



Basics about ventilation dryers What is a ventilation dryer and how does it work?

Aeration dryer, also called respiratory dryer, silica gel filter or adsorber, which protects against water and dirt. Main applications are the reward of hydraulic fluids, lubricants, fuels and electrical systems. These systems are entitled to a nice moisture and clean air. In systems with liquids, water that has been washed out can lead to mechanical parts or even failure of the system. Reasons for this are:

- the promotion of fluid aging
- the deterioration of the lubricating effect
- the corrosion of components
- the formation of decomposition products.

Especially systems with open storage containers are affected. A sinking level leads to a negative pressure, which sucks ambient air into the storage tank. A cooling below the dew point temperature¹, leads to the condensation of water vapor inside the container. An aeration dryer drinks the sucked air. The dried air lowers the dew point temperature. The dew point temperature is at constant pressure.²

The influence of the relative humidity on the dew point temperature is shown in the table. At an ambient temperature of 20 ° C and a relative humidity of 90%, the dew point temperature is 18.3 ° C. When the ambient temperature drops by 1.7 K, the water vapor condenses in the air. A relative humidity of 30% increases the difference to 18.1K. This effect need the ventilation dryer. The formation of condensation, temperature differences, e.g. between day and night, is made more difficult.

¹ Die Taupunkttemperatur ist die Temperatur, welche bei konstantem Druck und absoluter Feuchtigkeit eine relative Feuchtigkeit von 100% hat.

² Lohrengel, Burkhard (2007): Einführung in die thermischen Trennverfahren, Oldenbourg Verlag München Wien.



Table: Dependence of the dew point temperature on the relative humidity at 20 ° C ambient temperature.³

relative humidity [%]	Dew point temperature [°C]
90	18,3
70	14,4
50	9,3
30	1,9

The typical structure and operation of a ventilation dryer is illustrated in the following figure. An average adsorber consists of a cylindrical housing with lid and bottom. Inside is a smaller cylinder, which penetrates the bottom of the housing. The lower end of this inner cylinder is the connection port that connects the aeration dryer to the system. At the upper end of the inner cylinder sits a filter. This prevents the inflow of dirt into the system. The filter encloses an activated carbon disc which adsorbs escaping oil particles to keep the ambient air clean. Below the activated carbon disc, the desiccant is placed. It usually consists of silica gel or molecular sieve. In order to avoid the discharge of the desiccant, it is embedded on a foam disc. In addition, this ensures an even distribution of the air flow. In the bottom of the housing holes are inserted. Through these holes, the air flow enters the aeration dryer. They can be equipped with valves.⁴

³ German Weather Service (1976): Aspiration Psychrometer Panels, 5th Edition, Friedr. Vieweg & Sohn Verlagsgesellschaft mbH, Braunschweig.

⁴ Giebel FilTec GmbH: Flyer and Homepage www.giebel-adsorber.de/en/company/adsorber-added-value.

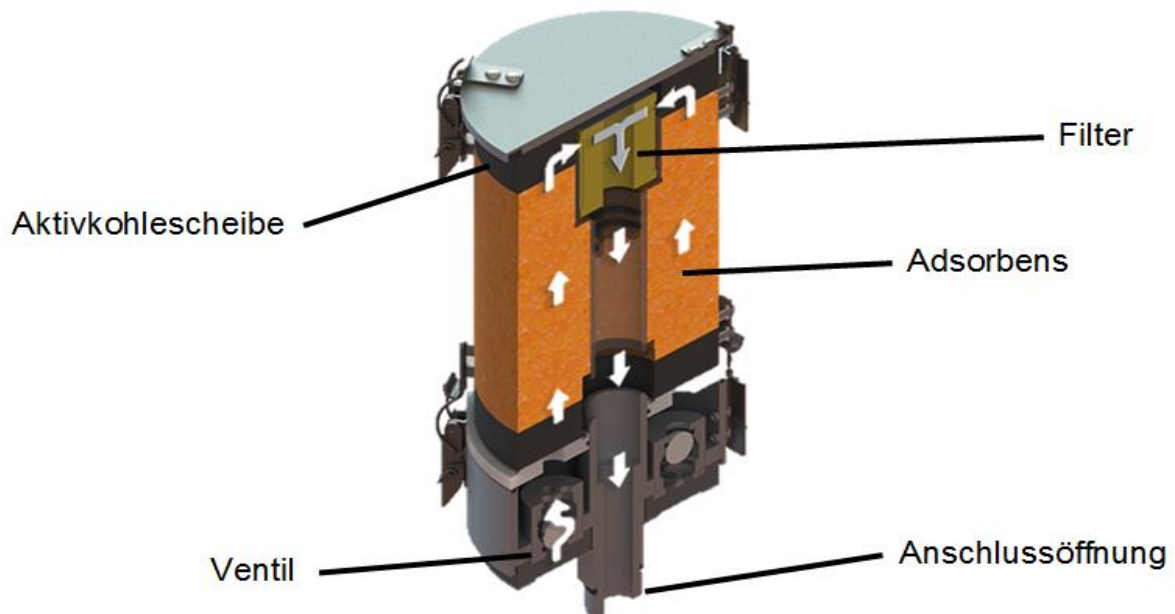


Illustration: Typical structure and mode of operation of a ventilation dryer.⁵

The above-mentioned sinking liquid level sucks the ambient air through the ground. Insert into the aeration dryer (suction process). Inside the ventilation dryer, this ambient air flows through the desiccant. This adsorbs the water vapor, which docks the incoming air. The built-in filter is the air of particles. This cocked and cleaned air through the connection opening in the system.⁶

The opposite event is the ejection process. During an ejection process, the dry air system expires. The air flows through the ventilation dryer in the reverse direction. Inside the desiccant bed adsorbed water molecules are desorbed and discharged from the bed. This process leads to partial regeneration of the adsorbent. With an average desiccant mass of 0.1 to 2 kg, they also weigh as adsorbers from industry and research.⁷

Silica gel often has a moisture indicator. This is available in different variations. The main criterion for the type of moisture indicator is the maintenance interval. The fluctuations of the silica gel are wrapped under defined environmental conditions of use.

⁵ GIEBEL FilTec GmbH: Flyer and Homepage <https://www.giebel-adsorber.de>.

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