion Technology also provides around the clock monitoring of its products through a remote Boiler Management System.

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