

# RME CRITICAL UPDATE

ROBERTS MECHANICAL EQUIPMENT COMPANY | "What's in your boiler room?"

May 22, 2007 (Updated August 2007)

## RE: COPPER FIN BOILER CODE – DRAIN VALVES

In an effort to assist our engineers, contractors, and end users we would like to update you on some common code and installation misunderstandings as they pertain specifically to **COPPER FIN** boiler designs. As you are aware, our firm represents 8 boiler manufactures covering the complete spectrum of boiler types. We are very careful to apply boilers properly and all of us have had significant training on all of the boiler types. This experience is a big plus for RME clients.

Here are some frequently asked questions regarding copper fin boilers:

### Q: Do copper fin boilers require a low water cut off?

A: A copper fin boiler should include either a low water cut off OR a flow switch. Personally, I like the flow switch because most contractors will mount the low water cut off in the piping above the boiler. The problem is the boilers often have valves on the inlet and outlet of the boiler. If you valve off the boiler, you can trap the water above the boiler making the conductivity of the low water cut off when the boiler can actually be dry. While code requires at least one, installing both can't hurt!

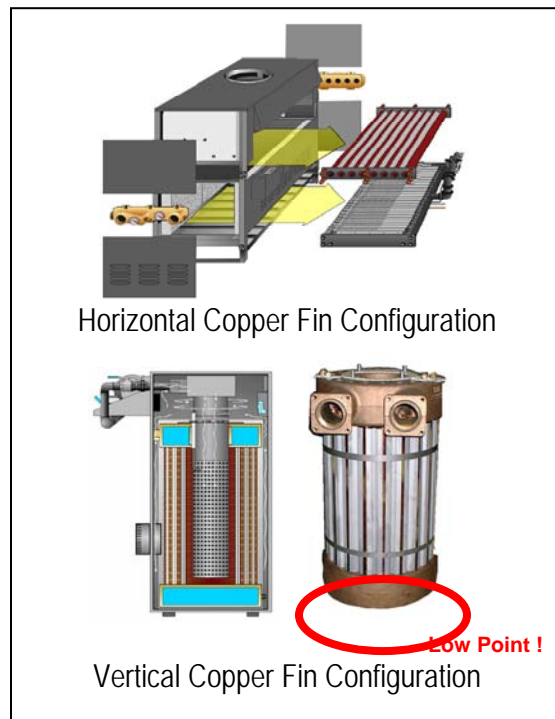
**Engineers can be safe by specifying both a low water cut off and a factory mounted flow switch!**

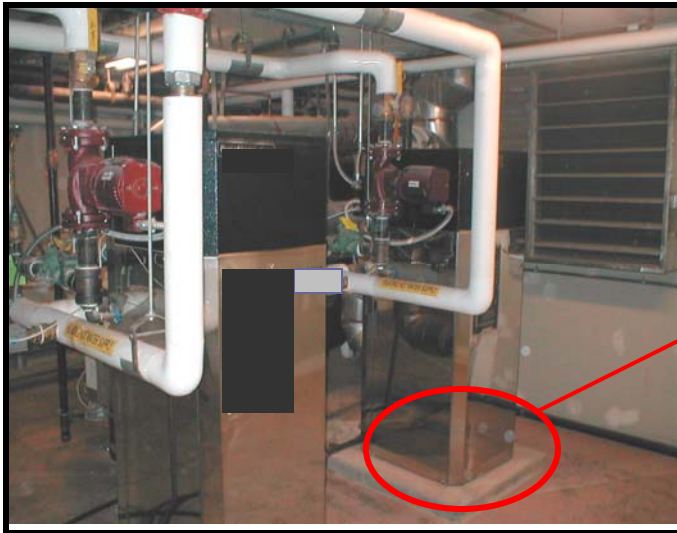
### Q: Where should a drain valve be mounted on a copper fin boiler and can I do it in the field?

A: ASME section IV along with the State of Ohio and National Board require that most copper fin boilers (actually all) have at least one (1) 3/4" drain valve at the lowest point of the vessel. This is an interesting situation because copper fin boilers typically come in two types. They either come as a horizontal exchanger (RBI Dominator, RBI LCD, Lochinvar Copper Fin I and II, Raypak Hi Delta, Teledyn Laars atmospheric etc...) or they come as vertical down fired exchanger (radial fired such as RBI Futera II, III, or Fusion, Lochinvar Power Fin, Thermal Solutions, Patterson Kelly Thermific or Modufire, etc..).

The horizontal exchangers are simple to deal with. On a horizontal plane, the lowest point of the vessel can be attained by tapping off of the header or simply installing a valve prior to the first shut off valve on the outlet of the boiler. Common sense says the boiler will drain completely this way and will do so instantly which we assume is the intent of ASME section IV and other similar codes.

The vertical exchangers work differently. They are arranged in a three or four pass configuration terminating the inlet and outlet at the top or the top and bottom of the rear. The issue is these are higher efficiency boilers with pre-mix combustion processes. The combustion chamber is pressurized so penetration of a drain valve **MUST** be completed by the manufacturer at the bottom of the heat exchanger. The drain will penetrate the cabinet and seal the combustion chamber to meet ASME section IV. All manufacturers listed above comply yet it has come to our attention that some of the newer copper fin manufacturers may not comply. Speaking with the State of Ohio, if no drain is located on the boiler, they will (should) not issue a license. RBI did not have the drain valve on very early generation units. The exchangers were ASME approved than put into the boilers so if it wasn't caught in the field, the configuration was acceptable to unsuspecting engineers, contractors, and building owners. **Engineers need to ask the question and require a drawing that shows the proper drain valves from the manufacturer before considering a basis of design OR an equal product!**





Pictured here is a newer copper fin boiler installed recently in the Cleveland Area. We were unable to locate a lower drain valve penetrating the jacket, however, the manufacturer claimed to have had one. I guess the State of Ohio will need to figure this one out!  
**Buyer beware!**

**Q: Who is responsible if the boiler does not get licensed?**

A: We would expect the local representative to know the codes and what is acceptable in the State of Ohio, however the problem sits with the owner. Knowing the normal path, the owner will be all over the installing contractor who will be all over the engineer who chose to specify a boiler that doesn't meet the states requirements. In the end, I would think the Rep will have to solve the issue, HOWEVER... knowing this combustion technology, there's no way I would let any one other than the manufacturer drill into my pressurized combustion cabinet!

**Q: I noticed that boiler and water heaters in the copper fin category can carry an H stamp or an HLW stamp (ASME) can you tell me the difference?**

A: Copper fin is effectively used for both heating and domestic hot water. Heating boilers are certified and stamped with the ASME H stamp while domestic hot water boilers are certified with the ASME HLW stamp. Visiting the National Board web site I was able to obtain the listings on most copper fin boiler manufacturers and as of this newsletter all the manufacturers listed above all carry both the HW and the HLW stamp according to National Board (home based in Ohio). Ironically, the same boiler manufacturer who does not appear to provide drain valves also does not show having an HLW stamp. I'm not sure if selling your copper fin boiler as a water heater means you HAVE to have the HLW stamp, but it seems that near all of them do.

***Engineers simply specify that the water heater must carry the ASME HLW stamp of approval. You will still have about 8 equal products to work with.***

**Q: When should I use Cupronickel?**

A: Copper requires a very specific flow rate to prevent scaling or erosion. Of course, the units are small and the tubes are small so we want to flow through the units at the fastest possible speed without moving water at a velocity that will damage the exchanger. RBI carefully calculates pumps to flow at a velocity of around 7fps. Every copper fin should be sized this way and if it is, cupronickel should never be needed. If the manufacturer or representative recommends cupronickel on a closed loop system he has no justification other than maybe the manufacturer is not confident in his own sizing or exchanger design requirements exceed copper tolerances. I know one manufacturer where the recommended velocity is way above an acceptable range (even for cupronickel). Problem is, erosion occurs in a 2-5 year period and warranty can be very difficult to get. (Especially if you are seeking warranty from a **new** manufacturer.)

I use cupronickel when my water quality is poor and I'm making up most or all of my water (domestic). I do this in the Canton area a lot. By increasing flow I can help to purge the solids but need the cupronickel to handle the increased velocity. The calculation is very specific and a great deal of experience goes into this recommendation. ***Engineers need to be safe by asking the boiler manufacturer to size, supply, mount, and wire the primary boiler pump! Most important use a manufacturer who's been around for awhile!***

**Q: Can I easily refer to a web site that can assist me in matters such as this?**

A: I have spent a lot of time the last few weeks researching the various sites. Most want you to pay a fairly costly price to obtain sections of their code. I was however impressed with the National Board web site. You can locate the site at: [www.nationalboard.org](http://www.nationalboard.org) . You may sign up free by simply supplying your email address and a password. They will mail you your confirmation but be warned to look in your junk mail box as that is where my membership confirmation ended up. You need the confirmation to access articles and to search stamps for manufacturers and local repair companies. I was impressed to see that that site also updated local welding companies who carry the proper certifications to make certain tank and boiler vessel repairs and welds. All this FREE OF CHARGE.. you don't get that often enough!

To learn more about this and other boiler related issues, simply visit: [www.robertsmech.com](http://www.robertsmech.com) and click on products or 'Boilers on Demand'. You'll also see this and other critical updates and tech tips to help you everyday of the week! You may also email us at [info@robertsmech.com](mailto:info@robertsmech.com) or call our Cleveland office at 216.587.0005.

Our support staff can also assist you with components or parts for all boilers and boiler related equipment. Simply contact our parts expert ( [Christina.roberts@robertsmech.com](mailto:Christina.roberts@robertsmech.com) ) or one of our factory trained and certified in house tech's through our solutions director ( [doug.bolas@robertsmech.com](mailto:doug.bolas@robertsmech.com) ).

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