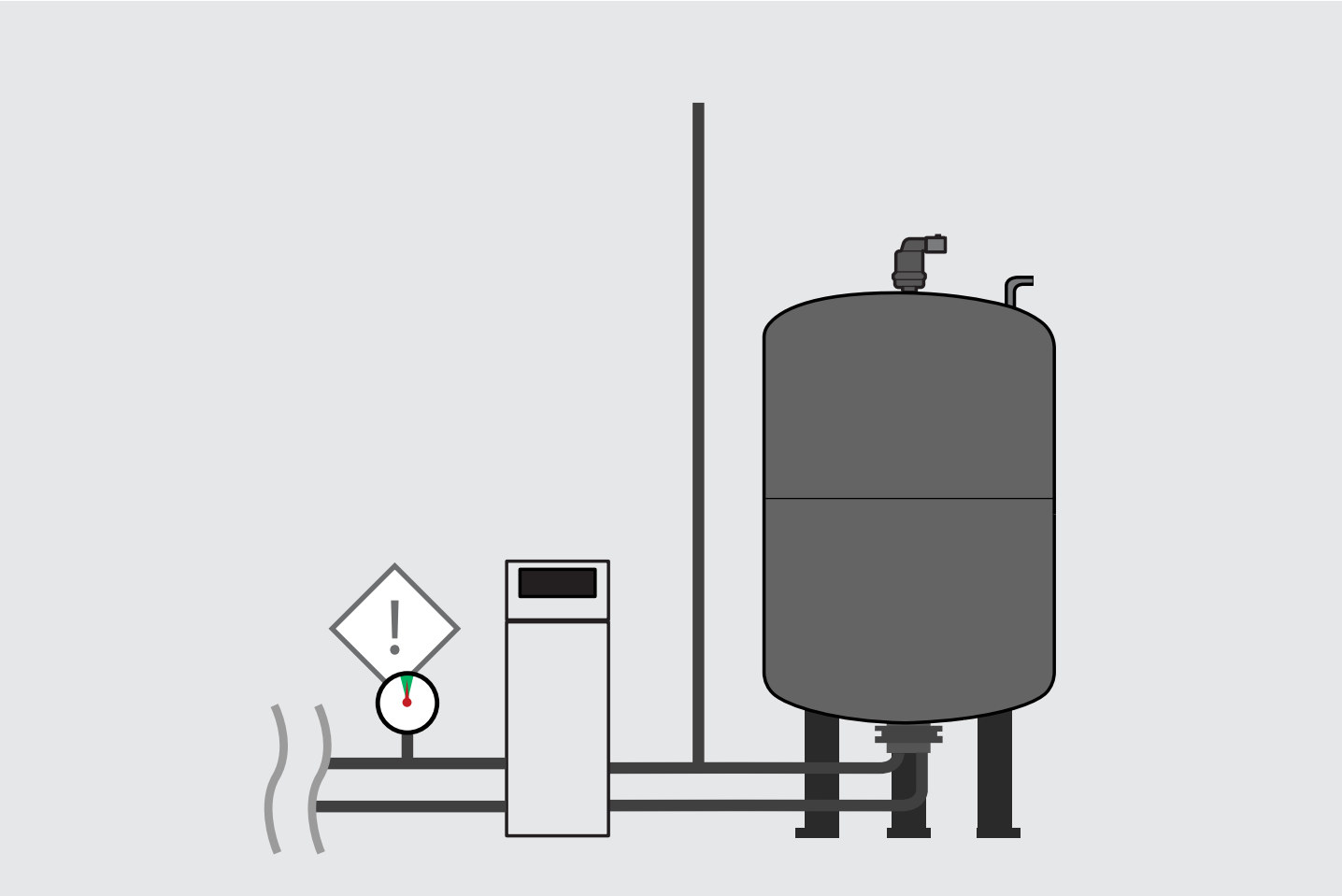
risycard

RICA 08 - explanation constant pressure pressurisation - content indication



RISK OF OXYGEN ENTRY

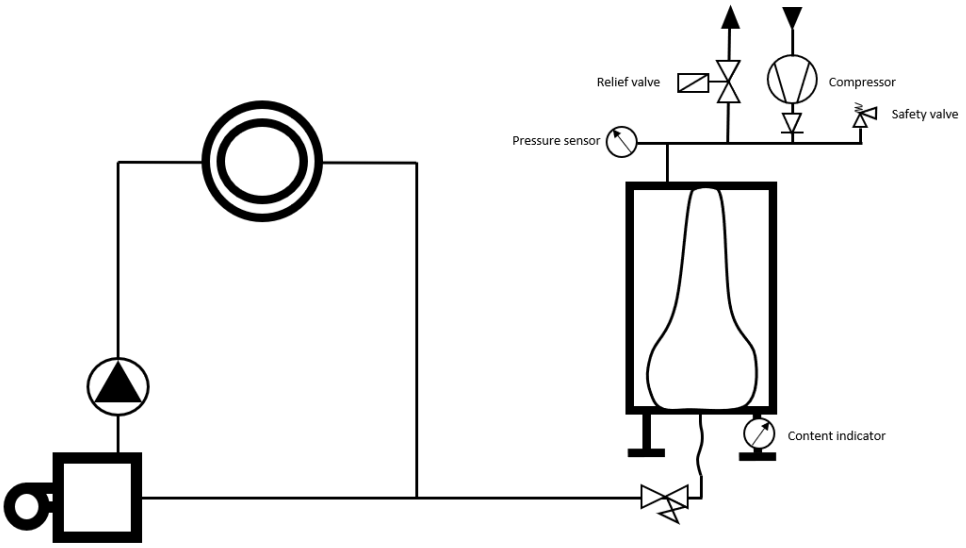
The constant pressure expansion system is a risk component due to the frequent misinterpretation of the system pressure on the pressure gauge.

Compressor System

When the central heating system heats up (expansion phase), the pressure in the installation rises, causing the expanding system water to flow into the bladder. The pressure of the compressed air cushion in the expansion tank around the bladder also rises until a solenoid valve opens to allow compressed air to escape.

When cooling (contraction), the pressure in the installation drops and the compressed air cushion pushes the contracting water back into the system. The pressure in the expansion vessel drops until the compressor starts and pumps air into the space around the bladder again.

The pressure in the installation and in the expansion vessel (both in and around the bladder) is the same.

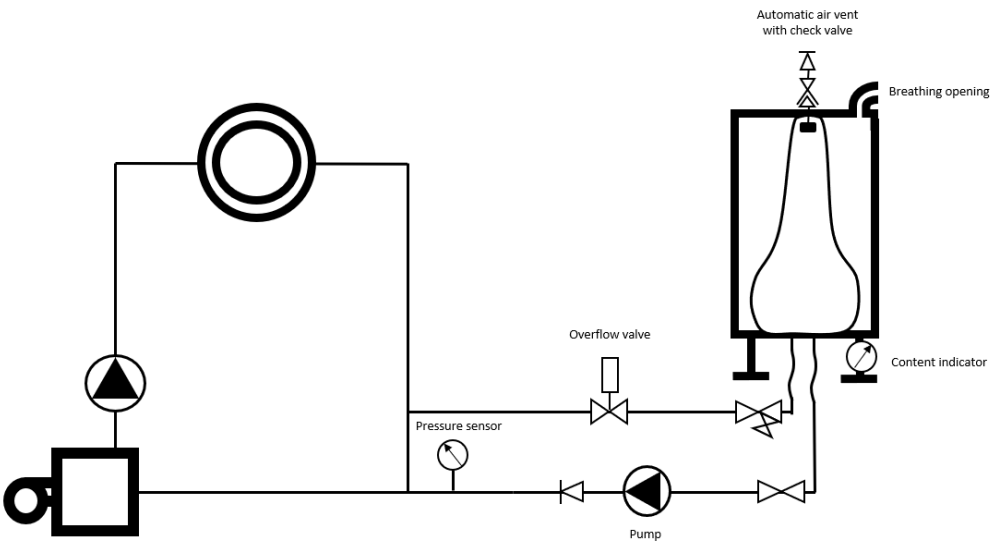


Pump system

When the central heating system heats up (expansion phase), the pressure in the installation rises, causing a solenoid valve to open that allows expanding system water to flow in to the bladder of the (pressure less) expansion vessel. This would increase the pressure in the space around the bladder, but it can escape through a breathing opening.

During cooling (contraction), the pump will start which pumps installation water from the expansion vessel into the installation in order to maintain the installation pressure. The pressure of the space around the bladder would fall as a result, but atmospheric air can enter through the breathing opening.

The pressure in the system and in the expansion, vessel is different: the expansion vessel with its breathing opening is pressure less (atmospheric).



RISK OF OXYGEN ENTRY

The insight that a pressure gauge in the installation with constant pressure will always remain at the same value and will not even change in the event of any expansion (heating) or volume reduction (cooling) is apparently not widely available. This has serious consequences with regard to the risk of oxygen ingress.

Therefore, such expansion systems are equipped with a **content indicator**, which allows the user to relate the fill volume of the expansion vessel to the average temperature of the entire installation. Since expansion vessels are equipped with a bladder, it is not possible to speak of level detection (because there is no water level) and measurements based on a sight glass, probes or float system cannot be used. The content indication works well via weight measurement of the expansion vessel. It is common for the content indication to be provided with a 'low water alarm' and a 'high water alarm', which must warn the user in good time when the expansion vessel is almost empty or almost full. It is advisable to link these warnings to the building management system, or better yet to permanently log the value of the content indication, so that the relationship between the average temperature of the system and the expansion occurring in the expansion system can be monitored.

Examples:

- If the entire installation has to perform at its maximum in the middle of winter, and so the average temperature is "high", the expansion quantity that has occurred will also be "maximum", which should reflect the content indication of the expansion system at that moment. **If at that moment the expansion system only indicates a "limited" amount of water taken up, there is a very good chance that as the outside temperatures rise again, and thus the installation cools down and contracts, the expansion vessel will empty and thus the pressure in the installation will drop. At that time, atmospheric air will enter through automatic air vents** (see RICA 01). With an expansion vessel under variable pressure, this process happens very slowly, so that the user has a view of the falling pressure via the manometer. With an expansion vessel under constant pressure, the pressure remains stable all the time, until it suddenly drops with an empty expansion vessel.

- If the installation has completely cooled down in the middle of summer (except for the heat generators for indirect production of domestic hot water), there is also no (or almost no) expansion. If the expansion vessel already contains a substantial amount of water at that time (e.g., is already half full), there is a very good chance that as the outside temperature drops, and thus the installation heats up and expands, the expansion vessel will fill completely and the pressure in the installation will continue to rise. With an expansion vessel under variable pressure, this process takes place very slowly, so that the user can see the rising pressure on the manometer. **With an expansion vessel under constant pressure, the pressure remains stable all the time, until it rises abruptly when the expansion vessel is full. Water is then lost via the safety valves, which may be refilled after cooling** (this way an incorrectly sized expansion vessel can go unnoticed).

There are several case studies available from Resus that illustrate the Risks covered in the Risycard series.

THE IMPORTANCE OF RISYCOR

A Risycor in the general return of the installation (Application Guideline “minimum protection”) will detect oxygen entering the installation. By also placing Risycors in the risk circuits and at the risk components (“optimum security level”), one is better protected and the possible underlying cause in the event of oxygen entry can be found more quickly.
At the “optimum” and “ideal” security level, no oxygen entry goes undetected: every oxygen entry, of whatever nature, is noticed immediately and Risycor sounds the alarm in good time.
In this way, Risycor provides a meaningful protection against misinterpretation of the pressure gauge in the system, and the combination of the logged data of the content indication and that of the Risycor can provide a very valuable insight into oxygen ingress as a result of:

- wrong adjustment of the constant pressure expansion system setpoint
- incorrectly dimensioned expansion vessel
- other abnormalities such as insufficient compensation of the load change

A Risycor that, in addition to the corrosion rate, also logs the pressure of the installation makes the protection (and possible problem solving) complete.

For a good follow-up of the entire installation, the recorded data should be checked using the Resus dashboard at least once a year..

ABOUT US

Resus is the manufacturer of Risycor, a system for continuous corrosion monitoring in closed heating and cooling systems. Like a smoke detector, a Risycor is an early warning system that prevents problems by providing an early warning.

Corrosion is ALWAYS the result of oxygen ingress, which in 90% of the cases
Is the result of poor pressure control. The remainder of the cases are often the result of failing risk components. Read more about this in our Risycards and Risybasics.
The application of Risycor is explained in the Risycor Application Guidelines.

READ ALSO

RICA 01 - automatic air vents
RICA 02 - green zone
RICA 03 - neutral point
RICA 04 - failing air non return valve
RICA 05 - oxygen diffusion open bladder
RICA 06 - breakdown of PWH water
RICA 07 - oxygen diffusion
RICA 08 - content indication constant pressure
RICA 09 - clopen systems
RICA 10 - pre-pressure

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