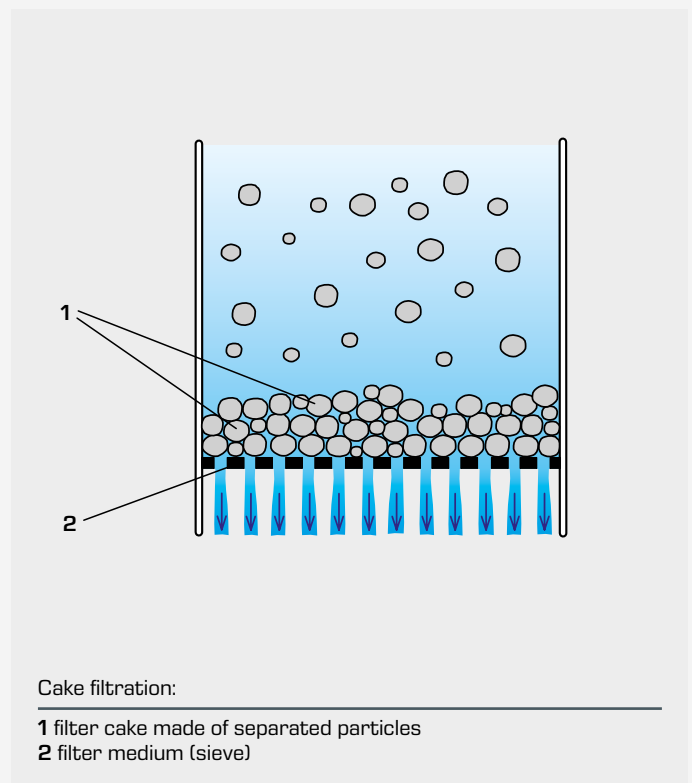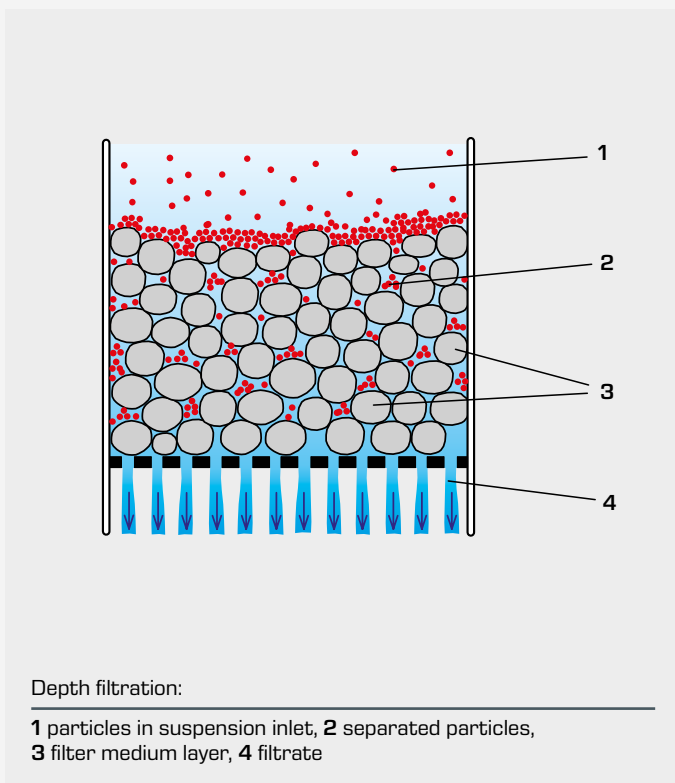## Basic knowledge
Filtration

During filtration, solid particles are separated off by a filter medium from a flowing suspension. Suspensions contain insoluble solids finely distributed in a liquid. Usable filter media are sieves, cloths, papers or bulk solids.

The filter medium must be as permeable to the liquid and as impermeable to the solid material as possible. The largely solid-free liquid emerging from the filter is termed the filtrate.

A fundamental distinction is made between depth filtration and cake filtration:

In **depth filtration**, the solid particles are separated inside a filter medium layer. The filter medium layer may be composed of larger grains (bulk) or of fibres. The solid particles are smaller than the pore width of the filter medium. They penetrate through the pores into the filter medium, where they are captured. Over time, the pores become more and more filled with the separated solid. This increasing loading of the filter is identifiable by a rising pressure loss. When a certain maximum pressure loss

has been reached and the capacity of the filter exhausted, the filter medium layer must be replaced or cleaned. Cleaning is usually carried out by way of back-flushing. Depth filtration is used mainly in water treatment, but also in the clarification of other liquids, such as beverages.

Depth filtration:

1 particles in suspension inlet, **2** separated particles,
3 filter medium layer, **4** filtrate

Cake filtration:

1 filter cake made of separated particles
2 filter medium (sieve)

In **cake filtration**, only one filter medium (sieve, cloth, filter paper) is present at the start of filtration. The pore width of the filter medium is less than the particle size of the solid. A growing filter cake made up of the separated particles thus forms over time on the filter medium. As a result, the pressure loss also increases and the flow rate decreases. For this reason the filter cake must be removed after a certain time. A distinction can be made between discontinuous and continuous filtration. In discontinuous filtration apparatus, such as Nutsche

Filters, the filtration process must be interrupted in order to remove the filter cake. An example of a continuous filter is the drum cell filter. It permits the filter cake to be removed while filtration is in progress. The desired product of a filtration may be the filtrate or the filter cake. Often the filter cake is rinsed and dried following filtering.