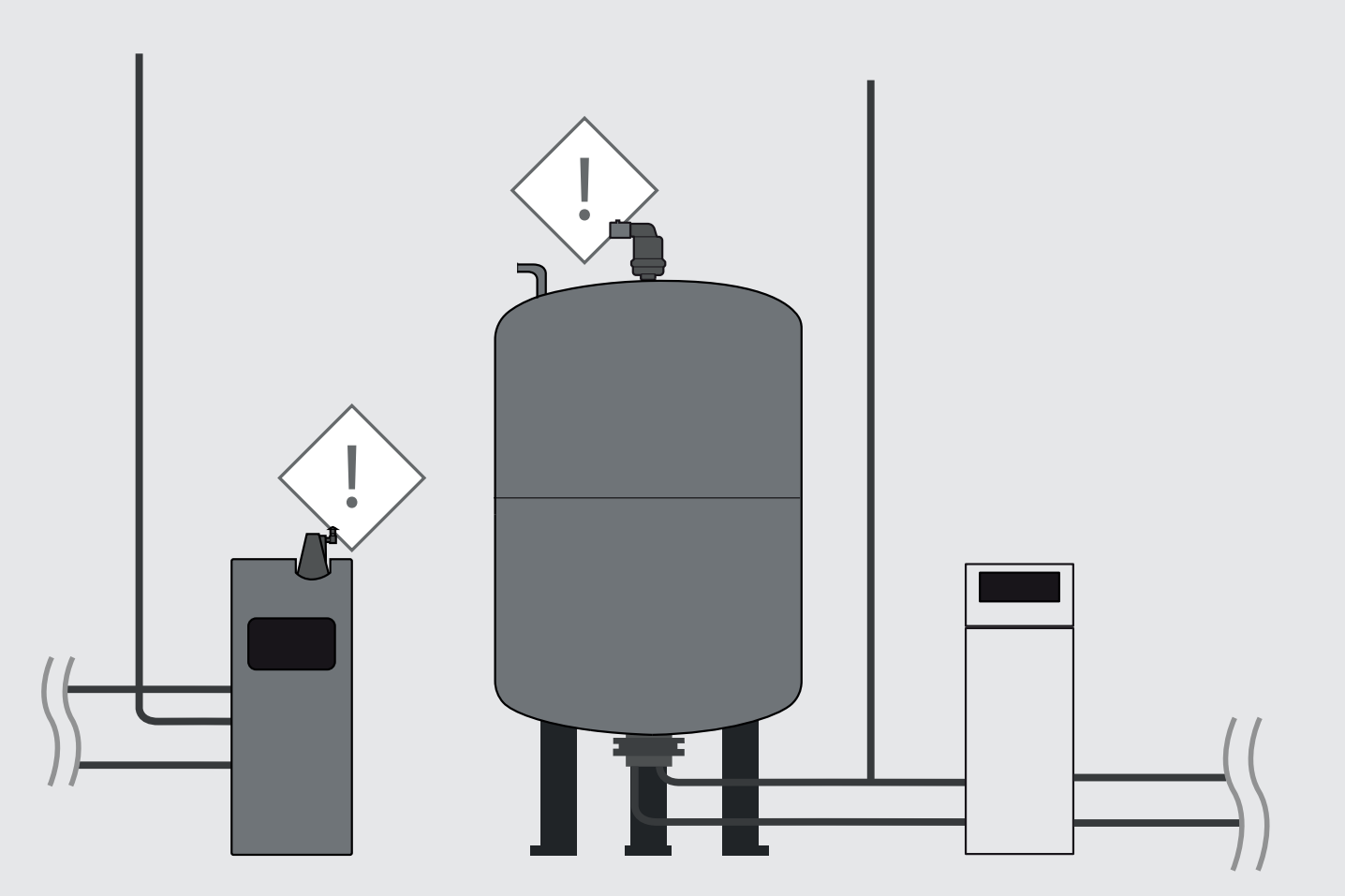
risycard

RICA 04 - Failed Air Inlet Barrier in Pressure Step or Vacuum Degassing



RISK OF OXYGEN ENTRY

Pressure step or vacuum degassing becomes a massive cause of corrosion if the air inlet barrier fails. This is a non-return valve that must prevent air (and therefore also oxygen) from entering the installation. Depending on whether it concerns vacuum degassing or atmospheric pressure step degassing in combination expansion systems, the amount of oxygen entering can differ greatly.

OPERATION

According to Henry's law, liquids can contain dissolved gases depending on pressure and temperature. System water flows through a valve into a degassing vessel (where a lower pressure temporarily prevails) so that dissolved gases can come out of solution from that water. In order not to cause an undesired drop in system pressure, the same water must of course be pumped back into the installation immediately via a pump.

Vacuum degassers have a degassing vessel where the pressure drops below atmospheric pressure (="vacuum") because a special pump extracts more water from the vessel than can flow into it. Any dissolved gases are therefore released quickly and collect at the top of the vessel. An automatic air vent cyclically expels the collected air by returning to normal system pressure in the degassing vessel.

An small check valve on the outlet of the automatic air vent prevents the ingress of air during the degassing/ vacuum cycle.

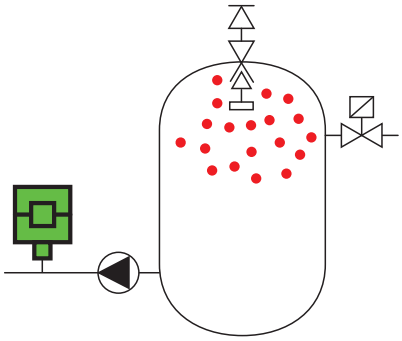


Fig.: vacuum degasser

Combined-expansion and degassing systems use the atmospheric pressure in the expansion vessel as the degassing vessel. Any dissolved gases are released by taking water from the installation into the vessel and then pumping it back into the system. The gases collect above the water's surface in the bag of the expansion vessel. The collected gases can escape via an automatic air vent on top of the vessel. This happens when sufficient tension has built up in the bag, for example if the bag is filled with water and/or gases in such a way that it has largely assumed the shape of the vessel, perhaps sooner if the natural volume of the bag is smaller than the vessel. Only then are the gases actually removed from the system. A small check valve on the automatic air vent on top of the vessel prevents air from entering as long as the water level in the bag hasn't reached the automatic air vent, but which is almost always the case in practice.

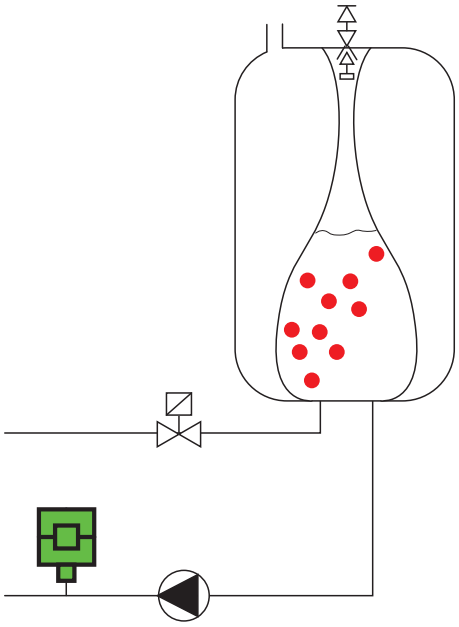
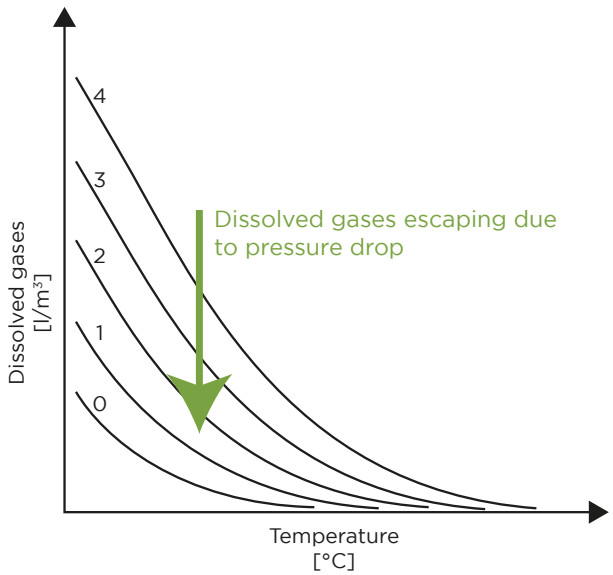


Fig.: combined-expansion and degassing system



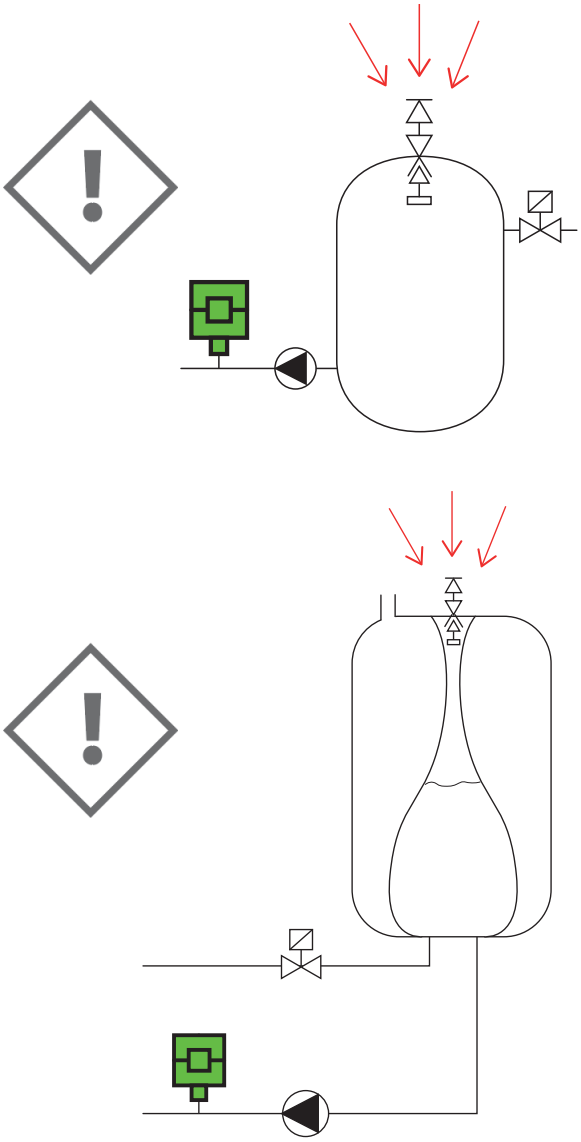
Graph: Henry's Law

RISK OF OXYGEN ENTRY

Vacuum degassers:
If the air inlet barrier fails during the degassing cycle, large amounts of air (and therefore oxygen) can enter the system, resulting in massive corrosion. Some pressure step degassers have a built-in protection logic in the internal control system to prevent this, which then shuts down the unit. Others send a fault message but continue pumping and pulling in air.

Combined-expansion and degassing systems:
Because the system water degasses in the bag of the expansion vessel, the float of the automatic air vent will rarely if ever float on water - so the bleed valve of the AAV is in fact always open. **If the small check valve, then malfunctions, air (and therefore also oxygen) can enter the system at will.** In fact, the expansion vessel has now become an open vessel. Depending on the way in which the degassing cycle is set, a larger or smaller volume flows through the (open) bag, resulting in a corresponding enrichment with oxygen. The correct functioning of the small check valve can only be verified manually. Because the AAV with the check valve mounted on it is subjected to a particularly intense load, and thus poses a significant risk:

- The AAV and check valve need to be replaced frequently, which rarely happens.
- some manufacturers replace the AAV , check valve combination as a preventive measure because it is considered a so-called “wear part”.
- because many cannot distinguish between an automatic air vent without and with a check valve, they are often replaced by the wrong type.
- It also happens that a well-intentioned check to see if the “cap” of the air vent is sufficiently “loose” (otherwise it cannot vent) leads to the loosening of the check valve so that it no longer fulfils its function.



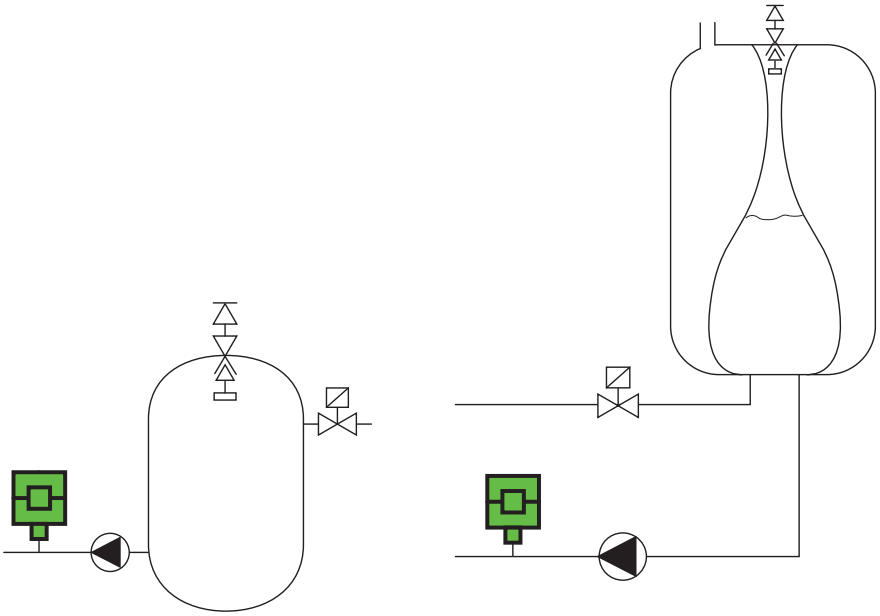
DID YOU KNOW?

Pressure step or vacuum degassing does not help to avoid corrosion, because such devices can never extract what is no longer in the water: after all, dissolved oxygen has disappeared in the corrosion process in a very short time.

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

THE IMPORTANCE OF RISYCOR

Additional to the Risycor in the general return (see our application guideline), we recommend a Risycor to be placed on the outflow of the vacuum degasser / combination pressurisation system to the main system. A malfunction of the air inlet barrier on the automatic air vent will be immediately noticeable due to an increased corrosion rate and alarm of the Risycor.
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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