



Bretzfeld, 02.09.2019

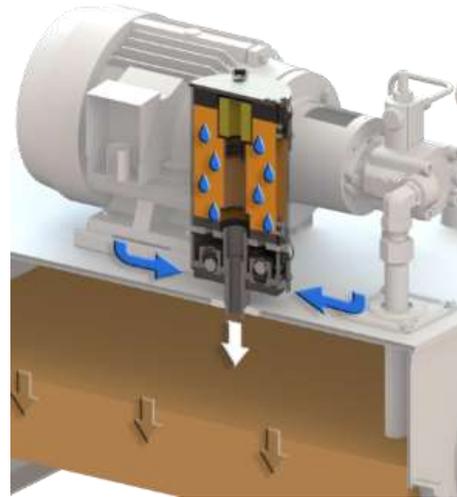
Question of the month september 09/2019

Does the pressure in the adsorber change when the adsorber is loaded?

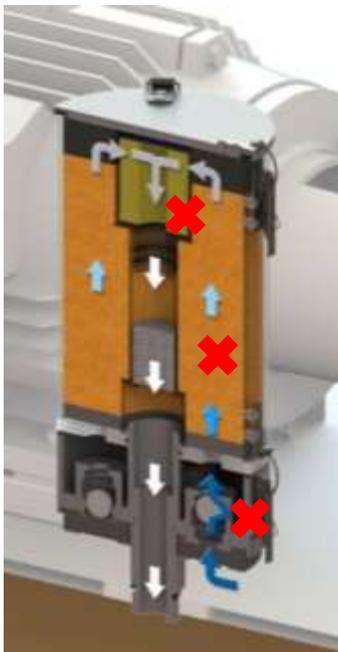
Functionality Adsorber

The air sucked in by the adsorber is generated by a vacuum created in the hydraulic tank, the storage tank, a drum or IBC tank and a gearbox.

The air must open the inlet valve, flow through the entire silica gel bed and pass through the internal 3µm or 1µm filter.



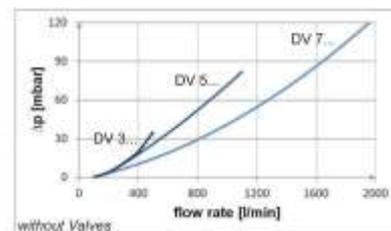
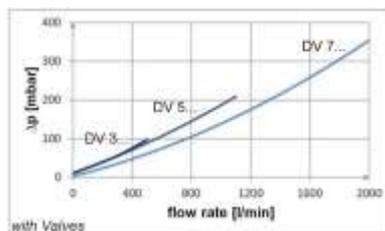
Components for pressure build-up



There are essentially three components responsible for the build-up of differential pressures in the adsorber, which cause the pressure to rise as a function of the air volume.

valves

The valves protect the desiccant from unnecessary loading and extend the maintenance interval. With the disadvantage that the adsorber increases the pressure. The following diagram shows that the pressure of an adsorber of the DV-5 series increases from 20mbar to 80mbar at 400l/min.





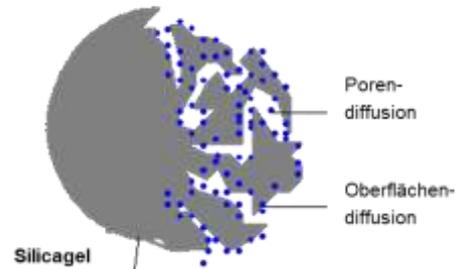
Silica gel

As the air passes through the silica gel, the water molecules are attracted to the surface of the granules and adhere to it. This happens due to the Van-der-Waals forces and is reversible depending on temperature and other influencing factors.

Because silica gel is a very porous substance and the water absorption takes place exclusively in the pores of the grains, the outer surface remains unaffected. This ensures that the grains retain their diameter, the entire bulk their volume and consistency.

The pressure build-up by the silica gel filling is favoured by the following factors:

- **Long adsorber**, long ways through the pouring
- **Small diameter**, small gap volume in the bulk material
- **Small particle size**, denser bedding and smaller gap volume in the bedding



Filter element



Star filter elements with a large surface are built into each adsorber. This ensures that the total pressure build-up of the adsorber is not caused by the filter.

The tested pressure build-up through the standard paper filter with 3µm was up to an air throughput of 500l/min at low 1-3mbar.

Pressure curve according to condition

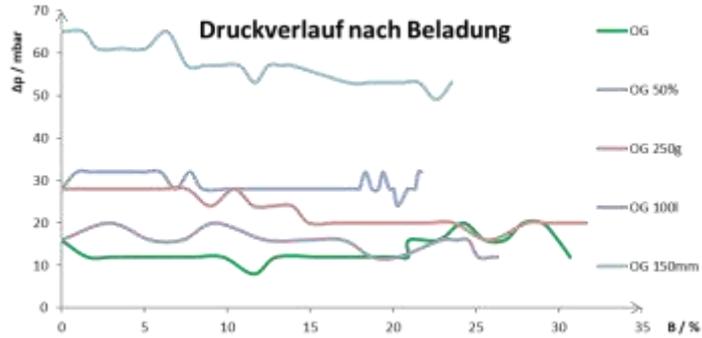


In the course of using an adsorber, the silica gel is loaded with water molecules, i.e. the free surface in the pores is filled. This reduces the binding energies for further absorption.

As a result, the newly inflowing humidity is no longer adsorbed and flows unhindered through the adsorber. Various tests have shown that the pressure does not change under different loading conditions.



Several adsorber variants have been tested in the graphic. With increasing loading of the silica gel (x-axis) the pressure remains constant (y-axis)..



Of course, it is important to pay attention to a high contamination by dirt particles. If the filter is used for a very long time, far beyond the colour change into the green, the suction of dirt can lead to an increase in pressure due to blockage of the filter.



Conclusions and recommendations for action

The pressure build-up in the adsorber is primarily generated by the valves. These are responsible for the largest part of the differential pressure. Furthermore, an incorrectly designed adsorber (too narrow and too high) will cause additional pressure as the air flow increases.

If the pressure in a system is decisive or there is a very high air throughput, an adsorber without valves is recommended. The pressure build-up will remain low. The loading condition is not important. The pressure remains the same over the entire time (under normal ambient conditions).

However, if the filter is exposed to high levels of dirt, e.g. in paper mills, cement factories, concrete plants, etc., care must be taken to change the filter regularly. This can otherwise block up and create a fast, high differential pressure.