THERMAL EXPANSION

What is thermal expansion? When water is heated it expands. For example, water heated from 90°F to a thermostat setting of 140°F in a 40 gallon hot water heater will expand by almost one half gallon. This is because when water is heated, its density decreases and its volume expands. Since water in not compressible, the extra volume created by expansion must go someplace. During no hot water usage periods in the home, pressure reducing valves, backflow preventer, and other one-way valves are closed, thus eliminating a path for expanded water to flow back to the water mains. Hence, system pressure increases.

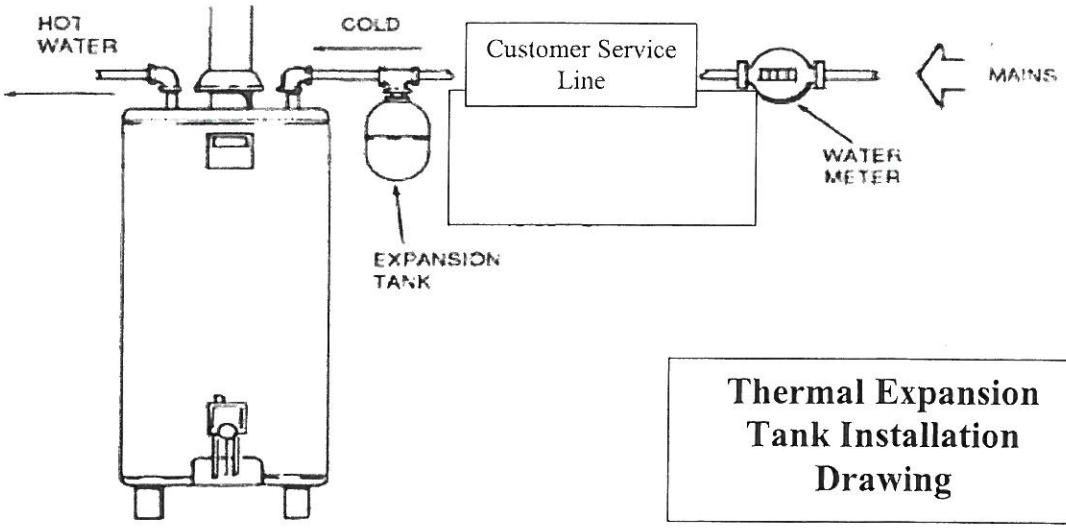
Our system has check valves at the water meter to prevent any possible contamination of our water supply by the accidental back-flow of contaminated water into the supply mains. In the days before check valves, the expanded water in a hot water tank had a place to go...back into our main where it was easily accommodated. Now that this expanded water has nowhere to go, the pressure builds up in the hot water tank. What customers and possibly some plumbers don't realize is that long before the relief valve pops, dangerous pressures are continually being exerted on the water heater, fittings, fixtures, appliances, and the piping system on a regular basis.....2 or 3 times a day.

What is a pop off valve (Pressure Relief Valve) on a hot water tank used for? This valve relieves the pressure in the hot water tank. Heated water generates pressure. This valve relieves the pressure before the hot water tank explodes.

During times when hot water is not in use, the hot water tank is still keeping that water hot. The hot water is expanding and if it doesn't have anywhere to go, it will build up pressure. This pressure, after a time, could cause the pressure relief valve to weaken and "pop" or start leaking. (This expanded water has to go somewhere)

The best solution to thermal expansion is to control the pressure. This can be done by installing an expansion tank. This allows somewhere for the expanding water to go and not cause an increase in pressure. The expansion tank contains a sealed-in compressible air cushion which will compress as thermal expansion occurs, providing a space to hold and store the additional expanded water. When hot water is used, the pressurized air cushion forces hot water back into the system for use.

The thermal expansion tank is a low-cost, simple-to-install control that provides a solution to thermal expansion problems. Thermal expansion tanks can be found at hardware stores and home improvement stores.



Thermal Expansion Tank Installation Drawing

Note: Water in a closed tank at 50 psi, when heated just 10 degrees, will reach a pressure of 250 psi.
*Info obtained from WVDHHR, Bulletin 45, and Dennis M. Streit, Residential Plumber