BOILER FACTS

TOOLS AND TECHNIQUES FOR TECHNICIANS

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Put your heating cap on...

Solving some steam system problems

Even though it is summertime and the air conditioners are still running, it unfortunately won't be long before the temperatures start to drop and your customer's hot water or steam heating system "kicks" on. And that's when the service department's phone starts ringing off the hook with all kinds of complaints. The numbers of potential system problems are far too numerous to list, but I have included a few of the more common problems below...

The old steam boiler needs to be replaced. Whenever you face the opportunity to replace a steam boiler, remember three things:

1. Size the replacement boiler based upon the amount of radiation that is connected to the system. This is very important because unlike hot water heating systems, steam boilers HAVE to produce enough steam to fill all the pipes and radiators in the system to heat every room. The only way to ensure the replacement boiler is big enough is to know how much radiation is connected.

2. Pipe the new boiler correctly. Sounds easy enough, but you would be surprised at the number of problem jobs where the source was created by improper near-boiler piping. New boilers are physically smaller than their older counterparts. With this come smaller steam passageways, smaller steam chests, and usually smaller exit holes. All these changes add up to the potential for "wet steam." The manufacturers, recognizing this, provide very detailed installation instructions detailing HOW to pipe their boiler to prevent problems.

3. SKIM the new boiler. When these boilers are manufactured, there are a lot of oils involved in the casting and machining process. Add in any cutting oils you may use when piping the new steam boiler and you have a potential problem on your hands. Oil creates surface tension on the water line. The steam bubbles, which are manufactured in the lower part of the boiler, have a tough time breaking through this tension. Once they do break through, they can really "rock" the water line, resulting in water being thrown up into the system piping. Prevent this problem by cleaning the new boiler. [Editor's note: see the sidebar on articles related to cleaning steam boilers.]

My new zone valves (either electric or non-electric) are making an incredible banging noise!

1. Ninety-nine percent of the time, when a zone valve makes a "machine gun-like" noise, where the valve appears to be vibrating and banging loud enough to "wake the dead", it is probably installed backwards. The design of most zone valves, generally speaking, is to have the valve stem drive the plunger onto the valve seat while it is "fighting" the direction of the system flow. When they are installed backwards, the direction of the system flow is now the same as the movement of the stem driving the plug onto the valve's seat. Installed this way, the system flow is trying to "help" the valve close and in doing so, causes this vibrating/shimmering effect that is VERY loud. Make sure of the system's true flow direction!

Related articles on cleaning steam boilers:

Mike Rutkowski of Weil-McLain tells you precisely how to clean a steam boiler and keep it clean in his article in the June 2009 issue of ***Oilheating Journal***. In the November 2009 issue, Gene Bartholomew also addresses the issue of dirty boiler water. Both articles are instantly available on ***ICM's*** website: indoorcomfortmarketing.com.

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The pressure relief valve located on the boiler is starting to discharge water onto the floor. Here are a few common causes to look for when this happens...

1. If the system is using a plain steel expansion tank, it may be waterlogged. If this happens, when the boiler fires and heats the water, the expanding water has no place to go, causing the pressure in the boiler to rise rapidly. Thus the relief valve discharges.

2. If the system has a diaphragm-style expansion tank, the tank may have lost its air charge. When that happens, the tank loses its air cushion and as with the steel tank, the heated water expands with no place to go, causing the pressure to build beyond the relief valve's setting.

3. If the boiler has a tankless coil, it may have

developed a pinhole in the coil. Once that happens, the higher-pressure city water enters into the heating system and over-pressurizes the boiler's relief valve setting.

4. The pressure-reducing valve may have sediment built up on its seat, preventing it from closing. When that happens, city make-up water is allowed to enter the system and eventually over-pressurizes the boiler relief valve setting.

5. The boiler's aquastat may be faulty. When this happens, the boiler continues to fire, creating excessive water temperatures and increasing the amount of expansion that takes place when system water is heated. This excessive volume of water exceeds the expansion tank's capabilities and causes the relief valve to discharge.

"Whenever my heating system comes on, it sounds like Niagara Falls in the baseboard!" If a customer complains of hearing this type of noise, the source is almost always air bubbles floating along with the water. Of course, the problem is where did the air come from? Here are a few common sources...

1. If the system's fill pressure is too low, there may not be enough pressure at the high point in the system. A quick check of the pressure-reducing valve's setting will give you the answer. (Remember, the fill valve's setting is determined by the height of the heating system: 1 psig for every 2.3 feet of lift. Whatever it takes to fill the system, add an additional 4 psig to ensure good positive pressure at the high points of the system.)

2. If the system has developed a slow leak and the feeder is bringing in additional water to satisfy the valve pressure setting, the additional make-up water contains tremendous amounts of oxygen. Once heated, the water releases a portion of this oxygen/nitrogen in the form of bubbles which may make their way out to the heating zones.

3. If a circulator is located on the return side of the system and the expansion tank (either diaphragm or plain steel) is on the supply, the circulator will lower the system's fill pressure every time it turns on. This phenomenon has been known for 40+ years and it has to do with the circulator/expansion tank relationship. A circulator creates a pressure differential when it turns on. Whether the differential pressure is added to the system's fill pressure or subtracted depends on whether the circulator is pumping toward the tank or away from the tank.

This is because the tank's pressure can only be changed by a change in water volume in the system. And this change can only occur by changing the system water's temperature or by adding more water to the system through a fill valve. Simply turning a circulator on does not change the water's temperature nor does it change its volume. Therefore it CANNOT change the tank's pressure. By locating circulators on the supply, their pressure differential will ADDED to the system fill pressure and this additional pressure will crush those pesky air bubbles to smithereens!

If you come across a strange heating problem or have a nagging question please call me at 1-800-423-7187 or email me at gcarey@fiainc.com