

Focus on: the Beer Industry

Product Design, Development, Manufacture and Technical Support



World Class Filtration Solutions

Committed to Serving the Brewing Industry

The production of beer can be dated back thousands of years. The basic ingredients of beer tend to be water, malted barley, yeast and hops. Other fermentable starch sources can be used in place of barley, these are usually other cereal grains. The majority of beer is converted into alcohol with yeast and then flavoured with hops.

Slight variations in these ingredients and the process, enables brewers to provide the wide variety of beers and ales that are available today.

The stages included in the brewing process consist of malting, milling, mashing, lautering, boiling, fermenting, conditioning and packaging. Since the very start of beer production, beer spoilage, microorganisms such as wild yeasts, Lactobacillus and Pediococcus lactic acid bacteria, have posed a problem for brewers during these processes. The highest standards of cleanliness are also essential for preserving the unique flavour and taste of beer.

For these reasons filtration is crucial in the manufacture of a superior quality beer; to reduce waste, minimise product spoilage, extend shelf life and preserve taste.

Working together to understand your brewing business and beer processing goals

Porvair Filtration Group have extensive experience in providing innovative filtration and separation solutions to the global brewing industry and our filters can be safely used without compromise to the quality of the finished product.

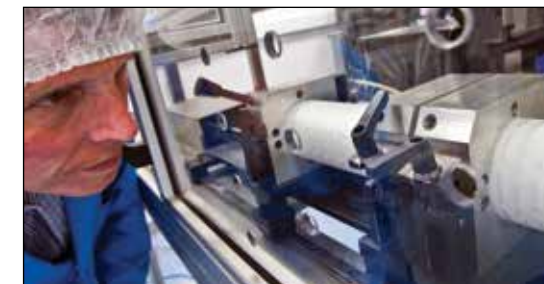
Porvair: Your Partner in Filtration and Separation

Porvair Filtration Group understands the challenges that this industry faces and we are committed to partnering with our customers to improve process control, increase production efficiency and reduce costs, whilst protecting the final product quality.

Our dedicated test, development and laboratory services underpin our design and development activity, from filtration media and material characterisation, product verification testing to customer systems simulation trials and in-service performance evaluation.

Our technical support service capabilities include:

- **Laboratory services:**
 - Filter integrity testing
 - Contamination identification
 - Filterability testing
 - Filter and media efficiency testing
 - Dirt holding capacity testing
 - Filter failure analysis
 - Compatibility investigation
 - Flow versus pressure drop measurements
 - Particle counting
- **Validation services:**
 - Process specific validation
 - Filter compatibility
 - Retention studies
 - Microbial challenge tests
 - Endotoxin and particulate testing
 - Extractables testing
- **On-site services:**
 - Customer plant surveys
 - Process filter optimisation
 - Trouble-shooting
 - Pre inspection review
- **Training** (held at customer site or at Porvair's technical facilities):
 - Integrity testing
 - SIP and CIP methods



We are committed to partnering with our customers to find the best filtration and separation solutions



1

Stabilisation and Sterilisation

Stabilisation of the beer is crucial to protect the beer during storage, extend the shelf life and protect systems further downstream. This filtration stage reduces the microbial loading whilst retaining colloids, to prevent beer haze and assist in filling operations.

Sterilisation is a fine filtration stage to remove spoilage organisms to extend the shelf life without compromising the flavour of the final product.

Porvair products designed for this application:

- Biofil™
- Biofil™ Plus
- Vinofil™
- Hydrofil™
- Aquafil™
- Stabifil™

2

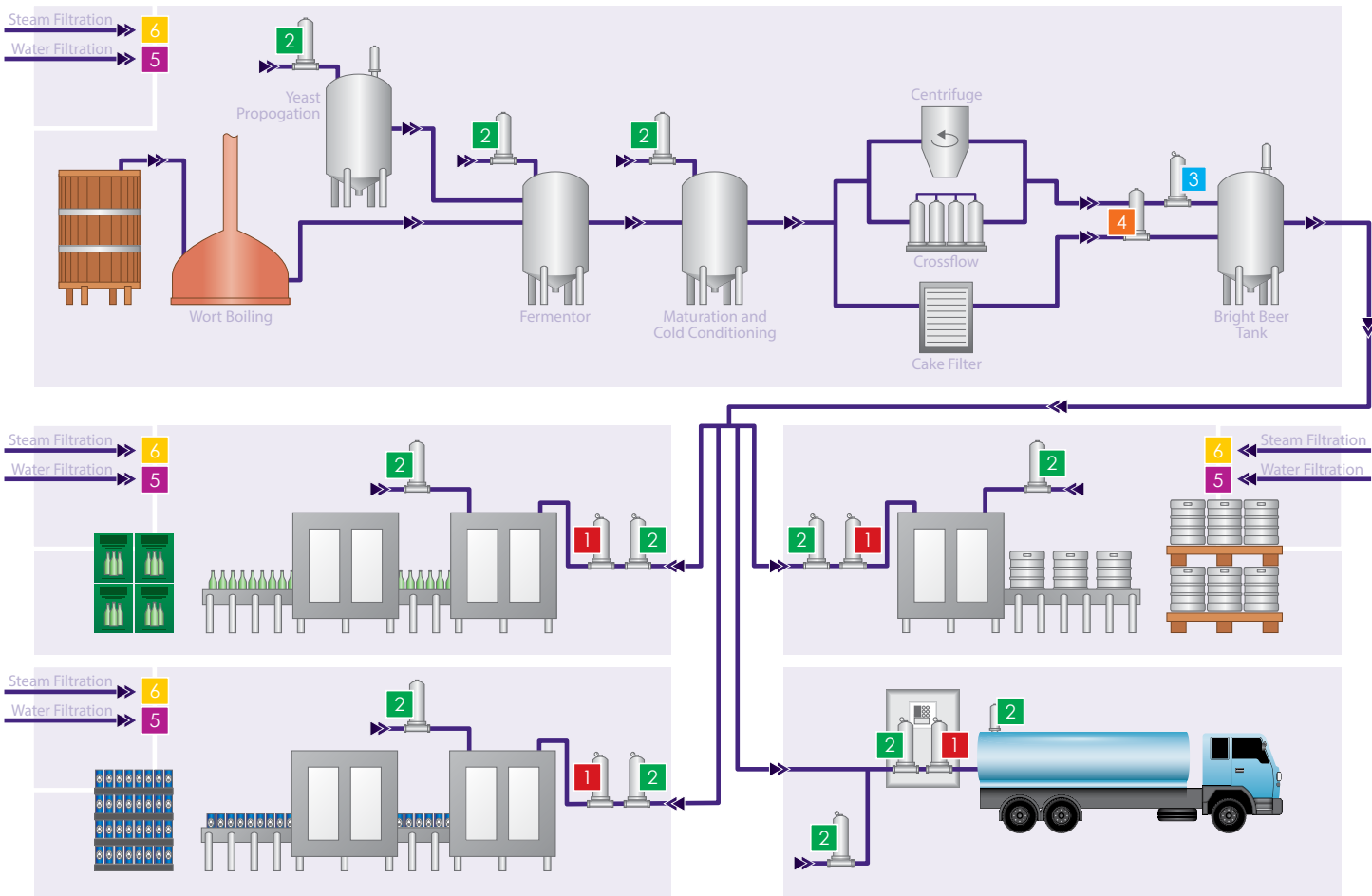
Sterile Process Gases and Venting

Compressed gases, such as Carbon Dioxide, Nitrogen and Oxygen, come into direct and indirect contact with the beer during its manufacturing process. These operations include the feeding of gas into fermentors and storage vessels, filling, packaging and the maintenance of machinery. It is vital that these gases are sterile to prevent contamination of the product which will reduce its quality and shelf life.

Sterile venting is critical for product storage vessels, pipelines and packaging to prevent contamination. These include steam-to-water change in volume conditions, emptying and filling of vessels, change in volume due to temperature changes.

Porvair products designed for this application:

- Fluorofil™
- Fluorofil™ Plus
- Chemifil™
- Ventafil™



5

Process Water Filtration

Filtered water is vital throughout the brewing process and each stage has differing filtration requirements dependant on its use within production.

The operational uses for water include deaerated liquor, bottle washing, the removal of chlorine, and clean-in-place cleansing of pipes, vessels, filters and fittings.

Porvair products designed for this application:

- Cryptofil™

6

Steam Filtration

Culinary steam filtration is vital for the sterilisation of bottling and canning lines, product packaging, sterilising equipment, removing pipe-scale, the prevention of fouling of valves and injectors, and the removal of bacteria and contaminants in fermentors.

Porvair products designed for this application:

- Sinterflo® P Sintered Metal Powder

3

Prefiltration and Clarification

Prefiltration, clarification, prestabilisation and stabilisation are critical processes for protecting the quality of the final product.

Prefiltration and clarification stages remove particles, yeast, mould spores and bacteria to ensure clear and bright beverages, as well as preventing blockages further downstream.

Porvair products designed for this application:

- Polyfil™
- Klearfil™
- Tekfil™
- Microfil™

4

Guard Filtration

An amount of sediment, such as yeast cells, wort, proteins, fats, and particulate filter aids such as PVPP powder and Diatomaceous Earth (DE), remain in the beer following the fermentation stage of the brewing process.

Guard filtration is there to capture these particulates to prevent deterioration, avoid secondary fermentation, protect the flavour and ultimately lengthen the shelf life before the product enters the bright beer tank.

Porvair products designed for this application:

- Trapfil™
- Microfil™
- Klearfil™

Clarification, Stabilisation and Sterilisation of Liquids

Biofil™ II and Biofil™ Plus polyethersulphone membrane cartridge filters

A range of microbially rated cartridge filters featuring the latest developments in membrane technology, Biofil™ II cartridges are based on a naturally hydrophilic polyethersulphone (PES) membrane with a mirrored asymmetric pore structure. When combined with quality all-polypropylene cartridge components and high integrity manufacturing techniques common to all Porvair cartridge filters, the polyethersulphone membrane provides a high strength, long life cartridge of consistently precise microbial retention.

Vinofil™ double layer membrane cartridge filters

Vinofil™ membrane cartridges have been specifically designed for beer filtration, as a final filter for cold biological stabilisation. Vinofil™ cartridges utilise a double layer of naturally hydrophilic polyethersulphone (PES) membrane with a mirrored asymmetric pore structure, which provides graded filtration throughout its depth, resulting in higher throughputs and long service life. When combined with quality all-polypropylene components and high integrity manufacturing techniques, the Vinofil™ filter cartridge is ideally suited to the most demanding process conditions.

Hydrofil™ nylon 6.6 membrane cartridge filters

A range of microbially rated cartridge filters featuring the latest developments in membrane technology, Hydrofil™ HT cartridges are based on a naturally hydrophilic nylon membrane. When combined with quality all-polypropylene cartridge components and high integrity manufacturing techniques common to all Porvair cartridge filters, the nylon membrane provides a high strength, long life cartridge with consistent microbial retention.

Aquafil™ single layer polyethersulphone membrane cartridge filters

A range of cartridge filters featuring the latest developments in membrane technology, Aquafil™ cartridges are based on a naturally hydrophilic polyethersulphone membrane with a mirrored asymmetric pore structure. When combined with quality all-polypropylene cartridge components and high integrity manufacturing techniques common to all Porvair cartridge filters, the polyethersulphone membrane provides a high strength, long life cartridge.

Stabifil™ porous polymer composite filters

Stabifil™ has been developed as unique technology that is at the interface of Porvair's filtration and porous material technology. The unique manufacturing process allows contact between the adsorbent and the beer to be at its optimal. The product can be manufactured in the format of a filter cartridge and will fit into most industry standard housings used in the brewing industry; thus providing an economic means by which the stabilisation process can be integrated into the processing of beverages.

Stabifil™ is highly flexible due to the robustness of the composite material, which enables it to be to be easily incorporated into any process where beer stabilisation is required.

Sterile Process Gases and Venting

Fluorofil™ and Fluorofil™ Plus ePTFE membrane cartridge filters

Fluorofil™ and Fluorofil™ Plus cartridges are manufactured using a highly hydrophobic ePTFE membrane. The enhanced ePTFE membrane offers exceptionally high gas flow rates at low pressure differentials. Fluorofil™ and Fluorofil™ Plus cartridges are recommended for sterile gas filtration and venting applications. The hydrophobic characteristics of the ePTFE membrane makes the Fluorofil™ and Fluorofil™ Plus filter cartridges particularly suitable for wet gas sterilising applications, such as fermenter air feed.

Chemifil™ polypropylene membrane cartridge filters

Chemifil™ cartridges are manufactured using a polypropylene membrane of uniform thickness and high voids, with a homogeneous structure and controlled pore sizes. Designed for the removal of sub-micron organic and inorganic particulate matter, the inherent structural stability of the membrane eliminates any risk of media migration and minimises the release of particles.

Ventafil™ ePTFE membrane cartridge filters for autoclave venting

Ventafil™ cartridges are manufactured using a highly hydrophobic ePTFE membrane and are designed meet the demanding filtration requirements of the pharmaceutical, laboratory and sterile production environments. The enhanced ePTFE membrane offers exceptionally high gas flow rates at low pressure differentials and are suitable for a wide range of small-scale sterile venting applications.

Prefiltration and Clarification

Polyfil™ II absolute rated pleated polypropylene cartridge filters

A range of absolute rated cartridge filters featuring the latest developments in meltblown polypropylene filter media technology, Polyfil™ II cartridges are based on a robust all polypropylene construction, offering removal ratings from 0.5 to 105 micron absolute.

Klearfil™ absolute rated pleated depth cartridge filters

A range of absolute rated cartridge filters featuring the latest developments in meltblown polypropylene filter media technology, Klearfil™ cartridges are based on a robust all polypropylene construction, offering removal ratings from 0.5 to 75 micron absolute.

Tekfil™ polypropylene depth cartridge filters

Tekfil™ is a high flow, graded depth filter with high contaminant capacity for long life. Constructed from FDA approved polypropylene with excellent performance characteristics, it is an economic choice for a wide range of applications.

Microfil™ absolute rated pleated glass fibre cartridge filters

A range of absolute rated cartridge filters featuring the latest developments in borosilicate glass fibre filter media technology, Microfil™ GP cartridges are constructed from robust glass fibre and polypropylene filtration layers, offering removal ratings from 0.5 to 5 micron absolute.

Guard Filtration

Trapfil™ polypropylene guard filters for clear, bright beverages

The Trapfil™ filter has been specifically developed for the retention of diatomite and polyvinylpyrrolidone (PVPP) particles. The Trapfil™ filter is designed to withstand repeated backwash and caustic cleaning cycles for extended life.

Klearfil™ absolute rated pleated depth cartridge filters

Microfil™ absolute rated pleated glass fibre cartridge filters

Process Water Filtration

Cryptofil™ designed for the removal of cryptosporidium oocysts

Cryptofil™ filter cartridges are utilised for the control of cryptosporidium oocysts in water used in the food, beverage and ultrapure water industries. The Cryptofil™ cartridge has been developed after extensive research and has resulted in filter media with continuously graded fibre density. This yields progressively finer oocyst retention through the depth of the media. This graded density depth filtration mechanism, combined with optimised pleated pack configuration and resultant high surface area, affords high flow capability and exceptional oocyst retention capacity.

Steam Filtration

Sinterflo® stainless steel filters for steam filtration

Porvair manufacture a range of Sinterflo® stainless steel filters for the production of particulate-free culinary steam for critical applications that come in direct contact with beverages or product contact surfaces. These filters exceed the 3A Sanitary Standards 609-03, constructed to remove more than 95% of 2 micron particles.

Porvair's Sinterflo® stainless steel process steam filters are used where clean, dry steam is critical for plant performance and continuous operation, but where there is no direct contact with the manufactured product.



Additional Information

Range

Our range of filters are suitable for use in **Porvair** filter housings and as direct replacements for existing cartridges, our cartridges can be supplied with end fittings to suit most hardware installations without modification. They are available in single or multiple module units of various lengths, and in a choice of microbial ratings. Each cartridge is supplied with all necessary seals or O-rings to ensure chemical compatibility.

Quality Assurance

Porvair Filtration Group cartridges are manufactured in an ISO Cleanroom environment by staff fully gowned to minimise any risk of contamination during production. All cartridges are integrity tested and, if required, pulse flushed with 18MΩ.cm pyrogen-free ultra-pure water to give rapid resistivity recovery rates and low TOC levels. As a further safeguard, every cartridge is individually and batch identified with a unique serial number, allowing users to maintain their own process records.

Registered to ISO 9001, **Porvair Filtration Group** procedures are subject to high standards of quality assurance as demonstrated through its Drug Master File status.

Material Conformity and Validation

The bio-safety of all materials in the manufacture of **Porvair** cartridges is assured by FDA approval and meets or exceeds the latest EC Directives for Food Contact.

Our cartridges have been tested and shown to be 100% retentive in line with HIMA and ASTM F838-05 guidelines for *Brevundimonas diminuta* challenge (0.2 micron), *Serratia marcescens* (0.45 micron) and with *Saccharomyces cerevisiae* (0.65 micron). To guarantee the bacterial retention performance of every cartridge, a correlation has been made between the bacterial challenge and integrity tests. A comprehensive validation guide for our cartridges is available on request.

Chemical Compatibility

The materials of construction are compatible with a wide range of chemicals and solvents, however, care must be taken to select the appropriate seal material. A comprehensive chemical compatibility guide is available. Since operating conditions vary considerably between applications, verification by the end user is recommended.

Filter Housings

Please contact a **Porvair Filtration Group** representative for further information on our range of filter housings.



Porvair Filtration Group Ltd.

Queensway
Stem Lane, New Milton
Hampshire, BH25 5NN, UK
Tel: +44 (0)1425 612010
Email: info@porvairfiltration.com

Porvair Filtration Group Inc.

301 Business Lane
Ashland, Virginia 23005, USA
Tel: +1 804 550 1600
Email: infoUS@porvairfiltration.com

Porvair Filtration Group

Chengdong Area
Square Industrial Park, North District
Xiaonan Economic Development Zone
Xiaogan, 432000, China
Tel: +86 (0)712 2878955
Email: infoCN@porvairfiltration.com

www.porvairfiltration.com

Porvair, Sinterflo and Porvair Sinterguard are registered trademarks of Porvair plc.

© Copyright 2016, Porvair Filtration Group Ltd. All rights reserved.

Whilst every effort has been made to ensure the accuracy of this document, due to continuous product development, the data contained is subject to constant revision and Porvair Filtration Group Ltd. reserves the right to change, alter or modify its contents.