

Training Update September 2020

Under pressure

No doubt everybody reading this will be familiar with Temperature & Pressure Relief valves but it might pay to do a little revision.

Mains pressure storage water heaters need various devices on them to ensure that they operate safely, here is a short list:

Event	Risk	safety device
Normal thermal expansion	loss of heated water	Cold water expansion valve
Cylinder over-pressured	Cylinder bursting	Cold water expansion & TPR valves
Electric thermostat fails	Cylinder contents become hot	Bimetal thermal overload
Thermostat & bimetal thermal overload fail	Cylinder contents become dangerously hot	TPR valve



Increasing severity



The TPR valve is located at the top of the hot water cylinder (the hottest location). As anybody would know from the name, it relieves independently on **P**ressure & **T**emperature. For temperature relief, the probe expands between 93 & 99° C, pushing the valve open and allowing over temperature water to run to the drain. The incoming cold water continues pushing the hot water out until the probe temperature drops to somewhere around 70° C. This means that almost the complete contents of the cylinder go down the drain but there is no safety risk.



This sounds inconvenient, surely it is O.K. just to let the cylinder boil – after all, it was common in the days of low pressure wetback heaters to hear the water boiling in the cylinder? The danger is because of mains pressure, the cylinder is typically running at 700 kPa (the cold water expansion valve pressure). This is 7 times the pressure in a typical pressure cooker!

If the water was heated in an uncontrolled way and the TPR valve was not fitted, the contents of the cylinder would reach 170°C. When a tap was opened, the water under pressure will flash into live steam as the pressure dropped which is extraordinarily dangerous.

Boiling point of water increases with pressure

Gauge Pressure (kPa)	Temp (deg C)
0	100
100	120.42
200	133.69
300	143.75
400	151.96
500	158.92
600	165.04
700	170.5
800	175.4
900	180

Final word

So the simple **TPR** valve is a great protection device, keeping users safe, don't do what this muggins did and cap off the TPR outlet because it was dripping!

