

LifeASSURE™ BA Series

Filter Cartridges for Beverage Stability

Advances in Membrane Technology

LifeASSURE™ BA series cartridge filter membrane technology allows casting of an integral membrane onto a variety of substrates. The result is a microporous membrane with characteristics, such as increased flow and reduced pressure drop, tailored to provide ideal performance for the intended application.

Advances in Membrane Technology

The LifeASSURE BA series membrane is combined with an advanced cartridge construction to provide enhanced mechanical and thermal resistance. This superior construction permits continuous service, even under demanding process conditions.

LifeASSURE BA series cartridge filters can reduce your final filtration costs by up to 50% or more in three ways:

1. Longer Life from Greater Surface Area

The LifeASSURE BA series cartridge filter has 40% more surface area compared to some competitive filters. Cartridge filter life is directly proportional to filter area and inversely proportional to face velocity (flow rate per filter area). For most beverages, when the filter area is doubled at the same flow rate, the throughput is increased by two and one-half times. The LifeASSURE BA series cartridge filter area is 20 to 50% higher than some competitive filters, so the face velocity can be lower and throughput greater.

2. Longer Life from Repeated Alkaline Regeneration

LifeASSURE™ BA series cartridge filters and LifeASSURE™ BLA series prefilter cartridges are both manufactured to withstand a mild alkaline flush after each day's run (typically 30 minutes of forward recirculation of 2–3% NaOH at 140°F [60°C]). Throughputs are improved from 3 to 10 times for most beverages depending on when the cleaning cycles are started.

Features & Benefits

High Surface Area, Nylon 6,6 Microporous Membrane

- Results in faster flow rates and longer service life than conventional membrane filters

Exceptional Spoilage Organism Retention

- Provides reliable microbiological control

Durable Cartridge Design

- Withstands repeated hot water sanitation cycles

Individually serialized and integrity tested in manufacturing

- Full traceable

Meets Requirements for Food Contact

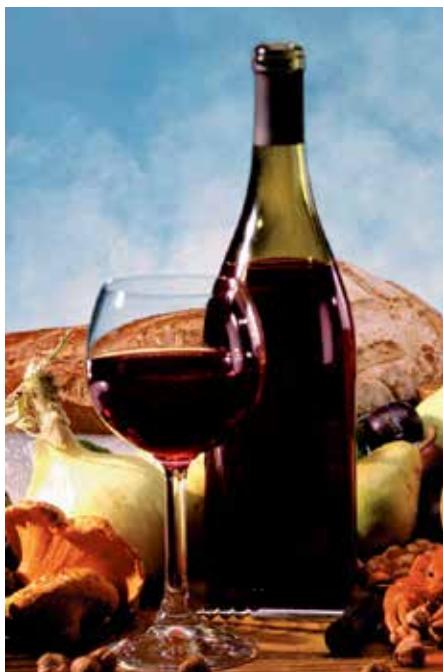
- Complies with requirements of The Pure Food, Drug and Cosmetic Act



Applications

LifeASSURE™ BA Series filters are optimized for Food & Beverage applications requiring reduction of fine particles and spoilage microorganisms.

- Wine
- Beer
- Bottled Water
- Soft Drinks
- Process Water
- Distilled Spirits
- Intermediates & Ingredients
- Syrups
- Dyes & Flavors



ISO 9001 Registered Quality System

LifeASSURE™ BA Series filter cartridges are manufactured under an ISO 9001 registered quality system. The quality system ensures that appropriate standards are met or exceeded to provide consistent, high quality products.

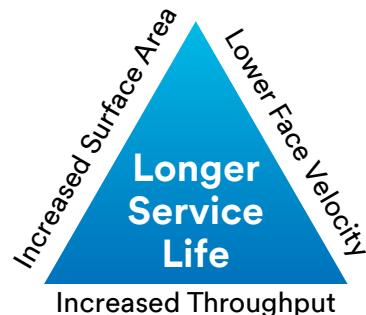
3. Enhanced Hot Water Stability

Hot water sanitation and warm-water flushing to dissolve accumulated contaminants are common practices in beverage plants. Longer hot water stability means longer filter life. The LifeASSURE BA series cartridge filter is constructed with nylon membrane optimized to withstand multiple hot water sanitation cycles without compromising filter integrity.

Saving with LifeASSURE BA Series Cartridge Filters

I. More Surface Area

The LifeASSURE BA series cartridge filter, when compared to many competitive filters at the same flow rate, provides immediate benefits by improving throughput, a direct result of the LifeASSURE BA series cartridge filter's greater surface area (see Graph 1) and lower face velocity (flow per unit area of membrane).



- With 40% more surface area than some competitive products, LifeASSURE BA series filters provide a 40% reduction in face velocity.
- Longer life from increased surface area = 40% or more¹
- Longer life from lower face velocity = 10% more
- Total life improvement factor = 50% or more

II. Cleanable

Alkaline flushing for regeneration can improve throughputs by a factor of 3 to 10 times compared to cartridge filter life without regeneration. (This benefit is enhanced if LifeASSURE prefiltration is also used because the prefilter can also be cleaned, and the throughputs for both filters will be improved.)

Assume: 2% NaOH regeneration improves throughput threefold, Lifetime Improvement Factor: = 3 times

1. Meier, et al., Proc. 23rd Convention of the Institute of Brewing, Asia Pacific Section, 1994.

Combined Lifetime Improvement

By combining the increased throughput provided by the greater surface area with the increased throughput resulting from filter regeneration, LifeASSURE™ BA series cartridge filters can increase system service life by over 100% to even 300% or more!

Smaller Housings

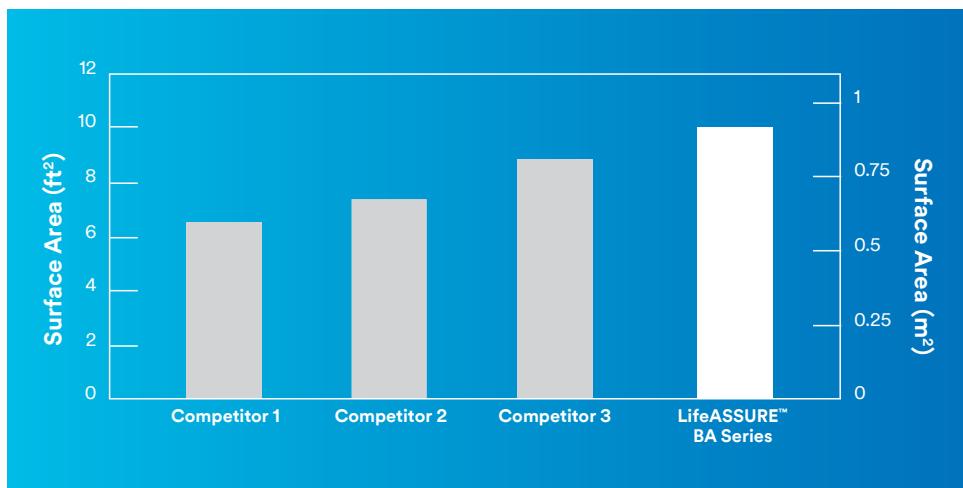
At a given, clean pressure drop, the LifeASSURE™ BA series filter can provide a flow rate that is greater than a number of competitive filters. Because the selection of a filter housing size is based on the flow rate of the filter, this means that bottlers choosing the LifeASSURE™ BA series filter can often select a smaller filter housing for their system flow rate. This results in decreased capital cost and a more compact system.

III. Longer Service Life

For very clean beverages, a LifeASSURE™ BA series filter's 50 hot water sanitation cycle specification means that the filter needs to be changed less frequently than competitive cartridges.



Graph 1. LifeASSURE™ BA Series Filter Cartridges provide the maximum surface area to reduce initial differential pressure, provide longer filter life, and minimize overall filtration cost.





Large and small bottlers of beer, wine, water, and juices have used membrane filtration as a part of their aseptic filling system for decades.

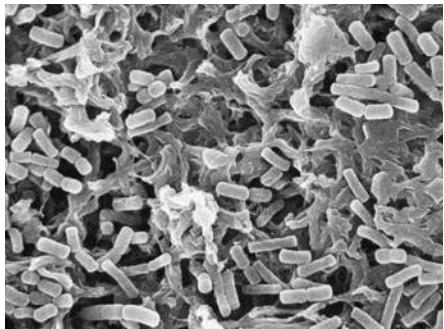


Figure 1. Scanning electron micrograph of the beer spoilage organism, *Lactobacillus brevis*, trapped on LifeASSURE™ BA Series 0.45µm membrane.

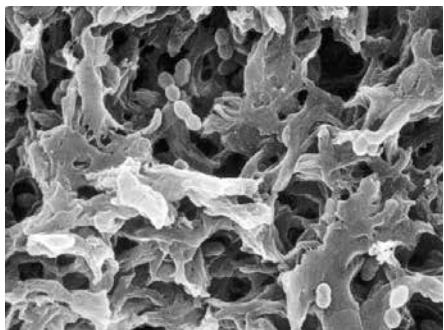


Figure 2. Scanning electron micrograph of the secondary fermentation organism, *Oenococcus oeni* (formerly *Leuconostoc oenos*), trapped on LifeASSURE™ BA series 0.45µm membrane.

LifeASSURE™ BA Series Cartridge Filters...

Quality, Economy, and Consistent Performance

Membrane filtration is the premier method of achieving microbiological stability in the container without the use of chemicals or heat. The organoleptic properties are completely preserved until the product is opened, be it weeks, months or years after filling.

The LifeASSURE™ BA series 0.65µm rated cartridge filter removes contaminating yeast, molds, and most spoilage bacteria from liquids. The LifeASSURE BA series 0.45µm rated cartridge filter removes not only yeast and molds, but even the smallest spoilage bacteria such as *Oenococcus oeni*, *Lactobacillus brevis* and *Pediococcus damnosus*.

Longer Life With Caustic Cleaning

Reports² show that most beverage membranes are fouled and plugged not by accumulated particulates and microorganisms, but by soft colloids of glucans, proteins and tannins that result from processes inherent in beverage manufacture. Removal of these deposits before significant build up results in longer filter life and improved process economies. Cleaning agents such as sodium hydroxide (long used by beverage bottlers) can effectively reduce the impact of colloidal material on filter life.

Advances in LifeASSURE BA series membrane and cartridge construction have resulted in a filter design that is cleanable using a dilute caustic solution. Laboratory studies conducted on plugged membranes showed 3 to 10 times more throughput by regular use of the caustic cleaning regime outlined in the following table after each bottling cycle.

Superior Bacteria Retention

In bacteria challenge studies, LifeASSURE BA series 0.45 micron rated membranes consistently provided log reduction values (LRV's) of >9 for *Lactobacillus brevis*, >8 for *Serratia marcescens* and >7 for *Oenococcus oeni* (formerly *Leuconostoc oenos*) at a minimum challenge level of 1×10^7 CFU/cm² of membrane surface area. LifeASSURE BA series 0.65 micron rated membranes provided complete retention of the spoilage yeast *Dekkera intermedia* (formerly *Brettanomyces*) at a concentration of 1×10^5 CFU/cm² of membrane surface area. These challenge levels are considerably higher than those commonly encountered in actual beverage filtration (see Figure 1).

Integrity Testing

LifeASSURE BA series cartridge filter can be integrity tested *in situ* by users. Bubble point pressure, diffusion flow, or pressure hold procedures can be performed while filters are in the housing, thus providing assurance of the filter's efficiency to remove spoilage microorganisms on-line. A technical brief on integrity testing LifeASSURE BA series cartridge filters is available from 3M Purification Inc. (request document 70-0202-6593-3).

Recommended Cleaning Parameters

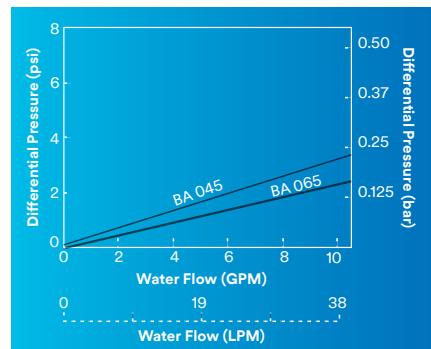
| | |
|--------------------|--|
| NaOH Concentration | 2–3% by weight |
| Temperature | 140°F (60°C) |
| Flow Rate | ≥1 GPM/10 in. Filter ≥4 LPM / 10 in. Filter |
| Duration | 30 minutes |

2. Meier, et al., Proc. 23rd Convention of the Institute of Brewing, Asia Pacific Section, 1994.

LifeASSURE™ BA Series Filter Cartridges for Beverage Stability

Recommended Operating Parameters

| | |
|--|--|
| Short Term Maximum Operating Temperature | 176°F (80°C) @ <35 psid |
| Maximum Operating Differential Pressure @ 72°F (25°C) | Forward: 80 psi (5.5 bar) Reverse: 50 psi (3.4 bar) |
| | Water: 3 gpm (11 lpm) |
| | Wine: 2 gpm (8 lpm) |
| | Beer: 1 gpm (4 lpm) |
| Recommended Flow Rate per 10 in. Filter | |
| Recommended Changeout Differential Pressure | 35 psi (2.4 bar) |
| Hot Water Sanitation (50 cycles) | 176°F (80°C), 30 min. |
| Steam Sterilization (20 cycles) | 250°F (121°C), 30 min. |
| Cartridge Filter Surface Area per 10 in. Filter | 10 ft. ² (0.93 m ²) |



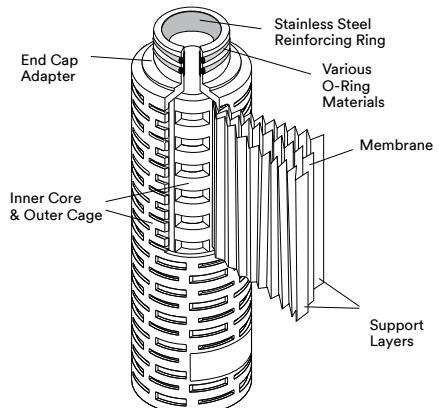
Graph 2. Clean Water Flow Rate vs. Differential Pressure for one 10 in. equivalent cartridge length at 77°F (25°C).

| Integrity Test Parameters | 045 Grade | 065 Grade |
|-------------------------------|----------------------|----------------------|
| Forward Flow Diffusion | ≤15 cc/min. @ 20 psi | ≤15 cc/min. @ 13 psi |
| Minimum Bubble Point | 24 psi | 16 psi |

Note: Integrity tests should be performed at ambient temperature with a regulated supply of compressed air or N2, and a water-wet cartridge.

LifeASSURE™ BA Series Cartridge Filter Construction

LifeASSURE BA series cartridge filters are constructed of single-layer reinforced, Nylon 6,6 microporous membrane pleated with polypropylene upstream and downstream support materials. The cage, core and end-cap adapters are made of polypropylene. Multiple length cartridges with industry standard connection styles are produced to fit the most widely used housing designs and system sizes. No resin or binder compounds are added. All materials used in manufacturing are traceable and CFR 21 listed for direct food contact. Cartridges are manufactured under an ISO 9001 certified quality system using the most advanced thermoplastic welding techniques for filter integrity. LifeASSURE BA series cartridge filters are 100% integrity tested after manufacture to ensure quality.



Prefiltration

Many bottling applications employ a prefilter and final filter in series to achieve maximum performance and economy. Prefilters are used to help protect and extend the life of more expensive final filters. 3M Purification Inc. offers two premium prefilter choices: Zeta Plus™ H series depth filter cartridges and LifeASSURE™ BLA series membrane filter cartridges. Zeta Plus H series filters (Literature 70-0201-8856-4) have long been used in clarifying beverages in both cellar operation and in-line to the bottler. Customers preferring cylindrical prefilters can select from LifeASSURE BLA series prefilter family (70-0201-8712-9). Containing a dual-zone version of the Nylon 6,6 membrane, LifeASSURE BLA series filters are designed to deliver excellent throughputs with high flow rates, while providing the ultimate in final membrane protection.

Recommended LifeASSURE™ BLA Series Prefilter Selections

| | Regular Service | Greater Protection |
|--|--------------------|--------------------|
| Prefilter for LifeASSURE™ BA045 | LifeASSURE™ BLA065 | LifeASSURE™ BLA045 |
| Prefilter for LifeASSURE™ BA065 | LifeASSURE™ BLA080 | LifeASSURE™ BLA065 |

3M Purification Inc.

A World Leader in Fluid Purification

3M Purification Inc. has a number of manufacturing facilities with ISO 9001 registered quality systems. Global manufacturing, together with trained stocking distributors and state-of-the-art laboratory support, bring quality solutions to beverage separations.

3M Purification Inc.'s leadership in fluid purification has expanded by continually providing superior products and services. 3M Purification Inc. filtration systems are designed and manufactured to the most stringent industry standards. This assures reliability of 3M Purification Inc. systems which beverage manufacturers around the world have come to expect.

Application Engineering

3M Purification Inc., Industrial Products has a global team of market-focused scientists and engineers who excel in supporting and collaborating with end-users. Our technical teams are skilled in performing on-site bench-scale or in-house tests, and relating results to full scale manufacturing operations and optimizing cost of purification. When unique processing problems are encountered, our product and application specialists are equipped to identify solutions using either 3M's broad array of existing products or potentially develop a custom solution for your application.



Completing the Beverage Filtration System

A specialized range of filter housings are available to meet the needs of the beverage industry. They provide easy access for filter changeout and establish that LifeASSURE BA series filter cartridges are sealed securely, thus minimizing the possibility of fluid bypass.



ZVS & ZMS Series Filter Housings. 3M Purification Inc.'s ZVS & ZMS series of filter housings are for lower volume beverage filtration applications requiring only a single LifeASSURE™ BA series cartridge filter.



ZWB Series Filter Housings. 3M Purification Inc.'s ZWB series of filter housings are for high volume beverage filtration applications requiring multiple LifeASSURE™ BA series cartridge filters.

3M Purification Inc. Filter Housings

| | ZWB (Swing Bolt Closure) | | ZMS (Clamp Closure) | | ZVS (Clamp Closure) | | | | | |
|----------------------------------|---------------------------------|-----------------------|---------------------------------|-----------------------|----------------------------------|-----------------------|--|--|--|--|
| | Model By Cartridge Capacity | Number of Cartridges* | Model By Cartridge Capacity | Number of Cartridges* | Model By Cartridge Capacity | Number of Cartridges* | | | | |
| Base Housing Models | 3ZWB | 3 | 1ZMS1 | 1 (10 inch) | 1ZVS1 | 1 (10 inch) | | | | |
| | 12ZWB | 12 | 1ZMS4 | 1 (40 inch) | 1ZVS4 | 1 (40 inch) | | | | |
| Housing Style | t-line Sanitary type connection | | t-line Sanitary type connection | | In-line Sanitary type connection | | | | | |
| Cartridge Lengths | 10, 20, 30, and 40 inches | | | | | | | | | |
| Materials of Construction | 316L Stainless Steel | | | | | | | | | |
| Literature Number | 70-0201-8884-6 | | 70-0201-8883-8 | | | | | | | |

*Cartridge lengths from 10 in. to 40 in.

LifeASSURE™ BLA Series Ordering Guide

| Catalog Number | Rating | Configuration | Length (Inches) | End-modification | O-ring Material |
|----------------|--------------------------|---------------|--|---|-------------------------|
| BA | 045–0.45µm 065–0.65µm | B – Cartridge | 01 – 10 02 – 20 03 – 30 04 – 40 | B – 226 Bayonet Locking with O-rings & Spear C – 222 O-rings & Spear F – 222 O-rings & Flat Cap | A – Silicone C – EPR |

Example: The part number for a 30 inch LifeASSURE BA series cartridge filter, 0.45 micron retention rating, 226 silicone O-ring connector with locating spear, would be: BA045A03BA.

PLEASE NOTE: The Ordering Guide above is for reference only. Not all combinations are available.
Please consult with your 3M Representative to determine the appropriate part number for your application.

| Technical Information |
|---|
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