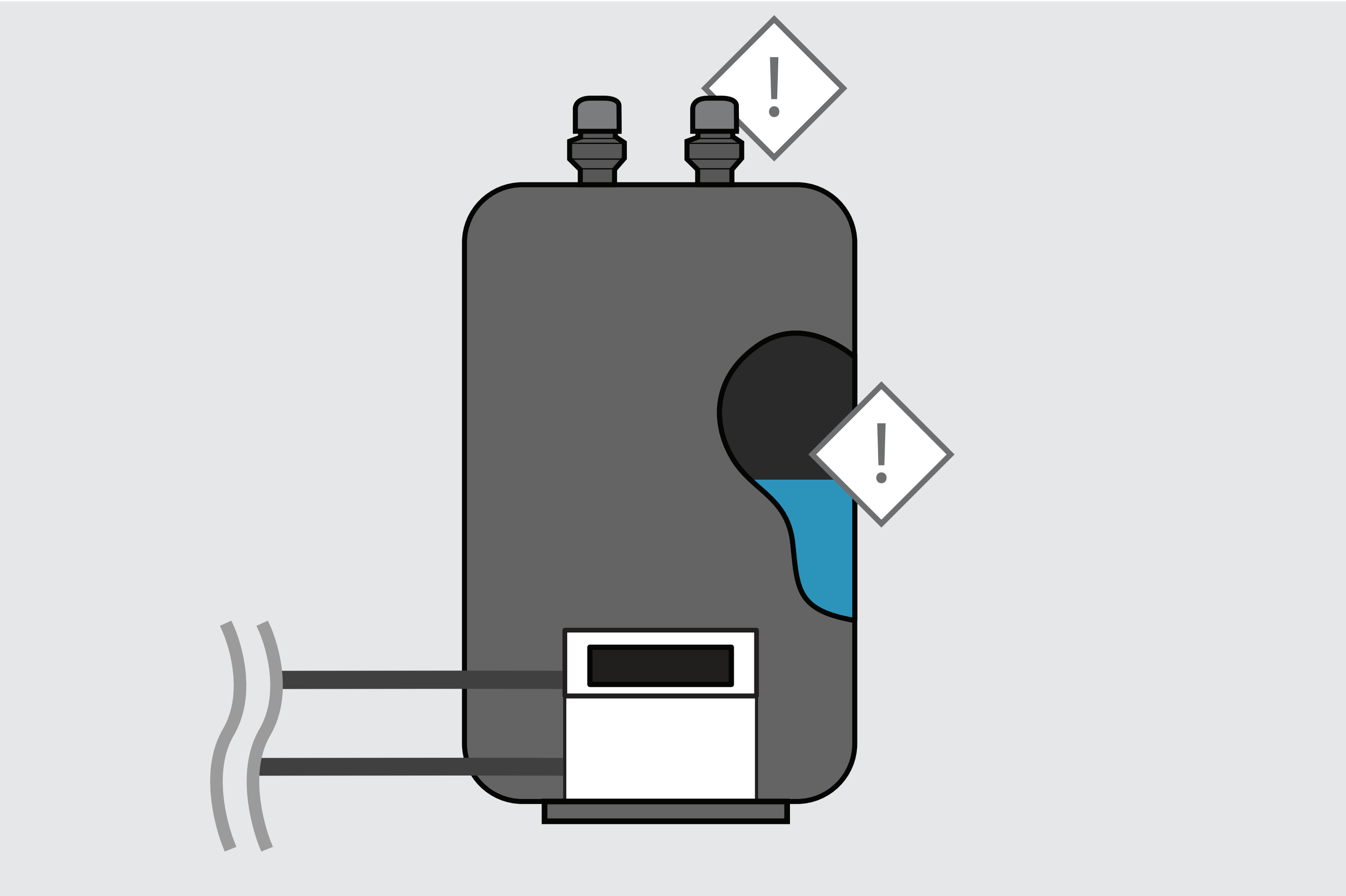
risycard

RICA 09 - CI-open systems



RISK OF OXYGEN ENTRY

Although these systems are marketed as closed systems (which they apparently are), they still cause serious oxygen entry, often resulting in massive corrosion.
In RICA 05 the importance of an oxygen diffusion tight bladder is explained, RICA 09 looks at alternative systems that do not use a bladder.

OPERATION

Pressure maintenance with a pump system
When the central heating system is heated up (expansion phase), the pressure in the installation rises, causing a solenoid valve to open that allows expanding system water to flow into a pressure less vessel. Upon cooling (contraction), the pump will pump back water from the pressure less vessel into the installation in order to maintain the system pressure.
Several variants of this principle exist .

Combination systems can also degas and make-up. They use the expansion vessel at atmospheric pressure as a degassing reservoir. Any dissolved gases are released by draining the water from the installation into the vessel and then pumping it back into the installation. The make-up is activated if the vessel contains too little water.

An open vessel that is apparently closed (breathing opening or loose lid)
The gases collect above the water surface in the vessel. Thanks to a breathing opening or a loose lid, they can escape, the vessel can be completely filled with expansion water, and afterwards become almost empty again due to contraction without this presenting a problem for normal operation.

A cl-open vessel (closed but automatically opening in two directions)
Since the gases escaping from the water in a closed vessel will cause the pressure to rise, as is the case with expanding installation water, a pressure relief valve must be fitted on the closed vessel that can release the excess pressure (by venting the gas above the water surface). When the installation cools down (contraction) and the pump again pumps water from the vessel into the installation, the reverse can happen: the pressure in the closed vessel drops so that it becomes lower than atmospheric pressure, and therefore a vacuum is created in the vessel. To avoid the vacuum, a vacuum break valve is fitted to the vessel which lets air into the vessel. Just as a burglar has no trouble getting into a house whose doors are closed, but not locked with a key, air can get in and out of the closed vessel via overpressure and the vacuum break valve.
Cl-Open vessel with so-called negative pressure membrane
Instead of letting the atmospheric air flow directly into the expansion vessel, a rubber bellows is mounted on the vacuum break valve with the intention of separating the installation water from the atmospheric air (and thus oxygen) as a kind of “lung” in the expansion vessel. It is not clear to what extent this bellows can completely fill the vessel and/or whether it is oxygen diffusion-tight (see also comments in RICA05). Also, the bladder principle is not compatible with a level indication (there is no water level).

RISK OF OXYGEN ENTRY

System water in contact with atmospheric air in the expansion vessel naturally causes an uptake of oxygen in the oxygen-depleted ("dead") system water. The more the installation heats up and cools down (and thus expands and contracts), the more oxygen enters. If the degassing function is active, the exchange of water between the installation and the vessel is very large, as a result of which the oxygen ingress increases massively. The automatic refill function can also be an additional cause of oxygen ingress if it makes-up for leaks, excessive (partial) emptying or other unacceptable reasons like compensating for an expansion system that is dimensioned too small.

Numerous cases are known where these systems were identified after some time as the cause of corrosion instead of a corrosion avoider (as some brands present themselves). With one brand the function of the vacuum breaker on the expansion vessel seems to be replaced by topping up with fresh water to compensate for the negative pressure in the expansion vessel. Oxygen then enters indirectly, through the oxygen contained in the fresh water. This also increases the risk of scale formation and excessive make-up because of gas emissions after. The efficiency of the "vacuum membrane" is unclear due to missing information about material used and it's oxygen diffusion tightness.

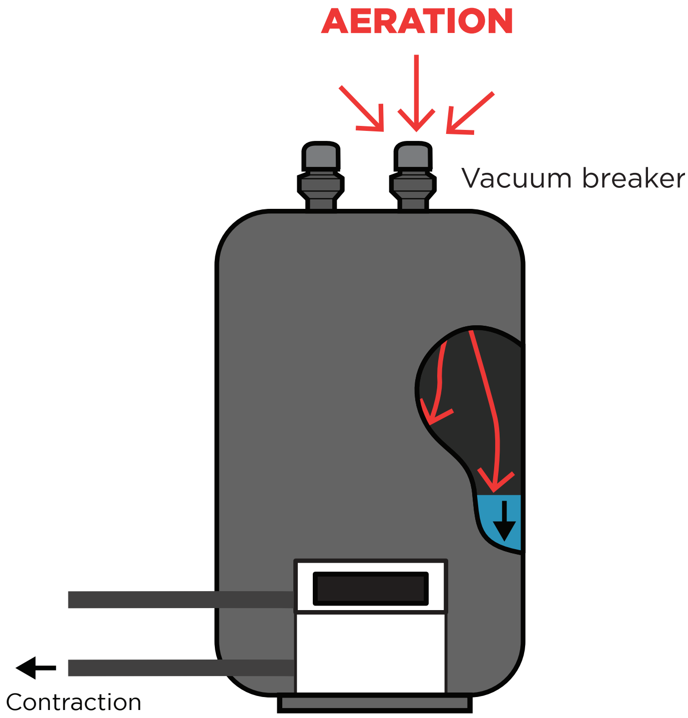


Fig. oxygen entry at a cl-open vessel

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

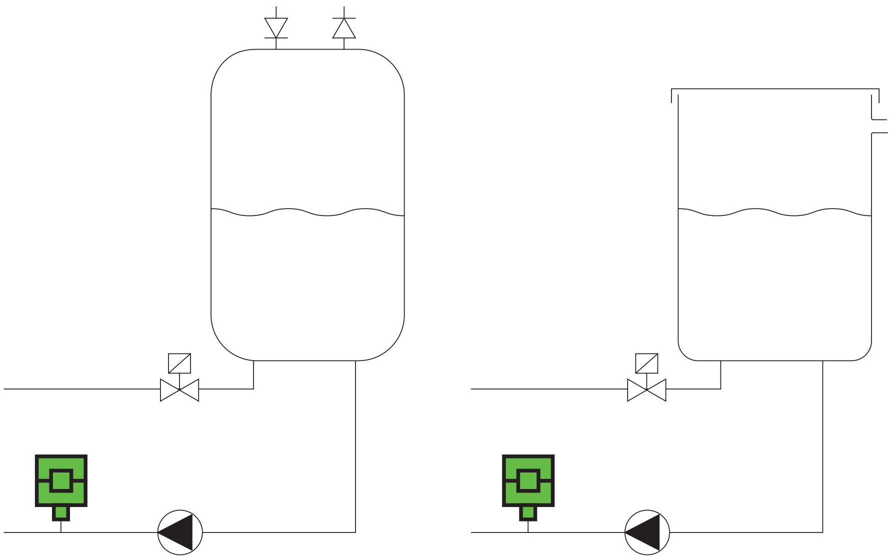
DID YOU KNOW ?

A degasser can also be an oxygen enricher at the same time. If the system water contains a lot of dissolved gases (primarily nitrogen), they can be expelled by a degasser. But because the partial pressure for oxygen in an installation is almost zero (because of corrosion), the water will always want to absorb oxygen again.

THE IMPORTANCE OF RISYCOR

In addition to the Risycor in the general return of the installation (see Risycor Application Guideline), it is advisable to install a Risycor close to the risk component in the return from the expansion vessel. If oxygen enters via the vacuum breaker on the expansion vessel or via water make-up, then the Risycor will immediately register it and sound the alarm in good time.

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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