Repairing a Hot Water Radiator

Gord Rabjohn, February 2023

Our house is heated with 100 year old cast iron hot water radiators, the water supplied by a natural gas boiler in the basement. It is a simple 2-pipe hot water (not steam), closed loop system.

In March 2022, the battery in the battery-operated thermostat was weak enough that it was unable to close the relay to call for heat. We were away for a few days, and the weather was cool, so it went unnoticed and the house temperature fell below freezing. When I returned to a cold house, I immediately ran the boiler, and every radiator except one got warm. The one radiator that did not come back to life was in a 2nd floor room above a porch, so the room was exposed to the cold on 5 sides. This exposed room must have cooled faster than the rest of the house. The radiator, and pipes leading to it, clearly froze. I warmed up the room with an electric heater, but it actually took more than 24 hours before the warm water was flowing in the radiator. Clearly, the pipes in the floor (above the porch) had frozen.

To prevent this from happening again, I added a fail-safe thermostat in parallel with the battery operated thermostat. This thermostat uses old bimetallic technology with a mercury switch, and is permanently set to 10C.

Once the room warmed up, it was clear that the radiator was leaking. Not much, but enough that a small puddle formed under it. About 1 – 1.5 tablespoons per day. As time went on, the amount of water leaking out reduced. Of course, the weather was getting warmer, so the time the system was running under pressure was dropping. I thought that it might simply rust itself shut, and it may have. However, I wanted to make sure.

It appeared that JB Weld 2-part epoxy might do the trick. However, I wanted to make sure it had a chance to set without being blown away with water pressure. So, here's what I did that summer (when the boiler was not in use):

-I cleaned the area around the leak. It was just a pin-hole. I roughened the surface with sand paper and a file and cleaned it again with alcohol.

-I attached a hose to the boiler drain spigot, and submerged the hose into a half-full bucket of water. I turned off the valve that supplied fresh water into the system.

-I opened the drain valve. Water from the system drained into the bucket. However, since it is a closed system, there is nowhere for air to get in (other than the tiny pinhole), so negative pressure built up and the flow of water stopped. Only a few litres came out in total. At this point, the water pressure in the basement was exactly atmospheric pressure. The pressure in the 2nd floor radiator was negative because of the weight of the column of water under it.

-I quickly applied the JB Weld epoxy to the area around the pinhole. The negative pressure in the radiator meant that water would not be pushing the epoxy away; in fact it might even suck the JB Weld into the hole. JB Weld is rather viscous, so I doubt that much got in, but who knows.

-I let the epoxy set for several hours, then closed the drain valve.

-I let is set for several days, then brought the system back up to pressure (12 PSI in the basement). I blead the radiators.

-This winter, there has been no sign of water leaking from this radiator, and we have had cold days where the system would be at peak pressure and temperature. So, I think I fixed it.

In conclusion, I think I “dodged a bullet”. There could have been serious damage to the radiator and serious water leakage. I consider myself very lucky. My guess is that this was a weak spot in the radiator casting, and the pressure caused by the ice was enough to cause the leak. The fact that the radiator was on the 2nd floor made pressure control fairly easy, I did not have to drain the system. If your thermostat has a battery, then I urge you to have a redundant thermostat. Or, better still, some sort of alarm to alert you if the furnace fails to come on.

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