TIP SHEET:
October 2010

What You Need to Know About Converting Water to Steam

How many times have you thought about that benign water heater in your basement that provides the heated warmth for bathing, washing dishes, floors, etc. Probably only when it is not functioning, right?

How about a steam boiler? Have you ever thought of what goes on inside of it? You know it's really doing the same thing as a hot water heater -- applying heat to water and raising the temperature. In the case of the water heater, the water does not reach 212° F, so it's not boiling, but it could if the temperature sensor was not functioning properly, and the safety valve on top of the tank was blocked. The temperature would rise above boiling (saturation), and the additional heat applied would then change the water to steam. It is called the Factor of Evaporation.

This is exactly what goes on inside a steam boiler. We start with a pound(s) of water at 50° F and apply heat energy to it, and if we are at sea level, it will boil when it reaches 212° F. It will take 162 Btu's to raise one (1) pound of water to that temperature. This is called adding sensible heat to the liquid and it is based on the scientific principle of "one pound of water, one Btu and one degree rise." Once reaching the boiling point (212° F), additional Btu's from the burner will go into the fluid as latent energy, thereby changing the state of the fluid to a gas (steam) while maintaining the temperature corresponding to the pressure within the vessel itself. As the pressure increases, so does the boiling point and associated temperature. So what does this all mean to me? Why is it relevant?

Take into consideration that pound of water, assuming there are 8.3 pounds per gallon. When it reaches 212° F, it occupies a volume of 0.017 cubic feet per pound. Then, when additional heat is applied (latent energy), the liquid begins to change its state and become a gas (steam), but at the same time, the volume significantly changes too.

That pound of water, which was at 0.017 cubic feet of volume upon its changing state, expands to 27 cubic feet or 1600 times! And, it is this combined force of pressure and expansion, which if not properly contained, can cause devastating results to property and human life. Consider this -- fighter planes are launched from aircraft carriers using steam catapults. When fully armed and fueled, the fighters weigh approximately 60,000 pounds. When launched by the catapult, the fighter jet travels from 0 to 165 mph in two seconds. That's the power of steam.

It is why people in the water heating business go to extremes to build boilers and water heaters incorporating the highest safety standards possible. It is why boiler manufacturers strictly comply with the ASME Code and UL standards, assuring our customers that their safety and well being is paramount.

It is why we need to be aware that a pound of water being heated can be more than a warm shower. It can be a motive force, which if not properly contained, can be catastrophic.

The Cleaver-Brooks LevelMaster low water cut-off and pump control uses magnostrictive technology with a solid state sensor and microprocessor based controller.

The reliability and dependability makes this the safest controller on the market preventing the number one principle cause for a boiler occurance.

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