Automated water quality control in the boilerhouse

CONTROLS 4 STEAM

Introducing a better way to monitor and control the quality of boiler feedwater

In a climate of tougher demands on operational efficiency and environmental control, it has never been more important to seek ways of improving and maintaining optimum performance across all areas of the plant.

The boilerhouse is always under the spotlight to reduce energy consumption through greater efficiencies, such as the quality of the feedwater. This one factor alone can lessen blowdown frequency thereby improving the heat balance, saving energy and reducing the cost of water pre-treatment.

controls4steam specialises in supporting major users of steam for manufacturing processes and space heating. Our expertise originates from more than 30 years of working with commercial and industrial steam users to provide bespoke solutions for the safe and efficient generation and distribution of steam.

Our customers tell us that accurate and consistent dosing of boiler feedwater with chemical additives designed to reduce scaling and foaming is a major concern. Continuously monitoring water quality and adjusting dosage rates of chemicals is costly and time consuming, and they unanimously favour an automated solution to constantly monitor and adjust to a range of ever-changing load conditions.

THE AQUANET SOLUTION

Now such a solution is available in the form of Aquanet, a fully automated water monitoring and control system that scrutinises water quality to ensure chemical dosing is aligned to real-time water quality and the demands on the boiler, protecting the water system and steam plant 24 hours a day.

Over-dosing with expensive chemical treatments becomes a thing of the past and systems are afforded optimum round-the-clock protection. Aquanet is fully configurable to suit the recommendations of all leading chemical providers.

STEAM BOILERS

The Aquanet high pressure system enables boilers up to 100 bar to be monitored and controlled with one system managing up to three boilers, five water sample points and five chemical injection options.

MEDIUM PRESSURE BOILERS & EXHAUST GAS GENERATORS

The standard Aquanet medium pressure system is designed for boilers operating at up to 16 bar, monitoring up to three boilers and controlling up to five chemical injection pumps.

CONSTANT SYSTEM PERFORMANCE MONITORING

Engineers usually test boiler water conditions once or twice a day and adjust the chemical dosing to suit conditions prevailing at those times. However, no allowance or compensation can be made for the periods between tests and the readings that are taken can often prove inaccurate, resulting in over or under dosing. This can lead to excessive use of expensive chemicals or leave the boiler insufficiently protected.

It is estimated that some 70% of all boiler failures are water related, but with Aquanet the boiler water is being continually monitored. The chemistry of the water is adjusted according to operating conditions and fully automated blowdown maintains conductivity levels to within the boiler manufacturers' recommended limits, eliminating wastage and avoiding blowdown occurring at critical load times.

The Aquanet system provides a detailed performance history, enabling plant managers to make quantifiable operational decisions and plan essential inspection and maintenance schedules with ease and confidence.

With Aquanet, achieving optimum performance and efficiency in the boilerhouse has never been easier or more reliable.

A system tailored to every boilerhouse - Aquanet delivers on quality and performance

Illustrated *(right)* is a simple schematic of an Aquanet system on a single boiler installation with two dosing pumps/chemical additives.

Local water conditions will dictate the most suitable combination of chemicals to achieve the best results, most commonly pH builder, hardness control, oxygen scavenger and condensate control if permitted.

For correct control, the pH builder and hardness control should be dosed direct to the individual boilers. Oxygen scavenger and condensate control should be dosed into a common part of the feed system as far as possible from the boilers, not into the feed tank.

For a two pump system a combined pH builder/hardness control chemical and an oxygen scavenger would be the norm. Please contact **controls4steam** for schematics of typical multi-boiler installations.

Recommended reference material

BS 2486:1997 Recommendations for treatment of water for steam boilers and water heaters.

BS EN 12953-6:2002 Shell boilers - Part 6: Requirements for equipment for the boiler.

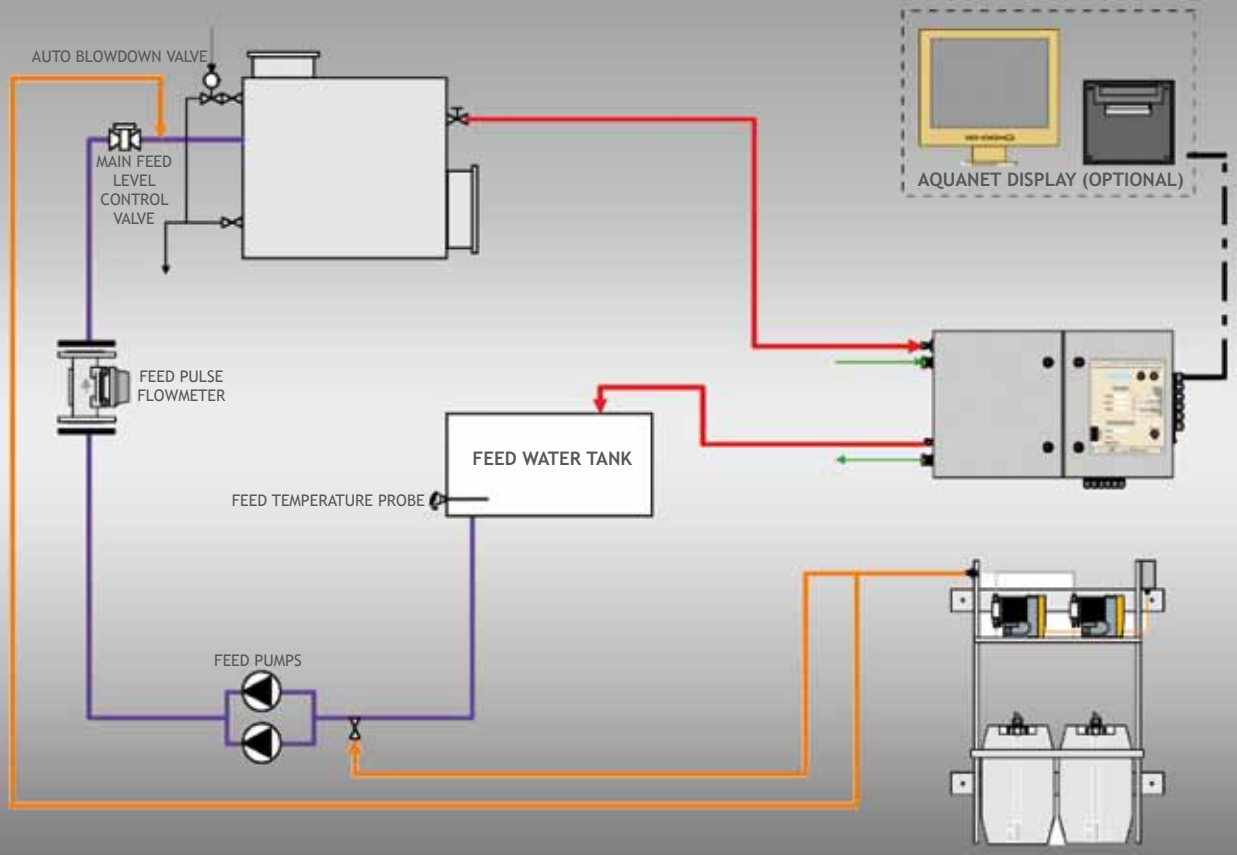
BS EN 12953-10:2003 Shell boilers - Part 10: Requirements for feedwater and boiler water quality.

HSE Guidance Notice INDG436 / Safed Guidance on safe operation of Boilers BG01.

Above: *An example of scaling/chemical blockage inside a heater tube from a watertube boiler.*

Below: *Oxygen pitting caused by inadequate oxygen control. Damage of this nature can be prevented thanks to Aquanet advanced feedwater chemistry control technology.*

Schematic of typical AQ301 installation for a two product regime



Key

- BOILER WATER TREATMENT INJECTION LINES
- BOILER SAMPLE IN/RETURN
- COOLANT IN/OUT
- MAIN FEED LINE
- DATA OUTPUT TO OPTIONAL DISPLAY

Improve steam quality, reduce maintenance costs and save on expensive chemical treatments

Boiler blowdown is universally acknowledged as an essential part of maintaining water quality within the boiler. If TDS (total dissolved solids) are allowed to build up they can seriously impair the transfer of heat between the boiler tubes and the water, cause foaming and seriously threaten the performance and integrity of an entire plant. Allowing deposits of waterborne detritus into pipelines has the potential to clog valves and steam traps, damage valve seats and threaten the integrity of the process plant itself.

However, excessive blowdown only serves to waste heat energy. If discharged to a blowdown pit that energy is lost forever, along with the costly chemical content used to condition the water.

Whilst a heat recovery system can capture the energy content and use the resulting condensate to preheat the feedwater, it will also contain the original chemical content. Unless this can be detected and measured precisely, there is likelihood that this will not be accounted for in the dosing of the feedwater, resulting in costly and unnecessary overdosing.

At controls4steam we recognise how this can add significantly to your operating costs. There is no advantage to overdosing. Indeed, operating outside the parameters set by individual boiler manufacturers can prove counter-productive.

Aquanet addresses all these issues in one integrated computer controlled management system. This relieves plant managers and operatives of:

- ✘ the need to perform manual dosing
- ✘ mixing or diluting chemicals
- ✘ making routine checks on reserve levels of chemicals
- ✘ performing manual blowdown procedures
- ✘ choosing optimum times phased to demand from boilerhouse
- ✘ deciding on duration and frequency of blowdown

With Aquanet in charge of your feed water there is seamless integration with all aspects of your boilerhouse management system.

The savings made from reductions in chemical consumption allied to more efficient blowdown and heat recovery and less manual intervention will serve to reduce the payback period.

The wealth of data that can be accessed and dowloaded from the Aquanet software will further help to fine tune routine operations, assist in cost analysis and can be used as a valuable management tool when planning inspection and maintenance schedules and spares inventories.

Aquanet is designed to work with most types of steam boiler and is suitable for retrofit as well as a key part of new-build installations.

controls4steam works closely with many leading boiler manufacturers and process engineering contractors to specify proprietary systems and develop bespoke solutions for a wide range of boilerhouse control functions.

In Aquanet we are pleased to offer a simple, well engineered, versatile and practical response to calls for better management of water systems in the boilerhouse environment. Aquanet delivers in all key areas including:

- ✔ continuous real-time monitoring of boiler water conditions
- ✔ maintaining optimum water conditions at all times
- ✔ precise chemical dosage saves wastage
- ✔ chemicals drawn straight from drum(s) - no decanting/spillage
- ✔ metered blowdown minimising loss of heat and treated water
- ✔ plant-wide protection against transfer of TDS
- ✔ user configurable to allow for changes in chemical supplier
- ✔ data collection to assist with maintenance scheduling

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