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

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Bretzfeld, 02.11.2019

Question of the month November 11/2019

What is the correct air flow for an adsorber?

Function adsorber

An adsorber protects hygroscopic liquids from moisture in the air. The sucked air flows through an adsorber and is dehumidified. In the process, residual moisture (after the flow) is reached from the initial 2% RH to a maximum of 30% RH (with complete color change).in Adsorber schützt hygroskopische Flüssigkeiten vor Feuchtigkeit aus der Luft. Die eingesaugte Luft durchströmt einen Adsorber und wird entfeuchtet. Dabei werden Restfeuchten (nach der Durchströmung) von anfangs 2% rF bis max 30% rF (bei kompletten Farbumschlag) erreicht.

With this "question of the month", the question will be answered, which air flow or volume flow is the right one for a ventilation dryer and how this is determined.

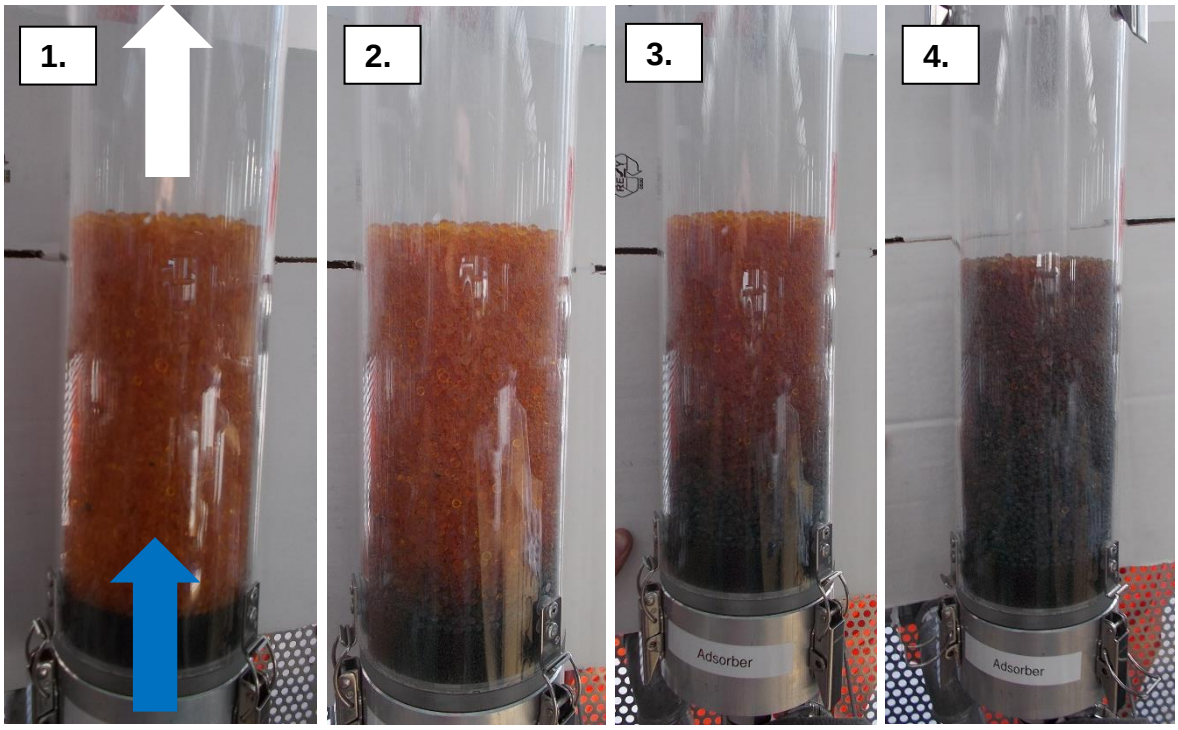

Figure 1: Color gradient of an adsorber with 1.5 kg of silica gel with increasing loading.

Influencing factors on air drying

F To determine the optimal and maximum air flow through an adsorber, some influencing factors play an important role. These include essentially the physical properties of the

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desiccant, the geometry of an adsorber and the ambient conditions, such as temperature and humidity.
In order to determine the ability of a ventilation dryer and to quantify the efficiency, the adsorber index can be used. This is determined by the mentioned influencing factors. An optimum adsorber index of 1.0 (100%) is achieved with a long loading time and low residual humidity. In bad conditions, ie at low loading time and a high residual moisture, the adsorber index is low and reaches a limit.

I In practice, an adsorber index of 0.7 has been found to be optimal. With this value, a maintenance interval of approx. 1 year is aimed for (depending on the application cycles) as well as a residual air humidity after drying of an average of 10% RH and a dew point of approx. -12.5 ° C.

The graph below shows the adsorber index of an adsorbent with 1 kg of desiccant as a function of the volume flow (for example, the pendulum volume of a hydraulic tank). It can be clearly seen that with increasing volume flow, the adsorber index drops sharply at the beginning.

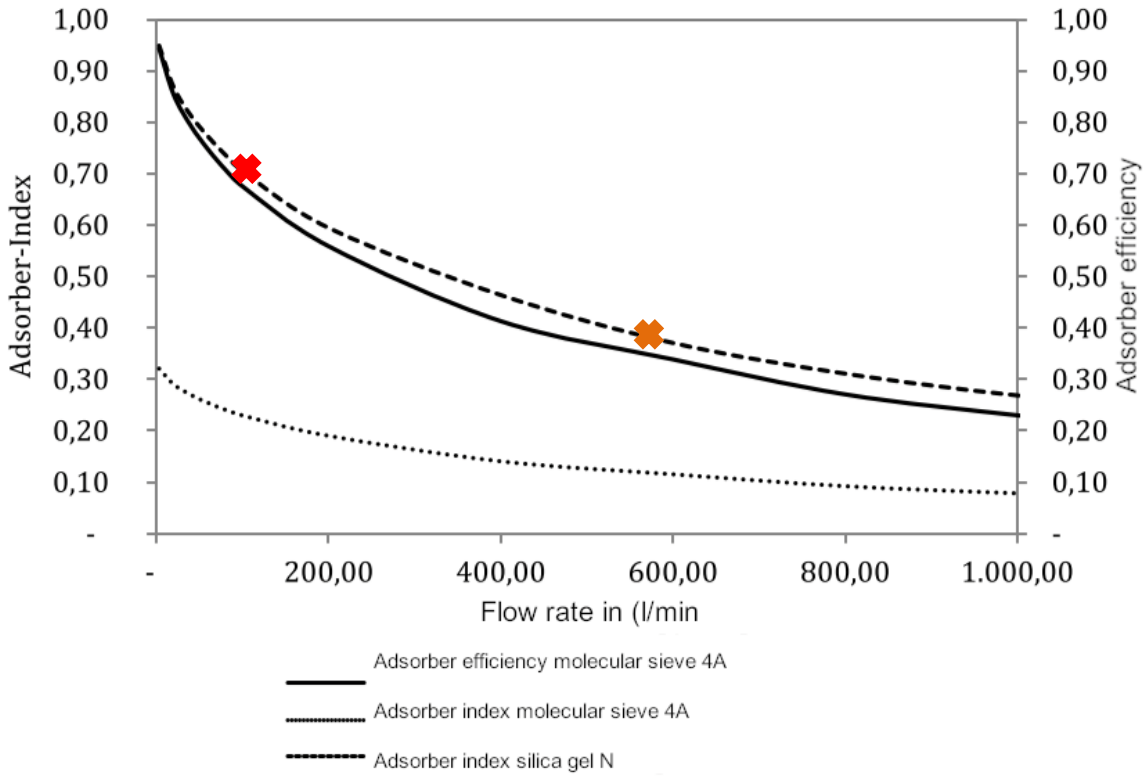

Figure 2: Adsorber index at 20 ° C and an adsorber with 1 kg desiccant mass, depending on the volume flow.

Furthermore, the adsorber index is shown in the following graph at a constant volume flow of 40 l / min. For this volume flow, an increase in the dry weight in the adsorber up to a mass of approx. 1 kg makes sense. After that, hardly any further benefit arises.

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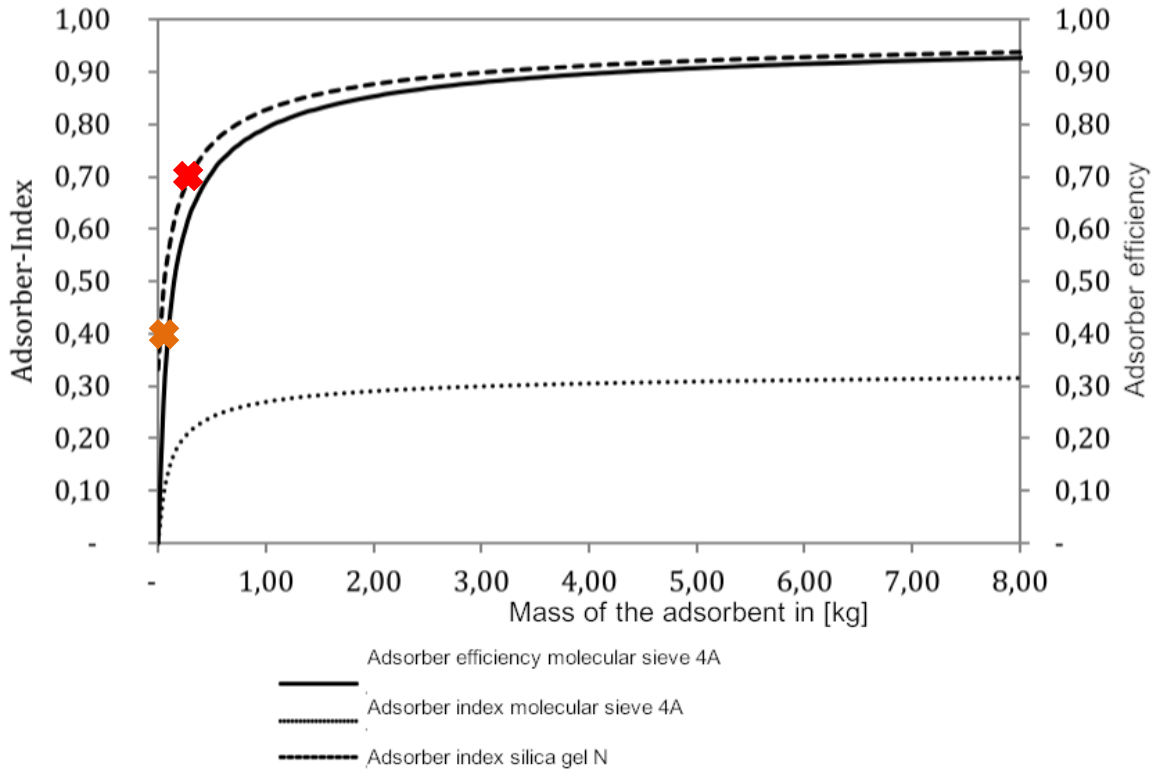

Figure 3: Adsorber index at 20 ° C at a flow rate of 40 l / min, depending on the dry matter mass.

Information on air flow rates in the market

Frequently, the specified volume flows in aeration dryers are not related to the drying performance (ie adsorber index), but only to the differential pressure. Thus, a flow rate of 1250 l / min for an adsorber with about 1 kg of silica gel is an easy to implement value and would only build up a pressure of 37 mbar (see graph below). However, this value has nothing to do with the basic benefits of an adsorber.

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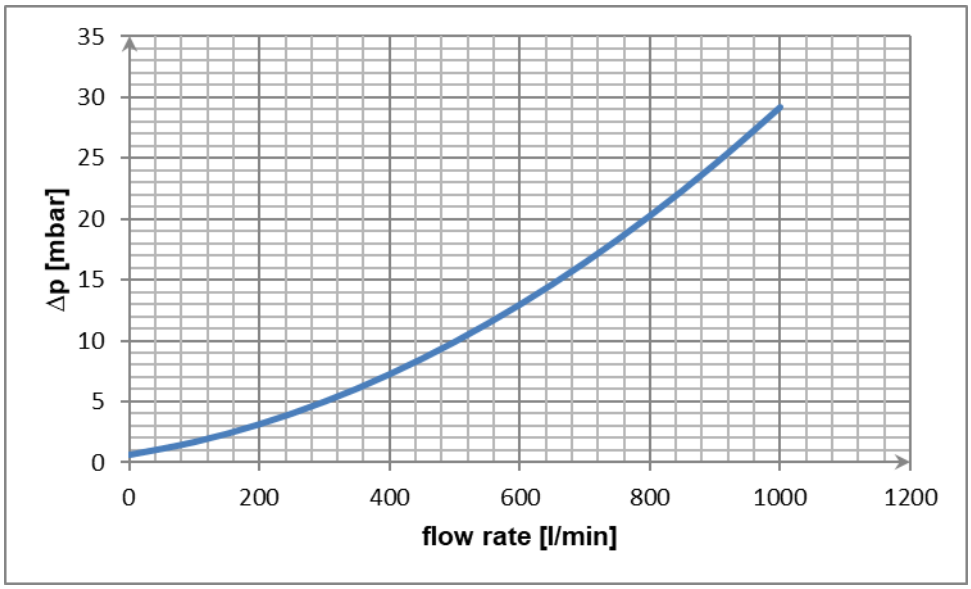

Figure 4: Pressure difference of an adsorber (without valves), depending on the volume flow.

Recommendations and Handling

From the adsorber index graphs, the following recommendations are made when using adsorbers.

The amount of desiccant in an adsorber should always be based on the volume flow and aim for an adsorber index of 0.7. If a system has a high pendulum volume, the sizing of the adsorber must be adjusted.