Boilers and the Bitter Cold

by Alex Taylor, National Account Rep

It is that time of year again--the cold has returned, and with it, all the winter problems that plague commercial and industrial facilities. Although they produce a tremendous amount of heat, boilers are not immune to the risk of freeze damage. Unfortunately, there are many misconceptions about what will and will not freeze in a boiler system, and this often leads to unexpected damage and subsequent downtime from pipes and other components bursting or warping out of shape.

Freezing can often be a small nuisance, such as a frozen pipe line that simply needs to be thawed with a space heater, but there are numerous situations where the result can cause extensive downtime. It may be a controls failure that takes significant time to troubleshoot, only to find that a transmitter or sensing line wasn't insulated, accumulated some moisture inside, and ultimately froze. Other times, it may be that a pump was allowed to freeze, and there is damage to the housing or the impeller, and now it must be rebuilt or replaced; lead times on new pumps, depending on their size and pressure design, can be anywhere from a few days to several months.

One common misconception is that if a line is moving water swiftly or moving hot water, it will not freeze. Not only does this simply not hold up in extremely cold weather, but you must also ask yourself: what if there is an interruption in flow? If power is lost to the pumps, that water will no longer be moving, and it will most likely freeze. Another common error is to forget about drains. Especially on twin water softeners, which have a frequent need to backwash and regenerate their tanks, a frozen drain line will prevent the unit from running through its cycles, and will most likely end up breaking a valve or pipe line.

Recently, one of our customers had the misfortune of suffering extensive damage to a large watertube boiler, even though it was housed inside a heated building. The front of the boiler, which housed the low water cutoff safety controls and the transmitters that send signals for more boiler feedwater when it starts to run low on water, was

exposed to frigid temperatures after a nearby overhead door was left partially open. All those controls and control lines on the front of the boiler froze in place, making the boiler control system believe that it had plenty of water. As the boiler evaporated its water and did not call for more, there was no water to take heat away from the metal; by the time the operators realized there was a problem, the tubes were glowing red-hot inside the boiler, and the majority of them were warped and sagging down as the steel began to melt. The end result

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Here's How You Can Identify Potential Boiler Problems and Limit Downtime

Most people finish work at five, but that's not always the case at WARE.

Recently, one of our technicians was at a customer's facility performing a routine combustion check. He was getting a high furnace pressure reading, so he inspected the boiler's tubes and found a critical issue.

Around 5PM, he called back to WARE headquarters and told us the tubes in the boiler had been leaking…for a long time. There was so much chemical buildup that the flue outlet was almost completely blocked. Flue gases were barely able to escape.

They needed a rental boiler—fast.
Any extended downtime would force them to buy product from a competitor in order to stay up-and-running.

So we called a group of our guys—most of whom had started work at 7AM and already gone home to their families—and told them we needed them to come back.

And they did.
They got a rental boiler ready to go. It left our facility around 8:30PM and reached the customer's site around 11PM. The boiler was set by midnight.

While it varies largely with each facility, installing a rental boiler can take about a week on average.

In this case, the story was a bit different:

The entire boiler system was up and running again in less than 2 days.
"It's never an issue for us to make that happen. That is the business we are in," said Operations Manager, Daniel Ware.

In this case, we identified the problem and were able to help the customer avoid downtime.

There were three things that made this possible (and you can do the first two).
The customer already had contingency piping set up to support a rental boiler.

They had a rental installed in the past, and the piping was ready to be used on the new one.

If the contingency piping had not been installed, installing the boiler would have taken much longer, as we would have had to run new piping.

We recommend that our customers have contingency piping set up in their facilities for situations like this.

The customer called us in for an inspection.

We recommend quarterly inspections for all our customers. That lets us identify problems like this early and avoid (if possible) the risk of significant downtime.
Our team was willing to work through the night to make it happen.

We don't consider this special treatment. It's just what we do. We've got a sense of urgency with all our customers when these situations arise, and we don't think there's any job too tough for us to tackle efficiently.

These things happen.
Boiler systems fail for a variety of reasons, but issues like this are preventable—or at the very least, detectable—with routine inspections. And even though installing contingency piping might seem inconvenient, we guarantee it's not as inconvenient as downtime.

3 Ways to Beat Hard Water and Save Your Boiler

What is hard water?
If you're unfamiliar with the term, it doesn't sound too bad. It's just water, right?

Actually, hard water can be extremely damaging to your boiler.

Here's how we define hard water:
Hard water is water that contains an excess of calcium and magnesium, brought on by the water's source.

And using it in your boiler will quickly lead to mineral buildup, which will slow your boiler's heating process and cause it to work harder—using more energy and increasing your expenses.

Think of it like this:
Water hardness is measured in grains per gallon. To illustrate that, imagine a BB from a BB gun.

One BB is equal to 5-6 grains.

Now, consider that some people run 10,000 gallons of water per day through their boiler.

If that's you, and you're running hard water with a measurement of 5 grains per gallon into your boiler, that's a buildup of 10,000 BBs in your boiler—every day.

70,000 BB's per week. 280,000 per month.

It's adds up quickly—and so do repair costs.

On average, repair costs for this type of damage range from $4,000 to $15,000.

So, what can you do about it?
Here are 3 ways you can beat hard water and save your boiler.

1. Install a water softener system.

   This will remove the minerals from your hard water to decrease the risk of mineral buildup in your boiler.

2. Test your water daily using a water softener test kit to confirm whether your water softener system is working.

Water softener test kits have 3 basic components:

- Buffer
- Reagent
- Indicator

Here's how you can test for hard water:
a. Add the water you want to test to your measurement tube.
b. Add 5 drops of buffer to the water.
c. Swirl the mixture.
d. Add a scoop of indicator powder.
e. Swirl the mixture again.
f. Watch for results.

If your water softener system is working correctly, you should have soft water, which will cause the mixture to turn blue. Hard water will cause it to turn a different color.

If you test a sample of water and find you have hard water, here's how you can determine the grains per gallon measurement:

Add drops of reagent to the mixture until it turns blue. Count the amount of drops it takes for the mixture to turn blue. Each drop represents 1 grain per gallon of hardness.

So, if it takes 5 drops of reagent to turn the water blue, then the water you are testing is at 5 grains per gallon of hardness.

Water softening systems are based on grains per gallon.
So, if you know how many grains per gallon your hard water is currently at, you can adjust your water softener system to treat the water appropriately.

3. Document the number of gallons remaining before regeneration in your water softener system, as well as which tank you're operating on.

This gives you a history of information, so if you need to troubleshoot the softener in the future, you have the information you need.

Mineral buildup in your boiler can be a silent killer.

So, remember to test your water's hardness on a regular basis.

YouTube Watch WAREboilers channel

Watch a video on -
Testing Water for hardness.

Informative WARE videos

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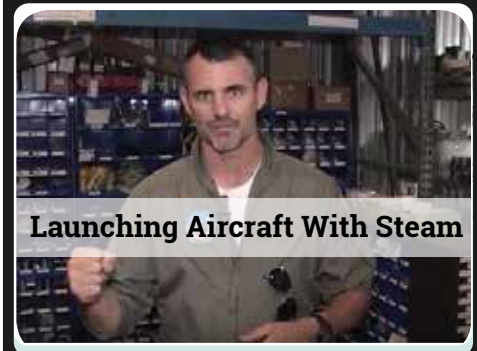
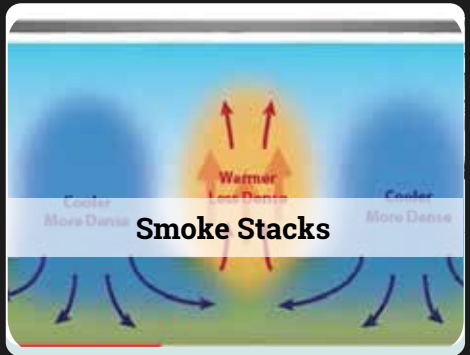
BOILING POINT

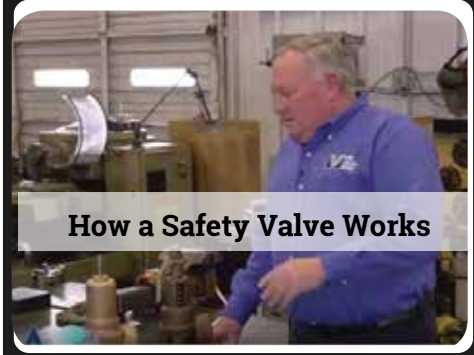

Launching Aircraft With Steam



Smoke Stacks


Steam Power Fire Engine

STEAM CULTURE


How a Safety Valve Works


Freeze Protection on a Rental Boiler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NEW VIDEOS UPLOADED ALL THE TIME.

WARE new and used List

All equipment listed is for sale or lease and subject to availability

Unit	HP/PPH	Year	Manf.	Fuel	Type	PSI	Ctrl.
779	82,500	2013	Victory Energy Limpsfield	(Low NOx) G/#2	Steam	350	IRI
796	82,500	2016	Victory Energy Faber	(Low NOx) G/#2	Steam	350	IRI
797	82,500	2016	Victory Energy Faber	(Low NOx) G/#2	Steam	350	IRI
767	75,000	2011	Victory Energy	(Low NOx) G/#2	Steam/SH	750/750	IRI
747	75,000	2000	B&W	(Low NOx) G/#2	Steam/SH	750/750	IRI
791	75,000	2016	Victory Energy	(Low NOx) G/#2	Steam/SH	750/750	IRI
750	70,000	1996	Nebraska	(Low NOx) G/#2	Steam/SH	750/750	IRI
709	60,000	1979	Zurn	(Low NOx) G/#2	Steam	500	IRI
741	60,000	1979	Zurn	G/#2	Steam	550	IRI
795	40,000	1986	Cleaver Brooks	Gas	Steam	260	IRI
496	800	1990	York-Shipley	(Low NOx) G/#2	Steam	200	IRI
634	800	1972	York-Shipley	G/#2	Steam	150	IRI
SSB30	800XID	2014	York Shipley	(Low NOx) G#2	Steam	250	UL/CSD-1
620	800	1975	York-Shipley	G/#2	Steam	250	IRI
SSB28	600XID	2012	York Shipley	(Low NOx) G/#2	Steam	250	UL/CSD-1
SSB15	500XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SB139	500	2001	Cleaver Brooks		Steam	150	
SB226	400	2016	Victory Energy	(Low NOx) G/#2	Steam	150	UL/CSD1
SB138	350	1994	Cleaver Brooks		Steam	150	
SSB39	300XID	2016	Victory Energy	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB40	250	2017	Victory Energy	(Low NOx) G/#2	Steam	150	UL/CSD-1
415	250	1980	Eclipse	#2 Oil	HT/HW	954	IRI
SB216	250XID	2015	York-Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SB148	200	1995	Kewanee	Gas	Steam	325	IRI
SB146	200	1995	Kewanee	Gas	Steam	325	IRI
SB213	175XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD-1
SB220	175XID	2015	York-Shipley	G/#2	Steam	150	UL/CSD-1
SB240	175XID	2017	Victory Energy	G/#2	Steam	150	UL/CSD-1
SSB20	175XID	2012	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SWVB1	1200	2017	Victory Energy	(Low NOx) G/#2	Steam	250	UL/CSD-1
SWVB2	1500	2017	Victory Energy	(Low NOx) G/#2	Steam	250	UL/CSD-1

One hour quote on-line at www.wareinc.com or call 800-228-8861

continued

WARE new and used List

WeRentBoilers.com

All equipment listed is for sale or lease and subject to availability

Unit	HP/PPH	Year	Manf.	Fuel	Type	PSI	Ctrl.
SSB38	150	2016	Victory Energy	(Low NOx) G/#2	Steam	150	UL/CSD-1
SB242	150	2016	Victory Energy	G/#2	Steam	150	UL/CSD1
SB236	150	2016	Victory Energy	G/#2	Steam	150	UL/CSD1
769	150	1998	Precision	Electric	Steam	150	UL
SB-232	100	2016	Victory Energy	G/#2	Steam	150	UL/CSD-1
SB-228	100	2016	Victory Energy	G/#2	Steam	150	UL/CSD-1
SSB41	100	2017	Victory Energy	(Low NOx) G/#2	Steam	150	UL/CSD-1
SB-241	100	2008	York Shipley	Gas	Steam	150	UL
SB-237	70	2016	Victory Energy	G/#2	Steam	150	UL/CSD-1
SB-238	70	2016	Victory Energy	G/#2	Steam	150	UL/CSD-1
SSB35	70	2016	Victory Energy	(Low NOx) G/#2	Steam	150	UL/CSD-1
SB-234	50	2016	Victory Energy	G/#2	Steam	150	UL/CSD-1
SB-227	50	2016	Victory Energy	G/#2	Steam	150	UL/CSD-1
SSB33	50	2015	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1

Chillers

Unit	Size	Manf.	Volt.	Type	Year
RC-24	30 ton	Mc Quay	480v	3 ph	2000
RC-26	40 Ton	Mc Quay	480 v	3 ph	1999
RC-1	60 Ton	Mc Quay	480 v	3 ph	1995
RC-13	60 Ton	Trane	200-230 v	3 ph	1989
RC-5	95 Ton	Mc Quay	480 v	3 ph	1995
RC-6	105 Ton	Mc Quay	480 v	3 ph	1995
RC-10	195 Ton	Mc Quay	480 v	3 ph	1995

One hour quote on-line at www.wareinc.com or call 800-228-8861

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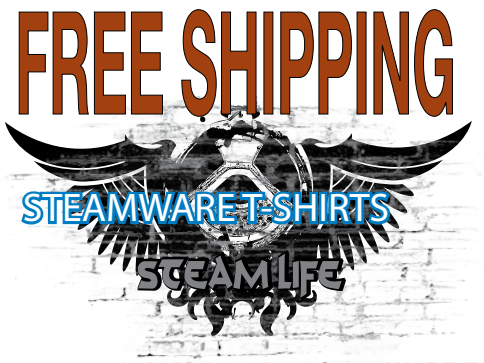
Boilers and the Bitter Cold pg 1

is that the boiler needs to be re-tubed, which is going to take it out of commission for months.

Boiler systems are just mechanical systems that are moving water and changing its physical state from a liquid to a gas, and like any other application, the water will freeze if its temperature is allowed to drop enough. WARE recommends heat-tracing and insulating any exposed water-bearing lines, valves, pumps, traps, etc., whether they be for feedwater, condensate return, drains, sensing lines, etc. If you suffer an unexpected outage, it is also highly recommended that you open all valves, drains, and drain plugs (especially on pumps); only drain boilers once they have cooled to a safe temperature, as you do not want to put pressure vessels through thermal shock and risk damage by draining when they are too hot. By being proactive and preventing freeze damage in advance, you will avoid the costly and aggravating problems that come when your system freezes up. If you are interested in getting your system protected against the cold, WARE also offers insulating services for boilers and piping.

Watch WAREboilers channel

Watch a video on -
Insulating a Boiler Room



All net proceeds from the sale of SteamWARE T-shirts go to Kosair Charities, where health care is provided to Children when there is no one else to turn to.

4STEAMWARE.COM

2018 BOILER UNIVERSITY NEW CLASS SCHEDULE

Boiler 101 is a two-day introduction to the boiler room, covering all of the important aspects from water treatment, to boiler operations, to condensate systems.

101 Classes
Two Days, $1,200.00

February	06-07, 2018	Knoxville, TN
March	13-14, 2018	WKU, KY
April	17-18, 2018	Chattanooga, TN
May	15-16, 2018	Louisville, KY
July	10-11, 2018	Louisville, KY
August	14-15, 2018	Chattanooga, TN
September	11-12, 2018	Augusta, GA
September	25-26, 2018	Louisville, KY
October	16-17, 2018	Nashville, TN

Boiler 201 is a three-day program building on the 101 foundation, but adding the full experience of our Louisville Boiler Lab, providing hands-on opportunities on many subjects with our four fully-operational lab boilers.

201 Classes
Three Days, $1,800.00

April	24-26, 2018	Louisville, KY
August	21-23, 2018	Louisville, KY
November	13-15, 2018	Louisville, KY

2018 Class Information and Registration Available at www.wareboileru.com

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