

False water lines... an old-timer's trick!



by George Carey

I want to share with you a recent problem job I had the chance to visit. It all started when the old boiler finally quit. The replacement boiler was considerably smaller, size wise, and consequently held less water. This created the need to install a boiler feed tank, which acts as a reservoir for the new boiler. This helps prevent the boiler from shutting down due to a low water condition, or flooding the boiler if a feeder is present. This will happen because the automatic feeder becomes overactive due to the lack of water in the replacement boiler. With the boiler feed tank, all the system surges take place in the receiver, allowing the boiler to maintain a steady water line.

This by itself isn't uncommon. But trying to install the new boiler feed unit into these older two-pipe air vent systems can be treacherous and expensive if you are not careful, especially when you consider that the original system was never intended to have a vented receiver attached to it. Of course, there was an economical and logical reason for choosing the two-pipe air vent system found in these older buildings. (You can find these types of systems in old schools, older apartment buildings and even churches.)

Because of their age, these systems were installed when one-pipe steam was the popular method of heating. In fact, steam traps hadn't been invented yet. The heat loss in these large old buildings was great, which called for extremely large radiators. It was also very common to bring in some outside air to ventilate the building. This was accomplished with large indirect radiators that were located inside tin duct-work.

In one-pipe steam systems, the riser, which supplies the steam, also handles the condensate that forms in the radiation. There is a counterflow action that takes place inside those pipes, and because of that, there are loads that certain diameter pipes can handle. If these maximums are exceeded, you'll get spitting radiator vents and water hammer.

Well, the heating engineers were faced with having to use "sewer-like" pipe sizes and supply valves to handle all the condensate that would be formed by these large radiators. The

other option they had was to use a second pipe on the outlet side of the radiator. This pipe would handle the condensate, thus eliminating the counterflow problem. The system could be described as a one-pipe/two-pipe system because each radiator still uses a steam vent. But they had to make sure that the return pipe drained down individually to a wet return. This was important because the water acted like a trap, preventing steam from passing into the return side of the other radiators. Once steam is allowed into the returns, all kinds of problems can occur: condensate being held up in the radiators, spitting radiator vents and water hammer!

When you install a boiler feed unit, all the returns MUST drain into this receiver. The only way water can now enter the boiler is by activating the feed pump with a pump controller located on the boiler. And this receiver is vented to the atmosphere because it can't withstand any pressure. This means that all those former wet returns now have NO backpressure from the boiler to offset the pressure from the supply side. Now the steam can reach down into those former wet returns and shove all that water back and forth in the piping, eventually showing up at the vent pipe, filling the boiler room with steam. Of course, in the process, the water hammer is incredible.

The answer to this problem is to install float & thermostatic (F&T) traps at the base of each riser drip and at the end of each main as well as radiator traps on each radiator. These traps will prevent the steam from entering into the return lines and pouring out of the receiver's vent line.

Unfortunately, sometimes it isn't economically feasible or even possible to install all those traps. The cost of removing the asbestos alone can be excessive, in addition to the material and labor. When faced with these circumstances, a lot of guys will try to get away with installing one "Master" F&T trap right at the inlet to the receiver. They figure this will prevent the steam from showing up at the vent pipe. It might, but it does nothing to prevent the steam from still reaching all the way down into those former wet returns, cre-

ating water hammer and other problems. Remember, the returns are now isolated from the boiler's back pressure because they all drain into the vented receiver.

There is one other way of getting the job to work with the new boiler and boiler feed unit without having to use a box full of traps. It is called creating a "false water line." By creating this "false water line," you can keep the old wet returns pressurized and full of water just the way they were in the original system. This eliminates the need for all the steam traps. There are several methods used to create this false water line. The following is the method I prefer: install a 2" F&T trap and hang it right near the boiler feed unit. You want the trap mounted so that its location closely mimics the water line of the old boiler. The style trap should have two inlet and two outlet tapplings. Combine all the wet returns from the system into one common line.

Pipe this line straight up from the floor into one of the trap's inlet connections. Then run a steam line from the steam main over to the OTHER inlet connection of the F&T trap. This equalizing line puts pressure on the backside of the wet returns, keeping them wet and pressurized. This pressure acts to balance the steam pressure from the supply side.

Now, pipe a line from one of the trap's outlet connections to the feed tank's inlet connection. As the condensate forms in the system, the F&T trap will open to drain this returning condensate back into the receiver. It is important that the new water line be high enough to cover everything that was originally covered by the level of the old boiler's water line. At the same time, if it is established too high, there is a chance the water could flow back into the main, causing water hammer and damage any of the system's main vents.

The next time you are faced with replacing a boiler in an old building and the replacement boiler needs a boiler feed unit, check to see what type of piping arrangement the system uses. Creating a "false water line" may be the solution to that system!

If you have any questions, please call me at 1-800-423-7187 or email me at gcarey@fiainc.com.