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BEVPOR BR Filter Cartridges

A Technical Guide

Parker domnick hunter

ENGINEERING YOUR SUCCESS.

Parker domnick hunter specialise in microfiltration solutions for the brewing industry.

As a customer of Parker domnick hunter, you have access to leading technologies to control specific contamination hazards, protecting the quality of your beer at the lowest cost.

With a team of technical and scientific experts located in over 50 countries, combined with 50 years experience supporting leading brands, Parker domnick hunter are the perfect partner to support your global brewing operations.

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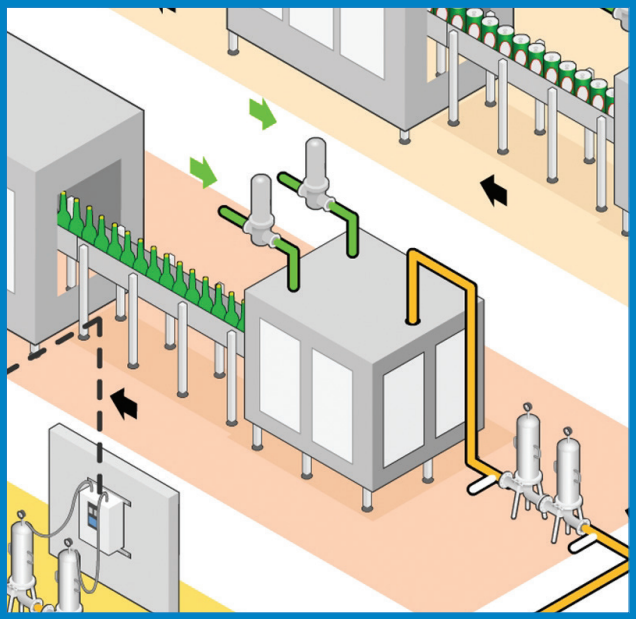
Protecting beer quality with BEVPOR BR filters

The new BEVPOR BR filter range from Parker domnick hunter allows brewers to significantly reduce the cost of microbial stabilisation, whilst protecting the sensory characteristics of their beer.

This is achieved by using a unique polyethersulphone (PES) filter membrane which has been validated to retain key spoilage microorganisms, whilst offering the longest service life and therefore the most efficient and lowest cost of operation. In addition, the unique construction of the BEVPOR BR filters allows easy integrity testing as the cartridges are entirely hydrophilic and wet out quickly and easily.

- Absolute elimination of beer spoilage microorganisms.
- Longest service life and lowest cost of operation.
- Guarantee and control of filter performance.
- Certified to European and US food contact requirements.

Cold Stabilisation of Beer



Cold stabilisation, or sterile filtration refers to the microfiltration of beer to remove any spoilage microorganisms before it is packaged.

The new BEVPOR BR filter has been designed to excel in cold stabilisation applications where the beer is required to be filtered in order to eliminate all spoilage microorganisms delivering stability once packaged.

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

BEVPOR BR filter cartridges are the most advanced filter cartridges available for the cold stabilisation of bright beer.

The filters offer an improved solution to the problem of microbial stabilisation as the unique, optimised PES membrane has been validated to retain key spoilage organisms, whilst offering the longest service life and therefore the most efficient and lowest cost of operation.

The ability to provide long service times in the application will translate into significant cost savings over time, as the frequency of replacement element purchases will decrease. In addition, the associated costs and operational expense of filter change-outs such as man power and downtime can also be significantly reduced.

The unique construction of the BEVPOR BR filters allows easy integrity testing as the cartridges are entirely hydrophilic and wet out with water easily. The ease of integrity testing allows a higher degree of control over the filtration which in turn will prevent operation with a failed filter, which could lead to microbial contamination and product wastage.

The combination of microbial retention, long lifetime and ease of integrity testing is unique to the performance of BEVPOR BR filters.

These benefits are attributed to the innovative construction and materials used in each module, where an optimised PES membrane in high area (0.8m^2) pleating, is combined with an integral prefilter layer and nylon end caps.

Cold stabilisation

Final filtration

Key filter requirements

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

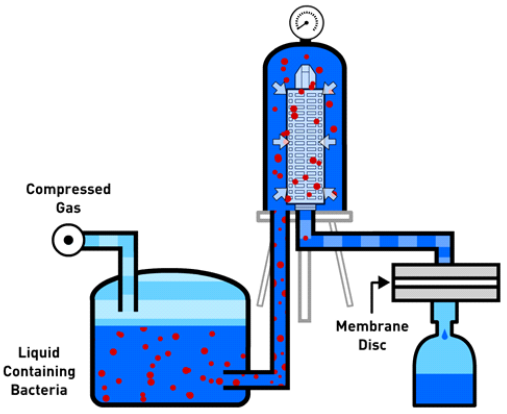
BEVPOR PS	BEVPOR PH	BEVPOR BR (NEW PRODUCT)
0.6m^2 filter area per 10"	0.8m^2 filter area per 10"	0.8m^2 filter area per 10"
	Prefilter layer	Prefilter layer
		Optimised PES membrane structure

Protecting Beer Quality with BEVPOR BR Filters

Typical beer spoilage organisms are species capable of growing in low pH and anaerobic conditions. For example; lactic acid bacteria such as *Lactobacillus brevis* and fermenting yeasts such as *Saccharomyces cerevisae* can proliferate in beer and cause faults such as; off-flavours, over carbonation, haze and sedimentation.

BEVPOR BR filters have been validated to provide best in class microbial retention to protect beer against typical spoilage species. This has been achieved through repeat live bacterial challenge testing in dynamic flow conditions based upon the principles of ASTM F838.

During the challenge, each filter is challenged with >10^7 living cells per cm^2 of filter membrane. This is to represent "worst case" conditions and to ensure that every pore of the membrane is challenged with at least 1 living cell.



Bacterial Challenge Process

Microorganism	Typical Cell Size µm	Titre reduction (per cm^2)
Saccharomyces cerevisae (ATCC 4098)	4	>10^7
Brettanomyces bruxellensis (NCYC 370)	1.5 - 3.5 x 2.0-19.0	>10^7
Lactobacillus brevis (NCIMB 8038, ATCC 8287)	1.7-1.1 x 2.0-3.0	>10^7
Lactobacillus lindneri (NCIMB 13089)	0.4-0.5 x 0.6 and 1.0	>10^7
Pediococcus damnosus (NCIMB 12010)	0.48-0.5 x 0.48 and 0.5	>10^7

Integrity Testing BEVPOR BR Filters

BEVPOR BR filters are the final barrier to eliminate spoilage organisms from the beer prior to packaging. When used in this application, BEVPOR BR filters qualify as a critical control point (CCP) in the site HACCP plan.

An integrity test is a non-destructive way of determining the filter system's retention ability and provides a quick and easy means of monitoring the condition of the filters and their lifetime in the application.

For maximum control and accuracy of integrity testing, it is recommended that the diffusional flow test method is used. The diffusional flow is the rate of gas flow through the wetted pores of the filter membrane and is correlated to the porosity, microbial retention and the integrity of the test filters.

A measured diffusional flow of compressed air (or nitrogen) through the test membrane which is within the maximum specification limits at the correct test pressure signifies that the test filter system is integral and will retain organisms to the validated levels.

BEVPOR BR filters have been designed to be easily integrity tested as part of the monitoring procedures required to maintain HACCP principles.

Diffusional flow test parameters when wet with water.	
Test pressure (mbar)	1240
Maximum diffusional flow per $10^{"}$ (ml/min)	26.9

Protecting Beer Quality with BEVPOR BR Filters

Quality is built into all Parker domnick hunter filtration products through a rigorous product design process, careful selection of suppliers and materials, and manufacture within a highly controlled environment using validated production technologies in adherence to cGMP.

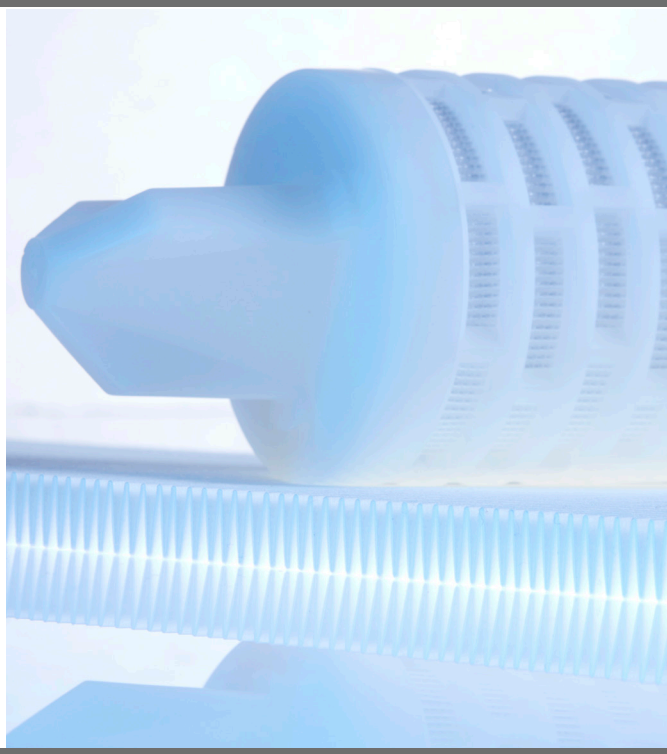
Manufacturing Facilities

BEVPOR BR filters are manufactured at Parker Hannifin Manufacturing Ltd, domnick hunter, Process Filtration – Europe.

All personnel within the manufacturing operations are fully trained in cGMP and against competency frameworks to ensure their suitability to operate within specific manufacturing areas.

Parker domnick hunter is certified to current versions of the following quality standards by Lloyds Register Quality Assurance:

BS EN 9001	Quality Management Systems
BS EN 14001	Environmental Management Standard
BS EN 22000	Food Safety Management System Standard



Material Conformity

Materials of Construction

Filtration membrane	Polyethersulphone (0.8m^2 per 10˝ module)
Prefiltration layer	Polyester
Upstream support	Polyester
Downstream support	Polyester
Inner support core	Polypropylene
Outer protection cage	Polypropylene
End caps	Nylon
End caps insert	316L stainless steel
O-rings	Silicone /EPDM

European

The BEVPOR BR range of filters supplied by Parker domnick hunter complies with the relevant requirements as laid down in:

- Framework Regulation (EC) 1935/2004 (dated 27-10-2004), articles 3 and 17.
- EU Commission Regulation (EU) 10/2011 relating to plastic materials and subsequent amendments up to 284/2011.
- Commission Regulation (EC) No. 2023/2006 Good Manufacturing Practice.
- German Bfr XXI Recommendations and Council of Europe Resolution AP(2004)5 for o-rings in contact with food.

The Parker domnick hunter range of BEVPOR BR filters complies with the European Framework Regulation (EC) 1935/2004 and is declared safe for its intended use for direct contact with all food types up to 70°C.

United States of America

The materials used by Parker Hannifin Manufacturing Ltd. in the manufacture of BEVPOR BR filters comply with the compositional and test requirements of the regulations for materials in contact with food according to the American Code of Federal Regulations Part 21 CFR parts 170 to 199.

Product Release

All BEVPOR BR filter cartridges undergo final product quality control prior to shipment. This includes: a diffusional flow test to ensure product integrity prior to dispatch, a high volume flush with water that meets or exceeds the current EP and USP standards for purified water, drying using HEPA filtered air and final packaging sealed in a protective polyethylene bag within the controlled manufacturing environment.

Traceability

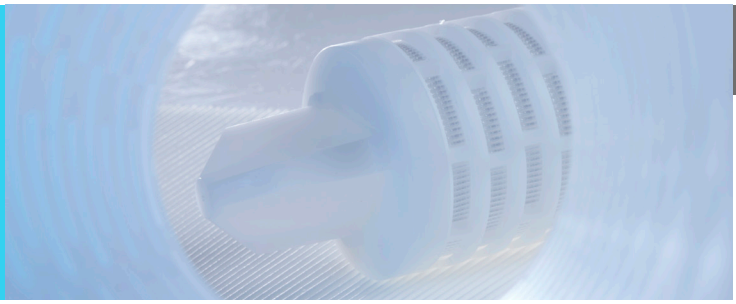
The product code, lot number and unique serial number are printed on all BEVPOR BR products.

Additionally, the lot number is identified on the protective bag label and the box label within which the cartridge is packed.

The serial number provides complete traceability back to pleated materials used in the manufacture of each cartridge and the manufacturing processes through the module routing sheet.

Protecting Beer Quality with BEVPOR BR Filters

BEVPOR BR filters protect the sensory profile of beer and have been shown to improve shelf-life stability in comparison to pasteurization techniques.



A number of independent tests have investigated the effect on taste of both flash pasteurization and cold stabilisation using Parker domnick hunter's BEVPOR filters.

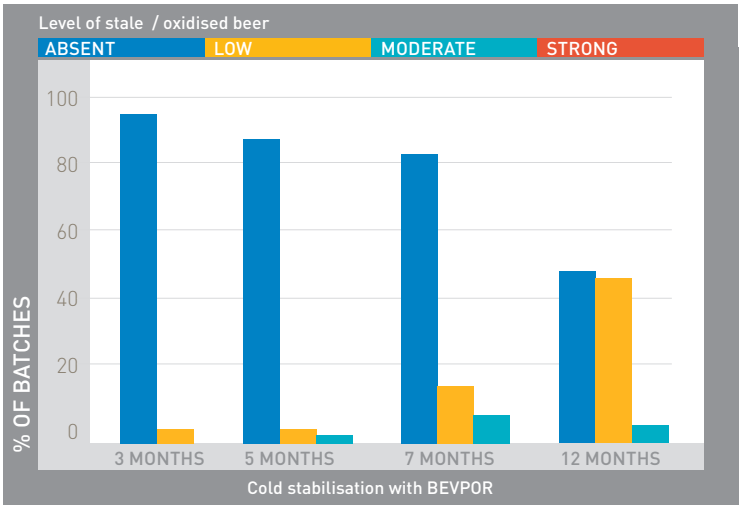
The tests, carried out with an experienced taste panel, tested the same batches of beer after cold stabilisation and flash pasteurization to identify if the method of stabilisation impacted upon the finished product characteristics of the beer.

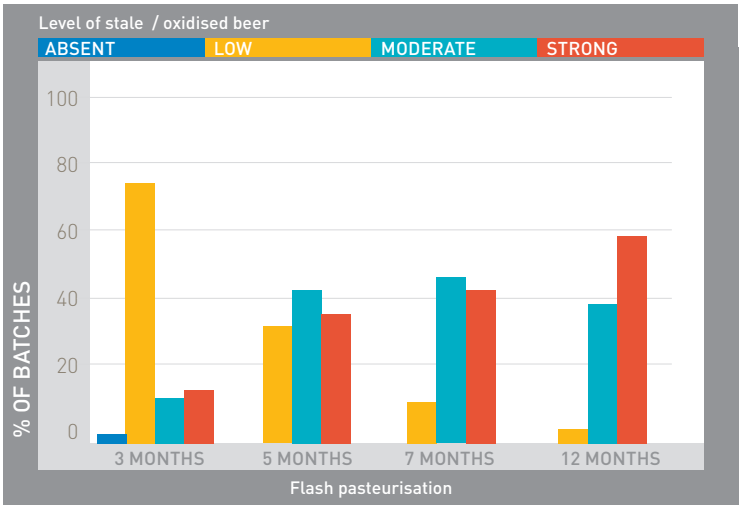
The studies performed not only established the immediate characteristic changes of the beer that had been pasteurized, they also identified that the method of stabilisation had an effect on the beer's characteristics for the duration of the product's shelf-life.

It was identified that cold stabilisation using BEVPOR filters increased the time taken for the beer to display a stale / oxidized characteristic. Not only did the oxidized characteristics take longer to develop in the microfiltered beer, but it was far less pronounced over the 12 month trial.

BEVPOR BR filters utilise an optimised polyethersulphone (PES) membrane which has been carefully selected due to its excellent performance characteristics in beer stabilising applications. As such, the unique characteristics of beer are protected whilst guaranteeing the removal of yeast and typical spoilage organisms.

Extending shelf-life of beer





Throughput Performance

BEVPOR BR filters have been designed to return the maximum lifetime and throughput to blockage – an important characteristic to reduce the operational costs of microbial stabilisation.

The unique, graded density PES membrane has been engineered to resist blockage by capturing microbial contaminants without restricting flow paths.

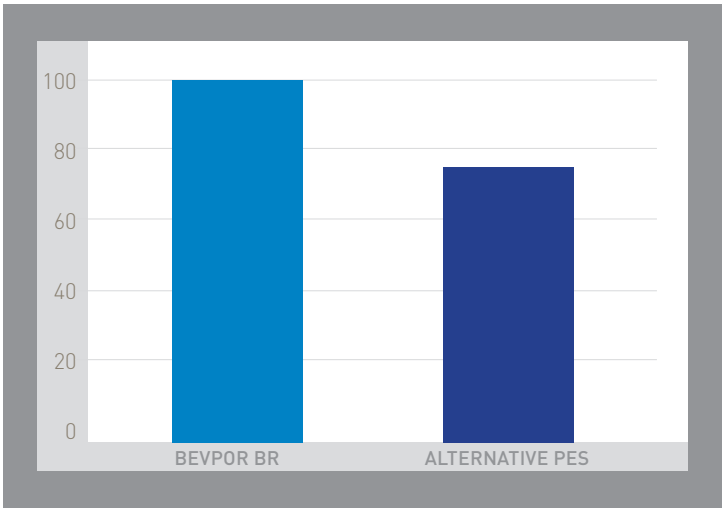
Lifetime is further extended by offering the proven features of; a high effective filtration area (0.8m^2), and an integral prefilter layer built into the construction of each 10" module.

Cleaning and Sterilising

BEVPOR BR filters are compatible with a wide range of standard industry cleaning and sanitising agents and can be repeatedly cleaned and sanitised to further minimise the onset of blockage and maintain hygienic conditions.

For detailed advice of typical CIP regimes, please contact your local Parker domnick hunter representative or email: **TSG@parker.com**

Relative beer throughput to blockage %



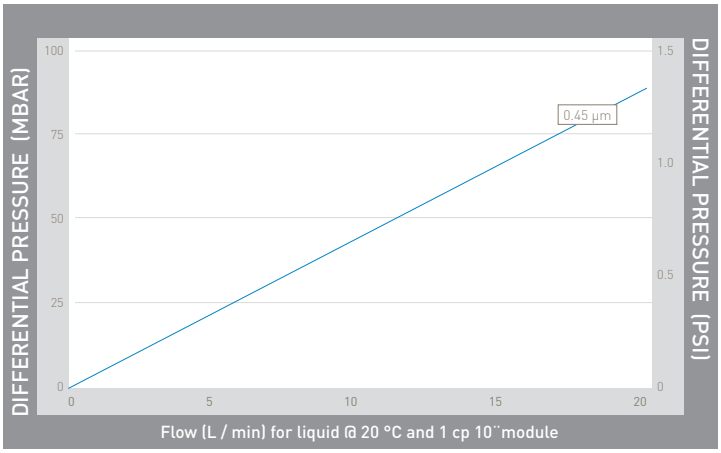
Recommended Operating Conditions

Up to 80°C (158°F) continuous operating temperature and higher short-term temperature during CIP to the following limits:

Temperature		Maximum Forward dP	
°C	°F	(bar)	(psi)
20	68	5.0	72.5
40	104	4.0	58.0
60	140	3.0	43.5
80	176	2.0	29.0
90	194	1.0	14.5
>100 (steam)	>212 (steam)	0.3	4.0

The optimised construction of BEVPOR BR filters can deliver at least 20% throughput improvement against similarly graded membranes as qualified during development testing under like-for-like flow conditions.

Flow characteristics



Ordering Information

CARTRIDGES

BBR — □ □ — □ A □

Code	Cartridge Length
1	10¨ (250mm)
2	20¨ (500mm)
3	30¨ (750mm)
4	40¨ (1000mm)

Code	Micron
04	0.45

Code	End cap (10 inch)
C	Fin / 226 Bayonet
D	Fin / 222
E	Flat top / 222
R	Fin / 222 Bayonet

Code	O-rings
S	Silicone
E	EPDM

SINGLE HOUSINGS

HSL — □ 01 □ □ □ — □ — □

Code	Vessel Class
CE	Standard

Code	Cartridge Length
1	10¨ (250mm)
2	20¨ (500mm)
3	30¨ (750mm)
4	40¨ (1000mm)

Code	Connection Size
B	1¨ (25.4 mm)

Code	Standard Connection
T	Tri-Clamp

Code	Cartridge
C	226

Code	Seal
S	Silicone
E	EPDM

MULTI HOUSINGS

VSH □ □ — □ □ □ □ □ □

Code	Vessels Class
CE	Standard

Code	No of Cartridges
03	3
05	5
08	8
12	12
18	18
24	24
30	30

Code	Cartridge Length
1	10¨ (250mm)
2	20¨ (500mm)
3	30¨ (750mm)
4	40¨ (1000mm)

Code	Connection Size
B	1¨
Y	1.5¨
C	2¨
X	2.5¨
D	3¨
E	4¨

Code	Connection Type
D*	DIN Male
F*	Flanged
M	SMS Male
R	RJT Male
T	Tri-Clamp®
W	Butt Weld

Code	Connection Standard
A	NPT/ANSI
B	BS4825
D	DIN
I	EN10921PN6

Code	Vent / Drain Connection
T	Tri-Clamp®

Code	Seal
E	EPDM
S	Silicone

BEVCHECK

Part	Code
BEVCHECK Unit	WBC300
Software CD (WinFilter 3.0)	
Transformer and power connection	
USB cable	
Carry case	
Operational manual	
Declaration of conformance	

Accessory and spares:	Code
Regulator kit	639502421
Bluetooth Printer	XPRWBC300
Software CD	609500369
USB cable	65921547
Paper rolls	XPAPR00WBC300

BEVCHECK PLUS

Part	Code
BEVCHECK Plus Unit	WBC-BEVCHECK PLUS
Software CD (WinFilter 3.0)	
Transformer and power connection	
USB cable	
Carry case	
Operational manual	
Declaration of conformance	

Accessory and spares:	Code
Calibration order code	609500091
Regulator kit	XAK00BC
Software CD	XWINFILTER_V3
Paper rolls	XPAPR00WBC300

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