

THERMAL EXPANSION

Most homes are supplied with hot water from an electric or gas heated tank. Until the heating element stops working, and one is faced with a cold shower, the water heater is usually taken for granted. However, if not properly maintained, a water heater may become a safety hazard.

Water expands in volume as it's temperature rises. The extra volume caused by thermal expansion must go somewhere. If not, the heated water creates an increase in pressure. This is the principle of a steam engine.

The temperature and pressure in the water heater is reduced when hot water is withdrawn from a faucet and cold water enters the tank. The increase in pressure from thermal expansion can also be reduced by water flowing back into the public water system. However, when a check valve, pressure-reducing valve or backflow preventer is installed in the service pipe, a "closed system" is created. Provisions must be made for thermal expansion in these cases.

The thermostat of the water heater normally maintains the water temperature at about 130 F. 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, the water within the tank becomes "super heated". When this "super heated" water is suddenly exposed to the atmosphere when a faucet is opened, it instantly turns to steam. As the pressure within the tank continues to build up under super heated conditions, the tank may explode.

Protection from thermal expansion is provided in a plumbing system by the installation of a thermal expansion tank and a Temperature and Pressure Relief Valve (T & P Valve) at the top of the tank.

The thermal expansion tank controls the increased pressure generated within the normal operating temperature range of the water heater. The small tank with a sealed compressible air cushion provides a space to store and hold the additional expanded water volume.

The T & P Valve is the primary safety feature for the water heater. The temperature portion of the T & P Valve is designed to open and vent water to the atmosphere whenever the water temperature within the tank reaches approximately 210 F. Venting allows cold water to enter the tank.

The pressure portion of a T & P Valve is designed to open and vent to the atmosphere whenever water pressure within the tank exceeds the pressure setting on the valve. The T & P Valve is normally pre-set at 125psi or 150 psi.

Water heaters installed in compliance with the current plumbing code will have the required T & P Valve and thermal expansion tank. For public health protection, the water purveyor may require the installation of a check valve or backflow preventer downstream of the water meter. In these situations, it is essential that a T & P Valve and thermal expansion tank be properly installed and maintained in the plumbing system.

The T & P Valve should be periodically inspected to ensure it is properly operating.