

Thermal Expansion Basics

When water is heated, it expands. We might not think this scientific fact would have much of an effect on our daily lives, but it can have a big effect on our water heater, which is a big part of our daily lives.

Water from your rural water service provider generally enters your home at a temperature range of 35°-55° degrees depending on the source of the water and the time of year. As water is drawn into your water heater, it is heated to a temperature range of 120°-140°. This increase in temperature can cause water expansion. This is because when water is heated, its density decreases and its volume expands (see attached graphic). Since water is not compressible, the extra volume created by the expansion must go somewhere.

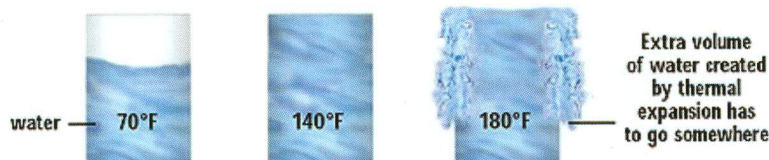
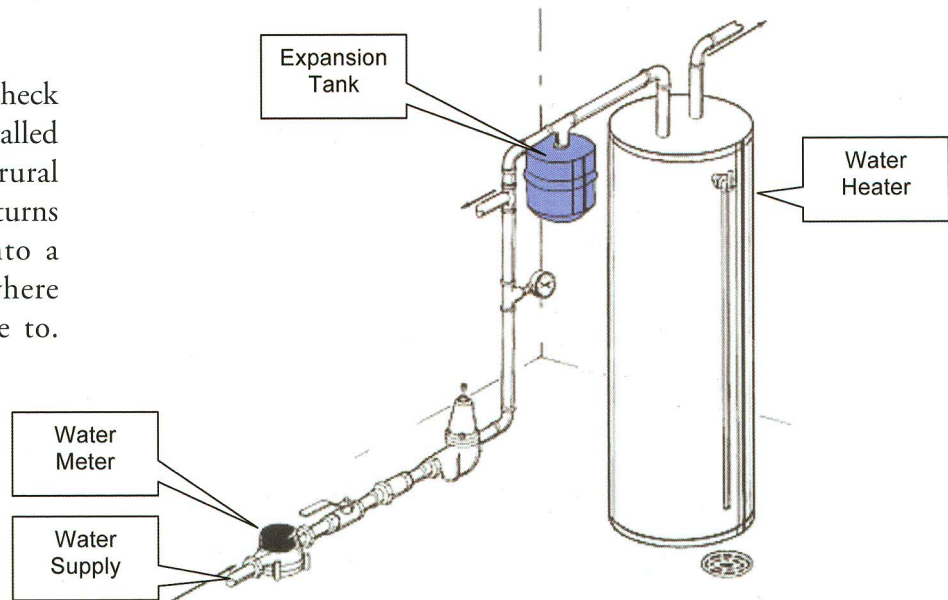
All rural water services have a check valve or backflow preventer installed to prevent backflow into the rural water system. This device also turns your household plumbing into a "closed" system and limits where thermal expansion can escape to.

Thermal expansion in a closed plumbing system can create a number of annoying and potentially dangerous problems. These include: the build-up of unusually high pressure in a system; pressure surges; and the continuous dripping of a temperature and pressure (T&P) relief valve. In addition, dripping faucets and leaking toilet fill valves are also symptoms of thermal expansion. More serious problems can happen such as failure of internal flues, fittings or water connections.

A thermal expansion tank can be the ideal solution to thermal expansion issues. An expansion tank is a small

steel vessel with a rubber diaphragm inside. As the temperature and pressure reaches its maximum, the diaphragm flexes against an air cushion to allow for increased water expansion. When the plumbing system is opened or water in the system cools, the water leaves the tank and returns to the system. The attached graphic shows a common expansion tank installation.

Expansion tanks are required by the SD State Plumbing Code for new construction and during any major revision to an existing water system. They should be installed by a licensed plumber.



Graphics courtesy Watts Regulator Company®