



**WATERLOO
MANUFACTURING**
COMPLETE BOILER ROOM SOLUTIONS

Boiler News

Volume 30

September 2012

Proper Selection and Set-up of Hydronic Controls

Many facilities today are taking advantage of lower temperature hydronic boiler heating systems, which are more efficient than traditional steam and hot water heating systems. Multiple high-efficiency condensing boilers are often used in these systems. There is also a growing trend toward hybrid heating plants that use both condensing and non-condensing boilers. To ensure that the hydronic heating system is fully optimized, it is important to invest in a good control system. Today, there are state-of-the-art control systems that continuously monitor a number of key variables in the facility, including boilers in operation, firing rates, system operating temperatures and other factors. An intelligent control system that integrates these factors with knowledge of the equipment being

controlled ensures that a hydronic boiler system will operate at peak efficiency.

The simplest controls sequence boilers on and off to meet a temperature set point. This constant cycling is counterproductive and expensive, in the same way that a car is more efficient when driven at a steady speed rather than in stop-and-go traffic, which uses more fuel and wears out parts sooner.

It is also important to note that putting a low-end sequencing control on a state-of-the-art boiler like the Cleaver-Brooks ClearFire® keeps a boiler from reaching its full potential. For example, if a facility installs a low-end sequencing control on a condensing boiler plant, the facility may experience higher-than-expected energy usage. Often a poor controls strategy can lead to unreliable operation and nuisance service problems. These issues can be avoided, if not eliminated, by a good controls strategy and by implementing and tuning a control system that will effectively manage the boiler plant to meet a building's heating requirements.

Too often in a multiple boiler system, a facility will have an inadequate control or no sequencing control at all. It can be short-sighted to have a simple boiler sequencing control operating a multiple-boiler hydronic system. It is even worse to have multiple boilers cycle and modulate on their own without any cohesive strategy. Both scenarios lead to inefficient operation and higher-than-necessary fuel costs.

There are several advanced control systems



The Cleaver-Brooks Hydronic System Control (HSC) can be used with any hot water boiler and has the flexibility to match the needs of any hydronic heating system.



available today, including the Cleaver-Brooks Hydronic System Control (HSC), which can be used with any hot water boiler and has the flexibility to match the needs of any hydronic heating system, including hybrid plants. Also available is the Falcon control with integrated lead-lag, specifically designed to optimize the Cleaver-Brooks ClearFire line of commercial boilers.

Many facilities incorporate the hydronic boiler system control into a building's energy management system (EMS). While well intentioned, this approach often does not deliver the desired results. A building EMS likely is monitoring a diverse array of equipment in the facility, including chiller systems, air handlers, zone valves, pumps, back-up energy systems, etc. Although the energy-saving goal of an EMS matches that of a hydronic boiler control system, the execution differs.

Frequently, pump electrical energy-saving measures are over-emphasized at the cost of increased fuel usage. In order to save pump energy, the building EMS reduces the speed of system pumps under low-heating load conditions, thereby reducing the flow throughout the system. Often overlooked is the design operating temperature and commanded boiler firing rates when the system flow has been reduced. If the EMS operating set-point control ignores the reduction



Cleaver-Brooks hydronic controls combine PID set point and outdoor reset algorithms, boiler sequencing and firing rates, and pump speed controls into one control system for more efficient boiler operation.

in water flow rate through each boiler and tells the boiler(s) to increase firing rate, very quickly the boiler shuts off because there is not very much water to heat. In this way, a boiler cycles off and on unnecessarily, which wastes fuel.

In a hydronic heating system, fuel usually costs more than electrical energy consumption. So while a facility may save pennies in electricity, it could be blowing dollars up the stack in fuel bills. Coordinating pump and boiler operation for effective heating and maximum overall system efficiency is important. Cleaver-Brooks hydronic controls accomplish these objectives by combining the PID set point and outdoor reset algorithms, boiler sequencing, firing rates and pump speed controls into one control system designed by engineers who truly understand efficient boiler operations.

Finally, tuning the control system to meet building needs is critical and takes time. Merely conducting operational checks to make sure everything is functional and meeting the specification at installation does not guarantee that the hydronic system is effectively meeting its heating needs and energy-saving goals. Proper PID tuning, stage timing, flow control and set point evaluation are critical during initial commissioning but should also be revisited periodically to maintain an optimal heating system operation.

After installing a boiler control system, be sure to monitor it to gather operational trends. Keep track of temperature, load, fuel usage and cycling. Analyze this data on a regular basis and make adjustments to the system as needed. It is important to tune the system annually or seasonally, depending upon building usage and climate, to maintain efficient and reliable heating system performance.

Contact us to find out more about Hydronic System Controls.

For information on products and services please contact us at:

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