

3M Purification
Food & Beverage Markets

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LifeASSURE™ BNA

045 & 065 Series Cartridge Filters

Robust PES Membrane Filters for Beverage Microbiological Stability

- ☑ New name for BevASSURE PES 045 & 065 cartridges
- ☑ Longer lasting for fewer cartridge changeouts
- ☑ Faster flowing for smaller assemblies
- ☑ Higher retention for added security

3M



LifeASSURE BNA Cartridge Filters for Beverage Microbiological Stability

Controlling the spoilage microorganism population prior to packing is critical for many beverage processors. Eliminating these microorganisms, while keeping other beverage properties unchanged, is of vital importance. Of equal importance, however, is attaining long on-stream filter service life and driving down operating costs associated with filtration. 3M Purification has solved this demanding problem with the creation of the LifeASSURE BNA Series of filter cartridges.

LifeASSURE BNA Series filters, formerly known as BevASSURE PES, encompass new, leading-edge technologies that not only provide the highest degree of microorganism control, but do so in an extremely durable and long-lasting design. LifeASSURE BNA filters employ a highly-asymmetric polyethersulfone (PES) membrane that delivers excellent spoilage microorganism retention while greatly minimising any organoleptic interference. This highly durable membrane/cartridge design withstands repeated exposure to hot water sanitation and steam sterilisation as well as common chemical cleaning and sanitising agents.

Complementing this high-performance membrane are 3M Purification's Advanced Pleat Technology (APT) design and an upstream and downstream support design. All three work in concert to provide an increased flow rate at a lower pressure drop, resulting in smaller filter assemblies with extended service life and a lower overall operational costs.

Features and Benefits

Robust construction

Highly asymmetric PES membrane

- Longer service life
- Lower operating costs

High spoilage organism retention

- Reliable microbiological control
- Performance matched to industry standards

Advanced Pleat Technology (APT)

- Increased accessible surface area
- Longer service life
- Lower operating costs

Upstream/downstream supports

- Increased flow per cartridge
- Reduced housing costs

Broad chemical compatibility

- Stable with most cleaning and sanitation regimes

FDA 21CFR compliant materials

- Safe for food contact

Advanced Technologies

Highly Asymmetric PES Membrane

LifeASSURE BNA filters incorporate a PES membrane with a high degree of asymmetry (Figure 1). When viewed in cross-section, the membrane contains larger pores on the upstream surface that gradually taper to smaller pores towards the downstream surface. Compared to conventional membranes with a symmetric pore structure, this structure provides greater contaminant capacity, since it presents greater open spaces (void volume) in which to retain these contaminants. This increase in capacity leads directly to longer service life. In addition, the asymmetric structure provides less resistance to flow, resulting in a lower pressure drop when compared at a constant flow rate to competitive filters, allowing a user to employ fewer LifeASSURE BNA filters for any given flow rate.

Advanced Pleat Technology (APT)

LifeASSURE BNA filters feature the Advanced Pleat Technology (APT) design for extended service life. This design technology maximises the useful surface area of the filter while maintaining open flow paths between the media pleats (refer to Figure 2). By employing the APT design, the LifeASSURE BNA filter provides lower pressure drops, longer service life and lower overall operational costs.

Upstream/Downstream Support Design

LifeASSURE BNA filters employ a design that results in higher beverage flow versus pressure drop compared to competitive filters.

This unique 3M Purification development combines the high flowing PES membrane with special support layers upstream and downstream of the membrane. When combined with the previously mentioned Advance Pleat Technology, this feature greatly increases flow per cartridge and results in lower overall operational costs.

Figure 1: LifeASSURE BNA SEM

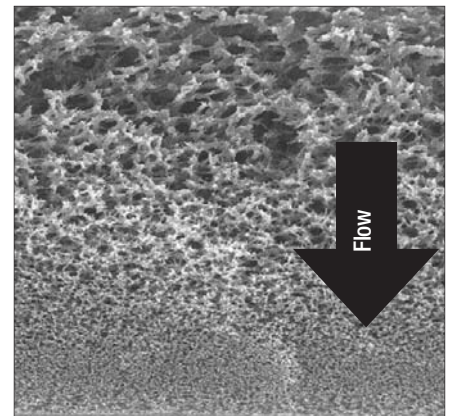


Figure 2: Advanced Pleat Technology

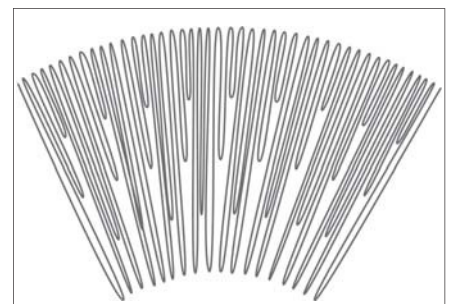
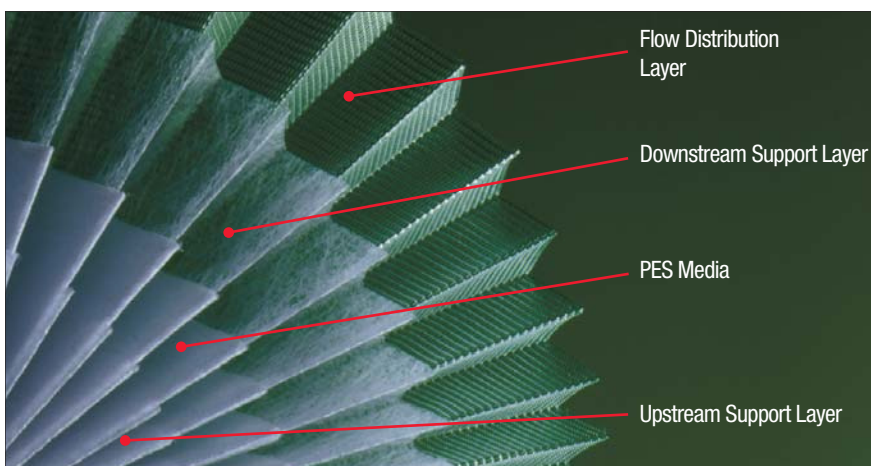


Figure 3: LifeASSURE BNA Support Design





Advanced Performance

Extended Service Life

In the majority of beverage applications, the final membrane filter is used in a continuous (as opposed to a batch) operation. Its service life is measured either by the volume filtered, or the number of days in service, before becoming permanently blocked. Filters that provide longer service life not only reduce direct operational costs, but also reduce indirect filter costs as well (filter change-out/installation labour, downtime between change-outs, filter flushing, etc.). The LifeASSURE BNA filter's unique combination of highly asymmetric PES membrane, Advanced Pleat Technology design and upstream/downstream supports all work together to maximise the volume of beverage that can be processed.

The chart at the bottom (Chart 1) depicts the service life performance of the LifeASSURE BNA filter compared to various competitive filters. A surrogate solution was employed to mimic beverage plugging characteristics at an increased rate. As the chart demonstrates, the LifeASSURE BNA filter's unique design provided more than twice the throughput of the nearest competitor, greatly reducing overall filtration costs.

LifeASSURE BNA Series	Microorganism	Typical Log Reduction Value (LRV)
BNA 045	<i>Oenococcus oeni</i>	8
BNA 045	<i>Serratia marcescens</i>	9
BNA 045	<i>Lactobacillus brevis</i>	10
BNA 045	<i>Dekkera intermedia</i>	9
BNA 065	<i>Lactobacillus brevis</i>	7
BNA 065	<i>Dekkera intermedia</i>	9

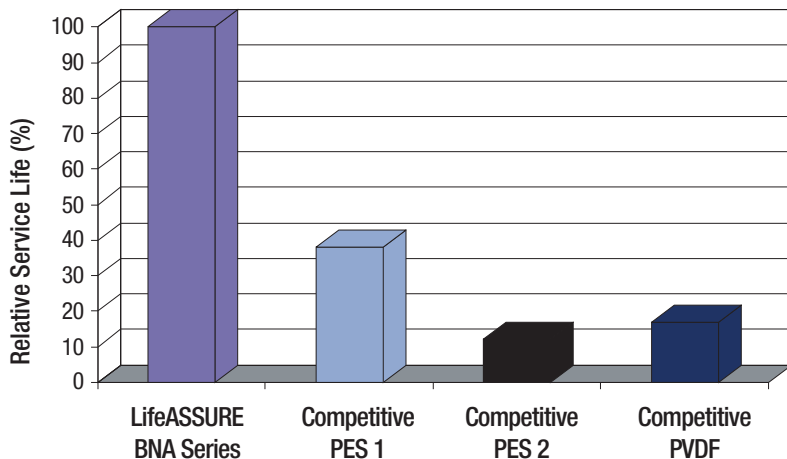
Reliable Microbiological Control

The primary purpose of a membrane filter cartridge in beverage processing is to effectively control spoilage microorganisms. LifeASSURE BNA 0.45 micron and 0.65 micron rated filters provide superior retention of common spoilage microorganisms, even at challenge concentrations that far exceed those experienced by most beverage producers (typically 10^6 to 10^7 cells per cm^2 of membrane area).

Log Reduction Values are calculated using the following formula:

$$\text{LRV} = \log_{10} \left(\frac{\text{total number of organisms entering the filter}}{\text{total number of organisms exiting the filter}} \right)$$

Chart 1: Comparative Service Life



Fast Flow Rates at Low Pressure Drops

3M Purification has combined three key technological advances to provide the fastest flow rate per unit of pressure drop. These three technologies, Advanced Pleat Technology (APT) design, an upstream and downstream support design and a unique, highly asymmetric microporous membrane, afford users with faster process flow rates using fewer filters.

Consider the following example:

Initial clean pressure drop (water) for a 30" cartridge flowing at 76 l/min (45 HI/h)	
3M LifeASSURE BNA 045	52 mbar
Competitor P*	132 mbar
Competitor M*	517 mbar
Competitor S*	172 mbar

As this example above illustrates, LifeASSURE BNA filters have a considerably lower pressure drop at a given flow rate when compared to competitive filters. Since filter change-out is usually tied to a terminal differential pressure drop (typically at 1.4 and 2.4 bar), employing filters that exhibit a lower initial pressure drop can result in longer filter service life.

Alternatively, in a new system when determining the number of filters needed to provide a desired flow rate at a given pressure drop, faster flowing filters will result in smaller, more economical systems.

Consider the following example:

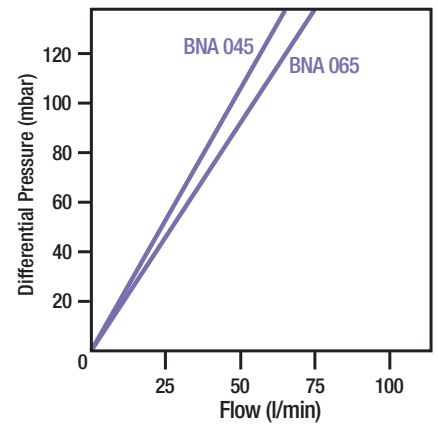
Number of 10" filters** needed to provide 76 l/min (45 HI/h) flow with a clean pressure drop of 70 mbar	
3M LifeASSURE BNA 045	2
Competitor P	5
Competitor M	24
Competitor S	5

As the example illustrates, the nearest competitor requires more than twice as many filter elements to provide the same flow rate and pressure drop.

Durable Design

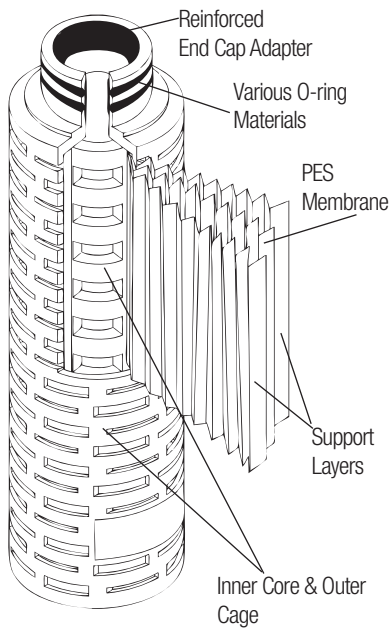
The LifeASSURE BNA filter membrane and cartridge design innovations result in a highly durable filter cartridge, capable of secure operation through numerous cycles of hot water sanitation, steam sterilisation and chemical based cleaning and sanitation.

10" Cartridges Flow Rates



* Data from published product literature

** rounded to nearest 10" filter length



LifeASSURE BNA Cartridge Construction

LifeASSURE BNA filter cartridges are constructed of single-layer, highly asymmetric, polyethersulfone (PES) 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 21 CFR compliant for direct food contact. Materials of construction meet USP Biological Reactivity for Class VI Plastics test. Cartridges are manufactured under an ISO 9001:2000 certified quality system using the most advanced thermoplastic welding techniques to ensure filter integrity. LifeASSURE BNA filters are 100% integrity tested after manufacture to ensure quality.

Materials of Construction	
Membrane	Polyethersulfone
Support layers	Polypropylene
Cage, Core, End Cape	Polypropylene
Adapter	Polypropylene with polysulfone reinforcing ring
O-rings	Various
Nominal Filter Dimensions	
Effective Filtration Area (EFA)	0.79 m ²
Filter Diameter	70 mm
Filter Lengths	254 mm, 508 mm, 762 mm, 1016 mm

Operating parameters		
Recommended Flow Rate (10" element)	Beer	3.8 – 7.6 l/min.
	Wine	7.6 – 11.4 l/min
	Maximum	34.5 l/min per 70 mbar
Max. Differential Pressure (Forward)	5.5 bar at 25 °C	
	2.4 bar at 90 °C	
Max. Differential Pressure (Reverse)	3.44 bar at 25 °C	
Max. Hot Water Sanitation Temperature	90 °C - 150 cycles, 30 minute cycles	
Max. Steam Sterilisation Temperature	135 °C - 75 cycles, 30 minute cycles	
NaOH cleaning duration (conc. 1M at 65 °C)	100 hours	
Peracetic acid sanitation (conc. 1 % at 21 °C)	100 hours	

Integrity Testing Parameters

The Integrity Test is a non-destructive test that can be performed by the user to ensure the filter is installed correctly and ready for operation. LifeASSURE BNA filters can be Integrity Tested either manually, or with the automated MicroCheck 2 tester, by one of three methods: the Forward Flow Test, the Bubble Point Test, or the Pressure Hold Test.

	BNA 045 (0.45 µm)	BNA 065 (0.65 µm)
Forward Flow Test Pressure	1.52 bar	1.03 bar
Max. Diffusion (10" element)	< 35 cc/min	< 25 cc/min
Minimum Bubble Point	1.65 bar	1.17 bar
Pressure Hold Test	Consult 3M Purification	Consult 3M Purification

Automated Integrity Testing - MicroCheck 2

A full range of non-destructive integrity tests can be easily and automatically performed with the MicroCheck 2 integrity test instrument. The MicroCheck 2 and MiniCheck integrity test instruments provide fast, reliable and accurate automated integrity testing of LifeASSURE BNA cartridges.

Prefiltration Selections

Many bottling applications employ a prefilter and final filter in series to achieve maximum performance and economy. Prefilters are used to protect and extend the life of more expensive final filters. 3M Purification offers two premium prefilter choices: Zeta Plus™ MHT Series depth filter cartridges and LifeASSURE BLA FlexN membrane filter cartridges. Zeta Plus™ MHT Series filters have long been used in clarifying fine wine in both cellar operation and in-line to the bottler. Customers preferring cylindrical prefilters can select from 3M Purification's LifeASSURE BLA prefilter family. Containing a dual-zone FlexN membrane, LifeASSURE BLA filters are designed to deliver excellent throughputs with high flow rates, while providing the ultimate in final membrane protection.

Filter Housings

A specialised range of filter housings is available to meet the needs of the food & beverage industry. They provide easy access for filter change-out and they ensure that LifeASSURE BNA filter cartridges are sealed securely to eliminate the possibility of fluid bypass. All housings are constructed using 316L stainless steel to maximise corrosion resistance. Internal surfaces of the housings are polished to 0.8 Ra to limit microbial adhesion and provide easy cleaning. 3M Purification also offers custom design, fully automated filtration skids and mobile units. These units can incorporate membrane housings, prefilter housings, SIP and CIP systems along with all necessary piping, valves, monitoring devices and computer controls for reliable, hands-free operation.

Scientific Application Support Services (SASS)

The cornerstone of 3M Purification's philosophy is service to customers, not only in product quality and prompt service, but also in problem solving, application support and in the sharing of scientific information. 3M Purification's Scientific Applications Support Services group is a market-oriented group of scientists and engineers who work closely with customers to solve difficult separations problems and aid in the selection of the most effective and economical filtration systems. SASS provides a vital link between 3M Purification and users of 3M Purification filter systems. SASS can carry out projects on-site, or in 3M Purification's extensive state-of-the-art laboratory facilities. 3M Purification's considerable experience with countless beverage installations provides the knowledge and insight to resolve problems promptly and efficiently in a cost-effective manner.



LifeASSURE BNA Series Filter Cartridge Ordering Guide

Catalogue Number	Rating	Configuration	Length	End Modification	O-ring/Gasket Material
BNA	045 – 0.45 µm 065 – 0.65 µm	F – APT Pleat	01 - 10" 02 - 20" 03 - 30" 04 - 40"	B - 226 O-rings bayonet lock with & spear C - 222 O-rings & spear D - Double open end, flat gasket (10" multiples) E - Double open end, flat gasket (9 ¾" multiples) F - 222 O-rings & flat cap J - 226 O-rings bayonet lock with flat cap T - 222 with spear (S code 28, not available with support ring)	A - Silicone (MVQ)* B - Fluorocarbon (FPM)* C - EPR (EPDM)* D - Nitrile (NBR)*

* ISO Designation

Note: LifeASSURE BNA is the new name for BevASSURE PES cartridges.

Example: The part number for a 30" LifeASSURE BNA Filter, 0.45 micron retention rating, 226 silicone O-ring connector with locating spear, would be: BNA045F03BA.

Important Notice

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Limited Warranty

3M Purification warrants it this product to be free from defects in material and workmanship during normal use for a period of one (1) year from the date of shipment from the factory. If the Product(s) is (are) defective within this warranty period, your exclusive remedy and 3M Purification's sole obligations shall be, at 3M Purification's option, to replace or repair the Product(s) or refund the original purchase price of the Product(s). This warranty does not apply to failures that result from abuse, misuse, alteration or damage not caused by 3M Purification or failure to properly follow installation and use instructions.

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