

3M Science.
Applied to Life.™

Cheers to better beers.

Tap into consistent quality with
innovative filtration and gas
control solutions for breweries.





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Crafting consistency.

Brewing beer is an art form. Creativity, innovation, trial and error, patience, and hard work go into each and every newly crafted pale ale, lager, pilsner or other specialty beer – and you know it when you have a winner.

As with any artisan, a brewer is particular about their beer and how they make it. Beer needs to taste good, but it must also look good, be protected from spoilage, and the brewing process must be reliable and efficient, minimizing product waste to maximize what gets into the bottle – leaving more money to devote to your next brew.

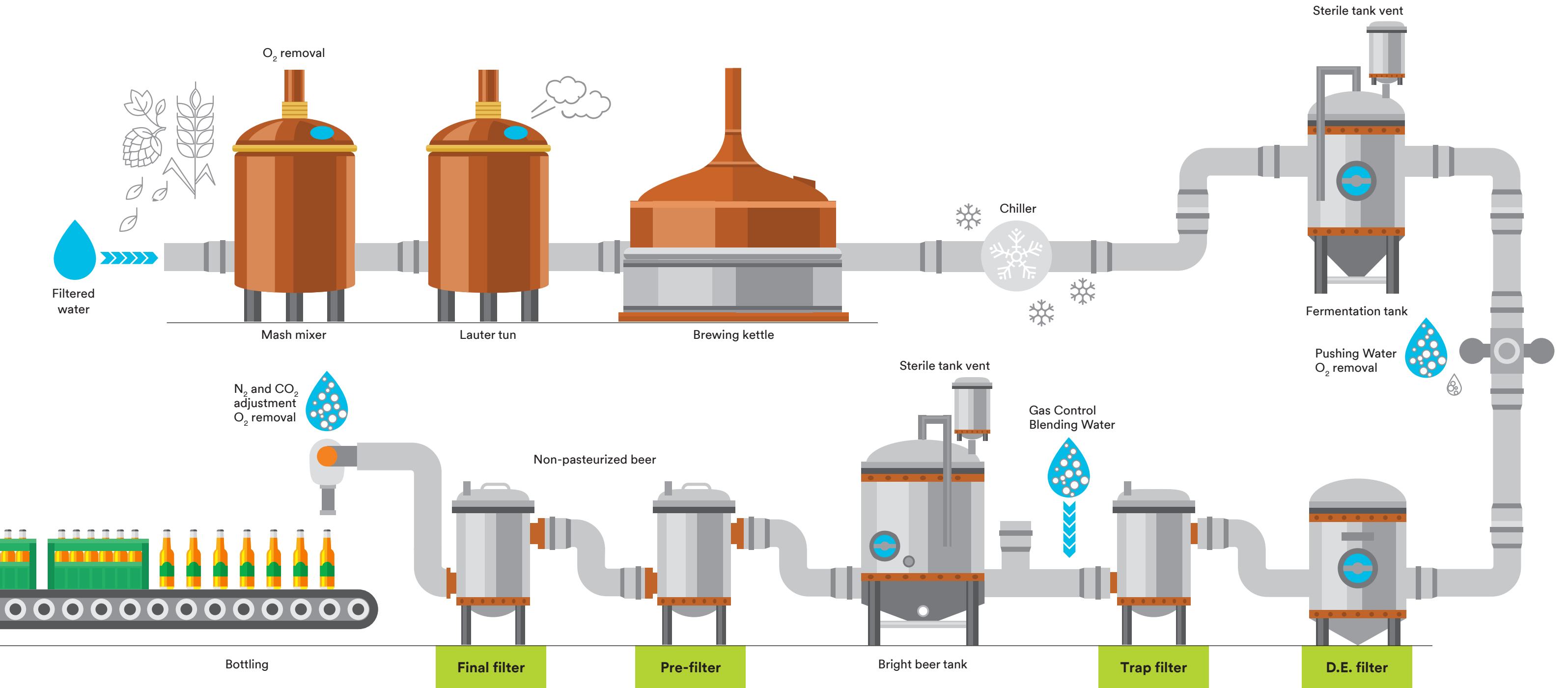
That's why you need the right filtration and gas control to help ensure that the second, third, fourth and one-hundredth batch is as good as the first.

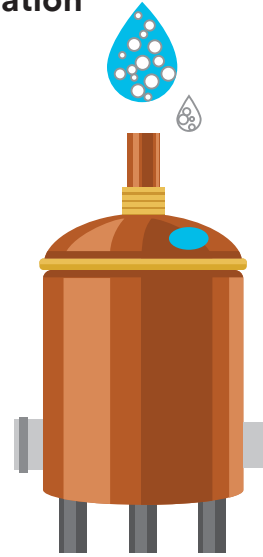
3M filtration – trusted in breweries around the world.

- ▶ Performance | Efficient and effective solutions to meet brewers' needs
- ▶ Convenience | Easy-to-use and easy-to-maintain systems
- ▶ Quality | Reliable, consistent results to help maximize production and minimize waste

Process Map

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





Quality beer comes from quality water.

Water, the fundamental ingredient in beer, must be carefully monitored and controlled. Since most breweries aren't located next to sediment-free mountain springs, process filtration is a vital part of brewing and blending water preparation, bottle/keg washing water and sanitizing water.

3M provides quality water filtration that can accommodate virtually any design to meet your process requirements.

3M™ Micro-Klean™ RT Series Filters

3M™ Micro-Klean™ RT Filters are all-polypropylene rigid depth filter cartridges.

Rigid Depth Filter Construction

- ▶ Helps reduce unloading at high differential pressure
- ▶ Efficiently reduces deformable materials
- ▶ Provides consistently superior particle reduction throughout filter life
- ▶ Enhanced holding capacity for fewer filter change-outs
- ▶ Grooved cartridge with extended surface area prolongs filter life
- ▶ All-polypropylene construction leaves taste unaffected



Larger volume requirements or space restrictions?

We have the right filtration solution for you. Check out the 3M™ High Flow Series Filters on page 8.



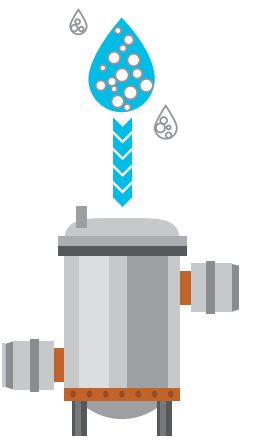
Other Applications

Bottle and Keg Washing Water

Bottle and keg washing water filtration are frequently overlooked applications. Wash water can contain particles and organics that affect the final product. Proper filtration of wash water is especially important when the container (bottle or keg) will not be pasteurized. Micro-organisms from poorly filtered water can re-contaminate non-pasteurized beer, easily causing spoilage.

Sanitizing Water

Sanitizing water (>80°C) is used to reduce bioburden and to clean systems, including the filters. Filtering sanitizing water is important so that the system is not contaminated with particulates in the sanitizing water between beer production runs.



Trap the trouble on the double.

Trap filters serve two essential functions. First, they reduce extraneous diatomaceous earth (D.E.) fines and yeast that randomly passes from the D.E. filter during normal filter operation. Secondly, trap filters provide additional protection in the event of a process upset if diatomaceous earth filter malfunctions (start-ups/screen rupture/overdosing/bypass). The trap filter helps protect against failure by preventing the yeast and D.E. fines from contaminating downstream equipment and piping as they are difficult to flush out completely.

3M™ Betafine™ XL Series Filters

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 superior on-stream life that provides more cost-effective filtration than conventional melt blown filter technologies.

3M™ Betafine™ XL Series Filters feature advanced pleat technology (APT).

This design construct maximizes the useful surface area of the filter cartridge while maintaining proper flow paths between media pleats.

How it Works

The staggered pleats with increased open area allow for greater contaminant loading between pleats at the inside diameter while the reduced length pleats take advantage of existing open space closer to the cartridge diameter.

Why it Matters

The result is a fully used surface area that provides superior service life. APT provides faster flow rates and greater surface area compared to conventional depth filters.



Conventional pleating

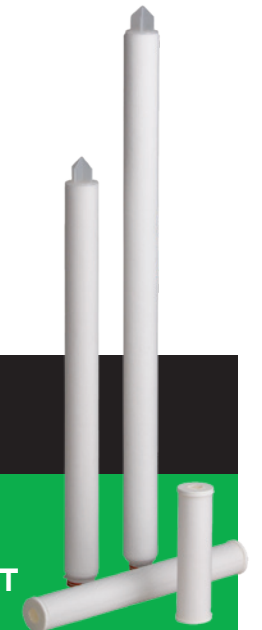


Advanced pleat technology

3M™ Betapure™ NT Series Filters

3M™ Betapure™ NT-T Filters provide the consistency of absolute rated filtration, as well as the high D.E. fine holding capacity needed in breweries.

- Provide excellent retention of diatomaceous earth fines, helping to protect beer quality and downstream filters
- Offers consistent, reliable performance from batch to batch, lot to lot over the lifetime of the filter
- Extremely durable and capable of withstanding multiple hot water sanitization cycles and backwashing



Get high flow capacity in a compact design with 3M™ High Flow Series Filters.

For brewers who need filtration efficiency and a small footprint, a 3M™ High Flow filter system may be the right filtration solution.

Compact Design

- ▶ Small housing minimizes capital expense requirements
- ▶ Up to 50% smaller than competitively-sized housing

Absolute Rating

- ▶ Consistent quality throughout the life of the filter

Polypropylene Construction

- ▶ Neutral to the brewing process, leaving taste unaffected
- ▶ Cartridges are discarded only when blocked

Easy to Use

- ▶ No special tools or hardware required for filter change-out, minimizing downtime
- ▶ “Twist-to-lock” seating mechanism provides positive seal
- ▶ Ergonomically designed handle facilitates easy cartridge installation and removal



Solutions for Smaller Brewers

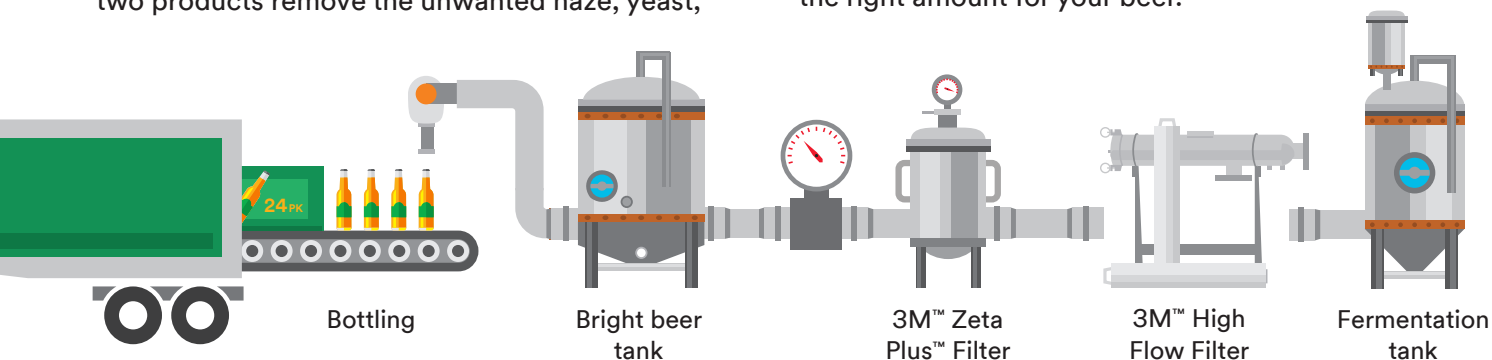
Filtration is often an overlooked facet of beer production at smaller breweries. Through correct filtration, a consistently stable beer can be produced to satisfy consumer demand time after time.

Our most effective products are our High Flow absolute filter to remove the heavy sediment, followed by a dual layer 3M™ Zeta Plus™ Series Filter, filtering down to around the 1µm level. These two products remove the unwanted haze, yeast,

and other particles, but not the taste—allowing for more of that great taste that your customers love. The successively tighter filter stages allow brewers to produce a consistently stable beer without the need for filtration following the bright beer tank.

Want more haze in your beer?

3M offers more open grades of filters to help dial-in the right amount for your beer.



Stop the presses.

Brewers 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 beer filtration.

3M™ Zeta Plus™ H Series Filters

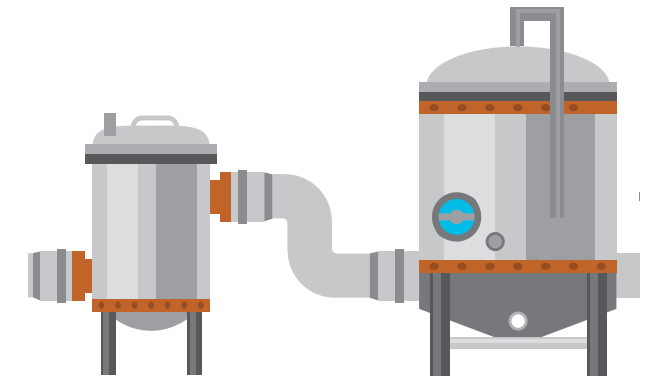
3M™ Zeta Plus™ H Series Filters are charge modified depth filters constructed with high tensile strength media.

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

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

3M™ Zeta Plus™ Dual-Zone MH Series Filters are advanced, dual zone depth filters designed to provide optimal clarification and prefiltration for difficult to filter beers. Their 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.

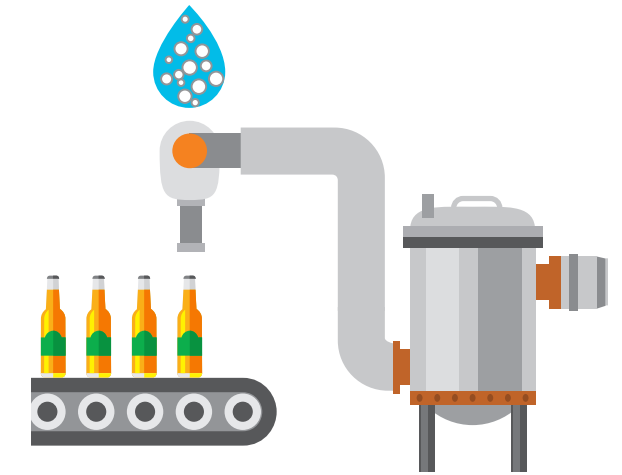
- ▶ Higher throughput, lower processing costs and smaller filter assemblies
- ▶ Customizable to meet application needs
- ▶ Withstands the rigors of hot water, steam and chemicals for longer service life



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

	3M™ Zeta Plus™ Series Filters Lenticular Filters	Filter Press
Leakage	Zero leakage—no oxygen/ bacteria pick up	As high as 1-2% of volume filtered
Labour	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 in 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

Fill 'em 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 brewers a complete sterile filtration package.

3M™ LifeASSURE™ BA Series Filters

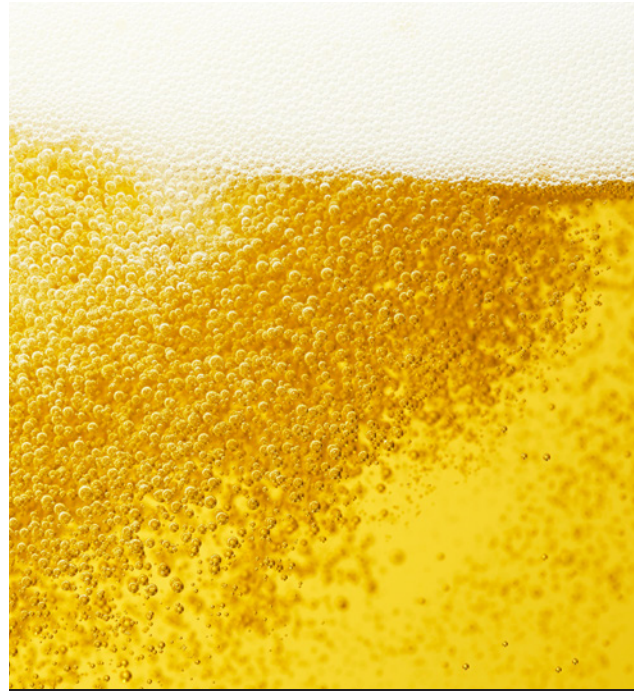
The 3M™ LifeASSURE™ BA Series Filter membrane is combined with the 3M cartridge construction providing thermal resistance. This thermal resistance permits continuous service, under demanding process conditions.



**3M™ LifeASSURE™
BA Series Filters**

Filter 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



Gas Control

Water Pretreatment

Oxygen in water used in beer production accelerates spoilage and shortens shelf life. It also impacts beer aroma and taste. 3M™ Liqui-Cel™ Membrane Contactors can reduce O₂ in brewery production water without using chemicals.

Carbonation, Decarbonation and Nitrogenation

Carbon dioxide and nitrogen impact product taste, mouthfeel and appearance. 3M™ Liqui-Cel™ Membrane Contactors provide a bubble-free in-line solution that can rapidly infuse gases to water, beer and wine with precision and predictability. 3M™ Liqui-Cel™ Membrane Contactors can also be used to adjust carbonation to achieve desired taste and texture.

Fast and efficient gas control that hits the spot.

Capable of both adding and removing gases to liquids, 3M™ Liqui-Cel™ Membrane Contactors provide a versatile, compact, in-line solution that delivers rapid deoxygenation, decarbonation, carbonation, and nitrogenation of liquids to precise concentration levels. Applying this advanced membrane-based science in your production processes can help increase operating efficiency and reduce guesswork while maintaining or improving product quality, consistency and stability.

3M™ Liqui-Cel™ Membrane Contactors

Compact and Versatile

- ▶ Install in space-limited locations
- ▶ May help reduce or eliminate construction costs
- ▶ Can be mobile and used in multiple process steps

Rapid In-Line Gas Control

- ▶ May eliminate the need for tanks or pumps
- ▶ May reduce installation work
- ▶ Lower residence time which may achieve the target gas concentration faster

Predictable and Precise

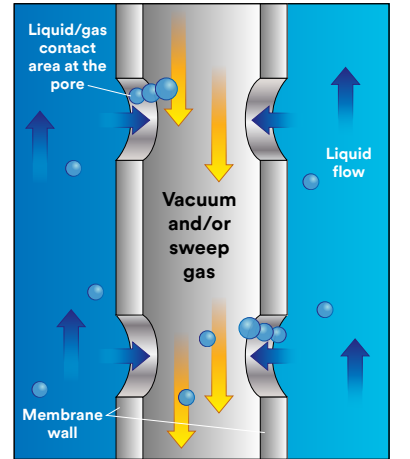
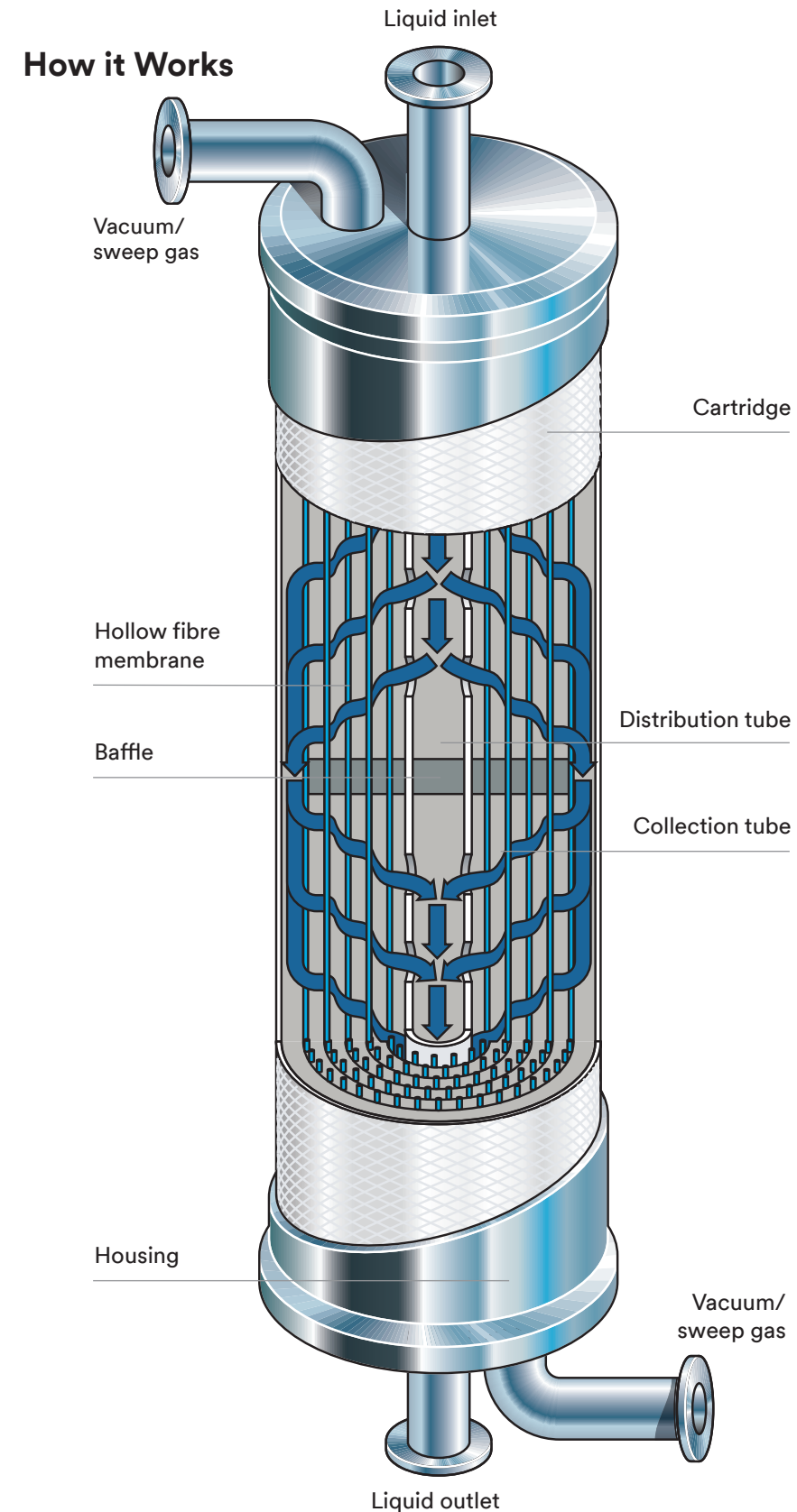
- ▶ Gas concentrations can be precisely controlled compared to spargers installed in tanks or kegs
- ▶ Gas infusion with a microporous membrane may produce a beverage with better foam-head stability

High Performance and Efficient

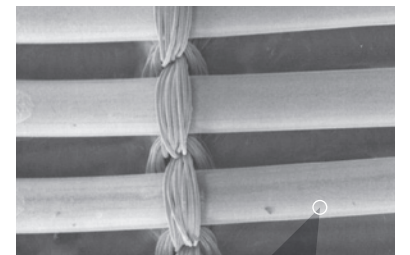
- ▶ Systems can be designed to deliver low levels of oxygen to help protect against flavour oxidation and to meet can liner specifications for maximum oxygen content
- ▶ Smaller pumps and efficient use of sweep gasses may lower operating costs

Modular Design

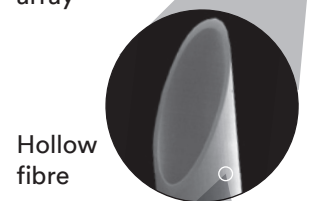
- ▶ 3M™ Liqui-Cel™ skids can be expanded in smaller flow increments for future expansions



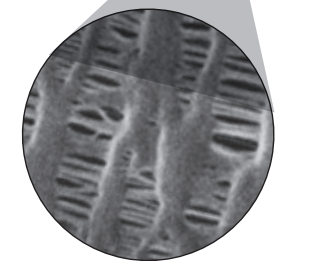
The hydrophobic membrane and small pore sizes keep liquid water from passing into the gas stream.



Hollow fibre membrane array



Hollow fibre



Hydrophobic membrane with pores approx. 0.03 μm



The science of suds.

Your industry strives to offer safe products that have a long shelf life with decreased chemical preservatives. This balance can be very difficult to manage due to pH and high sugar levels which make the beverages susceptible to yeast and mold. 3M provides solutions that enable you to control contamination and maintain the quality of the final beverage product.

3M™ Petrifilm™ Plates

The global food and beverage safety landscape is continuously changing. Are you keeping up? Unlike traditional agar methods, 3M™ Petrifilm™ Plates are ready to use—no prep required. Each slim pack offers consistent, uniform testing media. Just open it up and get right to work. Find new freedom with time to focus on what's really important: quality and efficiency. It's time to take a fresh look at food and beverage safety.

- Ready to use—reduce or eliminate time-consuming agar prep
- Proven testing methods for consistent, reliable results
- Compact size uses less storage/incubator space

Service that's always on tap.

The cornerstone of 3M's philosophy is service to customers, not only in product quality and prompt delivery, but also in application support and in the sharing of scientific information.

Our Application Engineering (AE) group is a market-oriented group of scientists and engineers who work closely with customers to solve difficult separation problems and aid in the selection of the most effective and economical filtration systems. AE routinely provides end-users with:

- Validation and regulatory support
- Extractable and compatibility analysis
- Filter system optimization studies
- 3M™ 101 Series Integrity Testing Device



Bioluminescence. Applied to guarding the line.

The 3M™ Clean-Trace™ Hygiene Monitoring and Management System provides you with the materials and technology to verify that you have cleaned effectively and that it's safe to start production. It's designed to give you the ability to make critical decisions with the right information in high pressure situations.

3M™ Filter Housings and Systems

Process Flow Rate—Small to Large

3M offers an extensive range of cartridge filter housings designed to meet most process flow requirements and handle even the most critical applications found in breweries. From the lab to pilot plant to full production, 3M filter housings are available to grow with the needs of the brewer.

User-Friendly Designs

3M filter housings are specifically designed with the end user in mind to make installing and removing filter cartridges quick and easy. Fast action swing bolts, quick release clamps and convenient cartridge hold-down devices allow for rapid filter change-outs, low labour requirements and reduced downtime.

Custom Vessels and Skids

We routinely produce housings in accordance with a wide variety of global Food Contact applications, and can produce special designs to meet a customer's specific needs.

<p>Product Selection and Use:</p> <p>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.</p>
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