

3M Science.
Applied to Life.™

**3M filtration and gas
management solutions
for wine production.**





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3M Combines Innovation with Tradition

From the vineyards of Europe to the wine cellars in the Australian and Californian valleys, 3M has cooperated for decades with winemakers, sharing the experience they have acquired in filtration in order to attain the requirements in terms of clarity and absolute stability of the finest wines.

3M has, on the back of this experience, developed a number of innovations, including the first depth filter with a lenticular design: 3M™ Zeta Plus™.

3M designs its own filtration systems with the aim of helping producers improve their wine making process. A fine wine is more than just the sum of its ingredients. This is why 3M cooperates directly with individual producers in order to define an ideal system for clarification, prefiltration and final filtration.

The product of this is the creation of systems capable of reducing the total cost of filtration, while still guaranteeing efficiency and exceptional reliability.

In addition, strong of a long experience acquired with system manufacturers around the world in the beverage industry, 3M has successfully introduced and supported the use of its 3M™ Liqui-Cel™ membrane contactors for dissolved gas control in wine production, offering a unique technology for high operating efficiency and performance.

Experience passed down the generations ...
the main ingredients for obtaining good-quality wines.
3M knows how complex and difficult it is to create
the best wines in the world.

Why do wine producers all over the world choose 3M filtration and separation systems?



Performance

3M filtration and separation systems provide solutions **based on quality and cost-effectiveness** to meet wine cellars' requirements.

- Filters and membrane contactors with long service life and high flow rate
- Reduction in labour and replacement times
- Exceptional contaminant holding capacity
- Filter cartridges and membranes contactors designed to be reused before regeneration
- Consistent and reliable quality

Quality

3M filtration and separation systems guarantee a high level of quality intended to provide consistent performance.

- Certified to ISO9001 standards
- Production and distribution on a global scale
- Rigorous internal validation tests

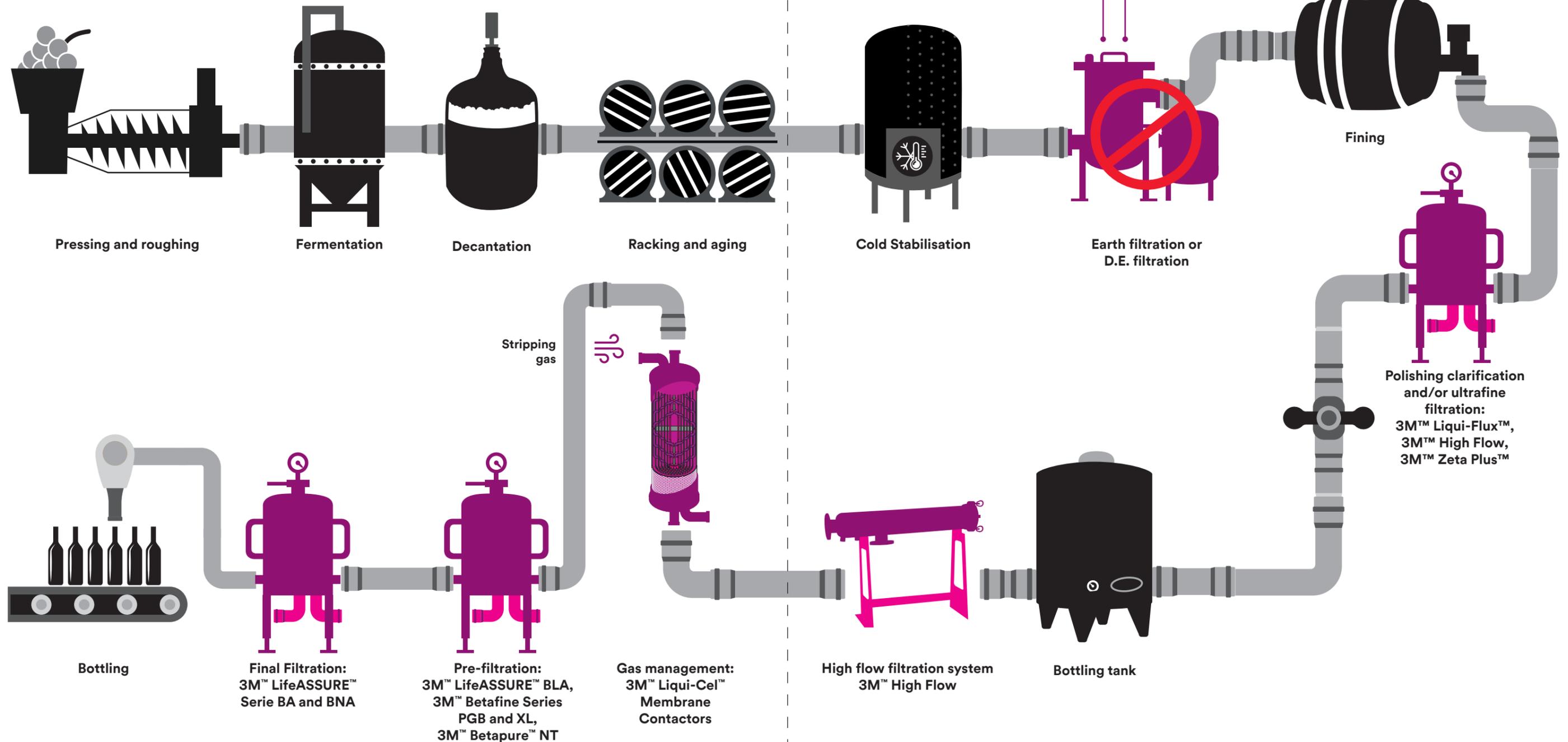
Benefits

3M filtration and separation systems offer convenient and easy use.

- Filters are easy to install and replace in order to minimise labour and down time
- The extensive range of products can be combined with many types of production lines

Wine Making Process

Here's an example of where filtration and gas control can enhance your wine production process.



1. Depth filtration systems

3M™ High Flow filtration systems,

highly efficient filters in a compact footprint design

3M™ High Flow requires fewer cartridges and smaller containers than traditional filtration systems.

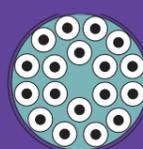
Comparison of potential options to obtain a system operating at a rate of 80 m³/h

3M High Flow filtration system



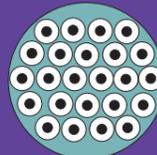
1 cartridge in a housing with a 8.6" (218 mm) diameter

2.5" (63.5 mm) pleated cartridges



18" cartridges in a housing with a 14" (356 mm) diameter

2.5" (63.5 mm) depth filters

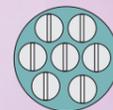


24" cartridges in a housing with a 16" (406 mm) diameter

↓ **90%**
90% fewer cartridges

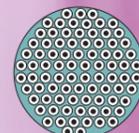
Comparison of potential options to obtain a system operating at a rate of 454 m³/h

3M High Flow filtration system



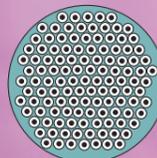
7 cartridges in a housing with a 24" (610 mm) diameter

2.5" (63.5 mm) pleated cartridges



85 cartridges in a housing with a 30" (762 mm) diameter

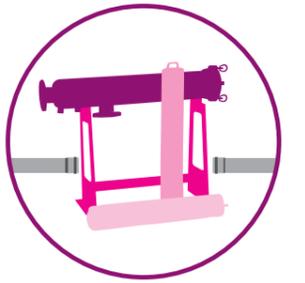
2.5" (63.5 mm) depth filters



120 cartridges in a housing with a 36" (914 mm) diameter

↓ **50%**
50% reduction in housing size

3M™ High-flow filtration system is perfect for prefiltration upstream of 3M™ Liqui-Cel™ membrane contactors



Quick and easy filter replacement

The user-friendly filter design allows the filters to be replaced in an easier and faster way.

Polypropylene structure

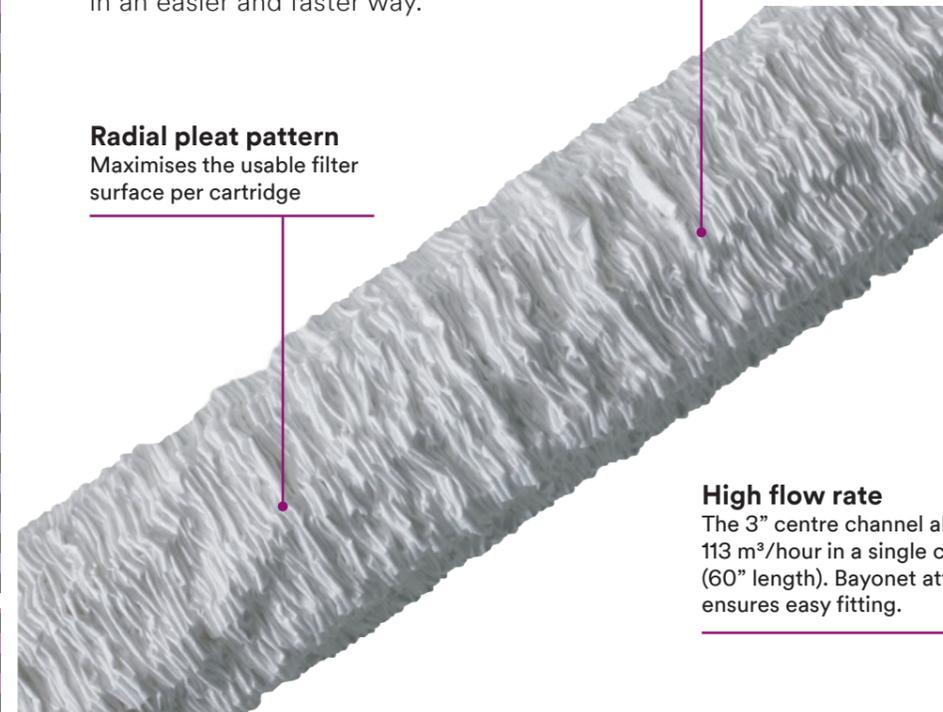
Provides broad compatibility with different types of fluids

Easy to use

Ergonomic and handy design, fast and easy to insert and remove without the need for any equipment.

Radial pleat pattern

Maximises the usable filter surface per cartridge



High flow rate

The 3" centre channel allows a flow of 113 m³/hour in a single cartridge (60" length). Bayonet attachment ensures easy fitting.





2. Cross-Flow Filtration System

3M™ Liqui-Flux™ Beverage Membrane Modules,

an alternative to filtration using Diatomaceous Earth (D.E.)

Technology

The 3M™ MF-PP Series capillary membrane modules have a symmetrical porous membrane structure and a high specific filter area.

This, combined with the low adsorption properties from polypropylene, makes the capillary membranes a reliable and economical alternative to conventional separation techniques, used in the clarification of wine.

In addition, filter modules with asymmetrical PES (Polyethersulfone) hollow fiber membranes are also part of 3M filtration product portfolio.

Full Cross-Flow Systems containing 3M™ Liqui-Flux™ Beverage modules as core components are assembled by OEM's worldwide.



Benefits

- Creates a single-step instead of a multi-step process
- No additional auxiliary filters required
- Adapted for fully automated production facilities
- Easy to regenerate in order to switch from one type of wine to another
- Low adsorption of polyphenols, tannins etc.
- Superior filtration performance
- Low wine loss
- Lower wine filtration costs
- No health-related risks compared to D.E. process
- Stainless steel and plastic housing available
- Long service life

3. Clarification



The 3M™ Zeta Plus™ HT and HN Series

guarantee the excellent polishing of wines

Wine producers all over the world use Zeta Plus™ depth filter cartridges to meet the most diverse range of filtration requirements.

Zeta Plus™ technology guarantees effective clarification and a significant reduction in contaminating yeast and bacteria, thereby ensuring the wines are improved and protected.

Zeta Plus™ cartridges with a narrower retention grade can retain 100% of yeast.



The wine producer's objective is to obtain a wine which is microbiologically stable and has an excellent clarity, which can sometimes be difficult to achieve.

Turbidity may depend on the heat, instable proteins or excessive yeast, as well as on more complex issues, such as the formation of protein complexes or polyphenols. Contaminating microorganisms come from a variety of sources and may originate from the grape itself, the addition of yeasts, from the surfaces of the barrels or even from lines which have not been cleaned properly.

The 3M™ Zeta Plus™ HT Series

offers major resistance to sanitation cycles

Zeta Plus™ HT Series filter cartridges are appropriately designed to be used in the winemaking sector. The design of the filter medium has been enhanced to withstand recurring sanitation cycles with hot water, thereby making it extremely efficient, cycle after cycle. This unique design, combined with the cartridge's robust structure, extends the filter's service life and makes the processes as economical as possible.



Benefits

- Significant reduction in particulates and microorganisms
- Closed system eliminates losses of wine, contamination by mould and insects and provides protection against oxidation
- Ability to withstand numerous sanitation cycles with hot water helps extend service life, reducing the wine's cost/litre by a significant margin
- The small amount of labour required and the easy installation and dismantling of the equipment keep production down time to a minimum

Technology

Depth filtration

Depth filtration helps reduce turbidity and particles effectively. The advanced filter medium makes it possible to retain bacteria, particles, colloids and contaminants and achieve higher performances compared to pleated filters.

Available in different retention grades and types, Zeta Plus™ filter cartridges provide optimum polishing and exceptional retention of microbial load.

3M™ Zeta Plus™ HN Series filter sheets,

high process reliability

3M™ Zeta Plus™ HN Series filter sheets are made from high-quality cellulose and inorganic components. 3M filter sheets have a high mechanical resistance, which means they offer an extended service life with lower operating costs.

The various retention grades available meet numerous application requirements.



3M™ Betafine™ XL Series pleated cartridge

The Betafine™ Series XL pleated cartridge, totally made of polypropylene, with absolute threshold, is constructed with "Advanced Pleating Technology" (APT™), which allows an increase in the total filtration surface, while keeping the dimensions of the standard cartridge.



Benefits

- Consistent and reproducible retention of contaminants and protection of downstream membranes
- Reduction in total filtration operating costs, thanks to the new innovative configuration, which maximises the filter surface area, helping extend service life and reduce the number of replacements
- The Betafine™ XL Series cartridge, thanks to its low pressure drop, makes it possible to size smaller filtration systems and thus reduce the overall cost of filtration
- Betafine™ XL cartridges made entirely of polypropylene support thermal and chemical cleaning cycles

3M™ Betapure™ NT-T Series filter cartridge

Betapure™ NT-T Series filter cartridges are 3M latest advance in depth filtration technology. The all polypropylene filter is constructed using a design that utilizes flow enhancing filter media and an innovative flow pattern. The result is an absolute-rated filter with vastly superior on-stream life that provides more cost effective filtration than conventional melt-blown filter technologies.

3M designed the Betapure™ NT-T Series cartridge to provide significantly superior service life while maintaining a consistent filtration efficiency. Betapure™ NT-T Series filters achieve this through an innovative cartridge design that allows uniform distribution of fluid flow and contaminant throughout the entire depth of the cartridge.

Betapure™ NT-T Series filter construction combines a polypropylene media with fluid distribution netting to form multiple layers. Critically positioned media flow channels allow greater movement of fluid from layer to layer. Three distinct media sections, made from multiple media/netting layers are combined to form the filter cartridge.



Benefits

- Superior Service Life
 - As much as three times greater dirt holding capacity than competitive filters
- All polypropylene depth filter cartridges
 - Allow for broad chemical and temperature compatibility
- Ratings from 0.5 to 70 micron
 - Suit a wide range of applications
- Absolute-Rated Performance
 - Allows for consistent filtration quality
- Exhibits superior particle retention under increasing differential pressure

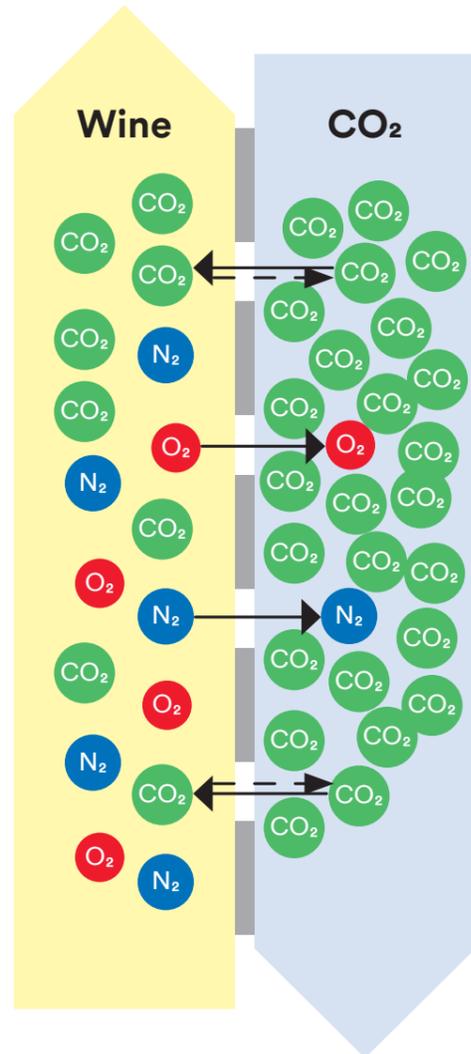
4. Gas control

3M™ Liqui-Cel™ Membrane Contactors

Remove/add gas to the wine in a versatile, compact solution

The taste and consistency of wine are linked to levels of dissolved gas content. Removing oxygen can help extend the product's shelf life, adding/removing carbon dioxide can make a product taste more pleasant. In general, gas control systems help improve the quality of the product, from the first sip to the last drop.

Efficiency at every phase of dissolved gas control



Benefits

- Gas concentrations can be accurately controlled to meet strictest product specifications
- High performance and efficiency: Liqui-Cel™ can achieve oxygen concentrations of less than 0,1 mg/l and avoid the loss of gas (nitrogen) used for sparging

Compact and versatile

- Liqui-Cel™ can be installed in confined spaces
- Liqui-Cel™ is flexible in terms of managing gas concentration of several gasses simultaneously
- Liqui-Cel™ can be used in several process phases: directly after clarification, tank to tank, or before bottling

Rapid gas control

- Can make the use of tanks or pumps redundant
- Reduces manufacturing labour and simplifies production processes
- Speeds up production processes by minimizing gas control process times

Deoxygenation

Oxygen in wine can compromise its quality and accelerate its deterioration.

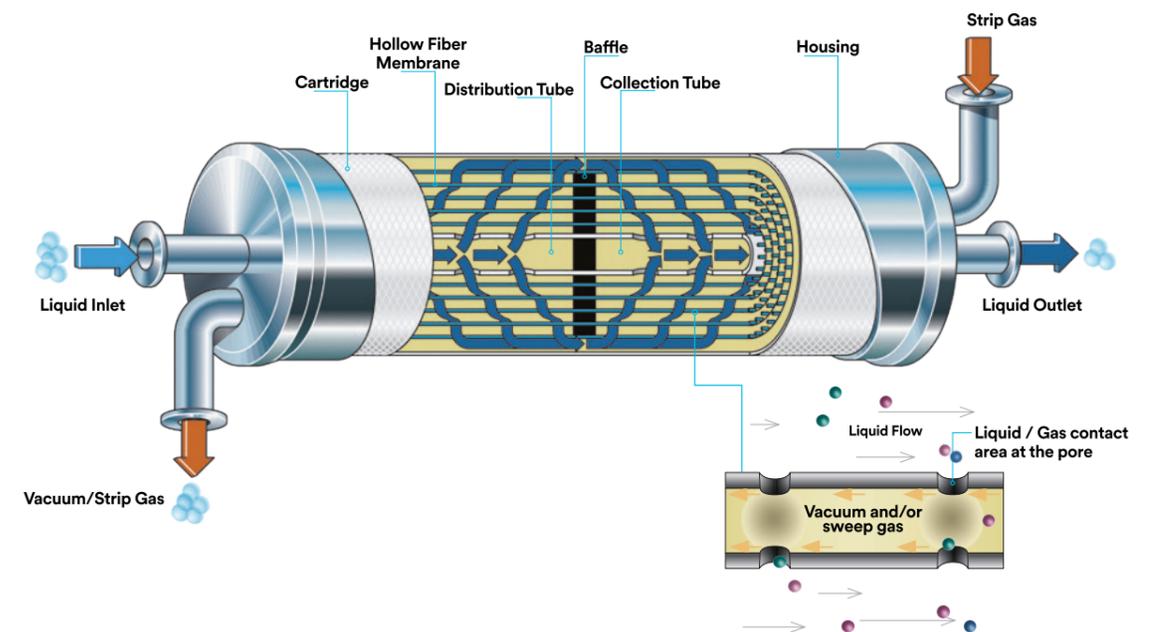
The membrane contactors in the Liqui-Cel™ series can reduce such impact on aroma and taste by limiting the amount of O₂ in the wine without using any chemical products. Gas management systems with 3M™ Liqui-Cel™ can protect the shelf life by O₂ removal.

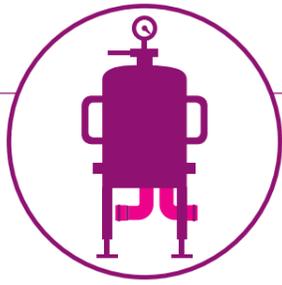
Addition or removal of carbon dioxide

Carbon dioxide affects the taste and sensation on the palate. Liqui-Cel™ can quickly add or remove gas to the wine in a precise and predictable manner.

Using Liqui-Cel™ in-line during the production process can help boost operational efficiency, while maintaining or improving the quality of the product, the consistency and stability.

Full systems containing 3M™ Liqui-Cel™ membrane Contactors as core component are assembled by OEM's worldwide.





5. Prefiltration

3M™ LifeASSURE™ BLA Series

Many bottling applications use one or more prefilters and a final filter, arranged in series, to achieve maximum performance and cost reduction.

Technology

LifeASSURE™ BLA Series filters are designed by combining a graded-density microporous membrane made of N66 nylon, with Advanced Pleat Technology (APT), to guarantee protection for the final membrane filters and an extended service life. The graded-density structure makes it possible to remove large particles and colloidal elements via the filter medium's external layer, which is more open, while smaller particles are retained in the filter's narrower internal zones.

This structure enables the contaminants to be distributed throughout the whole depth of the filter, thereby minimising the pressure drop and maximising the retention capacity.

Extended service life and superior quality

LifeASSURE™ BLA Series cartridges are designed to provide a long service life and high-performance level. When compared with competitor products, they help users achieve the same filtrate quality with a longer service life and a significantly higher flow rate.

Significant reduction in microorganisms

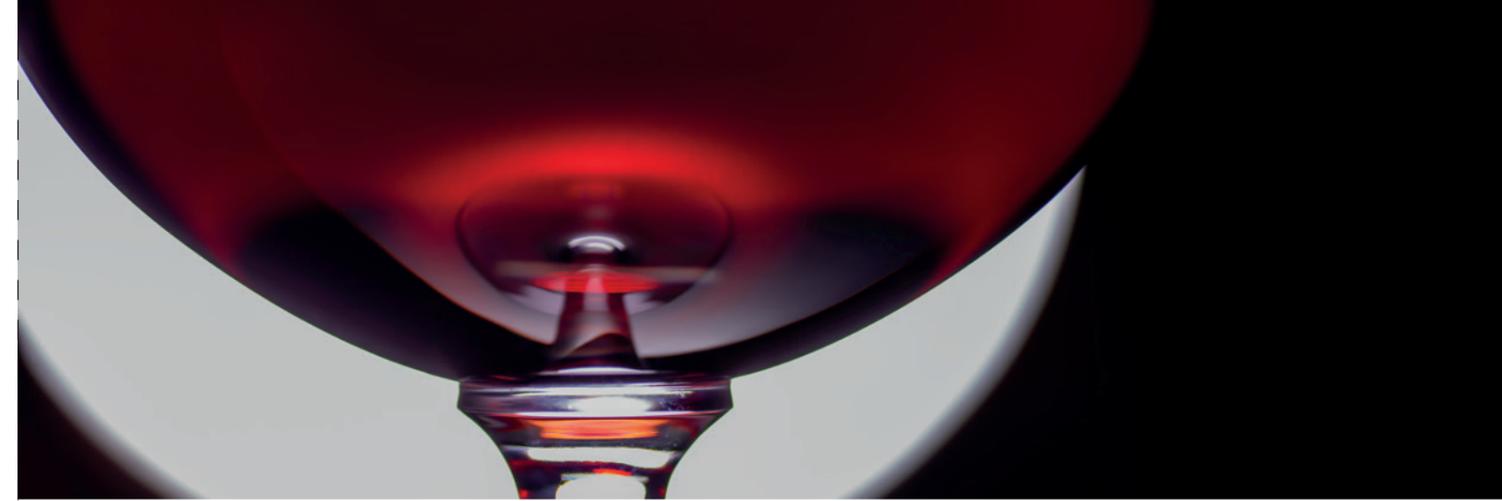
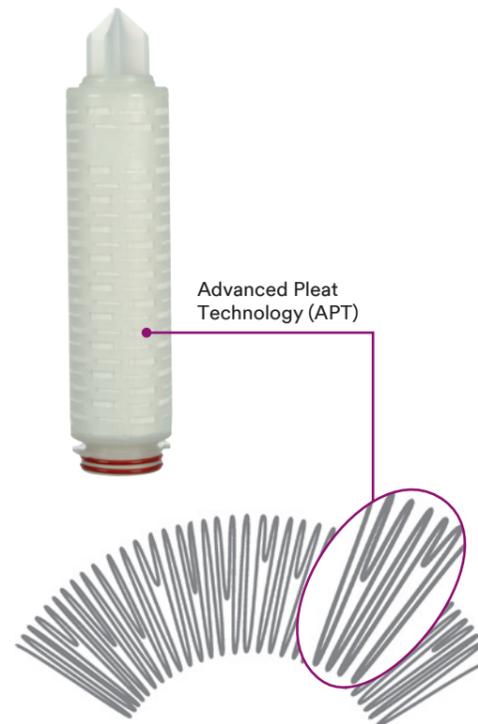
LifeASSURE™ BLA Series filters help reduce microorganisms further, compared to competitor filters.

In order to achieve effective prefiltration, the reduction of microorganisms is a critical parameter.

The LifeASSURE™ BLA filters help reduce bacteria (LRV) from 3.5 to 7.3, depending on the retention grade.

Benefits

- Increases the final filter's service life substantially
- Reduces the frequency of final filter changeouts, thereby considerably cutting filtration costs
- Reduces the microorganism content significantly
- Testable membrane to insure full integrity of the system after several filtration cycles



The prefilter selection guide is strongly influenced by specific process conditions. Some conditions may require the use of a different prefilter than specified below. The prefilter selection can be ascertained by small-scale pilot tests.

Prefilter selection guide

3M offers a wide selection of prefilters in the LifeASSURE™ BLA Series to meet the most diverse filtration requirements sought by users. Prefilter selection may depend on different factors, including:

- Nature of the fluid
- Particulate/colloid content of the fluid
- Degree of pre-treatment or clarification of the fluid
- Degree of filtration of the final membrane to be protected

Prefilter

Filter cartridges 3M™ LifeASSURE™ BAO45/BNA045 Series			
Grade	Upstream	Downstream	Particles/colloids in the fluid
BLA045	0.8 µm	0.45 µm	Low levels
BLA065	1.2 µm	0.65 µm	High levels

Filter cartridges 3M™ LifeASSURE™ BAO45/BNA045 Series Filter cartridges 3M™ LifeASSURE™ BAO65/BNA065 Series			
Grade	Upstream	Downstream	Particles/colloids in the fluid
BLA080	2.5 µm	0.80 µm	High levels

3M™ Betafine™ PBG Series Filter cartridges

The staggered pleating system featured in the Betafine™ PBG Series cartridge, combined with an innovative support material, provides a larger filtration surface area for the same media size. The staggered APT pleats designed in this way have a larger filtration surface area and support greater contaminant loading, taking full advantage of the surface available, and offering a longer service life.

Benefits

- Consistent and reproducible retention of contaminants and protection of downstream membranes
- Reduction in total filtration operating costs, thanks to the new innovative configuration, which maximises the filter surface area, helping extend service life and reduce the number of replacements
- Betafine™ PBG maximises retention capacity, thanks to the double-layer structure offering graded porosity, where the upstream layer acts as a prefilter for the downstream one
- The cartridge's polypropylene structure supports backflushing and makes it compatible with a broad range of detergent solutions (e.g. carbonate of soda)

3M™ High Flow Series

3M™ High Flow Filter System is an absolute rated, patented filtration system designed to accommodate flow rates up to 113 m³/hr per cartridge. The High Flow Filtration System features a sophisticated design combining 3M innovation and CUNO filtration experience to create a high flow filter in a compact design.

Benefits

3M™ High Flow Filter System offers the following:

- High flow capability from 20 m³/hr to 113 m³/hr per cartridge
- Compact design
- Ease of use
- Absolute rating
- FDA Compliant
- Compliant to Food Contact Directive (EC) 1935/2004 – Can be used in applications requiring direct contact in food and beverage processing
- The 3M™ High Flow Filter System requires 90% fewer cartridges than conventional 2.5” (63.5 mm) OD cartridge systems for a given flow rate

Features	Benefits
High flow capability per cartridge (vs. conventional 2.5” (63.5 mm) OD cartridges)	Fewer cartridges required, resulting in: <ul style="list-style-type: none"> • Reduced cartridge handling and disposal • Reduced filter change-out time • Less individual cartridge seal points, reducing chance of fluid bypass
Compound radial pleat design using 3M blown microfibre polypropylene media	<ul style="list-style-type: none"> • High filter loading capacity • Reproducible filter effluent quality throughout life of filter • Broad chemical compatibility
Compact system design	<ul style="list-style-type: none"> • Smaller housing minimises capital expense requirements • Reduces system footprint
Easy to use	<ul style="list-style-type: none"> • No special tools or hardware required for filter change-out • ‘Twist-to-lock’ cartridge seating mechanism provides positive seal • Ergonomic design handle facilitates cartridge installation and removal
Approved for food contact use	 <ul style="list-style-type: none"> • Complies with European regulations (Food Contact Directive (EC) 1935/2004) and US regulations (FDA CFR-21)

3M™ Betafine™ XL Series and 3M™ Betapure™ NT-T Series

As stated in Section 3. Clarification, the broad range of ratings offered by the Betafine XL Series and Betapure NT-T Series makes those well suitable for the pre-filtration step. Thanks to an innovative cartridge design offering maximised total filtration surface and superior service life along with the polypropylene membrane material these two Series provide robust, consistent and economical solutions.

6. Final Filtration on Membrane

3M™ LifeASSURE™ BNA Series Filter Cartridge

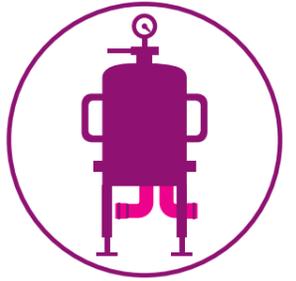
Membrane filtration is the best method to use to achieve microbiological stability without using chemicals or heat. This ensures that the organoleptic properties of the wine are preserved until opening the product, whether this occurs weeks, months or years after bottling. Microbiological stability (where undesirable yeast and bacteria are removed) is a vital characteristic for fine wines. LifeASSURE™ BA and BNA Series cartridges are available with retention grades of 0.65 µm in order to eliminate yeast, mould and bacteria, and 0.45 µm for removal of smaller microorganisms responsible for spoiling wine.

LifeASSURE™ BNA Series filter cartridges combine innovative Advanced Pleat Technology (APT) with a highly asymmetrical PES membrane. These technologies offer a greater capacity for holding contaminants, less resistance to flow, all resulting in a lower pressure drop compared to conventional membranes.

Extended service life

LifeASSURE™ BNA Series filter cartridges offer a long service life as they are very resistant to steam or chemical cleaning. Service life is measured in terms of “volume filtered” and “number of operating days before exhaustion”. Filters which offer a longer service life not only reduce direct operational costs, but also reduce indirect filtration costs for tasks, such as filter change-out/installation, machine down time and regeneration.

Another advantage of LifeASSURE™ BNA Series filter cartridges is the membrane they contain. It is testable after each filtration cycle to ensure the full integrity of the system.



Advanced microbiological control

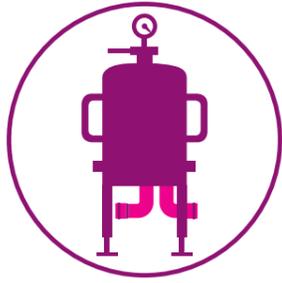
The primary aim of a membrane filter is to control the presence of smaller microorganisms. In fact, the LifeASSURE™ BNA020 Series offers retention of more common microorganisms at significantly higher concentrations than those which may be encountered by wine producers. The BNA series gives a bacterial reduction (LRV) ranging from 3, 5 to 7.3 depending on the grade.

Wine characteristics preservation

Preserving wine characteristics such as taste, colour or stability are fundamental for winemakers.

LifeASSURE™ BNA Series filter cartridges have the advantage to not discolour the wine due to its PES membrane design.





3M™ LifeASSURE™ BA and 3M™ LifeASSURE™ BLA Filter Series Cartridge

Extended service life

The service life of a membrane is directly proportional to its usable area and inversely proportional to flow per unit of area (flux). Filter cartridges in the LifeASSURE™ BA and BLA Series have an area which is 20-50% larger compared to the other filters available on the market. In the majority of applications, when the filter area is doubled, with the flow being the same, the output increases two and a half times.

Resistance to recurring alkaline regeneration

It has been noted that most membranes are saturated not by particles and microorganisms, but by glucans, proteins and tannins present in wine. Removing these deposits, before they accumulate to a significant degree increases the filter's service life. Cleaning with detergents such as sodium hydroxide can lessen the impact of colloid material on the filter's service life. The LifeASSURE™ BA and BLA Series have cartridges which can be cleaned using a diluted alkaline solution.

Resistance to cleaning with hot water

LifeASSURE™ BA and BLA Series filter cartridges are designed with a nylon membrane capable of withstanding repeated sanitation cycles and cleaning with hot water.

Technology

The membrane of the LifeASSURE™ BA and BLA Series cartridge are made of microporous nylon, offering unbeatable performance.

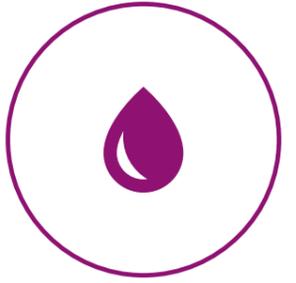
It allows high flow and decreased pressure drops, ensuring high thermal and mechanical resistance for an extended operating life even in extreme operating conditions.



Benefits

- High flow rates and extended service life, thanks to a larger filtration area and a nylon 6.6 microporous membrane
- Reliable microbiological control
- Extended service life, thanks to its excellent resistance to alkaline regeneration and hot water cleaning
- Testable membrane to insure full integrity of the system after several filtration cycles

7. Process water treatment



Sanitisation water used in wine production must be filtered to the same degree as the wine.

Water is a key element when it comes to controlling contamination and smooth operation of a wine production system. The use of poorly filtered water to rinse or disinfect filters results in early filter exhaustion.

Clean water is necessary in bottle washing, sanitation and cooling systems. Water that is free of particle and microorganism contamination protect the integrity of a wine processing system and improve the service life of filters.

Sanitisation water

Sanitisation water is used to clean plumbing lines and regenerate filters.

Sanitisation water filtration is essential to ensure downstream stability and avoid contamination between process cycles.

It's important to filter sanitisation water to the same degree as the wine itself.



8. Hygiene Monitoring and Management System

3M™ Clean-Trace™ ATP Tests

When it comes to monitoring hygiene, there are many aspects to consider and it is essential to have accurate information.

The **3M™ Clean-Trace™ ATP** hygiene monitoring and management system, which has been redesigned for reliability, ensures constant operation. The system allows you to prepare for and pass checks quickly, and is designed to offer you maximum peace of mind, thanks to greater precision and cutting-edge technology.

Ineffective tests are a waste of time. Nowadays, it is important to be able to intervene quickly and obtain reliable samples straight away.

The **3M™ Clean-Trace™ ATP** tests have an intuitive design, which is easy to use and implement, thanks to an elongated, flexible shape, which allows you to take samples from hard to reach areas.



3M™ Petrifilm™ rapid plates

Global food safety standards are constantly changing. Can you keep up? Unlike traditional agar methods, **3M™ Petrifilm™** plates are ready to use and do not require any preparation.

All packs (small in size and space-saving) offer consistent and reliable testing. Just open them up and start testing! Work with complete peace of mind, while focusing your attention on the things that are really important: quality and efficiency.

- Ready to use – unlike traditional methods, with no requirement for any preliminary preparations
- Proven test methods for precise and reliable results
- Compact design, maximising incubator space, thereby reducing waste and associated disposal costs



Benefits

- ↓ **85%**
 - less space occupied than traditional methods
- ↓ **45%**
 - less laboratory expenses
- ↑ **80%**
 - more efficient output from technical staff
- ↓
 - Data supplied in half the time of conventional agar methods

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