

# 3M™ LifeASSURE™ BA Series Filter Cartridges for Beverage Stability

## Advances in Membrane Technology

LifeASSURE BA Series filter cartridge 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 excellent construction permits continuous service, even under demanding process conditions.

## LifeASSURE BA Series Filter Cartridges Can Help Reduce Your Final Filtration Costs in Two Ways:

### 1. Longer Life from Greater Surface Area

LifeASSURE BA Series filter cartridges have 40% more surface area compared to some competitive filters. Filter cartridge 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 filter cartridge 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 filter cartridges and 3M™ 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

### Food contact compliance

- Designated filtration products comply with USA FDA 21 CFR Sections 170-186 for food and beverage use
- The product is compliant with the requirements of Regulations (EC) 1935/2004, (EU) 10/2011, and (EC) 2023/2006 for food contact for use in aqueous, acidic, alcoholic and dairy products
- Consult 3M for detailed regulatory compliance information



## Applications

LifeASSURE BA Series filter cartridges are optimized for food and beverage applications requiring reduction of fine particles and spoilage microorganisms.

- Wine
- Beer
- Bottled Water
- Soft Drinks
- Process Water
- Distilled Spirits
- Intermediates and Ingredients
- Syrups
- Dyes and 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.

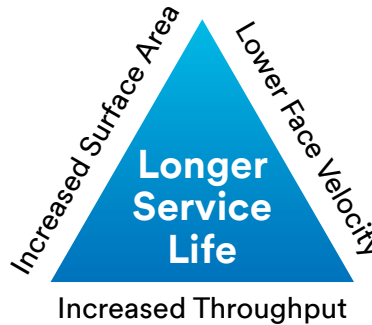
### 3. Enhanced Hot Water Stability

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. LifeASSURE BA Series filter cartridges are constructed with nylon membrane optimized to withstand multiple hot water sanitation cycles without compromising filter integrity.

## Saving with LifeASSURE BA Series Filter Cartridges

### I. More Surface Area

LifeASSURE BA Series filter cartridges, when compared to many competitive filters at the same flow rate, provide immediate benefits by improving throughput, a direct result of the LifeASSURE BA Series filter cartridge'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 filter cartridges provide a 40% reduction in face velocity
- Longer life from increased surface area = 40% or more<sup>1</sup>
- 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 filter cartridge life without regeneration. (This benefit is enhanced if LifeASSURE filter 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 filter cartridges can increase system service life by over 100% to even 300% or more.

### Smaller Housings

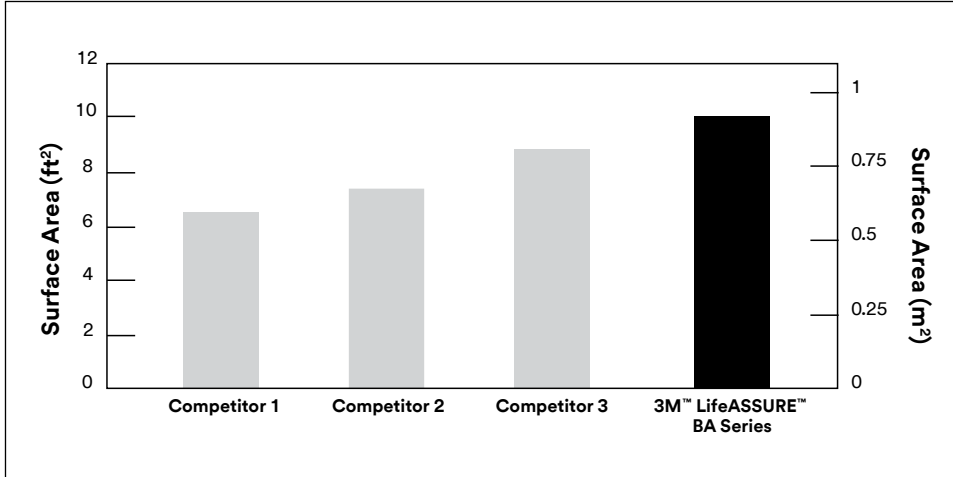
At a given, clean pressure drop, the LifeASSURE BA Series filter cartridge can provide a flow rate that is greater than a number of competitive filters. Because the selection of a filter housing size is based on the flow rate of the filter, this means that bottlers choosing the LifeASSURE BA Series filter cartridge 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 cartridge'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.

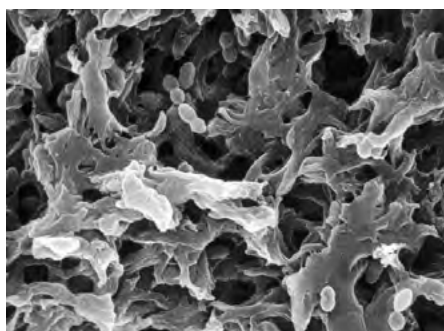


Figure 1. Scanning electron micrograph of the beer spoilage organism, *Lactobacillus brevis*, trapped on LifeASSURE BA Series 0.45 µm membrane.

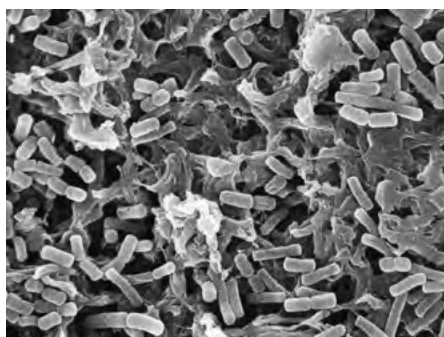


Figure 2. Scanning electron micrograph of the secondary fermentation organism, *Oenococcus oeni* (formerly *Leuconostoc oenos*), trapped on LifeASSURE BA Series 0.45 µm membrane.

## LifeASSURE BA Series Filter Cartridges

### 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.

LifeASSURE BA Series 0.65µm rated filter cartridges remove contaminating yeast, molds, and most spoilage bacteria from liquids. The LifeASSURE BA Series 0.45µm rated filter cartridge 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

Reports<sup>2</sup> 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  $1 \times 10^7$  CFU/cm<sup>2</sup> 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  $1 \times 10^5$  CFU/cm<sup>2</sup> 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 filter cartridges 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 filter cartridges is available from 3M.

#### Recommended Cleaning Parameters

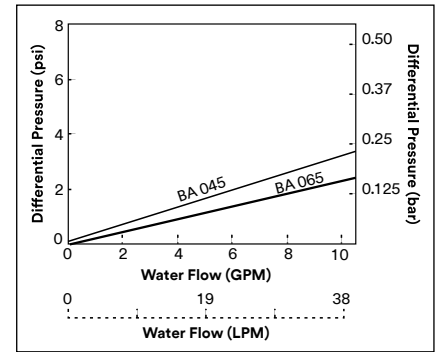
NaOH Concentration	2-3% by weight
Temperature	140°F (60°C)
Flow Rate	≥1 GPM/10 in. Filter ≥4 LPM/ 10 in. Filter
Duration	30 minutes

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

## 3M™ LifeASSURE™ BA Series Filter Cartridges for Beverage Stability

### Recommended Operating Parameters

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



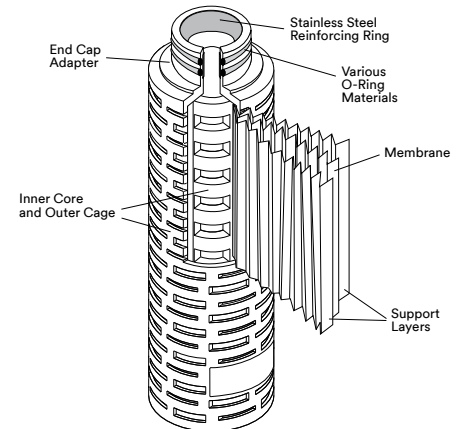
**Graph 2. Clean Water Flow Rate vs. Differential Pressure for one 10 in. equivalent cartridge length at 77°F (25°C).**

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

**Note:** Integrity tests should be performed at ambient temperature with a regulated supply of compressed air or N<sub>2</sub>, and a water-wet cartridge.

### LifeASSURE BA Series Filter Cartridge Construction

LifeASSURE BA Series filter cartridges 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. Cartridges are manufactured under an ISO 9001 certified quality system using the most advanced thermoplastic welding techniques for filter integrity. LifeASSURE BA Series filter cartridges 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 offers two premium prefilter choices: 3M™ Zeta Plus™ H Series Depth Filter Cartridges and 3M™ LifeASSURE™ BLA Series Membrane Filter Cartridges. Zeta Plus H Series filters 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. Containing a dual-zone version of the Nylon 6,6 membrane, LifeASSURE BLA Series filter cartridges 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
<b>Prefilter for 3M™ LifeASSURE™ BA045</b>	3M™ LifeASSURE™ BLA065	3M™ LifeASSURE™ BLA045
<b>Prefilter for 3M™ LifeASSURE™ BA065</b>	3M™ LifeASSURE™ BLA080	3M™ LifeASSURE™ BLA065

### **A World Leader in Fluid Purification**

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

### **Application Engineering**

3M 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.



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



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

### 3M Filter Housings

	3M™ ZWB (Swing Bolt Closure)	3M™ ZMS (Clamp Closure)	3M™ ZVS (Clamp Closure)
	Model By Cartridge Capacity / Number of Cartridges*	Model By Cartridge Capacity / Number of Cartridges*	Model By Cartridge Capacity / Number of Cartridges*
<b>Base Housing Models</b>	3ZWB / 3 12ZWB / 12	1ZMS1 / 1(10 inch) 1ZMS4 / 1(40 inch)	1ZVS1 / 1(10 inch) 1ZVS4 / 1(40 inch)
<b>Housing Style</b>	t-line Sanitary type connection	t-line Sanitary type connection	Inline Sanitary type connection
<b>Cartridge Lengths</b>	10", 20", 30" and 40"	10", 20", 30" and 40"	10", 20", 30" and 40"
<b>Materials of Construction</b>	316L Stainless Steel	316L Stainless Steel	316L Stainless Steel

\*Cartridge lengths from 10 in. to 40 in.

# 3M™ LifeASSURE™ BA Series Filter Cartridge Ordering Guide

Catalog Number	Removal Rating (µm)	Configuration	Length (Inches)	End-modification	Gasket/O-ring Material
BA	045 – 0.45 065 – 0.65	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 filter cartridge, 0.45 micron retention rating, 226 silicone O-ring connector with locating spear, would be: BA045A03BA.

\*\*“C” O-Ring (EPR) option is not for use in EU Food Contact applications.

**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.

**Intended Use:** 3M™ LifeASSURE™ BA Series Filter cartridges are intended for use in industrial filtration applications of aqueous fluids in accordance with the applicable product instructions and specifications. 3M LifeASSURE BA Series Filter cartridges are also intended for use with non-aqueous fluids where materials of construction are compatible. Certain limited 3M LifeASSURE BA Series Filter cartridges are also intended for use in food and beverage (F&B) applications. For details related to the specific use conditions or limitations for food contact applications please contact your 3M representative for more information. Since there are many factors that can affect a product’s use, the customer and user remain responsible for determining whether the 3M product is suitable and appropriate for the user’s specific application, including user conducting an appropriate risk assessment and evaluating the 3M product in user’s application.

**Restrictions on Use:** 3M advises against the use of these 3M products in any application other than the stated intended use(s), since other applications have not been evaluated by 3M and may result in an unsafe or unintended condition. Do not use in any manner whereby the 3M product, or any extractable or leachable from the 3M product, may become part of or remains in a medical device, drug, cosmetic, supplement, infant formula; or in applications involving life-sustaining medical applications or prolonged contact with internal bodily fluids or tissues.

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