

RME TECH TIP UPDATE

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

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RE: Assistance in the design and application of condensing boilers
More details are always available at www.robertsmech.com

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Condensing boilers are certain to pay the customer back if they are applied correctly. Applied wrong it can be an absolute nightmare! Here at RME we pride ourselves in having the most unbiased and honest approach to boiler application. Because our direct representation of boilers include all of the boiler types, we don't decide what you need based on the ONE boiler we might represent. Instead, we do our best to protect you by fully reviewing the application to be certain it is best suited for the boiler you are considering.

Today I'd like to cover some of the condensing boiler game.

[As seen on www.robertsmech.com ...](http://www.robertsmech.com)

Fully condensing boilers can fire as high as 99% efficiency and attain a higher efficiency in different ways. If you stop to think about it, these boilers are simply deleting as much energy from the gasses as physically possible, prior to exiting the building in the form of flu gasses. The key challenge created by this process is the handling of condensation. Condensation is a very acidic liquid formed anytime our outlet temperature drops below 120F or gains over 85% efficiency. This is a simple rule of thumb. Once those parameters have been met, we have to deal with the condensation so it does not destroy the boiler or vent system. So here starts the 'condensing game'. Be careful and consider the following prior to choosing a condensing boiler system:

VENTING:

With the above criteria met, the product should be rated as an ANSI category II (negative/corrosive) or IV (positive/corrosive) appliance. This means a special alloy stainless steel vent system called AL29-4C is required by code. This vent system can be manufactured by Schebler, Heat Fab, Zflex, or a small number of other manufacturers (UL listed products should be important to you). This material is to prevent damage and/or possible leaking from the vent system. You CANNOT vent a true high efficiency boiler through a masonry chimney as the mortar will fall apart and the chimney will fall in. This means you have to line your chimney with the AL29 which may be expensive and subtract from the payback based on first cost.

Many of the high efficiency boilers can vent through a side wall directly but you have to pay close attention to the maximum length and the equivalent run and the elbows or fittings. In addition, you must watch how you will exit the building as condensation can stain the side wall and the certain plume thrown from a high efficiency boiler may impede a view or an employee's concentration from windows above the vent outlet.

Last but not least, you have to be very careful of the 'wannabe' boilers. These are the boilers that sit at 87 and 88%. They 'wannabe' NON CONDENSING when the contractor figures out the vent material for condensing cost a whole lot more, and they 'wannabe' high efficiency when the customer wants a condensing boiler. The 'wannabes' typically cost much less than the full condensing guys, but warrant some attention here in this section. Improper venting can be the demise of a very expensive boiler.

Engineer's Beware: Considered equal products can require different vent materials. This can be a nightmare waiting to happen. I've seen chimney's cave in because of this. Be careful to disclaim, in your specs and schedules, so you are covered in the world of confusing venting codes. If you are in question at all, give us a call and we can review your vent

routing and your equal products to be sure you have nothing to worry about. A classic mistake would go something like this:

Basis of design is the RBI Futera II series boiler model FB1950. Equal products may be provided by:

Lochinvar
Thermal Solutions
Patterson Kelly

Now, go back to your Sesame Street days and figure out which of those DON'T belong. All of the manufacturers here are considered quality providers and name brands (this is important because today, too many copy cat copper fin boiler manufacturers with less than 5 years experience are out presenting as equals).

The dilemma is Lochinvar's equal is the PFN boiler and the PFN boiler has been rated as a category II or IV appliance (unless this has changed). This requires AL29 vent material. If you are venting into a chimney, the Lochinvar would need to use a liner while the Patterson Kelly and RBI carry an ANSI Category-I rating and can vent directly into the chimney and meet NFPA54 codes. The problem can get worse because now a wholesaler may say.. 'hey, they are bidding the category-I so I can use the Copper Fin II'. Now the scope of your job is changing because the footprint, piping, control, wiring and who knows what else will change on the sprawled out Copper Fin II vs the Down fired Powerfin unit that meets the arrangement of the RBI Futera or the Patterson Kelly Thermific.

At the end of the day, the Thermal Solutions product will also carry a category II or IV rating so they'll need a liner as well (maybe).

STAY OUT OF TROUBLE BY:

- Disclaiming the vent material by demanding it meet NFPA54 and ANSI category standards at the expense of the installing contractor when the basis of design is not being used.
- Using a rule of thumb that says anything over 85% combustion efficiency can condense and will probably need an AL29 vent material (Thermal Solutions is 88% and Lochinvar Powerfin is 87%). This being the case, they may not be your best equals for this project, or you might bring the basis of design in line with these products (RBI would be a Futera III and Paterson Kelly would be a Modufire) so they are all true equals. Your basis of design rep should help you with this.
- Always NAMING the manufacturers model number or series. This will prevent the 'you named them you have to take them game' that some reps or suppliers can play. It's much easier if our example project would have said: RBI Futera III is the basis of design with equal products being the Lochinvar Powerfin only, Thermal Solutions Evolution only, and the Patterson Kelly Modufire only. No confusion left for the contractor and no 'creative angle' for the bidders.
- Last but most important calling and letting us review your venting. We truly are the most knowledgeable representative firm when it comes to venting and up to date codes. We have to be because a big part of our business is providing guaranteed venting solutions for everything from clothes dryers and fireplaces, to grease duct and boilers.

Read the remainder of this white paper with more good information available on our web site in the 'payback' center ([White paper in its entirety](#)) under condensing boilers. Some more of what you can learn is below.

RETURN TEMPERATURE:

Most or all commercial condensing boilers rely on a very low return temperature to achieve a very high efficiency. For instance, if your system is running at an average temperature of 160F-180FLoop can be perfect for this. *continued on the web site*

[White paper in its entirety](#)

FLOW AND CONTROL:

Don't get caught up in the 'turndown' game. Most of the time literature will concentrate on maximum performance that happens a minimum of the time. Kind of like the car add that says "LEASE FOR \$129 PER MONTH"... fine print says "\$22,000 down, does not include tax or security deposit". A reasonable turndown is anywhere from..... flow is optimized to achieve about 7' per second. This rate will protect the exchanger from eroding (flow too fast) or liming, blocking, and melting (flow too slow). In other types of condensing boilers the flow may not be

critical to the longevity of the vessel, but will be critical to the operating temperatures. If the boiler provides a 30F delta T at about 200gpm..... *continued on the web site* .

[White paper in its entirety](#)

WARRANTY AND MANUFACTURER:

Warranty is always important but absolutely critical when a product is highly proprietary. For instance, brand "X" may make a wonderful condensing boiler, but if the temperature control system, the flame monitoring system, and the gas train components are proprietary.....*continued on the web site*

... boilers DON'T thermal shock which is why everyone and their brother now advertise thermal shock warranties over 20 years. If they don't, you should probably ask if you should worry about that..... *continued on the web site*

[White paper in its entirety](#)

MAINTENANCE AND SERVICEABILITY:

Ask how the tubes or vessel are repaired.... *continued on the web site*

[White paper in its entirety](#)

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