

Sanitizing LifeASSURE™ BA Series Membrane Filters with Hydrogen Peroxide/Peracetic Acid Based Sanitizing Agents

SAFETY INFORMATION

Read, understand, and follow all safety information contained in these instructions and the instructions provided with the original filtration system, prior to installation and use. Retain for future reference.

| EXPLANATION OF SIGNAL WORD CONSEQUENCES | |
|--|---|
|  WARNING | Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury and/or property damage. |
|  CAUTION | Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and/or property damage. |

|  WARNING |
|---|
| <p>To reduce the risk associated with system burst related injuries:</p> <ul style="list-style-type: none"> • Do not use if fluid pressure exceeds rating described on the pressure vessel dataplate; • Do not use with fluids at temperatures exceeding the rating described on the pressure vessel dataplate; • Do not use for continuous service with compressed gases |

|  CAUTION |
|---|
| <p>To reduce the risk associated with exposure to contaminants:</p> <ul style="list-style-type: none"> • Always use appropriate personal protective equipment (PPE) when installing or servicing the filtration system. • Ensure that all system pressure has been relieved prior to opening the system to atmosphere. • To reduce the risk associated with eye, skin, and respiratory and digestive tract injuries from chemical cleaners/sanitizers during system maintenance: <ul style="list-style-type: none"> Do not get chemical cleaners/sanitizers in eyes, on skin, or on clothing. Do not ingest or inhale. Wear appropriate PPE including eye and face protection, protective gloves, and an appropriate NIOSH-approved filter mask. |

Introduction

In many food and beverage applications, the final membrane filters tend to plug by the gradual constriction of the pores with colloidal materials, not by the collection of fine particulate or microorganisms on the membrane surface. These colloidal substances are composed of various naturally occurring organic substances in the malt or fruit based beverage. These organic substances include beta-glucans, proteins, tannins and carbohydrates. These materials are either inherent in the malt or fruit or are generated in upstream processes such as fermentation and the enzymatic breakdown of carbohydrates and other components.

Regular flushing of the filter with warm water can reduce this build up and remove the layer of materials on the membrane surface. Many beverage manufacturers have found that including a daily warm water flush of the membrane in their daily filtration cycle reduces the level of build-up on the membrane surface and decreases the rate of differential pressure increase across the membrane with time (3M Purification Technical Brief 70020253400). However, flushing with warm water alone is not 100% effective at cleaning the pores in the membrane.

Warm water will dissolve the colloidal materials, removing them from the membrane surface which results in longer filter service life and lowers operating costs. Longer service life and larger operating cost savings can be achieved if the warm water cleaning step is followed by the addition of a chemical sanitizing/sanitization step to the daily filtration cycle. The most commonly used cleaning/sanitizing agents are hydrogen peroxide/peracetic acid based sanitizing agents. Peracetic acid and hydrogen peroxide are strong oxidizing agents that are very effective in oxidizing organic substances and also has a beneficial biocidal effect. The agents also contain hydrogen peroxide at a significantly higher concentration than the peracetic acid.

The recommended conditions for chemical sanitizing of used membranes are a warm water flush using filtered water at 131°F (55°C) followed by a static soak of the cartridges for 30 minutes in 0.5% v/v aqueous/hydrogen peroxide/peracetic acid based sanitizing agent solution at ambient temperature.

Laboratory tests indicate that LifeASSURE™ BA series membrane is compatible with dilute solution (up to 1.5% v/v) of hydrogen peroxide/peracetic acid based cleaning/sanitizing agents for up to 192 continuous hours at room temperature. Measurement of the membrane bubble point during the tests indicated the bubble points remained constant as a function of time of exposure to the sanitizing agent and remained above the minimum bubble point specification. No deterioration in the membrane flow characteristics as a function of the time of exposure was found.

Chemical sanitizing is only effective when the hydrogen peroxide and peracetic acid can penetrate the pores to oxidize colloidal materials within the pores. Therefore, a warm water flush is employed prior to use of the chemical sanitizing agents to remove excess colloidal material from the membrane surface to expose the pores in the membrane. Warm water can only work on those pores the warm water can flow through. Once a pore is plugged, neither the chemical sanitizing agent nor warm water will be completely effective in removing the colloidal materials. Therefore, warm water flushing and chemical sanitizing should be practiced BEFORE the differential pressure across the membrane begins to build. Once the differential pressure rises, the pores are effectively lost and can be considered as permanently plugged.

The warm water flushing or regeneration of the membrane, followed by chemical sanitizing is ideal for removing water soluble materials and oxidation by-products. These cleaning steps are usually followed by a hot water sanitation step. The typical temperature during the sanitation is 80 ° to 90 °C. At these elevated temperatures, the colloidal materials tend to “bake” in the pores and on the membrane surface causing permanent plugging of the membrane. Therefore, maximum benefit is achieved by conducting the warm flush and chemical sanitizing PRIOR to the hot water sanitation step.

Procedure

WARNING

- Exercise caution when working with caustic solutions. Wear and use appropriate safety equipment (clothing, gloves, face/eye protection) at all times.

1. At the end of the daily filtration run, push residual product out of the housing and cartridges with ambient temperature filtered water or CO₂.
2. Flow 131 °F (55 °C) filtered water through the filters to drain for 15 minutes at the same flowrate used to filter the product.
3. If filters are in series, it is recommended that the first filter be flushed to drain with warm water for 15 minutes before diverting the flow through the second filter.
4. Allow the housing to return to ambient temperature. (Flowing cold filtered water through the filters will shorten the time required to cool the housing and filters.)
5. Slowly add the 0.5% v/v hydrogen peroxide/peracetic acid sanitizing solution and fill the housing.
6. Allow the hydrogen peroxide/peracetic acid solution to remain in contact with the filters for 30 minutes.
7. Flush the cleaning solution from the housing by flowing ambient temperature filtered water to drain for 15 minutes at a flow rate of up to 2 gpm per 10” element not to exceed 35 psid.
8. Flow 176°F (80 °C) filtered water through the filters to drain for 30 minutes at the same flow rate as used to filter the product.
9. Allow the housing to cool to ambient temperature. (Flowing cold filtered water through the filters will shorten the time required to cool the housing and filters.)

10. Integrity test the filters before the next production run.

The five most common cleaning/sanitizing agents (the manufacturer) used in this application are:

| Cleaning/Sanitizing Agents | Active Components | |
|----------------------------|-----------------------|---------------------|
| Oxygal NEP (CFPI) | 15% hydrogen peroxide | 2.5% peracetic acid |
| Oxonia® (Henkel) | 15% hydrogen peroxide | 5.8% peracetic acid |
| Divosan® Mezzo (Diversey) | 22% hydrogen peroxide | 2.5% peracetic acid |
| Divosan® Plus (Diversey) | 15% hydrogen peroxide | 5% peracetic acid |
| Divosan® Forte (Diversey) | 26% hydrogen peroxide | 15% peracetic acid |

8% nitric acid

The recommended alkaline solution is 2-3% NaOH at a maximum of 140°F (60°C). Always use filtered water to make the solution.

Procedure:

 WARNING

- Exercise caution when working with caustic solutions. Appropriate apparel, gloves, and face/eye protection (safety glasses, goggles, or full mask) must be worn at all times.

1. At the end of a standard filtration cycle, flush the filter with warm 131 °F (55 °C) filtered water as described in 3M Purification Technical Brief 70020253400. Flush until filtrate appears clear.
2. Drain the housing and close the inlet and outlet housing valves.
3. Open the upstream housing bleed valve.
4. Slowly open the caustic solution valve at the inlet to the housing.
5. Slowly allow the caustic solution to fill the housing.
6. As the caustic solution emerges, close the upstream housing bleed valve and slowly open the downstream housing valve.
7. Flush the caustic solution through the system for 15 minutes at a flow rate at least as fast as the beverage itself (typically 1-2 gpm [4-8 lpm] per 10" filter cartridge). Faster flows will access more pores but do not exceed 3 gpm (12 lpm) per 10" filter cartridge.
8. Flush housing to neutralize any residual alkaline solution in the housing with filtered ambient temperature 0.5% to 1% citric acid solution.
9. Integrity test the filter(s) before next use.

Important Notice

The information described in this literature is accurate to the best of our knowledge. A variety of factors, however, can affect the performance of the Product(s) in a particular application, some of which are uniquely within your knowledge and control. **INFORMATION IS SUPPLIED UPON THE CONDITION THAT THE PERSONS RECEIVING THE SAME WILL MAKE THEIR OWN DETERMINATION AS TO ITS SUITABILITY FOR THEIR USE. IN NO EVENT WILL 3M PURIFICATION INC. BE RESPONSIBLE FOR DAMAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OF OR RELIANCE UPON INFORMATION.**

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