Sterile Membrane Filters Ensure Wine Quality

In SIP cleaning, all parts of the filtration system that come into contact with the product are sterilized.

A Guide to Sterile Wine Filtration

How does the wine get into the bottle in a stable and safe way?

In wine production, bottling is considered to be particularly crucial for achieving the highest quality and cost-effectiveness. This is because it not only includes the final quality assurance step, but also determines the quantity of wine that will be sold. In order to meet the high market demands in terms of safety and service life, the filtration process must operate seamlessly.

Membrane filter cartridges are often used for quality assurance in bottling filtration. Also known as "police filters," they ensure that microorganisms harmful to wine, such as yeasts and bacteria, are retained before the wine is bottled. However, clogged or damaged membrane filter cartridges can lead to production downtime and thus to loss of revenue.

To avoid this, two aspects are particularly essential in filter cartridge management. First is correct pre-filtration, which prevents the membrane filter cartridges from early clogging.

Secondly, regular regeneration and sterilization so that they can be safely re-used.

During sterilization, microorganisms deposited on the surface of the membranes and all other product-contacting parts of the filtration system are eliminated. Thus, sterilization contributes significantly to the microbiological stability of the wine and the economy of the entire filtration process.

Steam sterilization is the most efficient method of eliminating microorganisms. In the SIP (sterilization in place) process, the complete cartridge housing is sterilized on site with saturated steam without having to remove the filter cartridges.

There are a few aspects to consider during steam sterilization to protect the membranes and plastic components of the filter cartridges from damage due to deformation and other defects.

Take advantage of Eaton's expert knowledge for safe and economical filter cartridge management.

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What Matters in Steam Sterilization?

In preparation for steam sterilization, the filtration system is drained and the hot saturated steam is pre-filtered so that it is free of rust, lime and particles.

When all valves are opened, the heating phase of the filtration system begins. Temperature and pressure slowly build up due to the incoming saturated steam, completely displacing the condensate as it is discharged at the lowest point on the inlet and outlet sides. At a temperature between 221 and 250°F (105 and 121°C), the steam outlet is throttled at all outlet valves and the actual steam sterilization begins.

The membrane filter cartridges and all other product-contacting parts of the filtration system are now sterilized for 20 to 30 minutes, depending on the temperature. It is important to note that membrane filter cartridges are always steamed in the direction of flow and that the maximum differential pressure of 4.4 psid (0.3 bar) is maintained during sterilization.

The filtration system is cooled down gently after steam sterilization to protect the membrane filter cartridges from damage.

For this purpose, Eaton recommends allowing oil- and water-free compressed air to flow along the filter cartridges at a maximum of 14.5 psi (1.0 bar) until a temperature of approx. 140°F (60°C) is reached and then continuing to cool slowly with filtered cold water. Alternatively, rinsing with filtered hot water [167 to 176°F (75 to 80°C)] followed by cold water is possible.

As the membrane filter cartridges are exposed to high temperature fluctuations during sterilization, their integrity must be ensured by an integrity test after each sterilization cycle.

Tips to protect filter cartridges from damage and defects:

- Do not clamp filter cartridges too tightly in the filter housing via the counter plate.
- Observe the manufacturer's instructions on maximum temperatures, pressure differences and times.
- Cool the filter cartridges gently with filtered compressed air.

Final wine filtration

Step 1
Filtration of service media

Steam filtration

BECO PROTECT® KM depth filter cartridges

Removal of particles

Active membrane protection

Step 2
Steam sterilization

Optimum steam temperature: 221–250°F (105–121°C)

Max. differential pressure: 4.4 psid (0.3 bar)

Duration: 20–30 minutes

Sterilization of membrane filter cartridges and system

Maximum process safety

Step 3
Filtration of service media

Compressed air filtration

BECO® MEMBRAN H Air membrane filter cartridges

Water filtration

BECO PROTECT or BECO MEMBRAN PS filter cartridges

Removal of particles and microorganisms

Active membrane protection

Gentle cool down of filtration system

Step 4
Integrity test

BECO MAX$_2$ integrity test unit

BECO Control Mini integrity test unit

Checking integrity of membrane filter cartridges

Maximum process safety

For more information on proper filter cartridge management, refer to Eaton's **Filter Cartridge Manual**.

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