

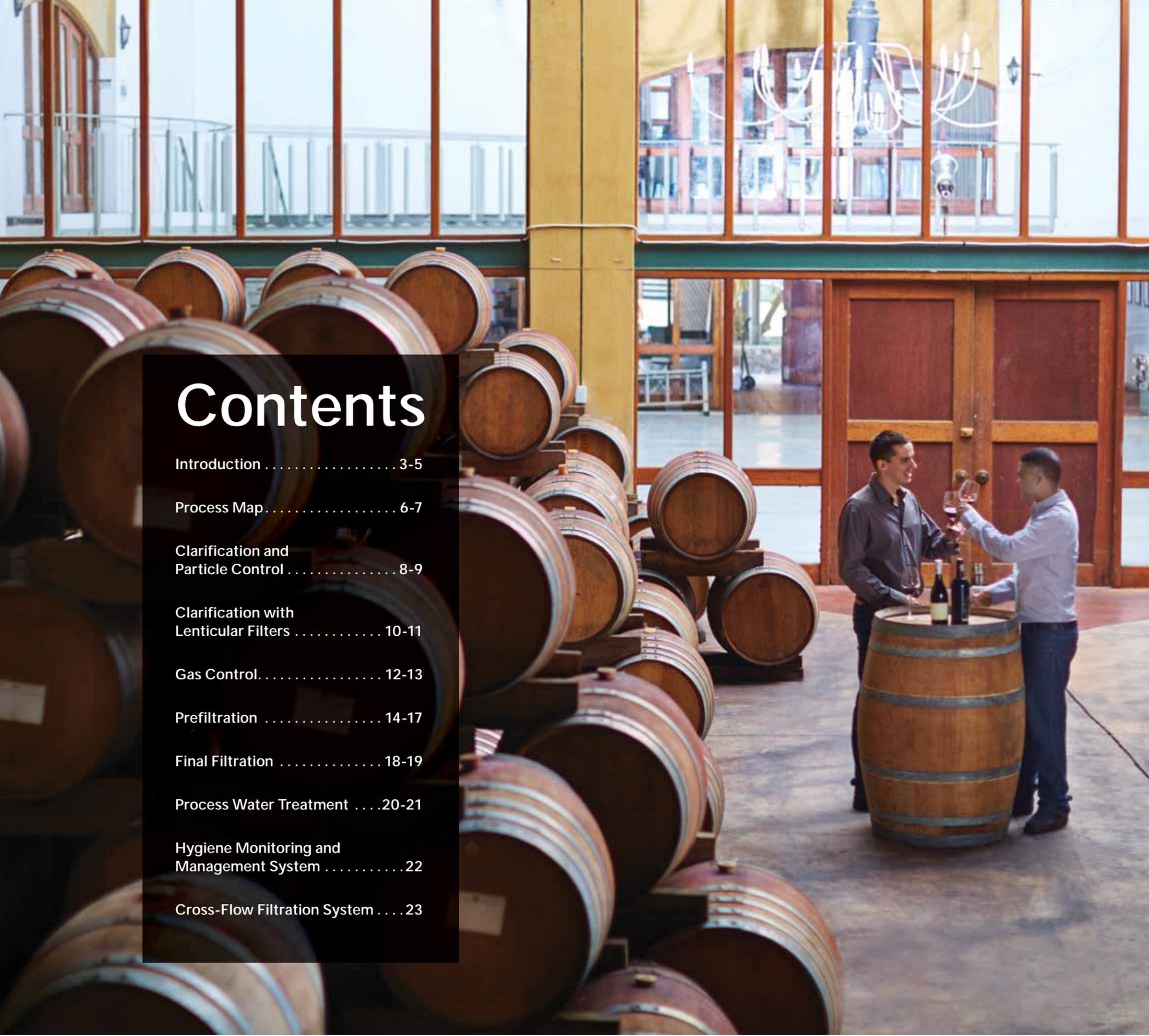


Science.
Applied to Life.™

3M Separation and Purification Sciences Division

Uncork a better bottle.

Pour on the possibilities with innovative filtration and gas control solutions for wine production from 3M.



Contents

Introduction	3-5
Process Map	6-7
Clarification and Particle Control	8-9
Clarification with Lenticular Filters	10-11
Gas Control	12-13
Prefiltration	14-17
Final Filtration	18-19
Process Water Treatment	20-21
Hygiene Monitoring and Management System	22
Cross-Flow Filtration System	23

Blending tradition with innovation.

From the vineyards of Europe to the wine cellars in the Australian and Californian valleys, 3M has cooperated with winemakers for decades, 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. Because of this real-world experience, 3M has developed a number of innovations, designed to help wineries achieve clarity and stability.

3M designs its own filtration systems with the aim of helping producers improve their wine making processes. A fine wine is more than just the sum of its ingredients. This is why 3M works 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 excellent reliability.

Building on this long tradition of innovation, 3M has successfully introduced the use of its 3M™ Liqui-Cel™ Membrane Contactors for dissolved gas control in wine production, offering a novel technology for operational efficiency and for achieving pinpoint performance targets.



There's a reason wine producers all over the world choose 3M filtration and separation systems.

Performance

With quality and cost-effectiveness always top of mind, 3M filtration and separation systems provide solutions to meet winery requirements.

- Filters and membrane contactors with long service lives and high flow rates
- Reduction in labor and replacement times
- Excellent contaminant holding capacity
- Consistent and reliable quality

Quality

Intended to deliver consistent performance, 3M filtration and separation systems provide a high level of quality.

- Certified to ISO 9001 standards
- Production and distribution on a global scale
- Rigorous internal validation tests

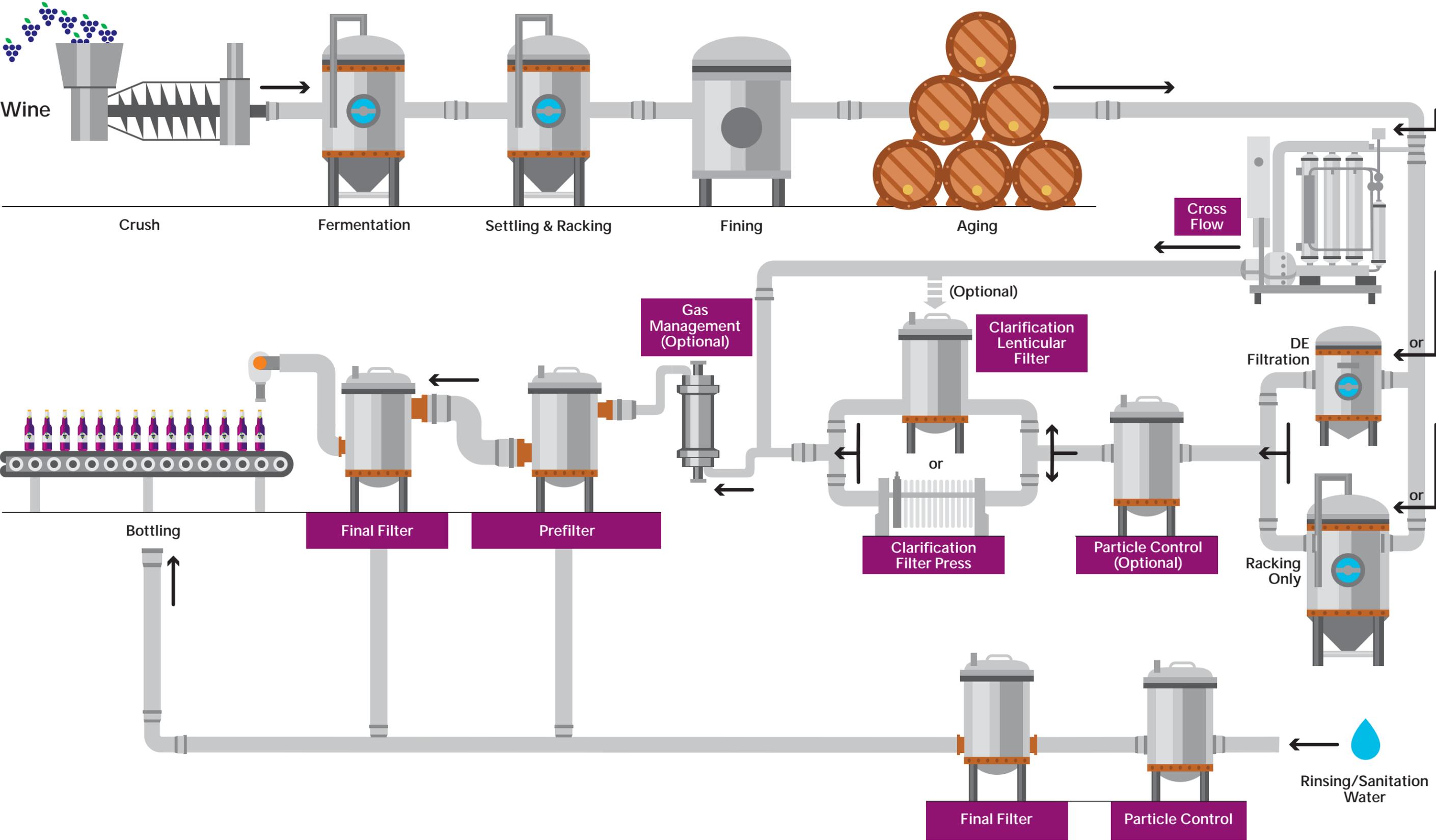
Benefits

With a focus on ease of use, 3M filtration and separation systems offer convenience.

- Filters are easy to install and replace in order to minimize labor and downtime
- 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.



3M™ High Flow Filtration Systems

Solutions with highly efficient filters in compact designs.

Requiring fewer cartridges and smaller filter vessels than traditional systems, 3M™ High Flow Filtration Systems can be used in particle control applications in water or wine, rough clarification or prefiltration of bulk wine.

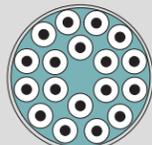
Comparison of Potential Options to Obtain a System Operating at a Rate of 350 Gpm (80m³/Hr)

3M High Flow filtration system



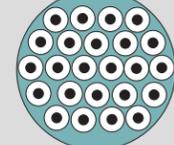
1 cartridge in a housing with a 8.6" (218 mm) diameter

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

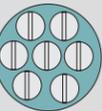


24 cartridges in a housing with a 16" (406 mm) diameter

90% fewer cartridges.

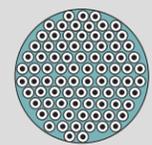
Comparison of Potential Options to Obtain a System Operating at a Rate of 2000 Gpm (454m³/Hr)

3M High Flow filtration system



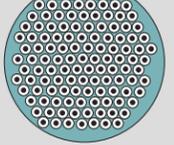
7 cartridges in a housing with a 24" (610 mm) diameter

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

Up to **33-50%** reduction in housing size.



3M™ High-flow filtration system is ideal for particle control in water or wine, rough clarification, or prefiltration of bulk wine or 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.

Easy to Use

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

Polypropylene Structure

Provides broad compatibility with different types of fluids.



Radial Pleat Pattern

Maximizes the usable filter surface per cartridge.



High Flow Rate

The 3" center channel allows a flow of 113 m³/hour, .500 gpm, in a single cartridge (60" length). Bayonet attachment ensures easy fitting.



Stop the presses.

Winemakers have used conventional plate and frame filter presses for many years. However, filter presses have never been considered a particularly convenient or efficient method of filtration. We developed 3M™ Zeta Plus™ Series Filters as an alternative to filter presses and to provide a convenient and cost-effective alternative for filtration.



3M™ Zeta Plus™ H Series Filters

Charge-modified depth filters constructed with high-tensile strength media.

- High wet-tensile strength filter media withstands multiple steaming and hot water sanitization and regeneration cycles
- Extended filter life can provide high throughputs, fewer change-outs and reduced operating costs
- Provides efficient haze and particle reduction, available in 8", 12" and 16" diameter cartridges

3M™ Zeta Plus™ Dual-Zone MH Series Filters

Designed to provide optimal clarification and prefiltration for difficult-to-filter wines, 3M™ Zeta Plus™ Dual-Zone MH Series Filters are an advanced, dual-zone depth filter. Their unique construction enhances the contaminant holding capacity of the filter by trapping larger particles, hazes and microorganisms in the upstream layer, and smaller ones in the downstream layer.

- Higher throughput, lower processing costs and smaller filter assemblies
- Customizable to meet application needs
- Withstands the rigors of hot water, steam and chemicals for longer service life

3M™ Zeta Plus™ Series Filters vs. Filter Press

	3M™ Zeta Plus™ Series Filters Lenticular Filters	Filter Press
Leakage	Zero leakage, saves valuable wine—no oxygen/bacteria pick up	As high as 1-2% of volume filtered
Labor	Filters can be changed in 15 minutes	It can take 2 to 4 hours to change a small filter press, reducing productivity
Change-Outs	Cartridges are used completely—fewer change-outs are needed	Filters changed based on time the press, not when filtration capacity has been achieved
Capital Costs	Filter housings are typically 25-50% the capital cost of a stainless steel filter press	Filter presses are large, expensive pieces of equipment
Maintenance	Housing systems have 3 O-rings that are easy to clean and maintain	Presses typically have 4 O-rings per plate—heavy and cumbersome plates must be cleaned regularly
Disposal	Fewer change-outs results in reduced disposal costs	Filter sheets are discarded on a timed basis—additional disposal costs could be incurred
Floor Space	Very small footprint frees up space for other operations	A 60 cm ² press requires up to 100 sq. ft. of floor space
Energy Consumption	Reduced energy/water operation time—reach sanitation temperatures in about 15 minutes	Takes 30-90 minutes to reach sanitation temperatures

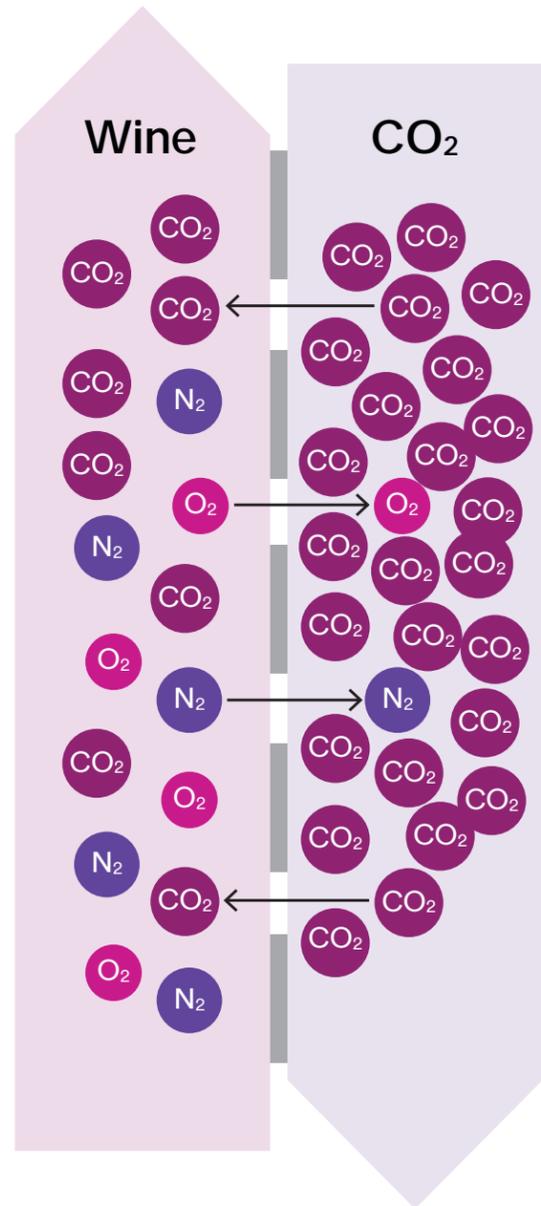


3M™ Liqui-Cel™ Membrane Contactors

Remove or add gas to 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, and 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 target product specifications
- High performance and efficiency: 3M™ Liqui-Cel™ Membrane Contractors can achieve oxygen concentrations of less than 0.1 mg/l and avoid the use of nitrogen gas for sparging and replace N₂ with CO₂

Compact and Versatile

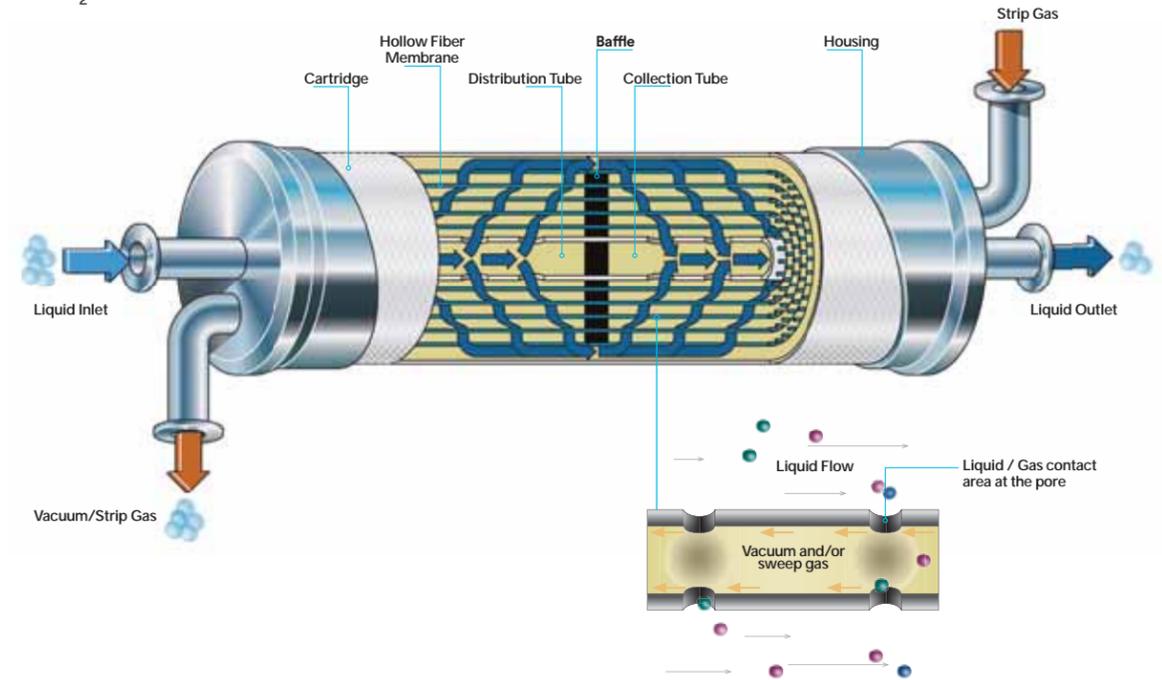
- Can be installed in confined spaces
- Flexible in terms of managing gas concentration of several gases simultaneously
- Can be used in several process phases: directly after clarification, tank to tank or before bottling

Rapid Gas Control

- Can make the use of tanks or pumps redundant
- Helps speed 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 3M™ Liqui-Cel™ series can help 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 help protect the shelf life with O₂ removal.



Addition or Removal of Carbon Dioxide

Carbon dioxide affects the taste and sensation on the palate. 3M™ Liqui-Cel™ Membrane Contractors can quickly add or remove gas to the wine in a precise and predictable manner.

Using 3M™ Liqui-Cel™ Membrane Contractors 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 Contractors as core components are assembled by OEMs worldwide.



3M™ LifeASSURE™ BLA Series Filters

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

Technology

By combining a graded-density microporous membrane made of N66 nylon, with Advanced Pleat Technology (APT), 3M™ LifeASSURE™ BLA Series filters guarantee protection for the final membrane filters and extend 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 minimizing the pressure drop and maximizing the retention capacity.

Extended service life and superior quality.

3M™ LifeASSURE™ BLA Series cartridges are designed to provide long service lives and high-performance levels.

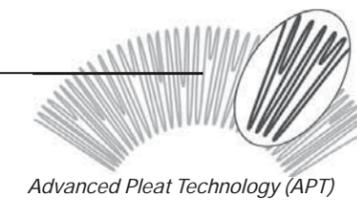


Significant reduction in microorganisms.

3M™ LifeASSURE™ BLA Series filters help reduce microorganisms.

The 3M™ LifeASSURE™ BLA filters help reduce bacteria (LRV) from 3.5 to 7.3, depending on the retention grade.

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



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

Offering a wide selection of prefilters, the 3M™ LifeASSURE™ BLA Series meets 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

Benefits

- ▶ Increases the final filter's service life substantially
- ▶ Reduces the frequency of final filter changeouts, thereby considerably cutting filtration costs
- ▶ Helps reduce the microorganism content significantly



3M™ Betafine™ PBG Series Filters

The Advanced Pleat Technology (APT) pleating system, featured in the 3M™ Betafine™ PBG Series cartridge, 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 maximizes the filter surface area, helping extend service life and reduce the number of replacements
- Maximizes retention capacity, thanks to the double-layer structure offering graded porosity, where the upstream layer acts as a prefilter for the downstream one
- The filter's all-polypropylene structure makes it compatible with a broad range of detergent cleaning solutions

3M™ Betafine™ XL Series Pleated Filter

Made entirely of polypropylene with absolute threshold, the 3M™ Betafine™ Series XL pleated cartridge is constructed with "Advanced Pleating Technology" (APT)—allowing 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 innovative configuration, which maximizes the filter surface area, helping extend service life and reduce the number of replacements
- Low-pressure drop makes it possible to size smaller filtration systems and thus reduce the overall cost of filtration
- Supports most thermal and chemical cleaning cycles by being made entirely of polypropylene



3M™ LifeASSURE™ BNA and BA Series Filters

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 virtually all yeast and bacteria is removed) is a vital characteristic for fine wines. 3M™ LifeASSURE™ BA (Nylon 6,6 membrane) and BNA (PES membrane) Series cartridges are available with retention grades of 0.65 µm in order to eliminate yeast, mold and bacteria, and 0.45 µm for removal of smaller microorganisms responsible for spoiling wine.

3M™ 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 and less resistance to flow, all resulting in a lower pressure drop compared to conventional membranes.



3M™ LifeASSURE™ BNA and BA Series Filters

These cartridges provide thermal resistance permitting continuous service under demanding process conditions.

Extended service life.

Resistant to steam and chemical cleaning, 3M™ LifeASSURE™ BNA Series Filter cartridges offer a long service life. Service life is measured in terms of “volume filtered” and “number of operating days before exhaustion”. Filters which offer longer service lives not only reduce direct operational costs, but also reduce indirect filtration costs for tasks, such as filter change-out/installation, machine downtime and regeneration.

Another advantage of 3M™ 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.

Benefits

- High surface area, nylon 6.6 microporous membrane. More area improves flow and filter life.
- Spoilage organism retention provides reliable microbiological control
- Durable cartridge design withstands repeated hot water sanitation cycles
- Individually serialized and integrity tested in manufacturing—fully traceable

Bottle up with confidence.

Microporous membrane filtration is an excellent method of achieving microbiological stability in the container without the use of chemicals or heat. The organoleptic properties can be preserved until the product is opened—whether weeks or months after filling.

3M provides a cost-effective solution to achieve microbiological stability. By combining the economy of a depth filter, 3M™ Zeta Plus™ Series Filter, with the security of a membrane filter, 3M™ LifeASSURE™ BA Series Filters, 3M gives wine makers a complete sterile filtration package.

Water used in hot water sanitation in the winery 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 sanitize 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 helps protect the integrity of a wine processing system and improves the service life of filters.

Hot water sanitation.

Hot water sanitation is used to sanitize plumbing lines and wine filters.

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

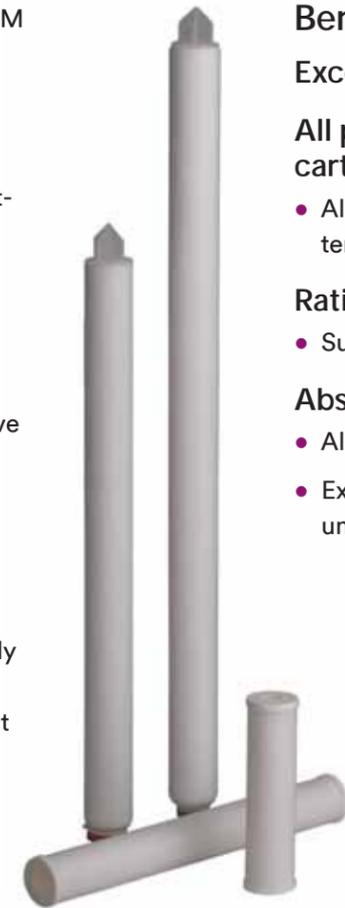
It's important to filter sanitation water to the same degree as the wine itself.

3M™ Betapure™ NT-T Series Depth Filter

3M™ Betapure™ NT-T Series filter cartridges are a 3M 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 excellent on-stream life that can provide more cost-effective filtration than conventional melt-blown filter technologies.

3M designed the Betapure™ NT-T Series cartridge to provide excellent service life while maintaining a consistent filtration efficiency. 3M™ 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.

3M™ 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

Excellent service life.

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.

- Allow for consistent filtration quality
- Exhibit superior particle retention under increasing differential pressure

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.

Redesigned for reliability, the 3M™ Clean-Trace ATP hygiene monitoring system ensures constant operation. The system allows you to prepare for and pass checks quickly, and is designed to help you attain 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™ 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.

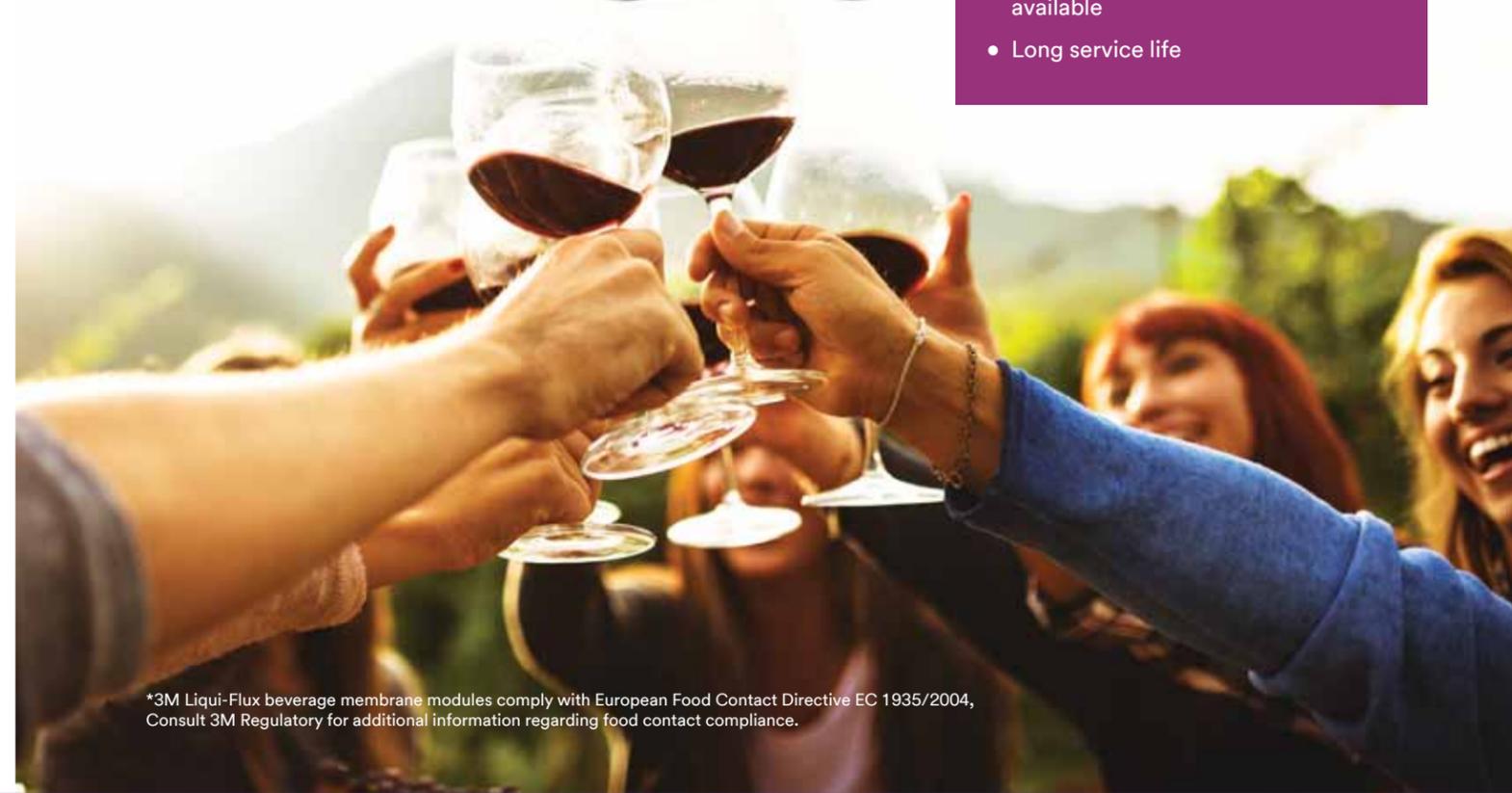
In addition, filter modules with asymmetrical PES (Polyethersulfone) hollow fiber membranes are also part of 3M filtration product portfolio.

Full Cross-Flow Systems containing 3M™ Liqui-Flux™ Beverage modules as core components are assembled by OEMs 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.
- High 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



*3M Liqui-Flux beverage membrane modules comply with European Food Contact Directive EC 1935/2004, Consult 3M Regulatory for additional information regarding food contact compliance.

Product Selection and Use:

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (e.g., OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.

Limitation of Liability:

Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.



3M Australia Pty Ltd
3M Separation and Purification
Sciences Division
Bldg A, 1 Rivett Road
North Ryde NSW 2113

Phone 1300 367 362
Fax 1800 671 599
Web 3M.com.au/purification

3M New Zealand Ltd
3M Separation and Purification
Sciences Division
94 Apollo Drive
Rosedale Auckland 0632

Phone 0800 362 886
Fax 0800 362 880
Web 3M.co.nz/purification

For more information about 3M filtration solutions for wine production, please visit our website at:

3M.com.au/wine or 3M.co.nz/wine

3M, Betafine, Betapure, Clean-Trace, LifeASSURE, Liqui-Cel, Liqui-Flux and Zeta Plus are trademarks of 3M Company.
© 3M 2022. All rights reserved. Please recycle.
AV011503131