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Depth Filter vs Membrane Filter

An important point in filtration is knowledge of the functionality and differences between depth filters and membrane filters.

- Depth Filter → Filtration of media with different loads.
- Membrane Filter → Filtration of already pre-clarified media, very often serves as a defined sterile filter/barrier for downstream systems/units.

Depth Filter

The functionality of depth filters is divided into several mechanisms. Interception, sedimentation and diffusion are the most important factors in liquid filtration. Very often it is a combination of these factors that produces the desired filtrate in the end product.

When we talk about depth filters at vipur, we usually mean real "depth" filters.

The components are either cellulose only or cellulose with diatomaceous earth, perlite and/or binding resin. This mixture results in a depth filter with a thickness of +/- 4mm and has a correspondingly high dirt holding capacity due to its large inner surface. This can be reinforced with a more or less pronounced adsorption capacity. This so-called zeta potential is the reason why these filters also retain submicron particles in their filter matrix.

What needs to be considered when using Depth Filters?

Depth filters are resistant to differential pressure to a limited extent. The maximum differential pressure must not exceed 1,5bar for open systems or 2,4bar for closed systems. Accordingly, a pressure measurement is absolutely essential. In order to determine a possible saturation of the zeta potential, it is also advisable to record the turbidity.

In terms of their application, depth filters are very often used to protect downstream filters (e.g. membrane filters) or other process systems.

Depth filters cannot usually be tested for integrity. This is usually because at least a pressure retention test can be carried out for very fine retention levels in closed systems. There is no correlation as with membrane filters using a bacterial impact test.

The retention rate of depth filters is specified as a nominal value or only as a bandwidth. A comparison between different manufacturers is therefore not easy.

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Membrane Filter

Membrane filters are purely surface filters and therefore cannot be used for the filtration of contaminated media. However, if this is the case, the cost-effectiveness of the filtration system must be considered.

Why are Membrane Filters used?

Membrane filters generally have load tests of microorganisms per cm^2 as a basic definition.

All membrane filters can be tested for integrity before and after filtration using a filter test device with a bubble point or forward flow test. This documentation assures the user and his process with regard to the functionality of the membrane.

Their retention rate is an absolute value in µm, which can be used to compare different manufacturers.

Membrane filters have a high differential pressure resistance. The maximum differential pressure depends on the manufacturer and, above all, on the temperature. As a rule, this is approx. 6,0bar in the flow direction at 25°C and approx. 2,5bar at 80°C.

Flow rate diagrams of water in a more or less standardized process are very often used as a performance comparison.

As always, vipur recommends carrying out tests on site.

Key Message Depth Filter

Depth filters have a very high dirt holding capacity and should protect the immediately downstream system as well as possible. Differential pressure and turbidity are important parameters during depth filtration.

A comparison of different manufacturers can only be carried out through tests.

Key Message Membrane Filter

Membrane filters are pure surface filters and can only be used for the filtration of media that have already been treated accordingly. Their retention rate correlates with the bacterial load. They can be tested for integrity using a filter test device.