



The advantages of closed heating systems

White paper



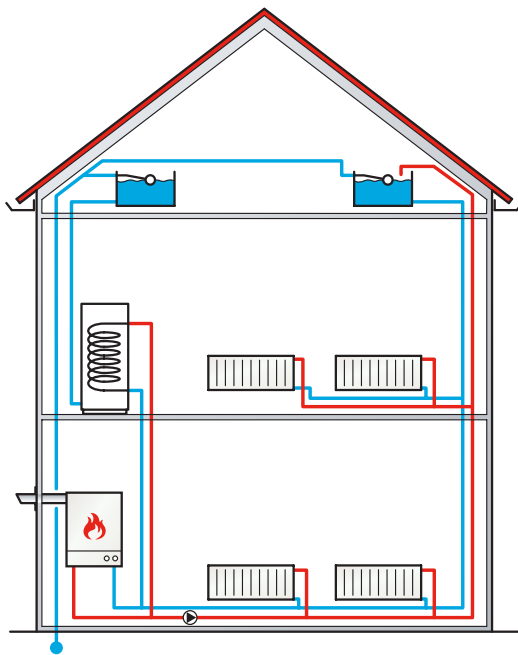
Closed versus open Heating Systems

Heating and cooling installation use water for the energy transfer because it's the most cost effective medium and most readily available, stable resource. Water expands when is heated, and contracts (volume reduces) when cooled. To accommodate expansion and contraction storage is required. In general there are two types of system for accommodating thermal expansion, Sealed systems (Closed) and Open vented systems.

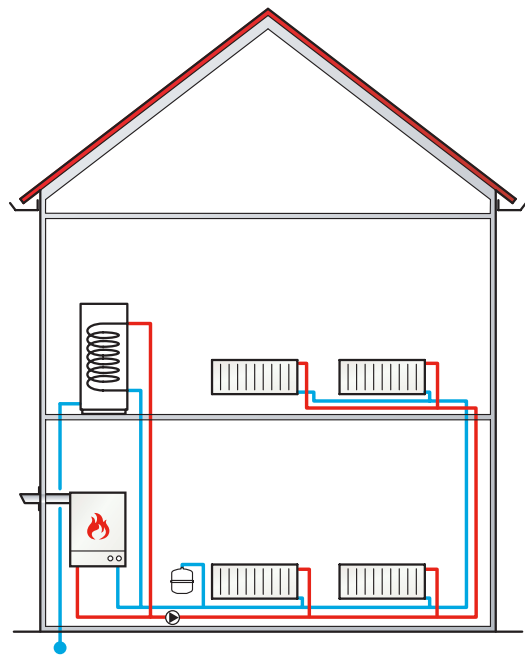
- In an open vented system an open tank at the highest point of the installation is used to store the expanded fluid (figure 1.1).
- In a closed system (pressurised/sealed) an expansion vessel is used to store the expanded fluid (figure 1.2).

In this white paper we will discuss closed heating systems using the following topics :

- Advantages of a closed heating system,
- Air in a closed heating system,
- Removing air from a closed heating system.



1.1



1.2



Advantages of a closed system

A closed system is a sealed system where limiting factors of open vented systems are removed. This creates the following advantages:

- Total installation time is reduced.
- No water loss in the system due to evaporation.
- Leaks directly affect the system pressure and are more readily identified.
- Reduced risk of freezing due to no exposed pipework above the insulation layer.
- Flexible installation options, removing the need for high level expansion tanks.
- Using circulation pumps with a larger pump head is no problem, this makes it possible to use smaller diameters of pipework.
- The overpressure prevents boiling sounds in the system at higher temperatures.
- Air is prevented from being reintroduced to the water, reducing corrosion and improving thermal efficiency.

A closed heating system does not need a high level header tank outside the insulation layer. This has the following advantages;

- The safety- and expansion line to the highest point in the system, as well as the overflow line are becoming redundant.
- No ball (float) valve in header tank which can seize shut.

Air in a closed heating systems

Air in sealed systems should be removed at all times because air leads to:

- Reduced energy usage, up to 8% saving on pump power alone.
- Inefficient water circulation.
- Cavitation and erosion: damaged components.
- Irritating noises (bubbling, hissing, vibration).

Gasses result in dirt through corrosion and erosion, causing:

- Breakdown of steel parts.
- Unwanted vibrations in moving parts.
- Clotting of pipes (higher flow rates, pump efficiency).



Although significantly less than in open systems, gasses are present in closed systems. How do gasses appear in a heating/cooling system?

Gasses appear in multiple forms in the system:

1. Free gasses

2. Bubbles transported by the system flow



3. Micro bubbles are dissolved in water



Removing air from a closed heating system

To remove air from a system a multitude of products can be used. The most efficient and most well known are air separators and pressure step degassers.

The air separator removes free gasses and micro bubbles. The pressure step degasser removes free gasses, micro bubbles and gasses that are dissolved in water.

Type	Air separators	Pressure Step Degasser
		
Removes	Free gasses, Micro bubbles > 15µm	Free gasses, Micro bubbles, Gasses dissolved in water



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