MASTER BREWERS ASSOCIATION OF THE AMERICAS

SEGMENTED FILTER SYSTEM
A PROVEN, REVOLUTOINARY DESIGN

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Introduction

Brewers and beverage producers are more concerned than ever about ensuring product and process safety, while keeping an eye on costs and sustainability. Process filters provide users the extra safety by filtering out contaminations that could harm the product, while protecting the valuable instruments and valves installed in the process line.

One Filter Construction, Many Possibilities

The popularity of the Segmented Filter systems for gases is based on their unique stainless steel construction. The stainless steel filter housing contains a number of stainless steel segment discs, depending on the filtration performance. Between these segment discs, the filter membranes are clamped safely in place.

Easy Adjustment with Variable Number of Discs

A complete filter unit is made up of an inlet segment disc, a filter membrane, an outlet segment disc, a filter membrane and an inlet segment disc. This construction can be repeated several times to increase the filtration performance. The only limit is the size of the housing. The three available housing types correspond to 2 to 6, 8 to 14 or up to 32 filter membranes.

A second parameter for adjusting the performance is the filter membrane diameter. These are available in the diameters 60, 82, 100 and 140 mm. The smallest possible configuration is made up of two 60 mm diameter filter membranes and a maximum gas performance of 40 Nm^3/h. The largest filter performance possible is 5,440 Nm^3/h, achieved using a filter with 32 140 mm membranes.

Different type of membranes

The filter membrane is supported mechanically on both sides and over the whole surface through the perforated segment discs. This does not reduce the filter area – the entire membrane of a segment filter is available as filter surface. In addition, this mechanical support makes the filter completely insensitive to pressure shocks, positive and negative ones. This results in a very robust, completely stainless steel construction, that does not damage or age during the filter life time.

Depending on the specific application, different types of filter membranes are used.

Extremely Robust PTFE Sterile Membrane

For sterile filtration, membranes made of high-quality 0.2 µm microbial rated PTFE with a bacterial and microbiological retention rate, called Log Reduction Value, of $>10^7/cm^2$ are used. The hydrophobic membrane material is free from resin and binding agents, and rejects bacteria transfer and growth.

This membrane is used for the sterile filtration of gases such as ambient air, compressed air, oxygen, CO_2 and nitrogen. The extremely high 95% distribution of the pores allows high flow capacities against very little pressure loss. In comparison to the pleated filter material found in alternative filter systems, the PTFE membrane is extremely robust, allowing for up to 150 steam sterilizations.

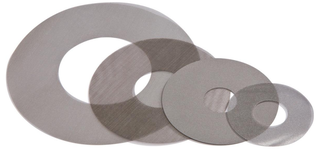
The filter membrane only needs to be changed after reaching this value. Apart from that, a filter membrane change is only necessary, if the desired flow rate is not achieved, or if the membrane is damaged.

Stainless Steel Mesh Separates Particles Reliability

An upstream particle filter reliably prevents damage to the sterile membrane or the direct entry of particles into the end product. This type of filter is also used for steam filtration. It is built in the same way as the sterile filter. Stainless steel mesh with a pore size of 3, 10, 25, 32, 50, 75 or 100 µm is used here. Other sizes are also possible. This stainless steel mesh separates particles like dust, mineral crystals and rust.

Contrary to sintered filter cartridges, the separated particles are kept on the upper surface of the stainless steel mesh, rather than retained throughout the filter medium. They can be removed by simply backwashing the filter element, restoring the filter performance. This backwash can be supported by chemical cleaning agents as required. Furthermore, the filter can be disassembled and the filter element cleaned separately in an ultrasonic bath.

Thanks to the high resistance and good cleanability of the stainless steel element, a filter element change is only required if damage is detected during maintenance.



The woven stainless steel structure doesn't change, even after long operating periods. A sintered filter cartridge, on the other hand, may emit particles after a certain length of time, contaminating the end product or damaging a downstream sterile filter and instrumentation.

Conclusion

The sophisticated design of the segment filter system allows for an easy adaption to differing capacities or different applications. By changing the filter material, it is possible to change between sterile and particle filters and vice versa at any time. Adjustment for increasing or decreasing filtration volumes is done by adding or removing segment discs and filter membranes.

In the segment filter systems, only the individual filter membranes need to be changed. In comparison to a complete change of a filter cartridge, segment filters therewith provide a much more sustainable solution and make cost savings of up to 50 percent for the same performance possible. Also, the packaging of 20 filter membranes, for example, takes up a volume of only 162x162x35 mm, reducing transport costs and storage volume in comparison to filter cartridges.

In addition, the actual condition of the filter membrane is openly on display. Separated particles or a defective membrane can be detected quickly and without great effort. This is yet another difference between the segment filter system and a 'black box' depth filter, with great importance for product safety.

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