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Valves in the adsorber Why and when are valves needed?

In light of the fact that many aeration dryers are not permanently flown through, the question arises as to whether the aeration dryers still adsorb moisture and how they can be protected from this unnecessary loading. This is especially interesting for ventilation dryers, which are not flowed through during most of the time of use.

If there is no flow, moisture diffuses through the adsorbent bed. It comes to a loading and a color change, although the aeration dryer was only flowed through. To counter the presumption, GIEBEL worked on various solutions.

In the experiment described below, three identical aeration dryers are tested with closed connection openings. These are filled with the same amount of silica gel orange. They have different openings in the ground:

- Holes (standard for cheap solutions)
- Holes covered with a hydrophobic membrane
- Valves with an opening pressure of 6mbar



Figure: Inserted aeration dryer vV 210-PA with 0.3 kg silica gel



Illustration: Ventilation dryer openings (left: holes, center: membrane, right: valve).

The mass of the aeration dryers is measured after defined time intervals. The ambient air of the aeration dryers is kept at a constant high relative humidity with a humidifier.

The following figure shows the load profile of the three different aeration dryers. The trial period is 50 days. Clearly recognizable are the effects of the hydrophobic membrane and the valves. The adsorbed amount of water of the ventilation dryer with holes at the end of the experiment is 10% of the dry mass. The hydrophobic membrane is responsible for a loading of 3.6% after 50 days of testing. At 0.6%, the aeration dryer with valves has the lowest load after 50 days of testing. As can be seen, the ventilation dryer with the simple holes, the largest slope. Its load increases on average 0.2% per day. The pitch of the aeration dryer with valves is 22 times lower.

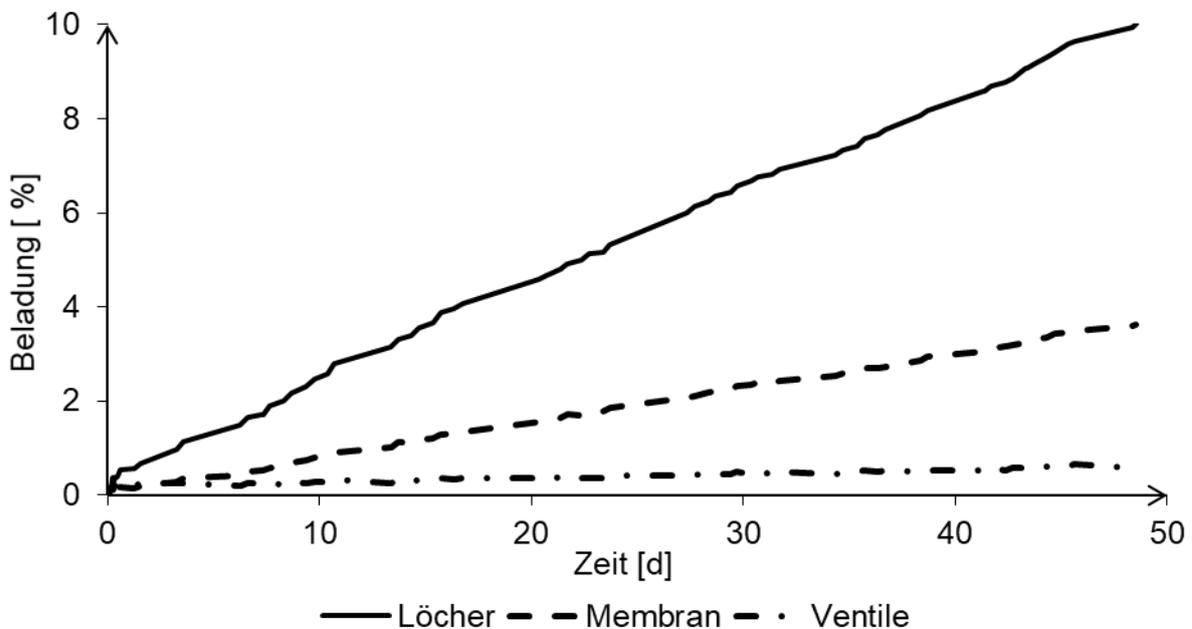


Figure: Loading curves of the non-flow-through aeration dryers with different openings.



Figure: Adsorber tested **after 50 days** (left: holes, middle: membrane, right: valve).

The color of the ventilation dryer with holes has become much darker. This discoloration is spread evenly over the entire height of the adsorbent bed. It does not come to the formation of a typical color profile. The adsorbed water molecules are evenly distributed over the entire height of the bed. The ventilation dryers with membrane and valves show no change in color after 50 days of testing.

The use of a hydrophobic membrane and valves has a major influence on ventilation dryers during plant shutdowns. They reduce the amount of water which diffuses through openings in the adsorbent. Valves are the most effective way of preventing exposure to the ambient air. The use of such valves significantly extends the life of aeration dryers, which are rarely in use.