

3M™ LifeASSURE™ BLA Series Filter Cartridges for Beverage Service

LifeASSURE BLA series filters are 3M's advancement in membrane filter cartridge technology. Encompassing two leading-edge processes, multi-zone microporous membrane technology and Advanced Pleat Technology (APT) construction, the LifeASSURE BLA series filter cartridges offer unmatched protection of final membrane filter cartridges, as well as long service life. Designed with pleated Nylon 6,6 membrane in an all-polypropylene cartridge construction, LifeASSURE BLA series filter cartridges are ideally suited for a wide range of pre-filtration and clarification applications in the beverage industry.

Optimal System Performance

Used as a pre-filter, LifeASSURE BLA series filter cartridges help protect and extend the service life of our 3M™ LifeASSURE™ BA, BNA and BDA series, final filter cartridges, as well as other membrane filter cartridges. LifeASSURE BLA series filter cartridges will:

- Increase final filter cartridge life substantially
- Decrease filter cartridge change-outs, substantially reducing filter cartridge costs
- Significantly reduce effluent microorganism content

Features & Benefits

Multi-zone microporous membrane

- Increased contaminant capacity
- Extended service life
- Maximum membrane protection
- Lower total filtration costs than competitive filter cartridges

Advanced pleat technology construction for high surface area

- Higher throughputs and longer service life than competitive filter cartridges
- Lower total filtration costs than competitive filter cartridges

100% integrity tested in manufacturing and *in-situ*

- Ensures proper installation and operation

True membrane construction

- Significant reduction of microorganisms

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 BLA series filters are optimized for prefiltration and clarification service in food and beverage applications.

- Wine
- Beer
- Bottled Water
- Soft Drinks
- Syrups
- Food Grade Dyes and Flavors
- Blending and Wash Water
- Distilled Spirits

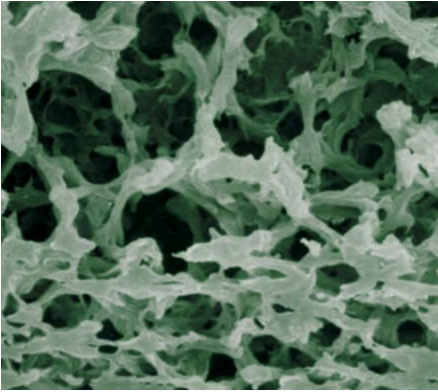


Figure 1: SEM of Multi-zone Microporous Membrane

Multi-zone Microporous Membrane Technology

LifeASSURE BLA series filter cartridges incorporate 3M’s advanced multi-zone microporous membrane technology. It allows excellent flexibility in creating a multi-zone membrane that offers the maximum in contaminant holding capacity while maintaining high retention efficiency. The SEM photograph shows that the single layer LifeASSURE BLA membrane consists of an “open” zone on the upstream side of the membrane and a “tighter” zone on the downstream side. In effect, the open zone acts as a pre-filter by capturing larger particles and colloids while the tighter zone provides the retention of smaller contaminants. This multi-zone structure eliminates dual-layer membrane construction to provide a larger surface area, significantly increased contaminant holding capacity and longer service life than competitive filter cartridges.

Advanced Pleat Technology Construction

LifeASSURE BLA series filters also feature 3M’s innovative Advanced Pleat Technology (APT) construction for extended service life. This design construct maximizes the useful surface area of the filter cartridge while maintaining proper flow paths between media pleats. By employing as much as 50% more effective surface area* than competitive filters (see chart 1), the LifeASSURE BLA series filter cartridge provides lower pressure drops, longer service life and lower overall filtration costs.

Chart 1: Surface Area Comparison

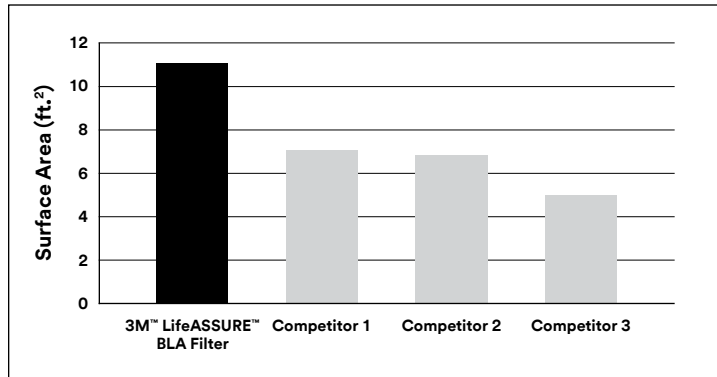


Table 1: Comparative Log Reduction Values

| Products | LRV |
|------------------------|-----|
| 3M™ LifeASSURE™ BLA020 | 7.3 |
| Competitor 1A | 4.5 |
| 3M™ LifeASSURE™ BLA045 | 3.5 |
| Competitor 1B | 2.6 |

* Competitive filter surface area data is from the respective manufacturers’ published literature.

Microorganism Reduction

LifeASSURE BLA series filter cartridges consistently exhibit a greater reduction of microorganisms than competitive filters that are either constructed of glass or polypropylene fibers, or filters that are constructed with non-integral membranes. For effective pre-filtration and clarification of beverages, microorganism reduction is a critical parameter resulting in economical, reliable filter cartridge systems.

In tests with *Brevundimonas diminuta*, (considered one of the smallest bacteria) LifeASSURE BLA020 series grade filter cartridges exhibited an average log reduction value** (LRV) of 7.3 and the LifeASSURE BLA045 series grade filter cartridges exhibited an average LRV of 3.5.

Optimize for Service Life and Effluent Quality

As the data in Charts 2 and 3 demonstrate, LifeASSURE BLA series filter cartridges are designed to provide both enhanced service life and performance. When compared to competitive products, the available grades of LifeASSURE BLA series filter cartridges allow the user to select equivalent effluent quality with vastly superior life, or improve the effluent quality with reduced, yet competitively superior, service life. Either way, the result is the same, LifeASSURE BLA series filter cartridges allow significantly more throughput than the competitive filter cartridges and provide up to double the service life.

Chart 2: Throughput Comparison of LifeASSURE BLA Series Filter Cartridge and 0.2 µm Nominal Filter Cartridges

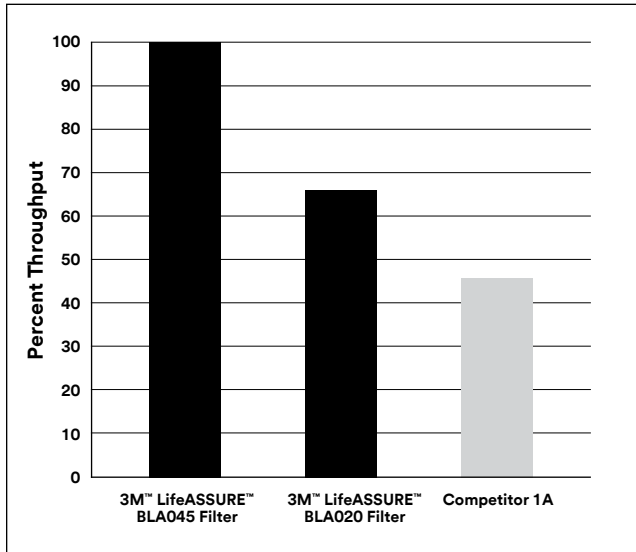
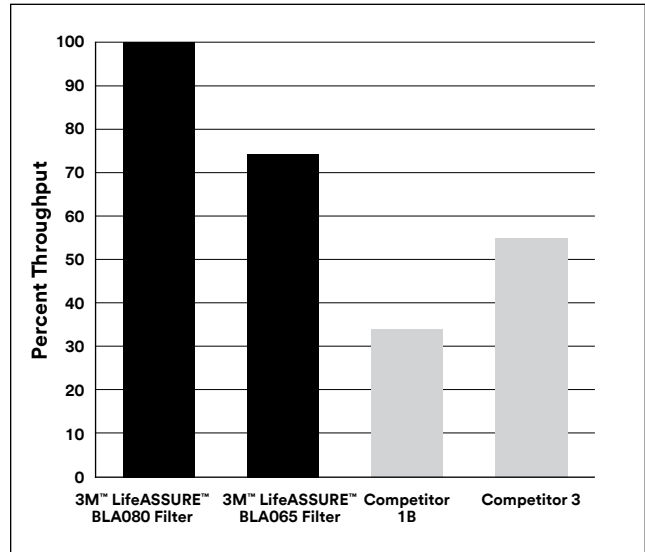


Chart 3: Throughput Comparison of LifeASSURE BLA Series Filter Cartridges and 0.2 µm Nominal Filter Cartridges



** LRV =log10 number of organisms in/number of organisms out.

Pre-filter Selection

Since beverages encompass a wide range of fluid conditions, 3M provides an array of LifeASSURE BLA series pre-filters to meet the needs of filter users. Pre-filtration selection is highly dependent on:

- The nature of the fluid
- The particulate/colloid content of the fluid
- The amount of pre-treatment or clarification of the fluid
- The rating of the membrane filter being protected

Table 2 below is provided as a guide to pre-filter selection, although actual process conditions may dictate the use of a more open or closed pre-filter, than specified below. Consult 3M's Scientific Application Engineering Department or 3M Technical Sales for more information.

Table 2: Pre-filter Selection Guide

| Grade | Upstream Zone | Downstream Zone | Fluid Condition | Pre-filter for |
|--------|---------------|-----------------|----------------------------------|--|
| BLA020 | 0.65 µm | 0.2 µm | Low particulate/colloid content | 3M™ LifeASSURE™ BDA020 or BNA020 Series Filters |
| BLA045 | 0.8 µm | 0.45 µm | Low particulate/colloid content | 3M™ LifeASSURE™ BDA020, BNA020, BA045 or BNA045 Series Filters |
| BLA065 | 1.2 µm | 0.65 µm | High particulate/colloid content | 3M™ LifeASSURE™ BA045 or BNA045 Series Filters |
| BLA080 | 2.5 µm | 0.8 µm | High particulate/colloid content | 3M™ LifeASSURE™ BA045, BNA045, BA065 or BNA065 Series Filters |



3M Final Series Filters

3M has several final filters to choose from in Food and Beverage applications, including:

- 3M™ LifeASSURE™ BA Series Filters — nylon membrane based final filters available in 0.45 µm and 0.65 µm retention ratings
- 3M™ LifeASSURE™ BNA Series Filters — PES membrane based final filters available in 0.2 µm, 0.45 µm and 0.65 µm retention ratings
- 3M™ LifeASSURE™ BDA Series Filters — PES membrane based sterilizing grade final filters available in 0.2 µm retention rating

Benefits of Higher Per-Filter Cartridge Flow Rates

The LifeASSURE BLA series filter cartridge construction results in a higher per-filter cartridge flow rate at the same pressure drop when compared to competitive filter cartridges. This can reduce filter cartridge costs two ways:

Change-out filter cartridges less frequently — For existing applications at a given flow rate, filter cartridges with more surface area per-cartridge have a lower flux (flow per unit surface area) than those filter cartridges with less surface area. Since service life is inversely proportional to flux (lower flux = longer service life) in most applications, LifeASSURE BLA series filter cartridges provide longer service life and require fewer filter cartridge change-outs than competitor cartridges.

Reduce filter cartridge housing costs — For new applications (where filter cartridge housing size is selected based on a desired “clean” initial pressure drop), filter cartridges that provide a higher flow rate per-cartridge at a given pressure drop will require fewer filter cartridges, and hence a smaller filter cartridge housing, to complete the task.

Installation Integrity Test

The installation integrity test is a non-destructive measurement of a filter cartridge’s ability to function as intended. Conducting an installation integrity test assures the user that the filter cartridge is installed and sealed correctly in the filter cartridge housing and is ready for service.

Unlike other pre-filter cartridges, LifeASSURE BLA series filter cartridges are 100% tested for integrity in manufacturing prior to shipment. Additionally, LifeASSURE BLA series filter cartridges are integrity testable in situ by the user.

Sanitation and Sterilization

The use of hot water (176°F/80°C) sanitation or steam (250°F/121°C) sterilization are common strategies employed in beverage production to maintain clean systems. LifeASSURE BLA series filter cartridges are constructed with Nylon 6,6 membrane optimized for thermal stability to ensure resistance to hot water or steam cycles.

Longer Life with Caustic Cleaning

Cleaning solutions, such as sodium hydroxide, can effectively reduce the impact of beverage colloids in plugging membrane filter cartridges. LifeASSURE BLA series filter cartridges, as with 3M™ LifeASSURE™ BA series filter cartridges, can be cleaned with a dilute caustic flush, reducing differential pressure build up and extending service life.



| Recommended Cleaning Parameters | |
|---------------------------------|--------------|
| NaOH Concentration | 2% by weight |
| Maximum Temperature | 140°F (60°C) |
| Flow Rate | 3 GPM/11 LPM |
| Duration | 30 minutes |

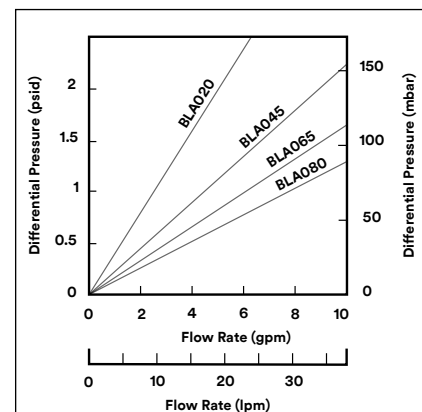
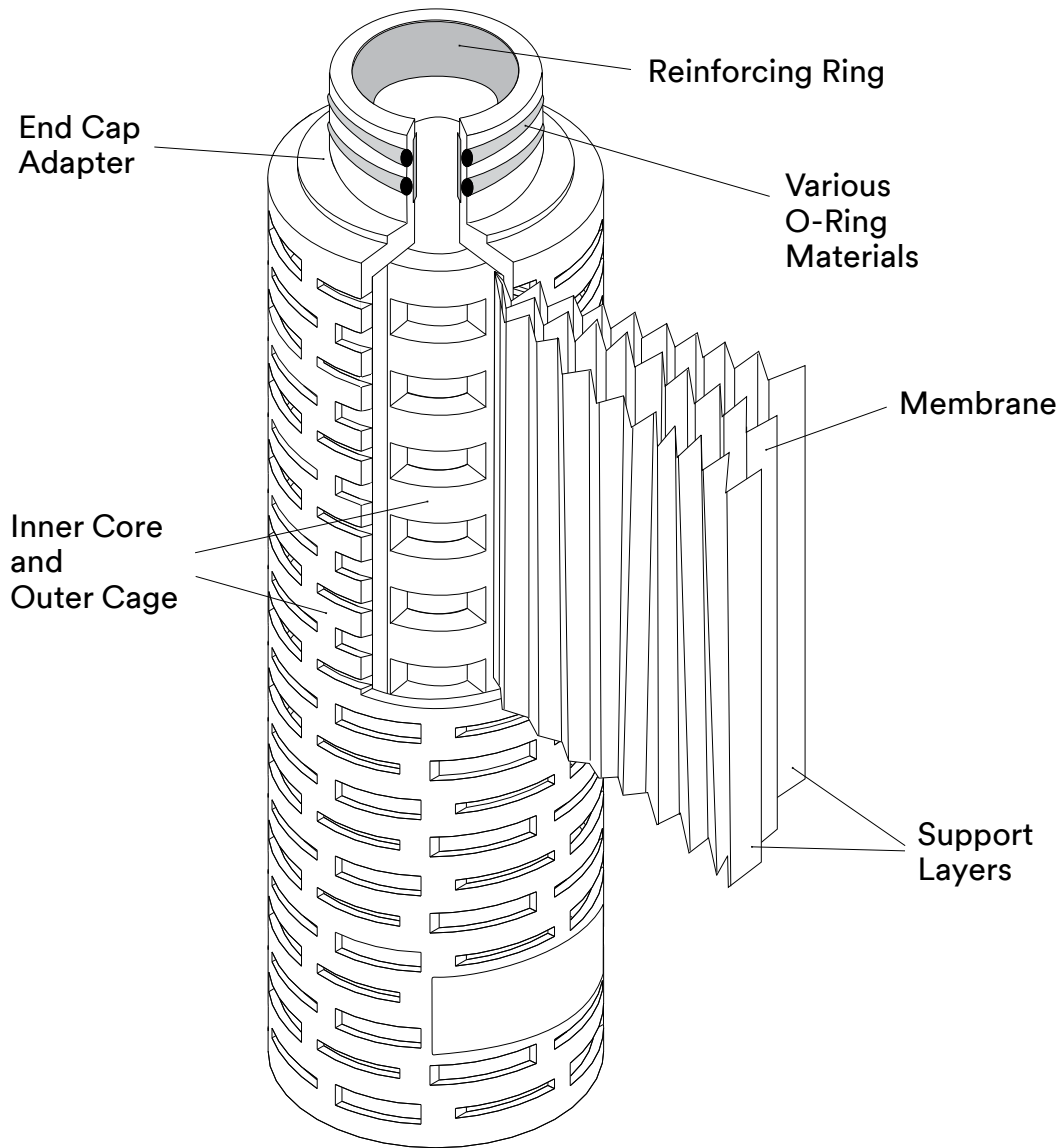


Chart 4: LifeASSURE BLA Series 10 in. Filter Cartridge Water Flow Rates @ 77°F (25°C)

3M™ LifeASSURE™ BLA Series Filter Cartridges Construction

LifeASSURE BLA series filter cartridges are constructed of single-layer, Nylon 6,6 microporous membrane pleated with polypropylene upstream and downstream support materials. The inner core, outer cage and end-cap adapters are made of polypropylene. Multiple length filter 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. LifeASSURE BLA series filter cartridges are 100% integrity tested after manufacture to ensure quality.



3M™ LifeASSURE™ BLA Series Filter Cartridges for Beverage Service

| Filter Cartridge Component | Material of Construction |
|--|--------------------------------|
| Outer Cage, Inner Core, End-Cap Adapters, Media Support Layers | Polypropylene |
| Membrane | Nylon 6,6 |
| Adapter Support Ring | Polysulfone or Stainless Steel |

| Filter Cartridge Dimensions | |
|-----------------------------|---|
| Filtration Surface Area | 11 ft. ² (1m ²) |
| Outside Diameter | 2-3/4 in. (7 cm) nominal |
| Length | Nominal 10 in. (25.4 cm), 20 in. (50.8 cm), 30 in. (76.2 cm), 40 in. (101.6 cm) |

| Operating Parameters | Specification |
|---|--|
| Maximum Operation Temperature | 176°F (80°C) for 30 minutes sanitation |
| Maximum Differential Pressure | Forward: 80 psid (5.5 bar) @ 77°F (25°C), 25 psid (1.7 bar) @ 176°F (80°C) Reverse: 50 psid (3.4 bar) @ 77°F (25°C) |
| Recommended Filter Cartridge Change-out Differential Pressure | 35 psid (2.4 bar) |
| Hot Water Sanitation | 30 minutes @ 176°F (80°C) |
| Steam Sterilization | 30 minutes @ 250°F (121°C) |
| Integrity Test Methods | Consult 3M for appropriate values for the specific filter cartridge and housing in use. |

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.



3M Filter Cartridge Housings

A specialized range of filter cartridge housings are available to meet the needs of the beverage industry. They provide easy access for filter cartridge change-out and the greatest assurance that LifeASSURE BLA series filter cartridges are sealed securely, thus eliminating the possibility of fluid bypass. All housings are constructed using 316L stainless steel to maximize corrosion resistance. Internal surfaces of the 3M™ ZWB Filter Housings are polished to limit microbial adhesion and provide easy cleaning.

3M™ LifeASSURE™ BLA Series Filter Cartridge Ordering Guide

| Filter Cartridge Grade | Removal Rating (µm) | Configuration | Length (Inches) | End-modification | Gasket/O-ring Material | Adapter Insert |
|------------------------|--|-------------------------------|--|---|--|--------------------------------|
| BLA | 020 – 0.20 045 – 0.45 065 – 0.65 080 – 0.80 | B – Pleated APT Configuration | 01 – 10 02 – 20 03 – 30 04 – 40 | B – 226 O-Ring & Spear (Code 7) C – 222 O-Ring & Spear (Code 8) D – Double open end (10 in. Length) E – Double open end (9-3/4 in. Length) F – 222 O-ring & Flat Cap (Code 3) | A – Silicone B – Fluorocarbon C* – EPR | 1 - No Insert 2 - SS Insert |

**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™ BLA 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 BLA Series Filter cartridges are also intended for use with non-aqueous fluids where materials of construction are compatible. Certain limited 3M LifeASSURE BLA 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.

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