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## 6 boiler replacement mistakes

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These situations are commonly overlooked when replacing commercial steam boilers.



Boiler without swing joint.

As we are entering the time that most commercial boiler projects are being planned and installed, I would like to share some common steam boiler oversights that I rarely see mentioned.

### Condensate tank or boiler feed

Most new replacement steam boilers require a boiler feed tank and most old steam boilers used condensate tanks. What is the difference?

A condensate tank is a small tank, usually about 12 to 30 gallons in capacity. The condensate tank will have a pump attached to it. The tank has an internal float that will energize the pump whenever the level rises inside the tank. The condensate pump will feed water into the boiler whether the boiler needs any or not. This was acceptable with the old, large boilers because the water level was not as crucial as it is for the newer ones. If the system required make-up water, water was fed directly into the boiler through a float valve located on the boiler. This cold water could lead to thermal shock as it entered the hot boiler.

A boiler feed unit is typically four to five times larger than a condensate tank. The pump on the boiler feed unit is operated by a control located on the boiler. This will assure the proper water level in the boiler. If the system requires make-up water, it is fed through an internal float on the boiler feed tank. This allows the cold make-up water to be preheated by the condensate, reducing the chances of thermal shock. The elevated condensate temperature also will help drive out some of the entrained oxygen in the feed water, reducing the corrosion inside the system.

If the system was an old vacuum return system or located in an extremely long building, you may have to oversize the tank. The best way to size a boiler feed tank is to measure how long it takes from the time the boiler generates steam to the time it takes for the hot condensate to return. Plan on installing a boiler feed unit on any steam boiler replacement project.



Boiler with swing joint.

## Swing joint

“The gaskets fell out of my steam boiler. Steam was blowing out of everywhere. What would cause that?” someone asked during a recent seminar. I offered a couple options but curiosity got the best of me and I visited the boiler room. As I looked inside the internal steam chamber of the cast-iron boiler, I saw what he was talking about. In between every section of the cast-iron boiler, round elastomer seals were installed to seal the gap between each section. On this boiler, the gaskets were hanging down.

I checked the steam pressure setting, thinking that the steam temperature could have melted the rubber gaskets, but the control was set for 5 lb. I then looked at the boiler piping and the answer came to me. Cast-iron steam boilers require a swing joint and this did not have one.

A swing joint is an extra set of fittings used to compensate for the different expansion rates between the piping and the boiler. On this particular boiler, the steam piping expanded and actually pulled the sections apart. This allowed the gaskets to fall out of place.

## Steam trap inserts

Whenever I am looking to replace a steam boiler, I always recommend replacing or renewing the steam traps. According to SchoolFacilities.com, the life expectancy of the thermostatic elements inside a trap is only three seasons. It goes on to say that the life expectancy of the float mechanism inside the trap is only six seasons. I have found most steam traps are as old as the building.

The study also estimates a savings of \$120 per year, per trap when replacing them. An inexpensive option is to use steam trap inserts. These inserts use the existing steam trap body but the internal components are new.

## High-level spill

A common problem with two or more steam boilers is that the lag boiler will always flood. In some instances, the flooding of the lag boiler will be so much that the boiler will not operate. For example, if the boiler pressure control is set for 2 lb. and the water level above the control is 5 ft., the weight of the water will fool the control into thinking that it has enough pressure.

The American Society of Mechanical Engineers recognized this problem and recommends a high-level spill, which is a float and thermostatic trap installed on each boiler at a level of about 1 in. to 2 in. above the normal water line. If the boiler water level rises to that elevation, the steam trap opens and allows the water to go back to the condensate or boiler feed tank. This assures that the lag boiler will always be ready for operation.

## Chemical treatment

Steam boilers require chemical treatment on a regular basis. A bypass or pot feeder, such as one used for a hydronic system, will not work well for steam systems. For example, if chemicals were added into a pot feeder, only the lead boiler will get the chemical treatment. This is called slug feeding. This could lead to overfeeding of the chemicals and cause bouncing and surging. The lag or unoperating boilers will not get fed.

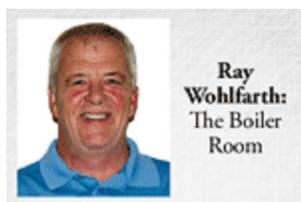
Most chemical treatment companies would prefer proportional feeding. This is accomplished with injection pumps. Each chemical will use a small pump to feed it into the system. Most chemicals will be fed into the boiler feed tank. Some chemicals, such as amines, may require a tapping in the steam pipe. Be sure to check with the chemical treatment manufacturer prior to installing the system.

## Makeup water meter

I have always been told that the best water treatment is a tight system, meaning no leaks. Installation of a water meter on the makeup water pipe will allow the owner to monitor the makeup water for the system. Steam systems will have a small amount of leaks due to vents and the open condensate side of the system.

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