

## Thermal Expansion and Your Water Heater

**Bradford White  
Explains What it is and  
How to Protect Yourself and  
Your Family From it.**



  
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Ask your representative for more details  
about the benefits of expansion tanks



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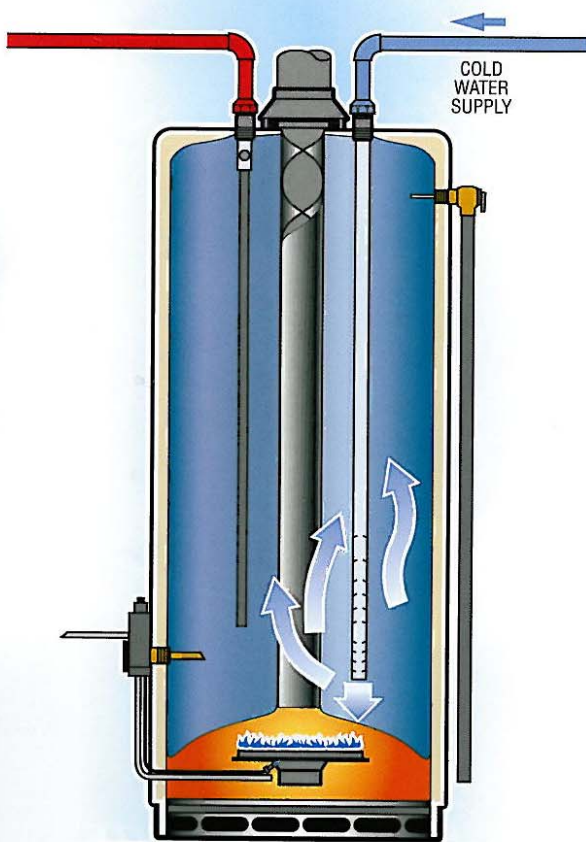
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### **WHAT IS THERMAL EXPANSION?**

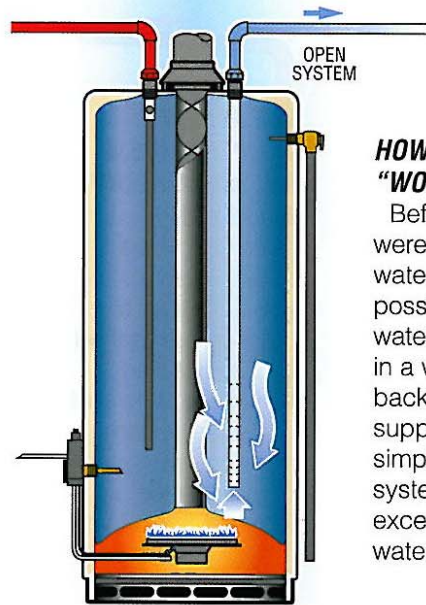
Thermal expansion is the term used to describe the circumstance of water expanding in volume as it is heated.

### **THERMAL EXPANSION IN A WATER HEATER**

All water heaters, regardless of heat source (gas, oil, electric, solar or indirect), can suffer the effects of thermal expansion. In every tank-type water heater, cold water is heated as it enters the water heater tank. This increases the overall water volume and pressure inside the tank. For safety, the increase in volume and pressure must be relieved in some way.

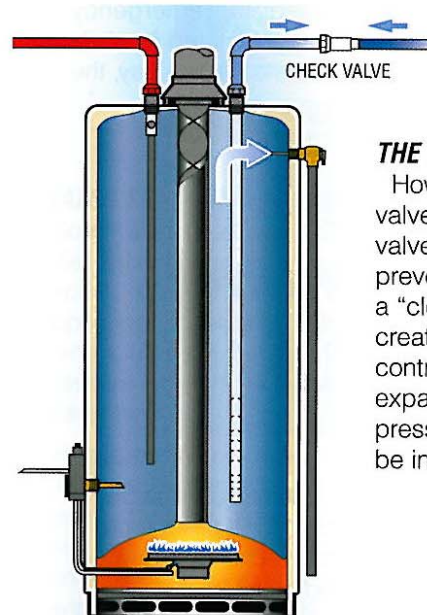


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### **HOW IT "WORKED BEFORE"**

Before major controls were placed upon city water supplies, it was possible for excess water pressure build-up in a water heater to flow back into the city water supply. This created a simple and efficient system for removing excess pressure in water heaters.

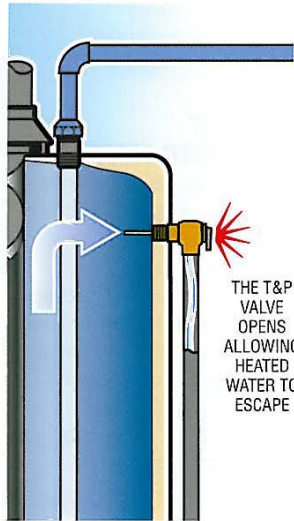


### **THE CLOSED SYSTEM**

However when a check valve, pressure reducing valve or backflow preventer is installed, a "closed system" is created. A method of controlling thermal expansion and relieving pressure build-up must be installed.

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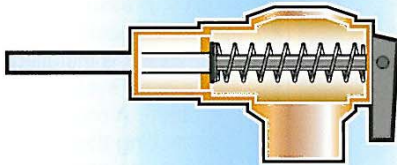
### **THE SAFETY TEMPERATURE & PRESSURE RELIEF VALVE (T&P)**

The T&P valve opens when a sufficient level of pressure is reached. This allows the heated water to spill out of the system relieving the pressure and lowering the volume

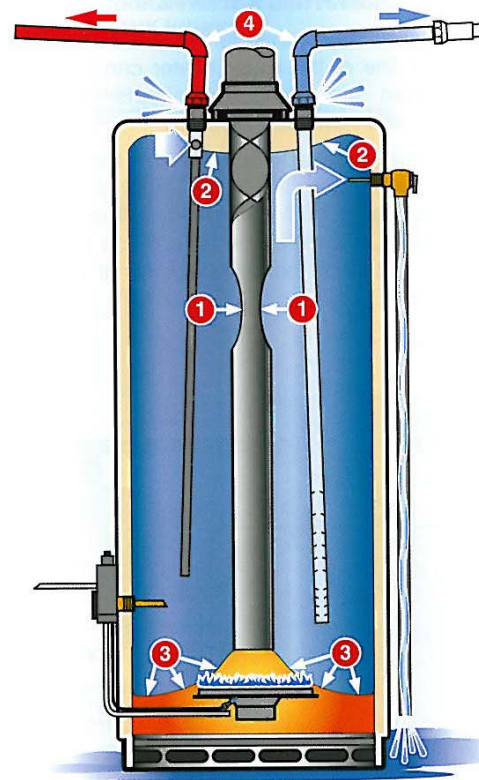
THE T&P VALVE OPENS ALLOWING HEATED WATER TO ESCAPE

### **THE T&P VALVE**

The T&P valve is designed for emergency situations. Its parts are not manufactured for daily use. Even if the valve only opens once a day, the valve can wear quickly.



A worn out valve could activate unexpectedly, releasing hot water unnecessarily. If this happens, the efficiency of the system is reduced. The water heater will waste energy and money.



### **WATER SYSTEMS UNDER PRESSURE**

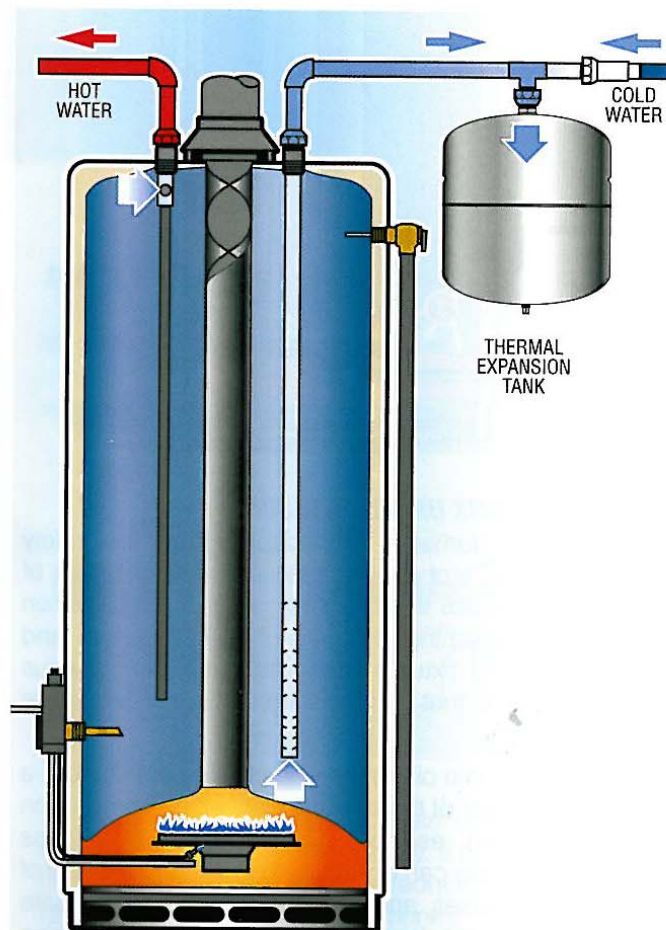
Sometimes, damage can occur before the safety relief valve has a chance to relieve the water heater of excess pressure. Fast acting solenoid valves on appliances (washing machines, dish washers) and some plumbing fixtures can create an instantaneous pressure spike that exceeds the rating of the water heater tank.

In gas and some oil-powered water heaters, there is a flue in the center of the tank through which combustion gases (fumes) escape. Under constant excess pressure, the flue can collapse (1) restricting the flow of combustion gases and possible resulting in unsafe carbon monoxide levels. Excess pressure can also distort the tank head (2), the tank base (3), and the hot and cold water lines (4).

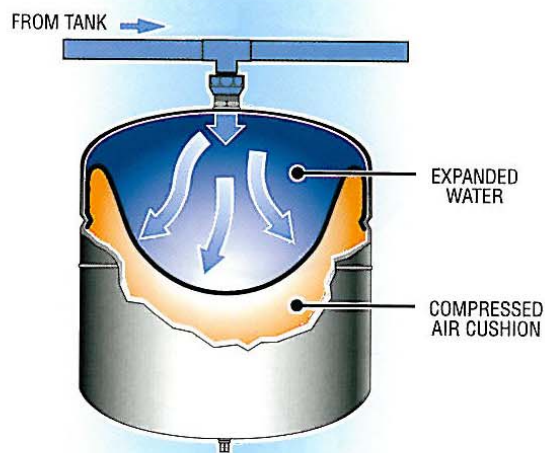
## PROTECTION FROM THERMAL EXPANSION

The installation of a thermal expansion tank in the cold water line of the water heater can protect the system from the damaging effects of thermal expansion and increased pressure.

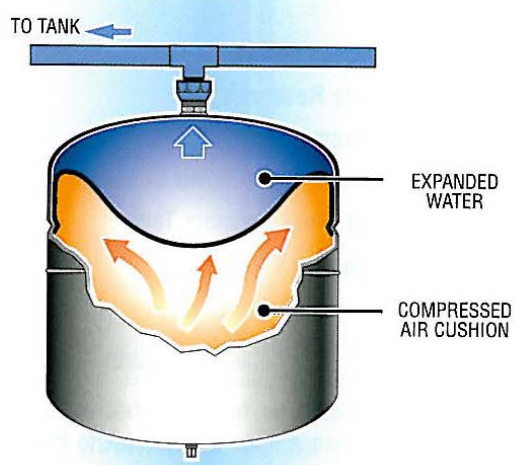
The thermal expansion tank controls the increased pressure generated within the normal operating temperature range of the water heater. The small tank with a sealed, compressible air cushion provides a space to store and hold the additional expanded water volume.



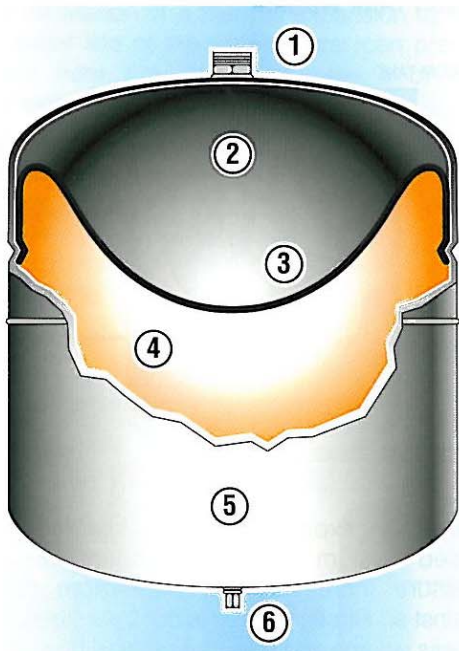
## EXPANSION TANKS - HOW A DIAPHRAGM EXPANSION TANK WORKS



When an expansion tank is installed in a closed system and the temperature and pressure increases, the diaphragm flexes against an air cushion (air is compressible). The excess volume and pressure created by thermal expansion enters the pre-pressurized tank.



When hot water is drawn from the tank or the water cools, the water leaves the expansion tank and returns to the water heater tank.



- 1. Connection Fitting**
- 2. Separate Reservoir**
- 3. Diaphragm**
- 4. Air Charge Chamber/Air Cushion Area**
- 5. Welded Steel Pressure Tank**
- 6. Air Charging Valve**

Thermal expansion tanks feature a diaphragm that seals in the air cushion and separates air from the hot water. The tank also has a liner that protects the tank from damage that can be caused by the corrosive effects of hot water.

Installing a properly-sized and charged thermal expansion tank in a water heating system is the recommended way to eliminate the problems associated with increased volume and pressure in a closed or restricted plumbing system. Consult the thermal expansion tank instructions for proper installation.



*For more information, please contact your local Bradford White representative or visit [www.bradfordwhite.com](http://www.bradfordwhite.com) to find a professional installer in your area.*



### QUICK REFERENCE SIZING CHART

Sizing chart based on:

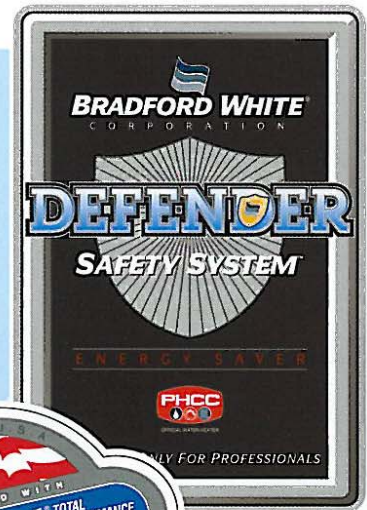
- 40°F incoming water temperature.
- 140°F maximum temperature setting.
- 150psi T&P valve.

Water Heater Gallons	Supply Pressure (PSI)					
	30	40	50	60	70	80
	Expansion Tank Volume (Gallons)					
20	2.0	2.0	2.0	2.0	2.0	2.0
30	2.0	2.0	2.0	2.0	2.0	2.0
40	2.0	2.0	2.0	2.0	2.0	2.0
50	2.0	2.0	2.0	2.0	2.0	2.0
65	2.0	2.0	2.0	2.0	3.2	3.2
75	3.2	3.2	3.2	3.2	4.4	4.4
80	3.2	3.2	3.2	3.2	4.4	4.4
120	4.4	4.4	4.4	4.4	4.4	10.3



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