

THE HVAC FACILITY CONNECTION

Volume 1, Issue 1
February 2009

FOR COMFORT AND EFFICIENCY IN YOUR BUILDING



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BOILER MAINTENANCE

When it comes to boiler maintenance are you proactive or reactive?

Hopefully you don't have a reactive boiler maintenance strategy. A reactive strategy is when there is no planning or anticipation of repairs that could prevent a failure. It is only when the equipment fails that the operators will evaluate the cause and then try to make the repairs.

The costs associated with a fix on fail strategy are typically high both in labor, much of which has to be done on an overtime basis, and the associated downtime. This explains why this is the least desirable approach to boiler maintenance.

On the other end of the boiler maintenance spectrum is a proactive maintenance program. This type of maintenance approach uses scientific testing techniques and analysis to anticipate and correct, by either repair or replacement, problems before they arise. Real time monitoring has contributed greatly to the ability to view and respond to changes in boiler operation and overall process performance. Operators can compare past baseline results against current readings to determine if a problem may be forthcoming.

A proactive maintenance program pays dividends in not only peak boiler performance but also in the overall safety of the individuals working in the boiler plant.

The key to properly analyzing boiler room conditions is having accurate data available. Boiler room logs are an important part of this process. Critical predetermined readings, such as fuel consumption and flue gas temperatures, are recorded on a daily or per shift basis. The history of recorded readings give the operator a baseline against which they can compare current day readings.

As an example, if the flue gas temperature of a boiler has gradually increased over the course of a month the operator will notice the change and be able to evaluate the system. He could then determine that there has been a build up of scale reducing heat transfer.

Keep in mind that every boiler operation is different. Some boilers will require more extensive logs than others. This is an area where management and boiler operators should review and jointly decide upon.

The following is a suggested list of areas that we feel require daily recordings:

- Water Level
- Blowdown Water Column
- Visual Check of Combustion
- Condensate Temperature
- Feedwater Pump Operation
- Gas Pressure
- General Boiler and Burner Operation
- Low Water Cut Off Tested
- Blowdown Boiler
- Boiler Operating Pressure and Temperature
- Feedwater Pressure and Temperature
- Flue Gas Temperature
- Oil Pressure and Temperature

continued on page 2

HOW CAN BRADY MAKE YOUR BUILDING BETTER?

Asked another way; what can Brady do to make your job easier?

At Brady we have developed service procedures that will insure reliable and efficient systems. These service procedures include:

Vibration Analysis All machinery that rotates on rolling element bearings has a unique signature. Using highly specialized equipment, our trained technicians can trend vibration in a machine. Changes in vibration levels, however discreet, can be an indicator of potential problems. This predictive maintenance tool allows you to plan for inspection and repair rather than react to an unplanned failure.

Fan Balance Fans that are out of balance can be the root cause of numerous problems. Premature bearing failure is the most likely result of an unbalanced fan. In extreme cases, an unbalanced fan can literally fly apart because the vibration weakens welded joints or mechanical fasteners. An unbalanced fan can also create a form of noise pollution that can have a real impact of employee comfort and productivity. Sometimes this noise pollution occurs at levels that are felt or sensed, rather than heard.

Look for more service tips in future issues. If you have specific questions, contact your Brady sales or service representative or call (800) 524-HVAC.

Boiler Maintenance Continued

Water Hardness

Since water is the key ingredient used in a boiler system, it is important to understand just exactly what is in the water you use. We recommend that customers have a water analysis performed so they have a true picture of what they are dealing with.

One of the items that will be quantified in the analysis is the water hardness which can be defined as the amount of mineral contamination that is found in the water. The degree of contamination can be measured by either a chemical analysis or by measuring the water's ability to conduct (or resist) an electrical current.

Hardness can be reported in one of three different expressions:

Mg/l - milligrams per liter

Ppm - parts per million

Gpg - grains per gallon

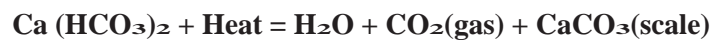
We normally work with the grains per gallon because it is easier to understand.

Imagine if you took a pill that weighed eight grains and dissolved it in one gallon of pure water. The result would be eight grains per gallon. To convert to milligrams per liter or parts per million use the following information to make the conversion:

$Gpg \times 17.1 = ppm$
$Gpg \times 17.1 = mg / l$
$Ppm \times .05833 = gpg$
$(Mg / l) / 17.1 = gpg$

Water hardness becomes an issue as soon as heat is applied in the boiler system. The most common problem is scale formation, a problem that will rob your system of the efficiency it was designed to deliver.

The following formula demonstrates scale formation.



To protect your boiler system it is best to invest in an ion exchange water softener.

Boiler Water Quality Recommendations

Refer to the table on the next page for recommended boiler water quality for Total Dissolved Solids (TDS), Alkalinity and Hardness.

continued next page

Owner Training

We are now accepting enrollment for Spring 2009 classes at our Greensboro, Raleigh and Wilmington locations. Please visit our website at www.bradyservices.com for a complete listing of classes and register online!

Onsite training is also available anytime throughout the year. Potential training topics can include:

- Centrifugal
- Package Equipment
- Rotary Chillers
- Controls
- Boilers
- Basic AC

Please contact your Brady representative or (800) 849-1915 for more details.

HVAC RENTAL EQUIPMENT AVAILABLE ANY TIME YOU NEED IT



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Ancillary Equipment

Pumps

Boiler Water Quality

Recommendations at Increasing Pressures

Boiler Steam Pressure (PSI)	Maximum TDS (PPM)	Maximum Alkalinity (PPM)	Maximum Hardness (PPM)
Low- 300	3500	700	< 20
301-450	3000	600	0
451-600	2500	500	0
601-750	2000	400	0
751-900	1500	300	0
901-1000	1250	250	0
1001-1500	1000	200	0
1501-2000	750	150	0
2001-3000	150	100	0

Proper Feedwater Treatment

Unless your boiler receives water of proper quality, its lifespan will be shortened. A steam plant's water supply may originate from rivers, ponds or underground wells. Each water supply source requires a specific analysis. Depending on the results of the analysis, various pretreatment methods may be employed to prepare makeup water for your boiler feedwater system.

Suspended solids represent the undissolved matter in water, including dirt, silt, biological growth, vegetation, and insoluble organic matter. When minerals dissolve in water, ions are formed. The sum of all minerals or ions in the water is the total dissolved solids or the **TDS**.

Iron can be soluble or insoluble. Insoluble iron can clog valves and strainers and can cause excessive sludge build up in low lying areas of a water system. It also leads to boiler deposits that can cause tube failure. Soluble iron can interfere in many processes, such as printing or the dyeing of cloth. In domestic water systems, porcelain fixtures can be stained by as little as 0.25 ppm of iron.

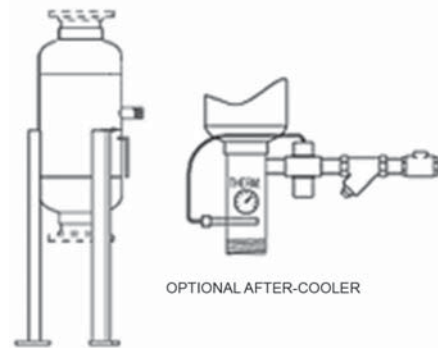
Water hardness is the measure of calcium and magnesium content as calcium carbonate equivalents. Water hardness is the primary source of scale in boiler equipment. Silica in boiler feedwater can also cause hard dense scale with a high resistance to heat transfer.

Alkalinity is a measure of the capacity of water to neutralize strong acid. In natural waters, the capacity is attributable to bases, such as bicarbonates, carbonates, and hydroxides; as well as silicates, borates, ammonia, phosphates, and organic bases. These bases, especially bicarbonates and carbonates, break down to form carbon dioxide in steam, which is a major factor in the corrosion of condensate lines. Alkalinity also contributes to foaming and carryover in boilers.

Boiler Blowdown

Blowdown of steam boilers is very often a highly neglected or abused aspect of routine boiler room maintenance. The purpose of boiler blowdown is to control solids in the boiler water. Blowdown protects boiler surfaces from severe scaling or corrosion problems that can result otherwise.

BOILER BLOWDOWN VALVE



There are two types of boiler blowdowns - continuous and manual. A continuous blowdown utilizes a calibrated valve and a blowdown tap near the boiler water surface. As the name implies, it continuously takes water from the top of the boiler at a predetermined rate.

Manual blowdowns are accomplished through tapings at the bottom of the boiler. These openings allow for the removal of solids that settle at the bottom of the boiler. Manual blowdown is also used to keep water level control devices and cutoffs clean of any solids that would interfere with their operation.

A continuous blowdown is an optional feature and may not be included on your steam boiler. However, all steam boilers should include a means for manual blowdown as standard equipment.

Proper blowdown:

Blowdown should be done with the boiler under a light load. Open the blowdown valve nearest the boiler first, which should be a quick opening valve. Crack open the downstream valve until the line is warm. Then open the valve at a steady rate to drop the water level in the sight glass ½ inch. Close it quickly being sure that the hand wheel is backed off slightly from full close to relieve strain on the valve packing. Close the valve nearest the boiler.

Repeat the above steps if the boiler has a second blowdown tapping. Water columns should be blown down at least once a shift to keep the bowls clean. Care should be taken to prevent low water shutdown if this will affect process load. Preventive boiler maintenance should also include checking all blowdown piping once a year for obstructions.

Preventative maintenance is the best strategy for maintaining your boiler system. Brady can assist you with all of your boiler maintenance and repair needs. Please contact your representative or (800) 849-1915 for more assistance.

**Have an idea for an article?
A HVAC question you need answered?
Email us at info@bradyservices.com
We appreciate your input!**

COUNT ON TRANE WHEN SOMONE COUNTS ON YOU

WHEN YOUR JOB IS TO MEET YOUR CUSTOMER'S DEMANDS FOR HIGH QUALITY INDOOR AIR ENVIRONMENTS, ENERGY SAVINGS AND LEED CERTIFICATION, THE TRANE ORGANIZATION DELIVERS FOR YOU. IN FACT, TRANE WILL ALWAYS BE THERE FOR YOU TO PROVIDE EXTRAORDINARY ENGINEERING SYSTEMS SUPPORT, SUPERIOR QUALITY EQUIPMENT AND CONTROLS, AND ENVIRONMENTALLY RESPONSIBLE SYSTEMS.

SO WHEN IT COMES TO BUILDING SOLUTIONS, REMEMBER THAT TRANE STANDS BEHIND YOU AND OUR PRODUCTS AND SERVICES. TO LEARN MORE, VISIT US AT WWW.TRANE.COM.



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PO Box 13587
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Brady Systems Show

We are excited to announce that this year we will be having a systems show in our Greensboro, Raleigh and Wilmington locations. We will be presenting the latest and greatest in the HVAC industry and the topics that you told us were important to you!

Sign up to receive an invite by sending an email to info@bradyservices.com with the subject line: INVITE ME!

**Wilmington: March 11th Raleigh: April 8th
Greensboro: May 13th**

Engineer Satellite Broadcasts

The following broadcasts will be held in our Greensboro, Raleigh and Wilmington locations. To register please call (800) 524-HVAC and ask for satellite broadcast coordinator in the office you would like to attend.

March 11, 2009: LEED 2009 Modeling & Energy Savings

April 22, 2009: ASHRAE sponsored broadcast, Topic TBD

May 13, 2009: Ice Storage System Design

NEW DATE! November 4, 2009: Air Handling Systems, Energy & IAQ

[newsletter input / feedback and address changes](#)

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