



Brewing Filtration

Selection guide for products and applications



ENGINEERING YOUR SUCCESS.

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Parker has a continuous policy of product development and although the company reserves the right to change specifications, it attempts to keep customers informed of any alterations. This publication is for general information only and customers are requested to contact our sales teams for detailed information and advice on a product's suitability for specific applications. All products are sold subject to the company's standard conditions of sale.

The production of beer is an ancient art which has been practiced and modified over thousands of years to yield the wonderful variety of beers and ales we have available today. At the heart of the brewing process lies a totally natural sequence of events – the anaerobic fermentation of malted barley by yeast.

The raw ingredients required for making beer are consistent across most beer production processes, they are; barley, yeast, hops and water. It is the careful modification of these key ingredients and the associated production recipes that gives rise to the huge variety of beers and ales available for us all to enjoy.

Across the beer and ale varieties, there are similarities common to the production stages necessary to control this natural process as consistently as possible to produce the perfect brew.

These can generally be classified as:

- Fermentation
- Clarification
- Stabilization
- Packaging

Each stage of the process typically requires dedicated technology and equipment and there is a huge range of choice and flexibility in approaches. However, there is no one single, universally accepted option to perform each operation as best practice, and the choice of approach is typically guided by the performance repeatability of the equipment versus the long term running costs involved, or in short, the operational efficiency.

Normal flow filtration techniques are becoming increasingly adopted by head brewers throughout the industry as the benefits of this technology are being realized by the micro-brewery and large consolidated global brewery alike.

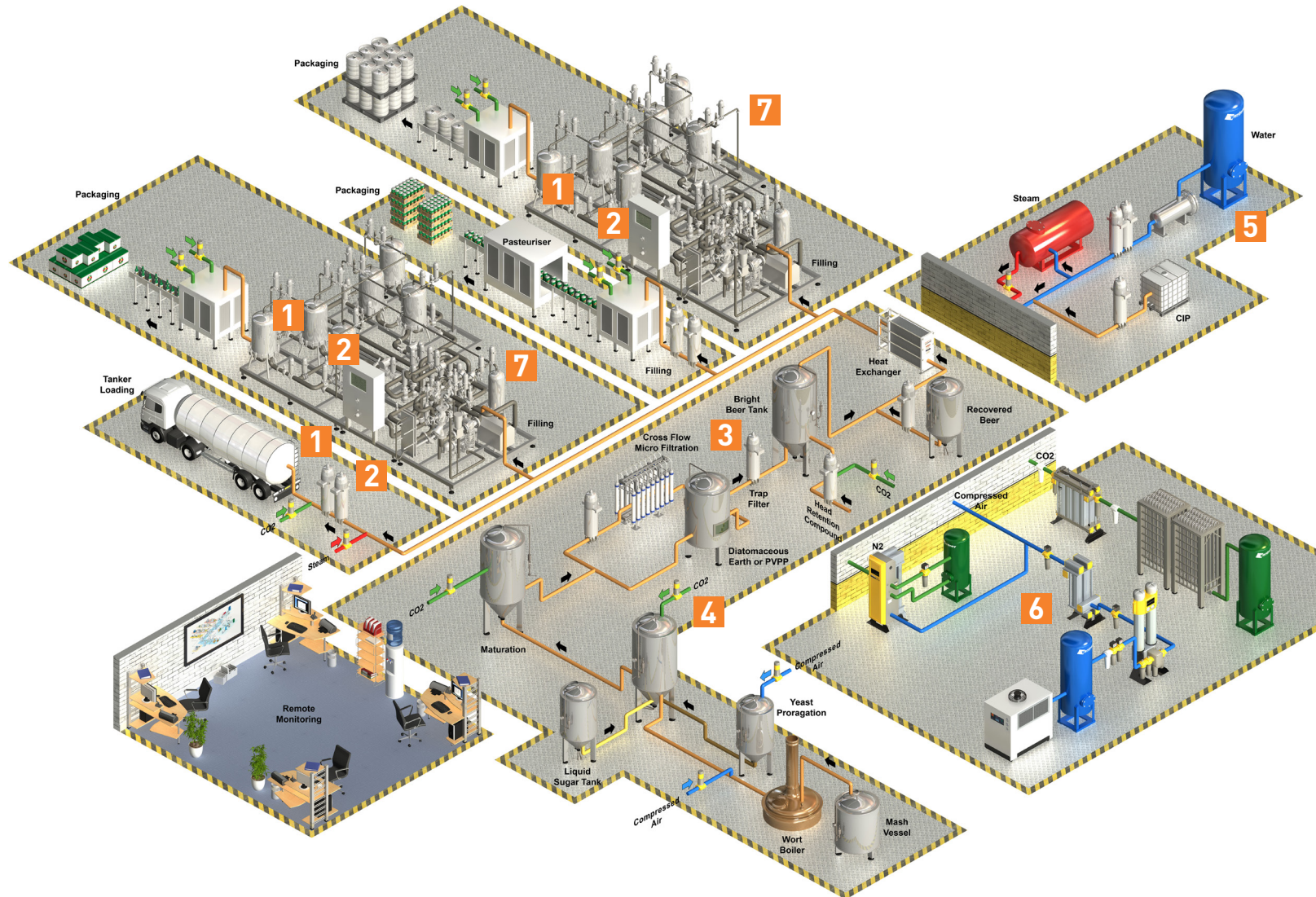
Parker Bioscience filtration continually offer significant process benefits to brewers across the globe. By combining specialist brewing knowledge with a dedicated product range we deliver:

- World class manufacturing and quality systems
- Consistent filter performance developed for specific brewing applications
- Commitment to reduce waste and energy consumption throughout the brewing process
- Process efficiency improvements through dedicated technical support

This document will focus on beer stabilization operations after fermentation and is intended to guide the optimum choice of filter product for a given application within your brewery, so that the benefits of Parker's capability can be maximized and the perfect beer is produced and enjoyed time after time.



Protecting the quality of your beer at the lowest cost...



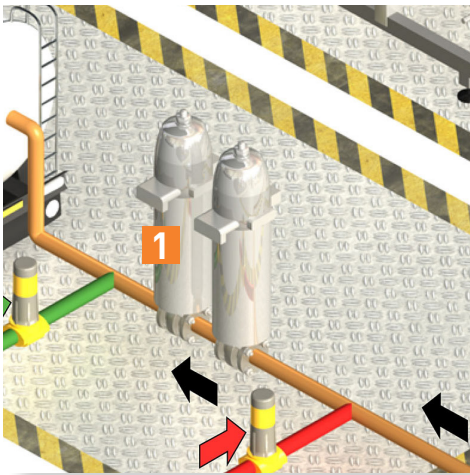
Parker's specialized brewing applications

- 1 Cold stabilization
- 2 Pre-stabilization
- 3 Trap filtration
- 4 Sterilization of gases
- 5 Water utilities
- 6 Gas utilities
- 7 Automation



Cold stabilization

Understanding the application



Cold stabilization refers to the filtration of beer to remove any spoilage microorganisms before it is packaged.

There are a number of spoilage organisms which must be removed from the beer to prevent spoilage and they are typically yeast, acetic acid bacteria and lactic acid bacteria.

The level of filtration will depend upon the expected shelf-life of the beer and the susceptibility to spoilage. Typically, for most large breweries, 12 months shelf-life and zero yeast or bacteria are the accepted norms once packaged into bottles or cans.

Until recently, the more commonly accepted method of achieving microbial stabilization was through pasteurization, either tunnel (~60°C for ~10 minutes) or flash (~70°C for seconds). Both forms of pasteurization compromise the process.

Disadvantages of pasteurization:

- Does not remove heat resistant spores
- May oxidize the beer and heavily compromises flavour
- Highly energy intensive
- Requires a big water demand

Benefits of cold stabilization:

- Removes all microorganisms
- Retention ability of filters can be verified by testing prior to use
- Minimal effect on beer flavour / characteristics
- Much reduced water or energy requirements
- Delivers a longer shelf-life

More frequently, brewers are turning to cold stabilization as a way of ensuring long shelf-life of packaged product. This movement has primarily been driven by the high energy and water consumption demanded by pasteurization operations coupled with advances in membrane technology which has returned longer filter life.

Parker have produced the range of BEVPOR filters to provide validated microbial retention, whilst being capable of frequent cleaning in place (CIP) for repeated use.

Cold stabilization

Final filtration

Key filter requirements

- Validated microbial retention
- Integrity testable
- Must not effect beer flavour / characteristics
- Easy cleaned for repeated use
- Strong and robust against pressure pulsing
- High flowing

BEVPOR BR

- 0.8m² filter area per 10"
- Prefilter layer
- Optimized PES membrane structure

SYSTEMS (see page 11)

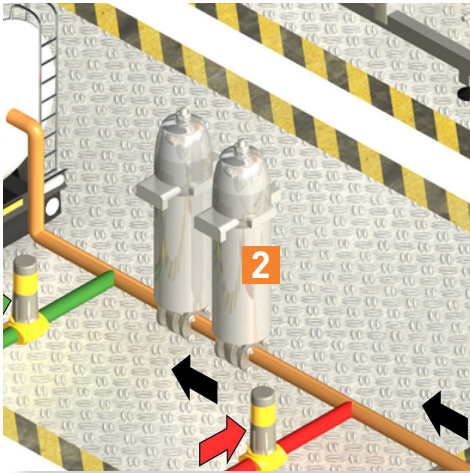


Size guide

1.5 - 3.0 L/min/10 inch cartridge

Pre-stabilization

Understanding the application



Pre-stabilization refers to the fine filtration of bright beer, beer which has already been clarified, to reduce the level of microorganisms and turbidity prior to further downstream processing / storage.

In large breweries, the ability to hold beer in a stable condition prior to packaging is of benefit to filling operations. Filtering the beer prior to storage to reduce the microbial loading will protect the quality of the brew during storage, allow flexibility in filling operations and improving the efficiency of the downstream systems.

Parker have produced the range of PREPOR filters to excel in pre-stabilization filtration applications. The cartridges will reduce the microbial loading of the beer whilst retaining colloids which can subsequently cause haziness in the finished package and protect membrane systems downstream.

Intermediate storage / membrane protection

Pre-stabilization

Key filter requirements

- Retention to colloidal species
- Microbial reduction
- Stable construction for reliable retention
- Strength to withstand CIP
- High flowing

PREPOR PP

- Yeast removal
- Haze reduction
- CIP regeneration

PREPOR NG

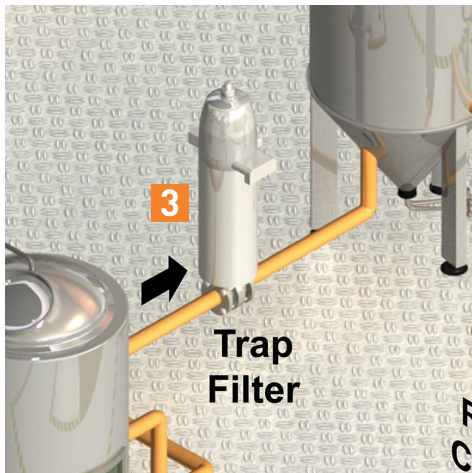
- More retentive, advanced depth construction
- Yeast removal
- Bacterial reduction
- Haze reduction
- CIP regenerable

Size guide

3.0 - 7.0 L/min/10 inch cartridge

Trap filtration

Understanding the application



After fermentation the brew, or “green beer”, will contain a high degree of solids and suspended material such as; wort (malted barley residue), yeast cells, fats and proteins. This typically forms sediment at the bottom of the fermentation vessel and is sometimes referred to as lees. In its present state the beer will appear hazy and will deteriorate if left untreated. In order to produce clear, visually appealing beer with a certain shelf-life once packaged, the brew will require clarification and stabilization.

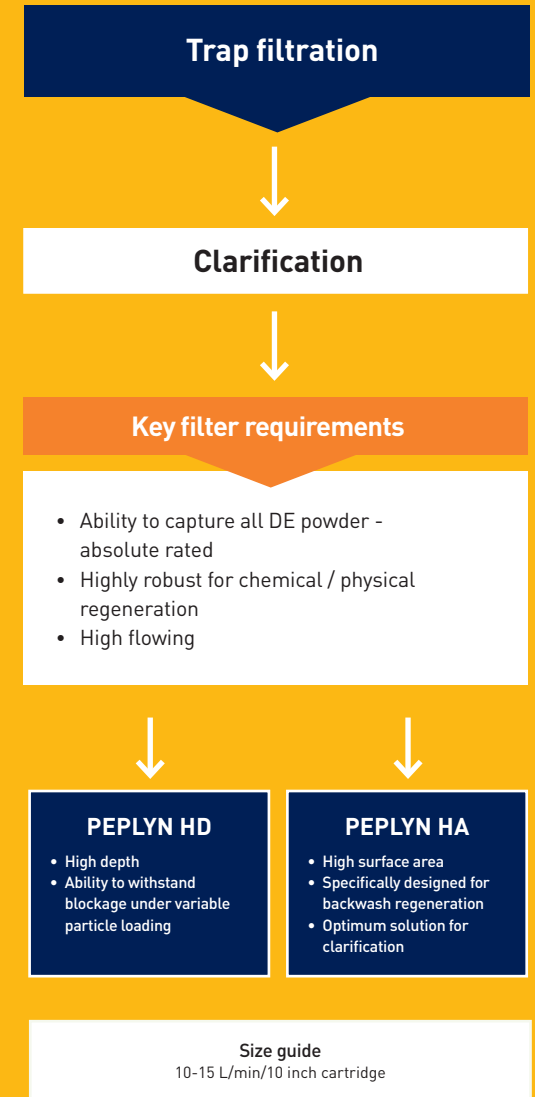
The first stage of this process will be to separate the solid lees from the liquid brew. There are various techniques available to do this, including centrifugation, physical stabilization by adding agents such as PVPP and isinglass, cross-flow filtration or powder filtration using diatomaceous earth (DE) or keisgelguhr. All of these processes are not absolute and some solid particles will still persist in the beer requiring filtration.

The trap filter system is designed to capture any solid particulate which has been left behind by the initial separation stage following fermentation. The objective of this filtration stage is to provide a consistent level of particulate filtration so that a certain quality of bright beer is delivered to intermediate

storage. A consistent quality of beer provided at this stage in the process will help ensure maximum efficiency of the downstream operations used for microbial stabilization.

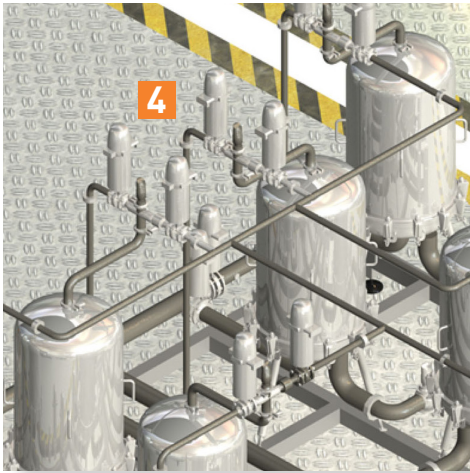
PEPLYN HA filters have been specifically designed to capture DE particles which will be periodically shed from powder filtration stages. The high area filter media will return high beer flow, whilst providing an absolute cut off to solid particulate. The construction of the HA filter has been optimized for repeated backwashing, so that filter regeneration and continual operation can be achieved.

PEPLYN HD is the product of choice where backwash is not required. The construction of the HD filter again returns absolute cut off to retain solid particulate and has been designed to resist blockage under variable particle loading conditions that are expected in this application.



Sterilization of gases

Understanding the application



Compressed gases which come into direct contact with ingredients, the finished product, packaging materials, storage vessels or the manufacturing machinery, are termed critical and require sterile filtration to safeguard against a potential contamination of the brew.

Sterile gas filters represent critical control points in aseptic filling applications and regular steam sterilization and integrity testing can provide ongoing assurance for the microbial retention performance of the filters and quality control in the filling process.

For aseptic filling operations, maintenance of machine sterility and the associated packaging such as bottles and caps becomes critically important. Where flash pasteurization or cold stabilization is used, the filling machine will typically require at least one sterile gas filter to remove microorganisms from the nitrogen or CO₂.

ASEPT-X has been designed for aseptic filling applications where steam lines and steam treatment hardware are not optimized for bulk condensate removal. ASEPT-X withstands multiple steam sterilization cycles under bulk condensate condition whilst remaining integral and providing the sterile gas needed for critical aseptic packaging applications.

Bottling tank vent filtration

Gas sterilization

Key filter requirements

- Fully validated microbial retention
- Integrity testable
- Hydrophobic to prevent blinding with moisture
- High flowing to reduce operational costs and increase energy efficiency

HIGH FLOW BIO-X

- Fully retentive to aerosol bacteria
- Superior flow rates
- PTFE impregnated depth media

ASEPT-X

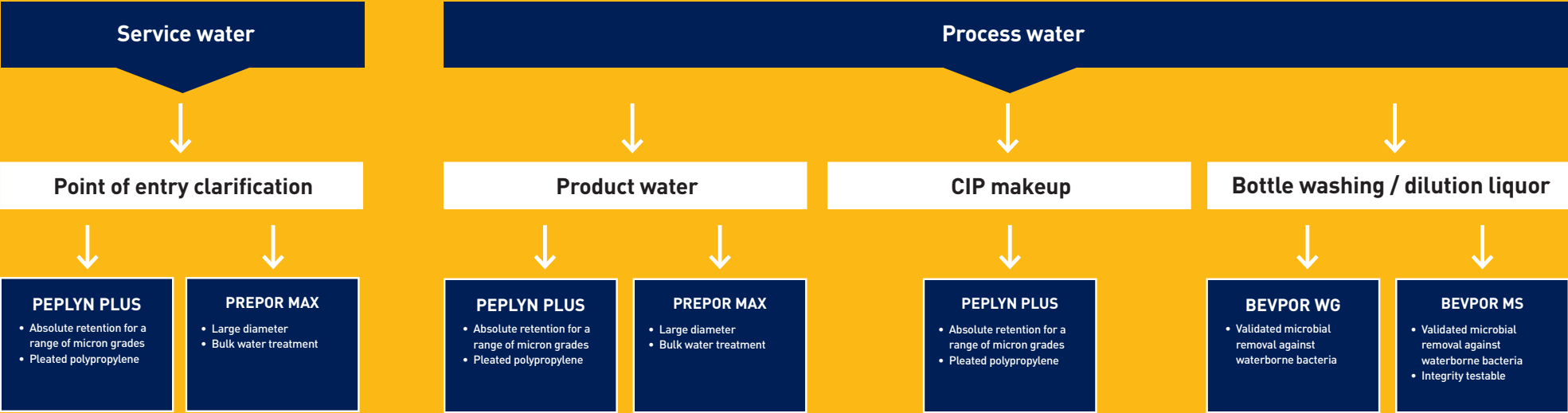
- High security PTFE membrane
- Fully retentive to aerosol bacteria
- Fully integrity testable
- Steam condensate capable

Size guide

For sizing consult your Parker representative

Water utilities

Understanding the application



Gas utilities

Understanding the application

Compressed air pretreatment / generation



OIL-X Grade AO

- Compressed gas filter
- Particle removal to 1 micron
- Remaining oil content 0.5 ppm

OIL-X Grade AA

- Compressed gas filter
- Particle removal to 0.01 micron
- Remaining oil content 0.01 ppm

OIL-X Grade WS

- Energy efficient water separators
- Removal of bulk condensate water and liquid oil
- Tested in accordance with ISO8573-9

OIL-X Grade ACS & OVR

- Oil vapour and odour reduction
- Point of use (ACS) or plant scale (OVR)
- Air quality to ISO 8573.1: Class 1 oil

Production or process air / gas

Product carbonation / filling



PCO₂

- Carbon dioxide quality incident protection
- Added sterility of CO₂ quality
- Protection against impurities resulting in flavour defects
- Easy maintenance

Nitrogen blanketing / flushing



NITROSource

- On-site nitrogen gas generation, removing the need to buy nitrogen from a gas company
- On demand, convenient and secure supply
- High purity supply
- Modular design allows expansion
- Cost-effective supply

Sterilization / purging / vent top pressure



HIGH FLOW BIO-X

- Hydrophobic glass microfibre
- Suitable for aerosol integrity testing

ASEPT-X

- Hydrophobic membrane filter
- Suitable for liquid and aerosol integrity testing

Steam

No product contact



SINTERED 25 µm

- 21 - 82 Kg / hr

PLEATED 5 µm

- 150 - 280 Kg / hr



Our solution for automated sterile filtration

Cold Stabilization Modules (CSM)

Brewers are looking to source a filtration system without having to worry about a fluent integration into their plant. Parker and Agidens Process Automation offer high performance filtration solutions tailored to brewers' needs. Regardless of the plant specifics and software systems used in a brewery, we deliver integrated systems that are flexible and fully compliant with the highest standards.

The CSM range of fully automated sterile filtration systems provide either continuous or batch processing combined with automated CIP and integrated integrity testing, ensuring complete microbial control for breweries of all production capacities.



THE SOLUTION

High performance filtration

Years of research and development have resulted in the highest performing filtration systems available in the market.

- Validated retention of beer spoilage organisms
- Easily integrity tested
- Complete confidence in performance

Investment with return

Not only do we aim to make high performing filtration systems, we aim to make them affordable.

- Adapted to expectations of any brewery
- Limited integration costs
- Long filter service life reduces replacement costs

A to Z integrated solution

A fluent integration into your plant while limiting downtime is critical in our approach.

- Extensive engineering team
- Tailored solution that can be integrated into existing software and control system
- Years of process design and automation experience
- Fast and high quality integration

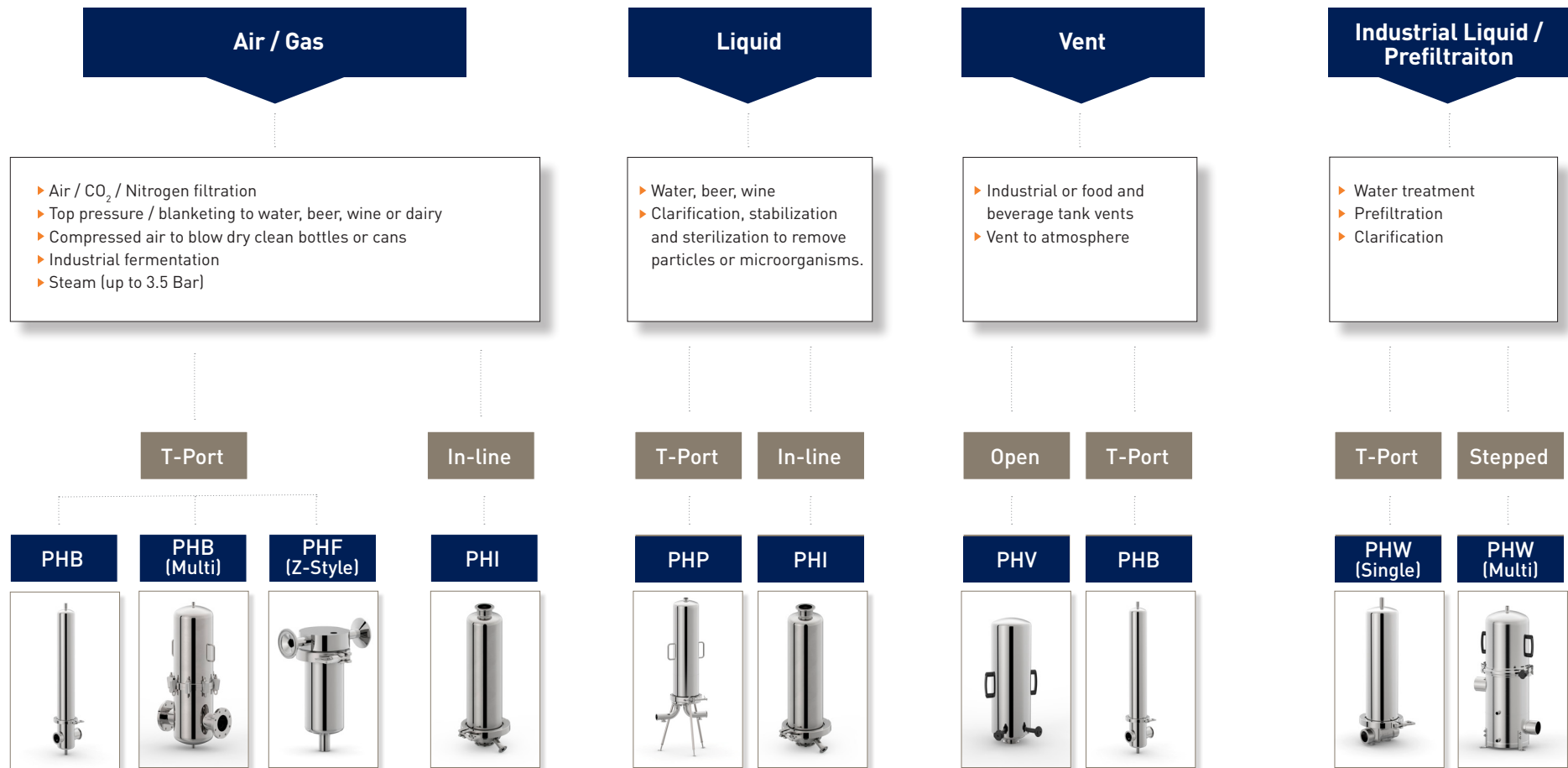
Easy to use and maintain

Our shared history in the world of breweries has allowed us to offer solutions fit to the needs of people that use them every day.

- Easy to use and maintain
- Wide range of service level agreements
- Complete operation support

Filter Housings

Standard housing range for food and beverage applications



Parker have a global network of scientists and engineers available to support the filtration operations in your brewery.




As beer is a sensitive product containing a complex mix of natural components. A high degree of attention over stabilization systems is required in order to produce beer to correct specification and to achieve the correct shelf-life.

In order to maximize brewhouse operations and produce fresh tasting, stable beer which preserves its character once packaged, care and attention must be paid not only to the filtration systems, but also the support in operations such as cleaning, disinfecting and integrity testing practices.



From system design, commissioning, operator training and on-going maintenance / support, Parker provides a range of technical support services aimed at maximizing brewery efficiency. With expert scientists and engineers and access to leading analytical laboratories, Parker are the perfect partner for filtration support.

- ➔ Expert filtration guidance and support.
- ➔ Rapid response to technical enquiries.
- ➔ On-site deployment for technical analysis.
- ➔ System design and best practice recommendations.
- ➔ System audits and process optimization.
- ➔ Technical training.
- ➔ Used product analysis.




Technical Support
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Cold stabilisation		Pre-stabilisation, membrane protection and BBT protection	
BEVPOR BR		PREPOR PP	
Polyethersulphone	0.45 micron	Polypropylene	0.6 - 1.0 micron
<ul style="list-style-type: none"> Validated microbial retention for effective stabilization Optimized PES membrane structure High filtration area - 0.8m² per 10" Integral prefilter layer 	<ul style="list-style-type: none"> Yeast and bacterial reduction Haze reduction Strong, pleated polypropylene construction for backwash and chemical CIP 	PREPOR NG	
		Polypropylene	0.5 - 1.0 micron
		<ul style="list-style-type: none"> Validated yeast removal and bacterial reduction Haze reduction Graded density construction for increased retention and throughput Strong, pleated polypropylene construction for backwash and chemical CIP 	

Trap filtration

PEPLYN HA		PEPLYN HD	
Polypropylene	1.0 - 20 micron	Polypropylene	1.0 - 20 micron
<ul style="list-style-type: none"> Specifically designed for back wash regeneration 	<ul style="list-style-type: none"> High depth Ability to withstand blockage under variable load 		

Water treatment utilities

PREPOR MAX		PEPLYN PLUS		BEVPOR MS	
Polypropylene	1.0 - 40 microns	Polypropylene	1.0 - 10 microns	Polyethersulphone	0.2 micron
<ul style="list-style-type: none"> Large diameter for high flow rates and ease of change-out Absolute retention ratings from 1 micron to 50 micron Inside - out flow pattern ensures positive capture of contaminants 	<ul style="list-style-type: none"> Absolute retention for a range of micron grades Pleated polypropylene 	<ul style="list-style-type: none"> Validated microbial removal against waterborne bacteria Integrity testable 			
BEVPOR WG					
Polyethersulphone	0.2 micron				
<ul style="list-style-type: none"> Validated microbial removal against waterborne bacteria 					

Air / gas filtration

HIGH FLOW BIO-X

PTFE Impregnated glass fibre - 0.01 micron sterilizing

- Fully retentive to aerosol bacteria
- 94% voids volume PTFE impregnated glass fibre
- Exceptional flow rates with low pressure drops
- Integrity testable by aerosol challenge



ASEPT-X

Polypropylene expanded PTFE 0.01 - 0.2 micron

- High security PTFE membrane
- Fully retentive to aerosol bacteria
- Fully integrity testable
- Steam condensate capable



OIL-X

High efficiency compressed air filters

- The most energy efficient filters available
- High quality ISO8573.1:2001 compressed air
- Running costs that start low and stay low



PCO2

Carbon dioxide purifier

- Ensures compliance with quality guidelines published by the International Society for Beverage Technologies (ISBT)
- Protects drinks manufacturing processes from vapour impurities
- Easy maintenance



NITROSOURCE

Nitrogen gas generator

- Energy saving technology
- Lower cost maintenance and extensive working life
- Unique gas quality control system
- Remote monitoring



Integrity test equipment

Valairdata 3

Gas filter test

- Aerosol challenge testing
- Integrity testing of gas filters



BEVCHECK

Liquid filter test

- Pressure decay and diffusional flow testing
- Hand held portability with rechargeable battery option
- Flexible: suitable for use with compressed air or nitrogen



BEVCHECK PLUS

Liquid filter test

- Pressure decay and diffusional flow testing
- Convenient built-in printer provides printed test report
- Flexible: suitable for use with compressed air or nitrogen



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