

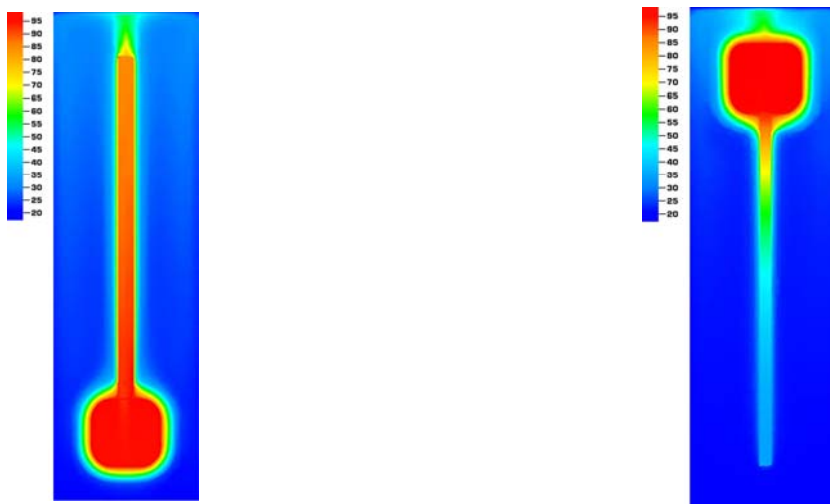
Reftele, Sweden, May 30, 2012

Have we forgotten to make heat traps?

The use of heat traps by suitable piping to stop the natural circulation is a former well-known knowledge, but seems to have been forgotten in many of today's installations. This is often confirmed when we follow up different installations in the field. Natural circulation leads to additional heat loss, but also to components being unnecessarily exposed to high temperatures for a long time which could lead to shorter life expectancy for the product. A heat-trap is a smart thing to make, even though it takes a little longer installation time when you make it, in the long run it saves you time and hazzel.

Thermal lift forces occurs in a liquid with differences in temperature

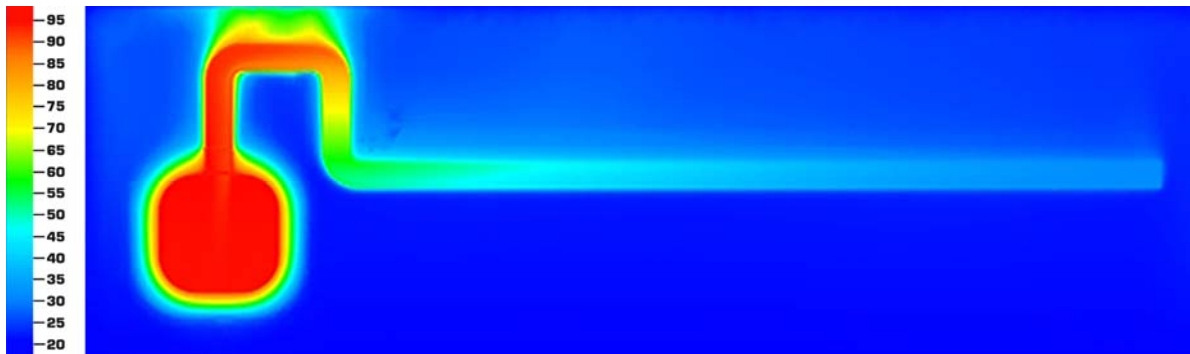
Heat spreading in a pipe which is filled with water and which is connected to a hot water tank will be completely different depending on whether the pipe is directed upwards or downwards. You can clearly see in the left figure how powerful the heat spread is upward as the thermal conductivity and thermal lift forces interact. You have to move far from the heat source before the temperature starts to decline. The right figure, where the pipe is directed downwards, the thermal conductivity is still acting along the pipe, but the thermal lifting forces act in the opposite direction. The result is that the temperature declines rapidly along the pipe. This is the basics behind a heat trap or thermal barrier.



Heat traps

Heat traps by bending the hot pipes downwards

By understanding how the hot water does not want to fall down, you can prevent heat distribution along a hot pipe by providing a thermal barrier. By bending the hot pipe downwards at least 20 cm, you will stop the self-circulation. Note that up to the downward bend of the thermal barrier, the temperature does not decrease significantly. Only in the vertical part of the pipe, the temperature begins to fall. After the heat trap, the natural circulation ceases and the temperature is spread here only by thermal conduction of water and copper pipes.



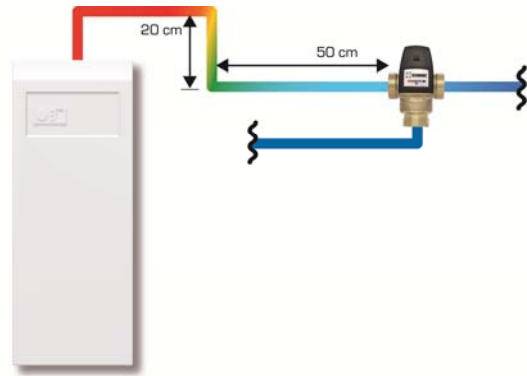
Heat barrier by installing check valves.

In installations where the bending of pipes is not possible, you can also use non return valves to slow down the natural circulation caused by thermal forces. This will lead to somewhat increased flow resistance in the circuit.

Application examples where heat traps should be used:

Thermostatic mixing valve for hot water on top of the boiler or storage tank.

We often see that the thermostatic mixing valve for hot water has been mounted very close on top of the boiler or tank. In this position the mixing valve is subjected to high temperatures. This is not a problem when water is running through the system and the valve can cool down to the preset temperature. However, when no tapping is done the cold water is not available for cooling and subsequently the valve is exposed to high temperature for long periods of time. A consequence, the wax element, which serves as an engine of the valve, will for a long time be put under unnecessary tough conditions, causing the valve to age more quickly than is necessary. A good solution is to stop the self-circulation by means of a simple heat trap. This allows the valve to cool down most of the day when no water is tapped. The distance between heat trap and valve should be long enough for the temperature in the pipe to get lower than the valves preset mix temperature at times when no water is tapped. Recommended distance from the down bend and to the valve is at least 50 cm.



Heat trap, correctly installed. This gives the valve an opportunity to cool down when it's not in duty between occasions when hot water is tapped.

A second application example where heat traps should be used

Load unit between a boiler and an accumulator tank.

The pipe work between a boiler and an accumulator tank should have a heat trap to secure that the hot water from the accumulator tank doesn't circulate backwards into the boiler when the fire has died down and the boiler has cooled down. A good way to make the heat trap is by elevating the pipes slowly from the boiler to the higher positioned accumulator tank. We recommend that an air venter is mounted at the highest point. It is especially important with a heat trap when the heat source is placed on a higher level than the accumulator tank which often is the case with water-jacketed stoves.

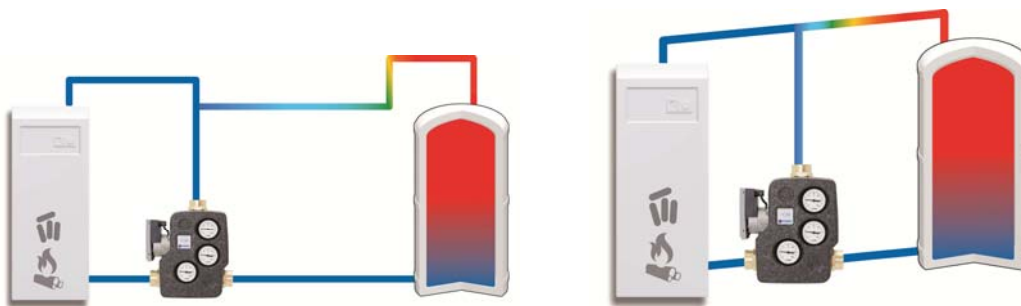


Fig. 8-9. Installations with load unit between boiler and accumulator tank. Both examples with heat trap.

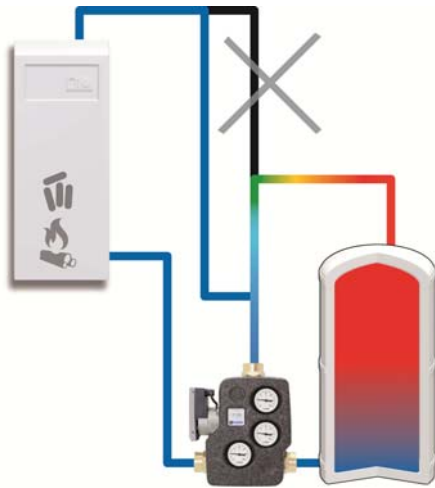


Fig. 10. It is important with a heat trap when the heat source is placed on a higher level than the accumulator tank.

The ESBE factory and headquarter is located in Reftele, Sweden. The company is growing and at the moment there are 220 employees and sales of 40 MEuro. ESBE is represented in more than 20 countries and is a market leader in the Solar, Heat pump and Solid fuel area. Working closely with important players in the OEM business gives ESBE the advantage to quickly acknowledge trends and constantly providing cutting edge products.