# Frequently Asked Questions

**What is Thermal Expansion?**
Thermal expansion refers to the characteristic of water to expand when heated. Unlike air, which can be compressed, water grows in volume and must be accommodated.

**How do I Deal with the Thermal Expansion Problem?**
Thermal expansion can be solved by installing an expansion tank or valve to your system near your water heater. The tank or valve will alleviate the pressure building in the heating tank. The expansion tank is inexpensive and requires no drains in addition to conserving water. Expansion valves are another option but require more complex plumbing solutions for draining water.

**Isn't a Temperature and Pressure Relief (T&P) Valve Enough to Deal with Thermal Expansion?**
No. A T&P valve is not a thermal expansion device because the constant dripping of water from the valve can result in a mineral deposit that can create a blockage, causing the T&P valve to become ineffective. Plumbing codes require thermal expansion be properly addressed.

*Thermal Expansion Tank*


*Thermal Expansion Valve*

**Still not convinced that you may need a thermal expansion device?**
Go to your favorite web browser and put in "thermal expansion," there are plenty of videos of exploding water heaters.

City of Santa Rosa WATER

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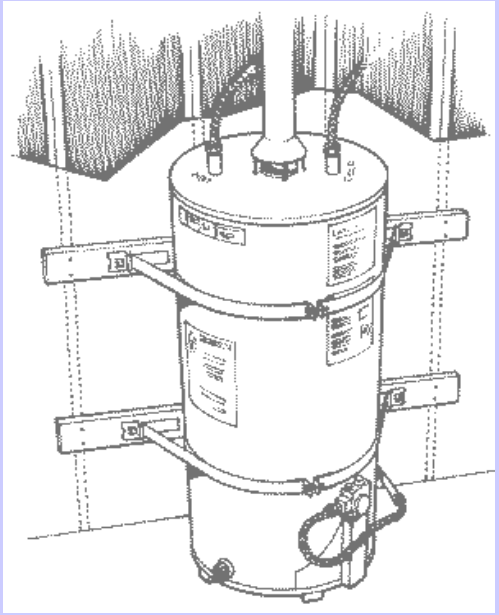
City of Santa Rosa WATER

# Thermal Expansion

## *Cause for Concern?*



**Typical gas water heater with earthquake straps.**

# Thermal Expansion Can Cause Hot Water Heaters to Explode!

## Thermal Expansion Danger

Most homes are supplied with hot water from a natural gas or electric heated tank type water heater. Usually water heaters are taken for granted until they quit operating and a cold shower alerts you to a problem. Unfortunately, a water heater that is not maintained can become a safety hazard.

Water expands as the temperature rises. The extra volume caused by thermal expansion usually expands into the cold water line in an open system. If you have a pressure reducing valve or a backflow device, your household water system may become a "closed" system. A closed system just means there is no place for the hot water to expand.

The thermostat of the water heater normally maintains the water temperature at about 130° F (54° C). However, if the thermostat fails to shut off the heater, the temperature of the water will continue to increase.

If the water temperature increases to more than 212° F (100° C), the water within the tank becomes "superheated." When this superheated water is suddenly exposed to the atmosphere when a faucet is opened, it instantly flashes into steam and a violent reaction may result. In fact, the tank may explode!

## Open System

A typical hot water heater in an "open" system has only a temperature and pressure (T&P) valve to prevent a rupture of the hot water heater (figure A). Open systems allow expanding hot water to push into the cold water line.

## Closed System

Once a private water system in a typical home has a pressure reducing valve or backflow device installed, it becomes a "closed" system and needs a thermal expansion device. The most common thermal expansion device is an expansion tank (figure B). The tank is partially filled with air which is compressible. This compressibility allows the expanding hot water a place to go. These expansion tanks can be orientated in any direction and are placed on the cold water line.

## Different Types of Thermal Expansion Devices

In addition to thermal expansion tanks, there are tankless thermal expansion devices available. These valves relieve the expanding water pressure by discharging the water to atmosphere (figure C). Since a drain line is required on the thermal expansion valve, it needs to be plumbed to a drain line with an air gap for safe disposal.

*Figure A*

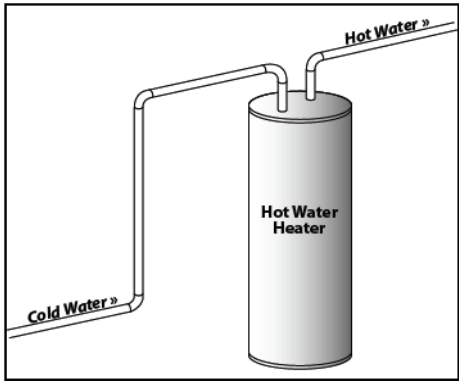



*Figure B*

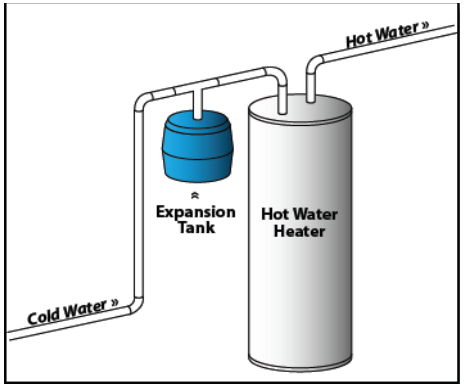



*Figure C*