

Bulletin Number: PTB-071519

Date: July 15, 2019
Product: Steam Boilers
From: Quality
Title: Heat Exchanger Failures and Maintaining Steam Boilers

Recently it has come to our attention that steam heat exchangers are being returned to ECR as warranty failures when in fact they are not. We inspect every return and are finding many with multiple section fracturing, damage due to overheating, corrosion above the water line, heat exchangers loaded with scale, LWCO probes fouled, etc. These are all evidence of an improperly maintained boiler, not a manufacturing defect.

To prevent premature corrosion and failure of heat exchangers in a properly installed system, there are two important considerations, water quality and maintenance. Steam boilers differ from their hot water cousins, in that they are open systems. They breathe, in and out. In the process of doing so, they also lose a certain amount of water in the form of vapor. This water needs to be replaced to keep the system operating. The key is to keep this makeup water to a minimum.

Bringing in makeup water creates two issues. The first is oxygen. Oxygen is entrained in the water and when heated in contact with the cast iron heat exchanger, attacks the metal at and above the waterline. All water also has other impurities in it including dissolved minerals, metals, etc. As the makeup water is brought into the boiler so are these additional impurities. As the water steams, these impurities are left behind in the heat exchanger and form a coating on all the internal surfaces, including the LWCO probe. The coating reduces efficiency because the heat exchanger is now "insulated". As the heat exchanger gets more and more insulated the temperature of the heat exchanger keeps rising until it reaches the failure point. If the LWCO probe becomes coated it will fail to function properly. The tip of the probe must be able to sense an electrical signal to work properly.

When replacing a boiler or performing maintenance, inspect and repair or replace any steam traps or other components that can cause accelerated water loss resulting in high makeup rates. Leaks in boiler piping must be repaired at once to prevent excessive makeup water. An excellent option is an Electronic water feeder that can measure and record the amount of water feed.

Steam boilers require regular maintenance (at a minimum yearly). The result of failing to perform this required maintenance is poor performance and drastically shortened heat exchanger life and may result in the denial of warranty coverage.

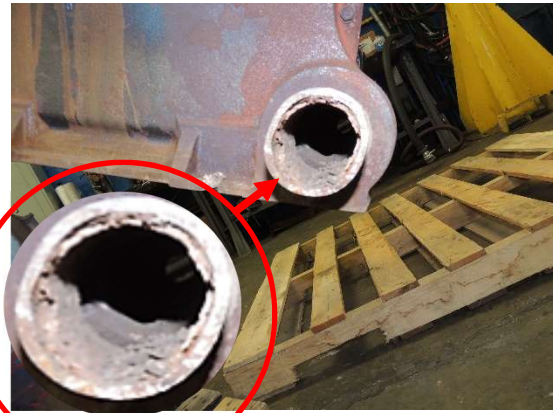
Examples of damage due to neglect can be seen on the following page.



Overheating



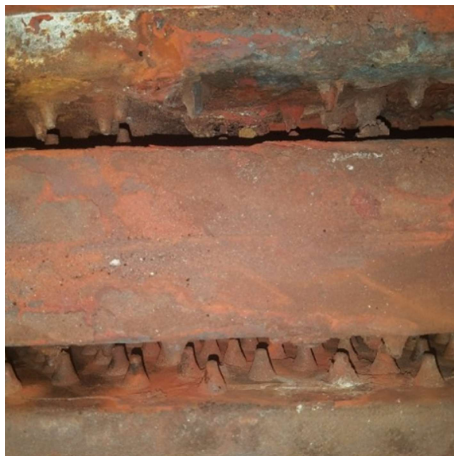
LWCO Probe fouled



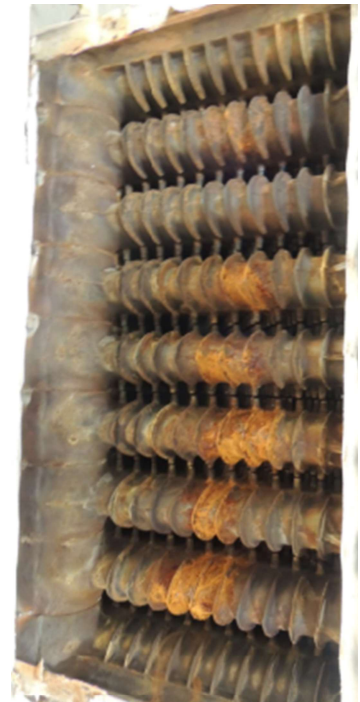
Loaded with scale



Overheating



Corrosion above the waterline



Multiple sections fractured

Failures caused by scale build up are due to neglect and not considered to be manufacturing defects. They are not covered by the warranty.

If you have any questions, please contact your Pennco Regional Manager or Technical Support.