GIEBEL Adsorber®
...setting standards in aeration drying!

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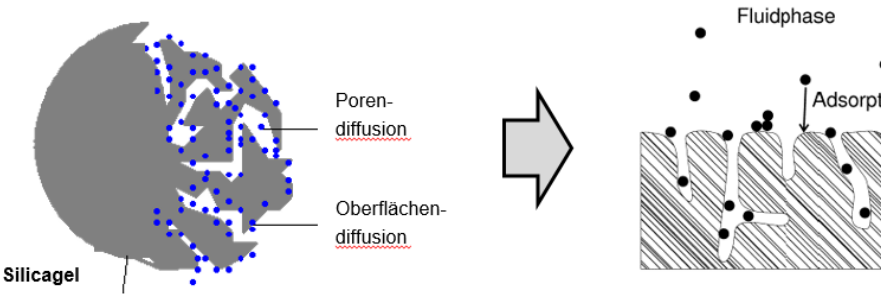
Function of a Ventilation Dryer

Why is a Ventilator / Ventilator better than a pure aerator?

Basics of Adsorbtion

The use of a ventilation dryer is used to protect a hydraulic fluid, a gear oil, a fuel or other hygroscopic fluid.

The sucked air is "pulled" by a desiccant. Due to the van der Waals forces of the contained adsorbent, the water molecules diffuse into the pores and adhere to the surface. This process is called a**d**sorption. In contrast, the a**b**sorption describes a compound / mixture of two substances.



Capacity Silica gel

During ventilation, the inflowing ambient air is dried from, for example, 70% RH to about 10% RH. The desiccant is increasingly loaded on the basis of the respective isotherm. The isotherm describes the maximum water absorption capacity at the ambient humidity. Silica gel, for example, at a humidity of 100% RH max. Take up 40% water (based on dry weight). By contrast, the maximum absorption capacity at 10% RH air humidity is less than 10%.

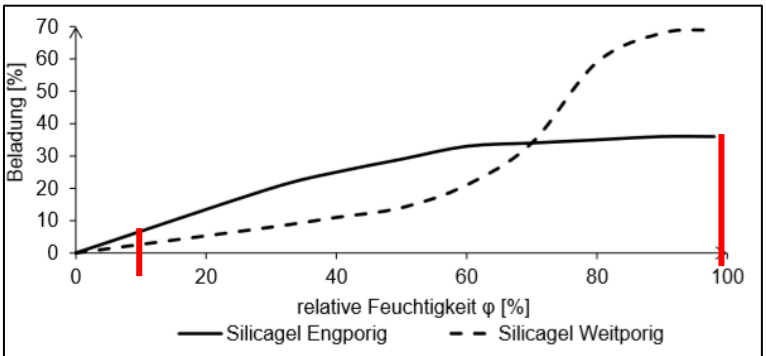


Abbildung 2.6: Adsorptionsisothermen von Wasserdampf an Silicagel bei 20 °C [1]

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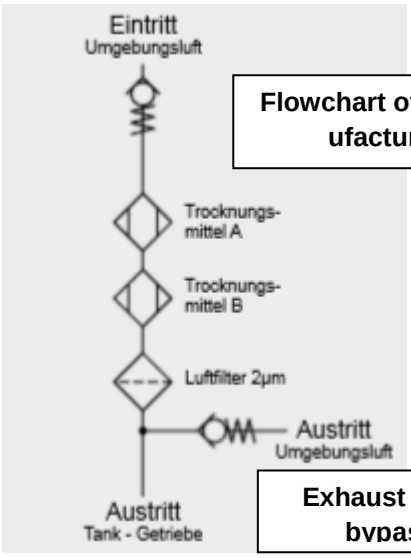
Functional principle aerator with bypass

If a ventilation dryer is used as a pure aerator with a separate outlet valve, this means that fresh and moist air is drawn in cyclically from the environment. For each negative pressure cycle, air is injected with e.g. 70% RH air intake and must be dried.

By contrast, the already dried and in-tank air is forced through the separate valve into the environment.

Supply air is dried

Exhaust air through bypass valve



Flowchart of a manufacturer

Exhaust air trough bypass function principle of a ventilator

When using a ventilation dryer, which works as a ventilator and ventilator in both directions of air flow, the humid air is also cyclically sucked in and dried.

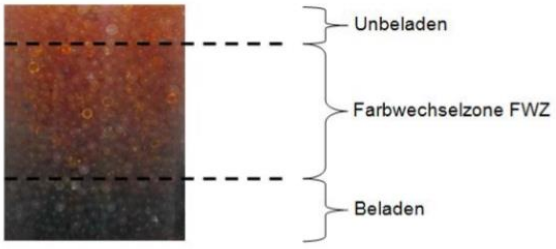


Abbildung 2.14: Farbverlauf in einer Schüttung aus Silicagel E Orange Grün.

On the other hand, the outflowing, previously dried air is forced out in the opposite direction through the adsorber / silica gel. Based on the isotherm described above, the silica gel will attempt to equilibrate during the passage of dry air. This means that the area loaded with about 30-35% by weight releases the bound water molecules to the air

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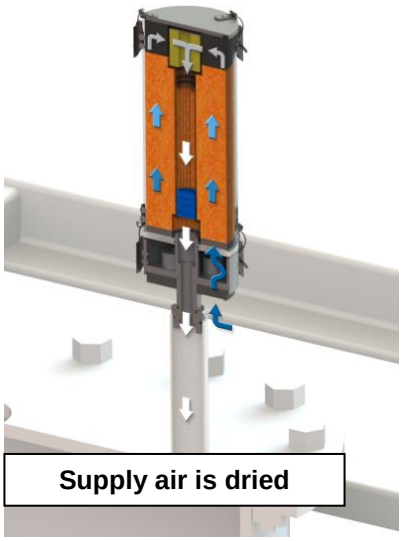
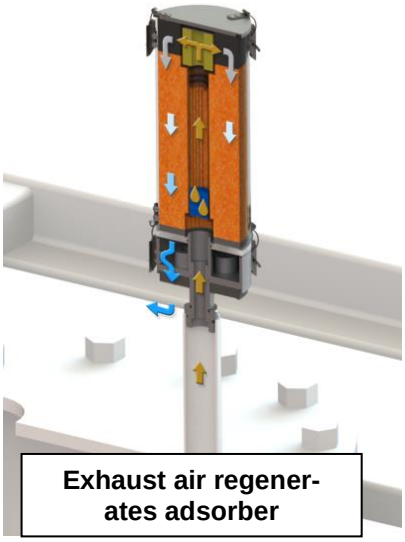
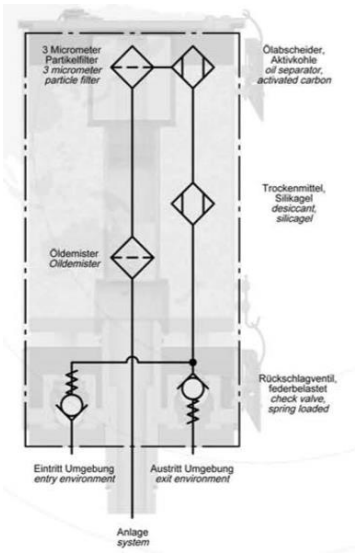
to reach the maximum value of 10%. If the air flow is sufficiently long, all water molecules are released into the air until only the maximum possible load has been reached.



Supply air is dried



Exhaust air regener-ates adsorber



Comparison and conclusion

The cyclical self-regeneration of a ventilator / ventilator has a significant influence on the service interval of an adsorber during operation. In practice, it has been shown that this can be up to 3-5x longer than a pure aerator.

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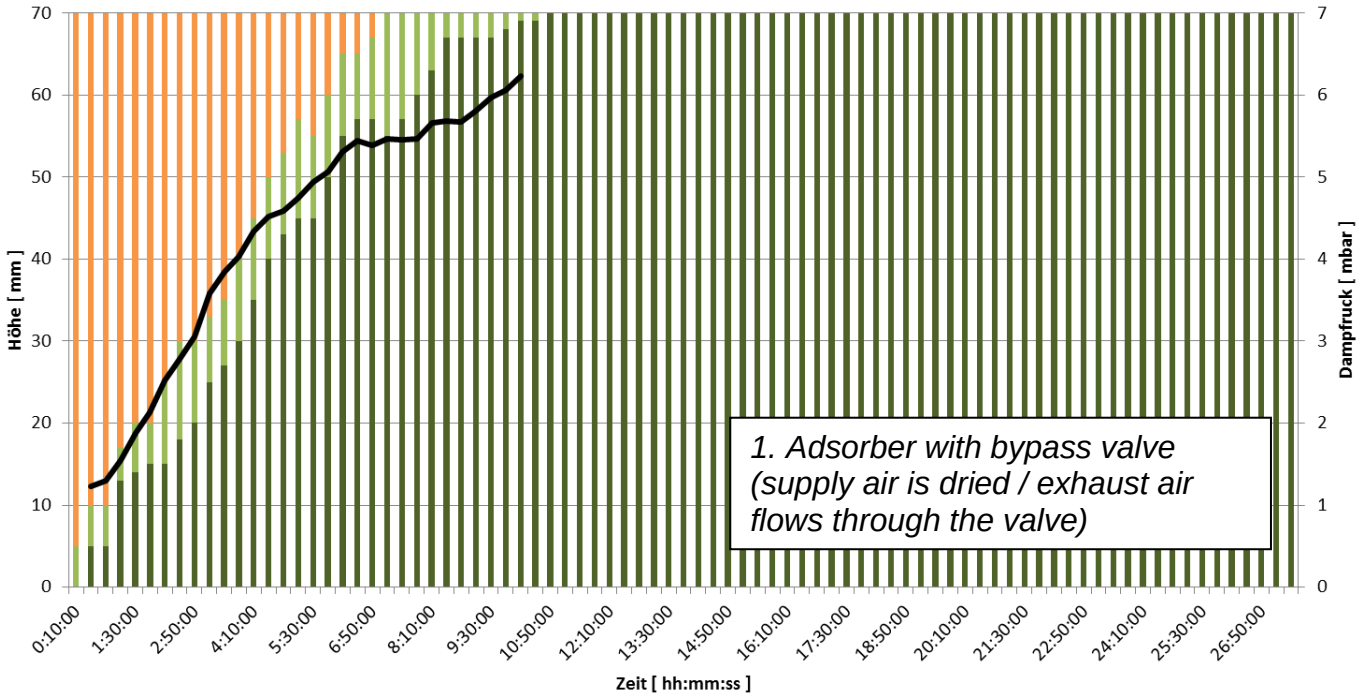
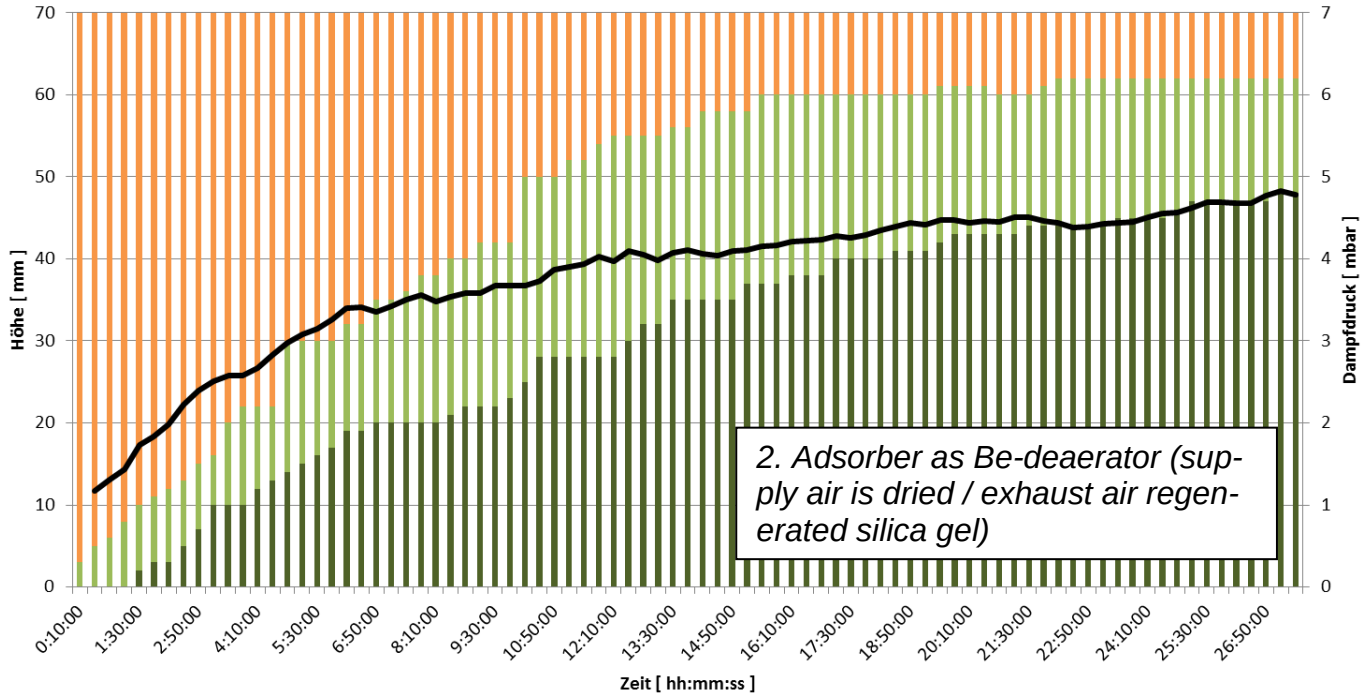
The following is a series of experiments on an adsorbent with 800g silica gel orange-green. Each 10 minutes, humid air was aspirated with 80% RH and then passed this dried air once through a bypass valve and once back through the adsorber.





Heinrich Laas / GIEBEL FilTec GmbH, 31th May 2018

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