



Condensation of Gas Water Heaters

A large percentage of the gas fired water heaters returned under warranty leaking do not leak on hydrostatic testing. What fools many homeowners and servicemen? Condensation. Condensation is the result of the reduction of temperature by the removal of latent heat of evaporation. The liquid product being produced is known as condensate. The removal of heat shrinks the volume of the vapor and the loss of energy will lead to the transformation of the gas into a liquid condensate.

We have all seen the condensate that forms on a glass of ice water on a hot humid day. Similar to when the first tank of cold water is heated, the same condensation can develop when a water heater is undersized or overdrawn. The thermostat brings on the main burner to heat the cold water that has entered the tank. If the water heater is large enough, the water temperature in the tank will not drop to the point where it cools the flue gasses to the point of condensation.

Interestingly, the majority of 'nonleaker' returns are found to have been replaced during the winter and early spring months when incoming water temperatures are at their lowest. Cold water inlet temperatures can vary in excess of 30° F between seasons.

While attempting to verify a suspected leaking water heater, first take a good look at all the fittings and attachments to the tank. Check for the tell tale signs of evaporated water around the fittings and outer jacket of the heater. Also, check the pattern of the water that has pooled into the drain pan. Normal condensation will accumulate and then evaporate. A leaking tank will always leak leaving larger accumulations of water with little time to evaporate.

Water vapor is one of the chief by-products of the combustion of gas. A gas water heater burning 50,000 BTU per hour produces almost five pounds of water vapor in one hour of continuous heating. If allowed to cool and condense fully, the five pounds of water vapor would form more than two quarts of water. Good venting is essential to the operation of a gas water heater. Venting carries away the products of combustion that could contaminate the air in a home and carries away the water vapor. A water heater must be of sufficient size to meet the homeowners demands for hot water. Homeowners will over draw an undersized water heater to the extent that the tank is constantly heating and cooling. Recall our glass of ice water? The same thing happens on the outside of the heater tank. The condensation rolls down the side of the tank and collects in the drain pan. Looks like a leaker, but is really condensation.

While all water heaters have some degree of condensation, excessive moisture on the outside of the tank can cause pilot outage and premature tank failure. Pilot outage can occur due to the condensate running down the inside of the flue tube onto the main burner and extinguishing the pilot flame. Premature exterior corrosion of the water heater tank, corrosion of the inside of the flue tubes and rusting on the main burner assembly are some of the problems caused by excessive condensation.