



# Bottled Water Filtration

Training guide for products and applications

aerospace  
climate control  
electromechanical  
**filtration**  
fluid & gas handling  
hydraulics  
pneumatics  
process control  
sealing & shielding



ENGINEERING YOUR SUCCESS.

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## **INTERNAL USE ONLY**

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Parker domnick hunter has a continuous policy of product development and although the Company reserves the right to change specification, it attempts to keep customers informed of any alterations. This publication is for general information only and customers are requested to contact our Process Filtration Sales Department 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.

# Introduction

## Protecting the purity of bottled waters worldwide

Multinational corporations and boutique producers of bottled water brands across the globe have partnered with Parker domnick hunter for over 30 years to successfully reach their quality and production requirements.

From factory to factory, every bottled water process is different depending upon; the category and branding of the finished bottled product, the local legislation of the intended market and the source of the water itself.

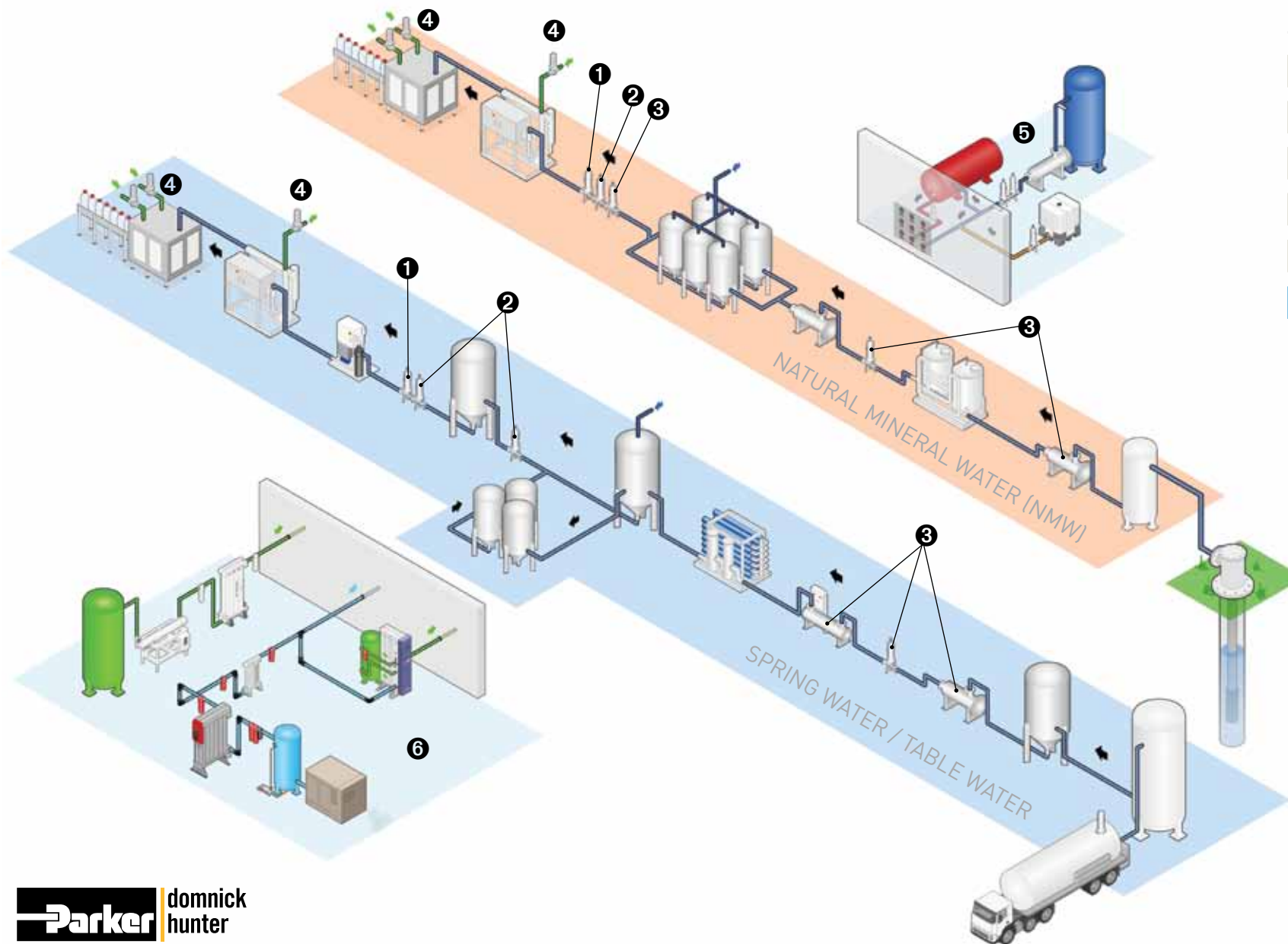
These differences influence the performance expectations of the filtration systems used and generate a wide degree of choice in approach. By understanding the specific requirements for each stage of the

bottled water production process we aim to offer value added filtration solutions which adhere to our application led philosophies of increasing process efficiency and reducing wastage.

Filtration solutions from Parker domnick hunter are supported through a structured pre and after sales program called Purecare. The Purecare approach by Parker domnick hunter ensures tailored filtration solutions are provided which meet the specific performance criteria required by a given process. Through a program of technical analysis available from a network of international support hubs, we work with end users. Continued process optimization is our duty.



# Typical processes



## Parker domnick hunter filter applications

1 Final stabilization

2 Pre-stabilization

3 Clarification

4 Sterilization of gas

5 Water utilities

6 Gas utilities

# Branding and local legislation

## Understanding the application

Throughout the world, there are three main classifications of bottled water recognized; natural mineral water, spring water and table water. Depending upon the country where the water is produced and the intended country of consumption, regulations apply to the production techniques used for each type of bottled water. For example in Europe please see Directive 2009/54/EC, for American standards see IBWA.

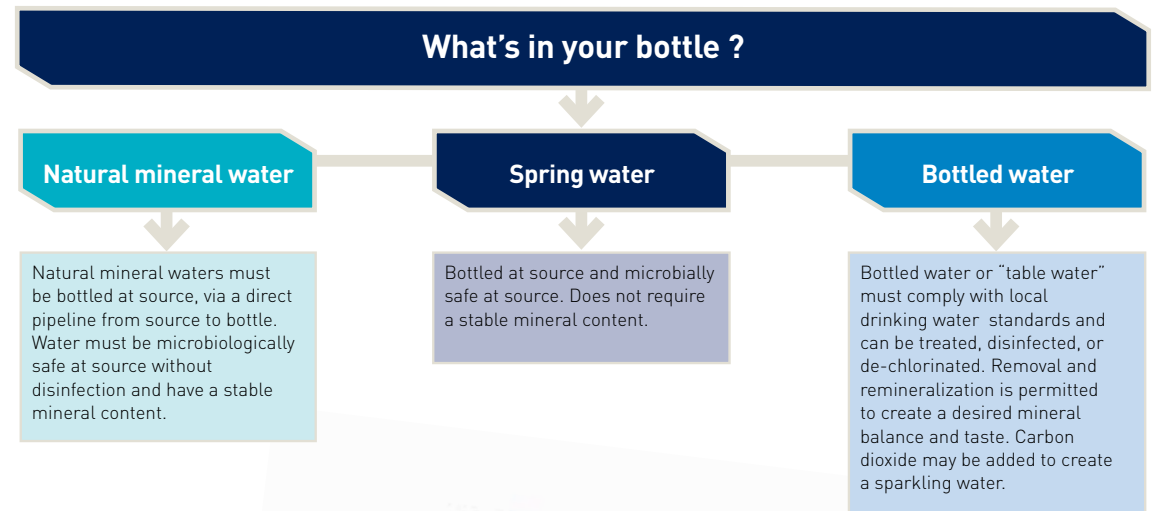
These regulations influence the levels of treatment which are permitted to produce each product, so care must be taken to understand the restrictions of each individual plant when proposing filtration solutions.

It is essential that the bottled water must be safe to drink, so it must be free from pathogenic organisms such as:

- *Eschericia coli*
- Faecal *streptococci*
- Non-sporulated sulphite reducing anaerobes
- *Pseudomonas aeruginosa*

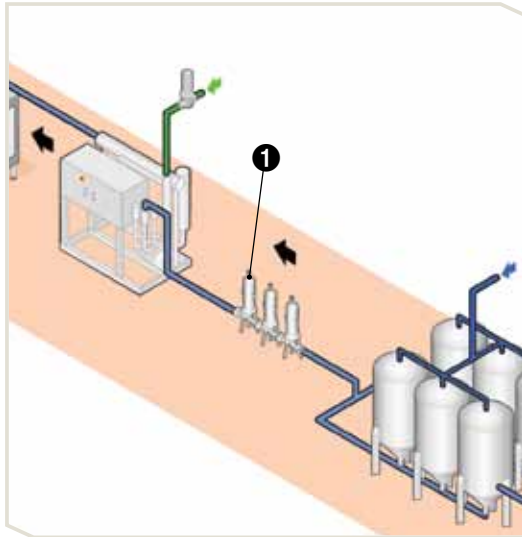
If the product is to be marketed as natural mineral water (NMW) in Europe, then the Official Journal of the EU specifies that *"any disinfection treatment by whatever means and, the addition of bacteriostatic elements or any other treatment likely to change the viable colony count of the natural mineral water shall be prohibited"*.

With these requirements in mind, it is important to promote a grade of BEVPOR filter which can retain these contaminants but not influence the natural microflora of the source water. In this case, a fully validated sterilizing grade BEVPOR filter would be unsuitable for bottled water marketed as NMW. The micron rating of the BEVPOR product can therefore be decided through a consultative process to clearly define the target contaminants required to be removed, whilst protecting the natural microflora present from the source.



# Application 1. Final stabilization

## Understanding the application



This application is termed “critical” as it is the final barrier to remove microbial contamination before packaging.

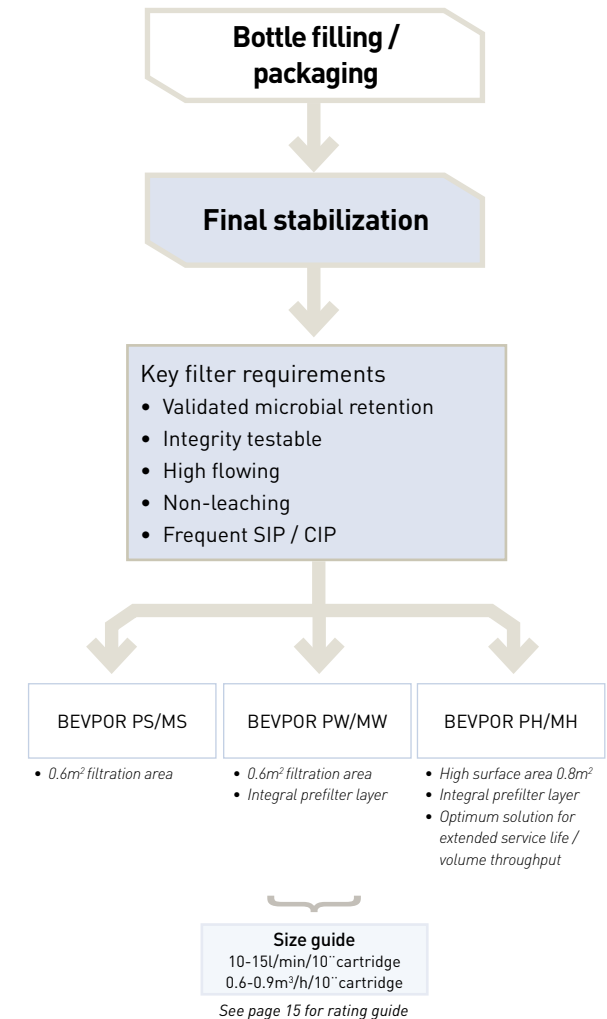
Membrane filtration by BEVPOR products will reliably remove any contaminating organisms from the water while protecting the purity and essential constituents which contribute towards the water’s unique properties.

Filter selection at this stage should be driven by the classification of the bottled water and the local legislation regarding exploitation of the source water.

Our global network of Technical Support Group (TSG) scientists can assist in verification of the optimum grade of BEVPOR filter either through laboratory trials, or in-line performance assessments. However, based on over 30 years of supplying this industry, use of either 0.2µm or 0.45µm BEVPOR P/M grade filters would be suitable for this application worldwide.

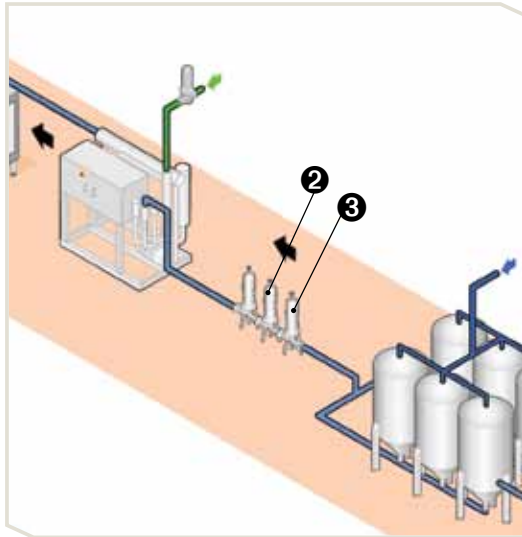
0.2µm BEVPOR M filters are fully validated sterilizing grade filters and provide sterile effluent when challenged with  $>10^7$  cfu *Brevundimonas diminuta* per cm<sup>2</sup>. BEVPOR P grade filters are classed as non-sterilizing but will effectively remove contaminating organisms from water, to ensure product safety whilst complying with EU legislation.

Some bottled water producers may require a validated *Cryptosporidium* removal filter. CRYPTOCLEAR PES / CRYPTOCLEAR PLUS filters provide a range of retention efficiencies in either membrane integrity testable or depth format.



# Application 2. Pre-stabilization

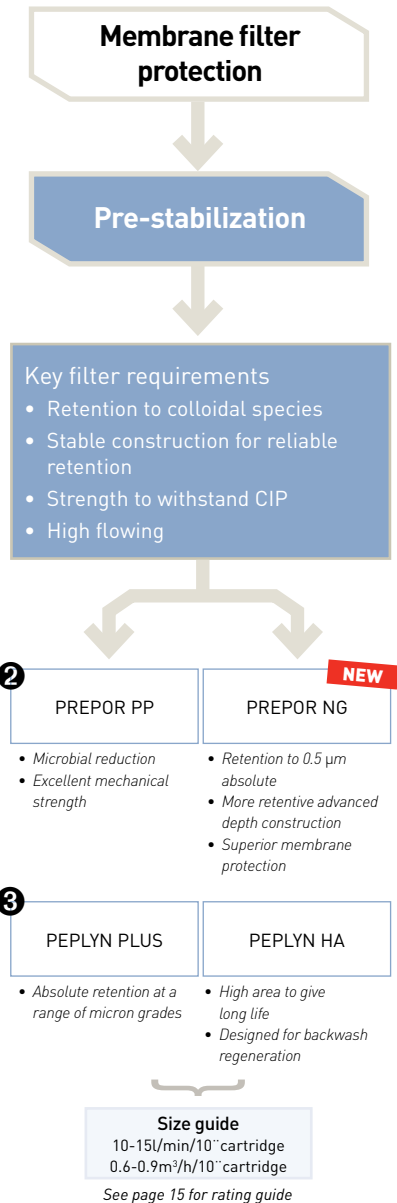
Understanding the application



The primary function of pre-stabilization filters is to protect the final membrane filters from colloidal particulate.

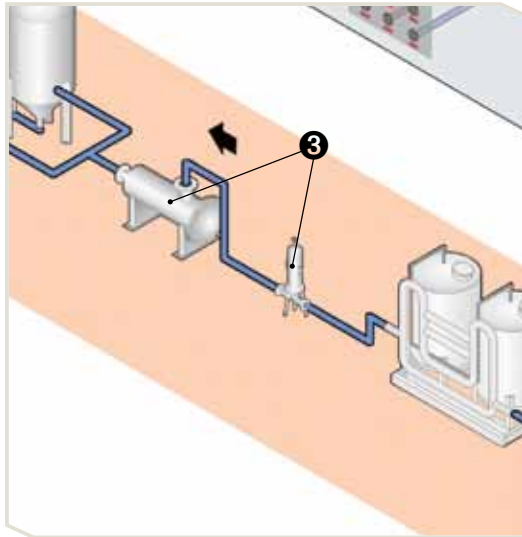
Most waters, while appearing visually clear, actually have a very large amount of suspended solids moving in solution. These are called colloids and are generally sub-micron in size. The main constituents of these colloidal species are ions ( $Fe^{3+}$ ) which have leached into the water from the source associated with organic material. These small, suspended particles are the major cause of membrane filter blockage, so their removal prior to membrane filtration will result in longer service life of the membranes and lower long-term running costs.

As the product water moves through the bottling facility, intermediate storage may be necessary. Pre-stabilization filters will limit the levels of microorganisms entering the storage tanks so the potential for biofilm development will be reduced. This control on microbial growth within the facility will optimize the operation of the final stabilization filters prior to bottling and return a more hygienic processing environment.



# Application 3. Clarification

## Understanding the application



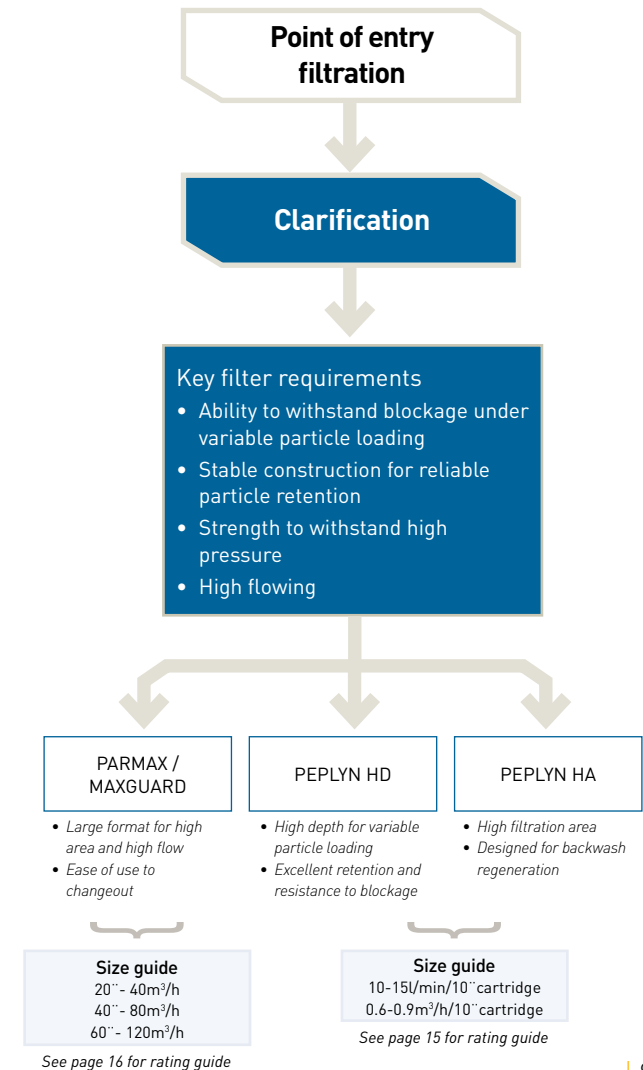
Water entering a bottling facility directly from a source is sometimes referred to as point of entry (POE) and will require clarification filtration to remove any insoluble contaminants such as sand, silt or debris before entering intermediate storage.

Typically the filtration employed for this requirement will be designed to handle a high and variable particle loading.

Carefully selected retention and construction of the filter at this stage in the process will greatly influence the performance of further downstream filtration and overall process efficiency.

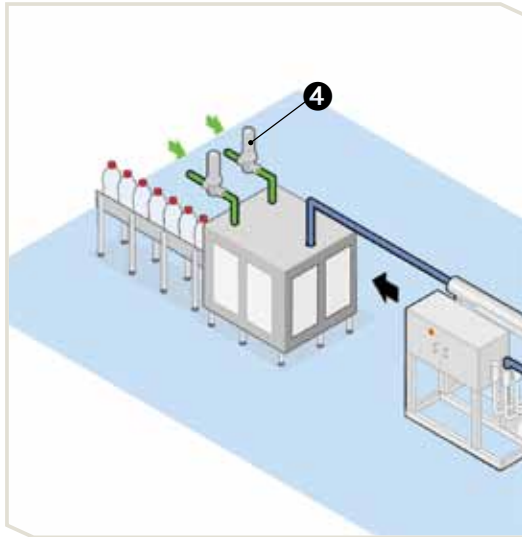
If chemical modification of the source water is permitted (for anything other than natural mineral water), adsorptive carbon filtration of the water can be employed to reduce any chlorine or chemical taints which could otherwise affect flavour or cause precipitation issues. Use of a carbon granulated filter will require a trap filter downstream to collect any carbon fines entering the process.

Where unstable components such as iron and manganese result in precipitation of small particles, backwashable clarification filters such as PEPLYN HA provide an efficient means of removal.



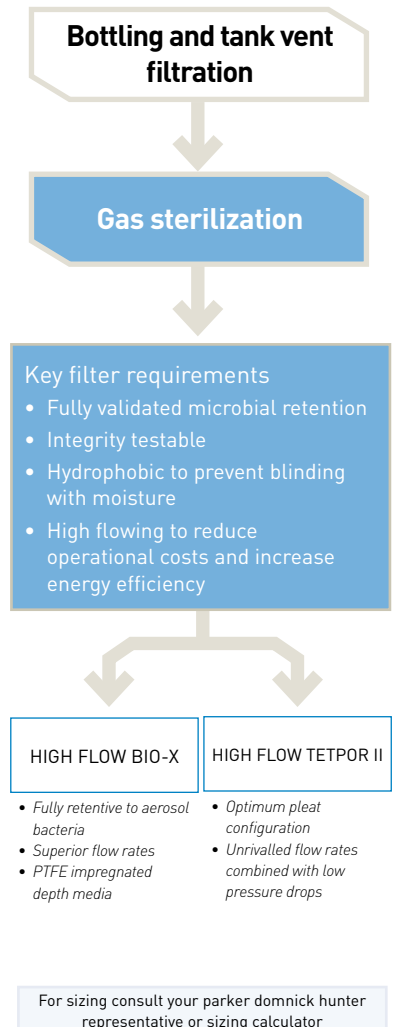
# Application 4. Sterilization of gases

Understanding the application

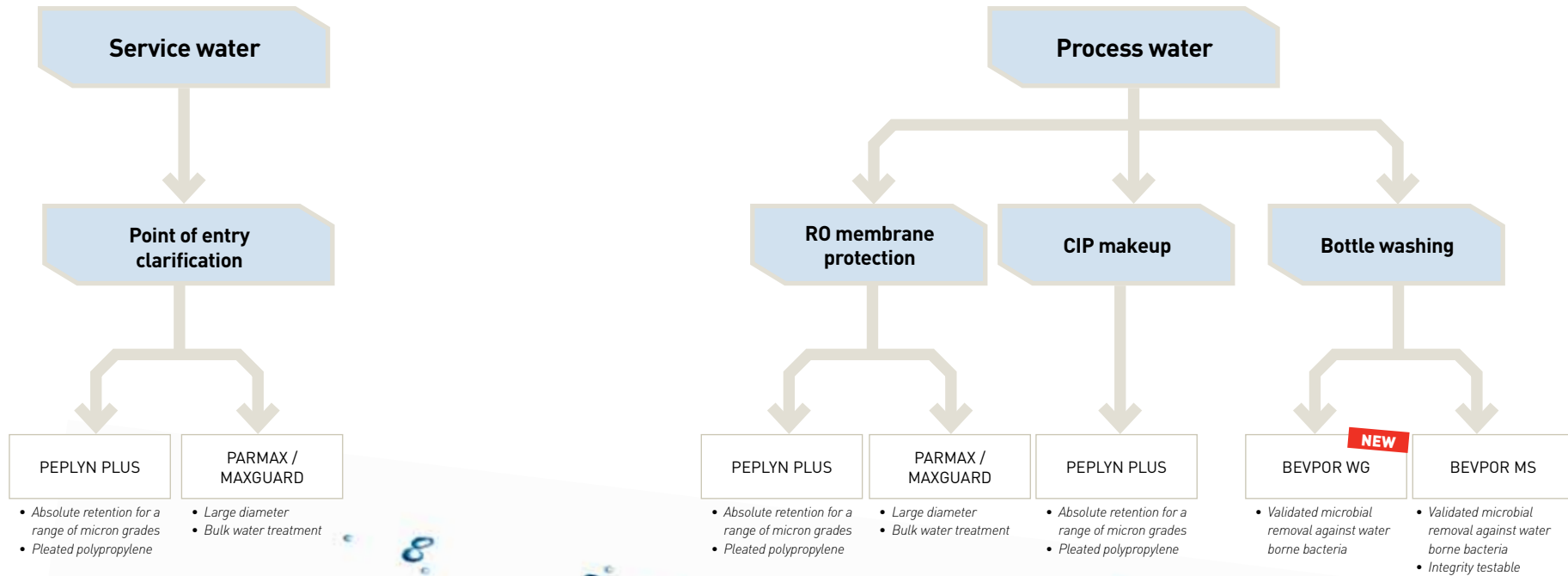


Compressed gases which come into direct contact with: product ingredients, the finished bottled product, packaging materials, storage vessels or the manufacturing machinery, are termed critical and require sterile filtration to safeguard against a potential microbial contamination.

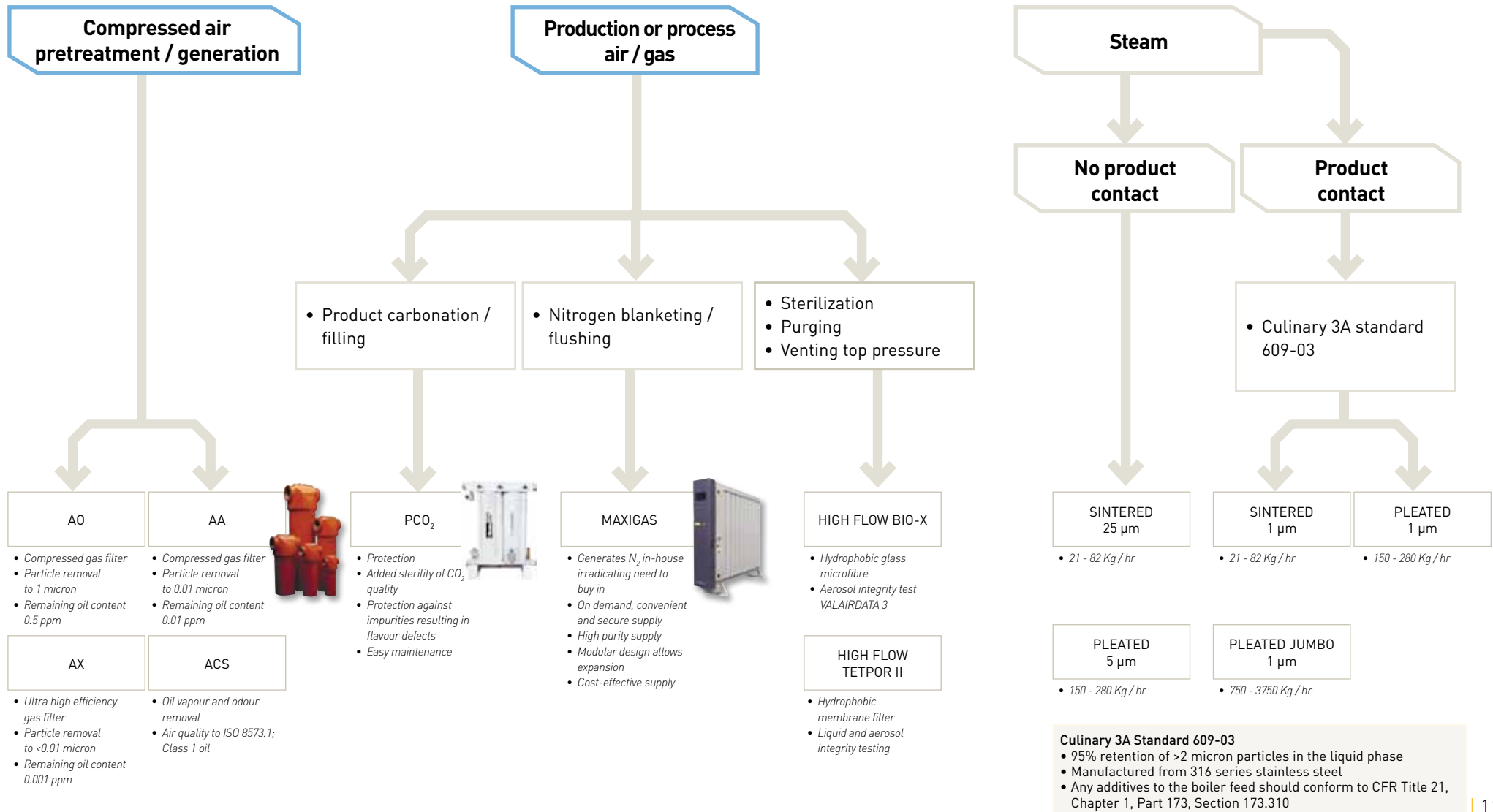
Typically filling machines use compressed gases at some point in the operation of bottle filling, whether for bottle forming, bottle rinsing / drying or product pushing. The gases will require sterilization to prevent a microbial contamination compromising the finished product once packaged.



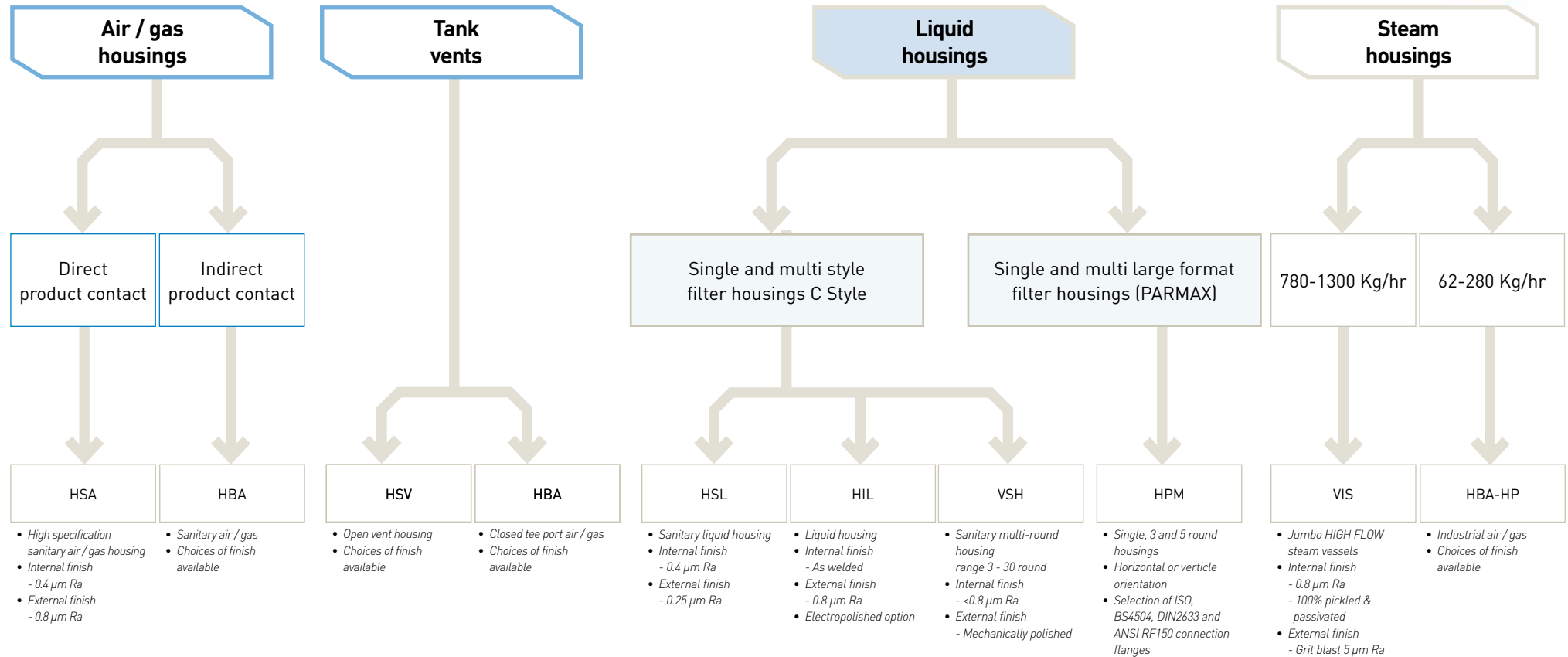
# Application 5. Water utilities



# Application 6. Gas utilities



# Filter housings



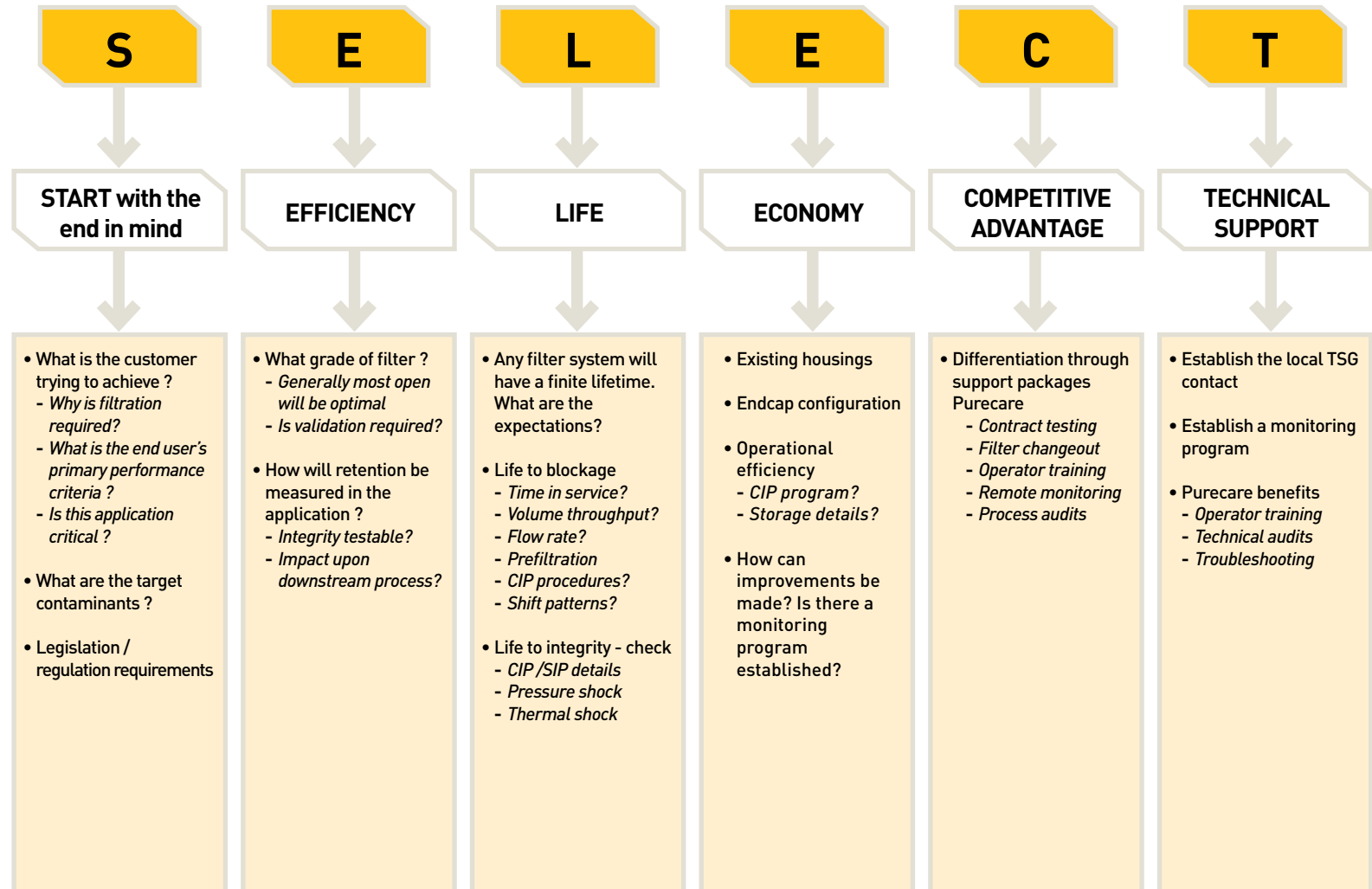
# Product selection process

There is no one single solution to any filtration application, it is a balance of factors which dictates performance and cost-effectiveness.

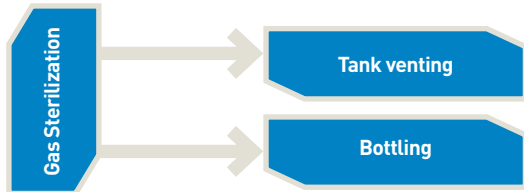
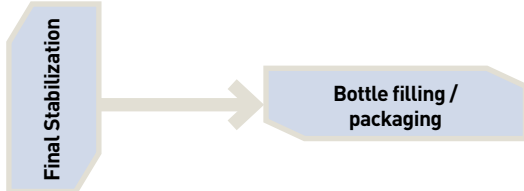
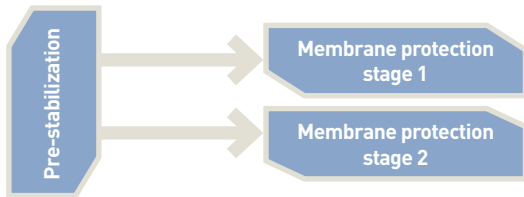
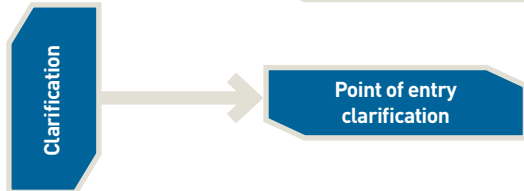
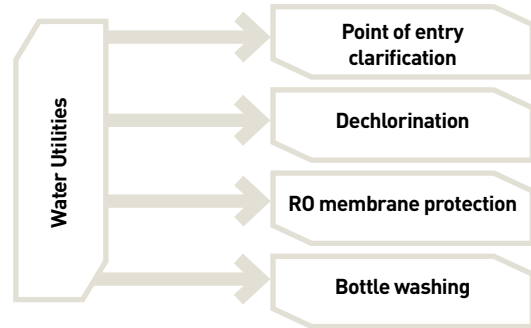
Depending upon the legislation surrounding the branding of the bottled water, the production methods will vary.

The Purecare program outlines the required information prior to establishing a filtration solution and the assessment methods used to identify the suitability of any Parker domnick hunter solution.

The SELECT process builds on the principles used to select the optimum filtration solution for the end user. Starting with the end in mind, following the outlined procedure will help to identify a suitable filtration solution.



# Selection matrix



	PARMAX / MAXGUARD	PROPLEAT	PEPLYN PLUS	CARBOFLOW MX	PEPLYN HD	PEPLYN HA	PREPOR PP	PREPOR NG	BEVPOR PS / MS	BEVPOR PW / MW	BEVPOR PH / MH	BEVPOR WG	BEVPOR MS	HIGH FLOW BIO-X	HIGH FLOW TETPOR II
Point of entry clarification	1	3	2												
Dechlorination	P	P		1											
RO membrane protection	3	2	1												
Bottle washing			P									2	1		
Point of entry clarification	3				2	1									
Membrane protection stage 1			2			1									
Membrane protection stage 2						P	2	1							
Bottle filling / packaging									P	3	2	1			
Tank venting														2	1
Bottling														2	1

# Clarification

## PEPLYN HD



Polypropylene

5, 10, 15 micron

- Graded density and increased depth resulting in high dirt holding capacity
- Ideally suited to high volume, forward flow processes

PEPLYN HD has been developed using graded pore density depth polypropylene media for clarification of bottled water. The PEPLYN HD has outstanding particulate holding capacity through its multi-layer depth construction providing optimized filtration for bottled water with high particulate loading and size distribution.

## PEPLYN HA



Polypropylene

5, 10, 15 micron

- Graded density results in high dirt holding capacity
- Optimized pleat configuration maximizes backwash efficiency

PEPLYN HA filters have been specially designed to capture particles on the surface of the media so that they can be easily removed through backwash, therefore, allowing easy regeneration and long service lifetimes. The high area filter media will return high water flow, whilst providing an absolute retention to solid particulate.

# Pre-stabilization

## PREPOR NG



Polypropylene

0.5 - 1.0

- Validated reduction of regulated organisms
- Graded density construction for increased retention and throughput
- Strong, pleated polypropylene construction for chemical CIP

Combining a superior level of microbial retention with a strong and robust construction to withstand frequent CIP, PREPOR NG filters represent the optimum choice for membrane protection and tank transfer operations.

## PREPOR PP



Polypropylene

0.6 - 1.0 micron

- Bacterial reduction
- Strong, pleated polypropylene construction for CIP

PREPOR PP filter cartridges will significantly reduce the numbers of bacteria from beverage products, to provide extremely cost effective prefiltration.

# Final stabilization

## BEVPOR PS / MS



Polyethersulphone

0.2 and 0.45 micron

- Validated microbial retention for effective stabilization
- 0.6m<sup>2</sup> filtration area

BEVPOR PS filters have been validated against typical bottled water spoilage organisms. Combined with easy integrity testing, the filters ensure the effective microbial stabilization of bottled water. The advanced polyethersulphone membrane has been configured to provide high flow and cost-effective performance throughout the range of grades.

## BEVPOR PW / MW



Polyethersulphone

0.2 and 0.45 micron

- Validated microbial retention for effective stabilization
- 0.6m<sup>2</sup> filtration area
- Integral prefilter layer

BEVPOR PW filters have been validated against typical bottled water spoilage organisms. Combined with easy integrity testing, the filters ensure the effective microbial stabilization of bottled water. The advanced polyethersulphone membrane in conjunction with the integral prefilter layer provides extended service life to blockage and improved filtration economics.

## BEVPOR PH / MH



Polyethersulphone

0.2 and 0.45 micron

- Validated microbial retention for effective stabilization
- High filtration area - 0.8m<sup>2</sup>
- Integral prefilter layer

BEVPOR PH filters have been validated against typical bottled water spoilage organisms. Combined with easy integrity testing, the filters ensure the effective microbial stabilization of bottled water. The advanced, high area polyethersulphone membrane in conjunction with the integral prefilter layer will provide maximum service life to blockage and the optimum solution for bottled water stabilization.

## Air / Gas filtration

### HIGH FLOW BIO-X



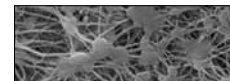
PTFE Impregnated Glass Fibre

0.01 micron sterilizing

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

HIGH FLOW BIO-X combines proven depth filter technology and a pleated construction to provide retention down to 0.01 micron in gas. Flow rates typically 2-3 times that of membrane filters make HIGH FLOW BIO-X the filter that can dramatically reduce cartridge usage and installation size within the fermentation, food and beverage industries.

### HIGH FLOW TETPOR II



Polypropylene Expanded PTFE

0.01 - 0.2 micron

- Assured biosecurity with absolute rated filtration
- High flow rates with low pressure drops
- High voids volume PTFE membrane

HIGH FLOW TETPOR II sterilization filter cartridges offer exceptional filtration performance whilst providing the highest levels of biosecurity throughout the process industry. Operating at ambient temperature conditions, HIGH FLOW TETPOR II filter cartridges provide a cost effective filtration solution.

## Water treatment

### PROPLEAT



Polypropylene

1.0 – 10 micron

- Economical solution to particle removal

PROPLEAT filters have been developed to bridge the gap between meltblown depth filters and absolute pleated media filters. The all polypropylene construction exhibit 99% efficiency at their given retention rating, providing consistent and economical clarification in a diverse range of applications.

### PARMAX



Polypropylene

1 – 20 micron

- Large diameter filtration for high flow rates and high capacity
- Absolute retention ratings for critical filtration

PARMAX filters offer the optimum solution to bulk water treatment where costs of equipment space are at a high premium. The use of PARMAX large diameter cartridge and housing offers a smaller footprint which is advantageous. The cartridges are available in absolute micron ratings from 1 to 20 microns.

### PEPLYN PLUS



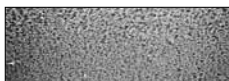
Polypropylene

0.6 – 25 micron

- Absolute particle retention at a range of micron grades
- Strong, pleated polypropylene construction designed for chemical CIP

PEPLYN PLUS filters are utilized for the clarification and pre-stabilization of a wide range of liquids for the food and beverage industry.

### BEVPOR WG



Polyethersulphone

0.2 micron

- Validated microbial removal against water borne bacteria

BEVPOR WG filters utilize a pleated PES membrane to remove bacterial contamination from water, ensuring the water supply entering the facility is of a safe standard to reduce the risk of biofilm formation / product spoilage.

### BEVPOR MS



Polyethersulphone

0.2 micron

- Validated microbial removal against waterborne bacteria
- Integrity testable

BEVPOR MS filters utilize a pleated PES membrane to remove bacterial contamination from water, ensuring the water supply entering the facility is of a safe standard to reduce the risk of biofilm formation / product spoilage. Added security is ensured through ease of repeat integrity testing.

# Housings

## VSH

- Multi-element sanitary liquid housing
- Designed specifically for the food and beverage industry
- High quality crevice free construction
- Available for 3 to 30 round filters



## HBA

- Flow efficient range of air / gas housing
- Designed to maximize flow and minimize pressure drop
- Designed specifically for the food and beverage industry



## HSV

- Industrial vent housing
- Direct connection to tank boss allows housing to be self supported
- Corrosion resistant 316L stainless steel
- Easy assembly and maintenance



## HSL

- Single-element sanitary liquid housing
- Designed specifically for the food and beverage industry
- Sanitary vent, tri-clamp connections as standard
- Sanitary tri-clamp body closure as standard



## HIL

- Industrial single-element liquid housing
- BSPP inlet / outlet standard connections
- Suitable replacement for plastic housings
- Suitable for cartridge types DOE or 222 and 226



## HSA

- Flow efficient sanitary range of air / gas housing
- Designed specifically for the food and beverage industry
- Sanitary tri-clamp, vent and drain connections as standard
- Sanitary tri-clamp body closure as standard



## VIS

- High efficiency steam filter housing
- Compatible with JUMBO element to maximize steam capacity



## HBAHP

- Air / gas and steam housing
- For pressures up to 15 barg (232.06 psig) @ 205 °C (401 °F)
- Double bolted clamp for extra security
- Available with many connection types



# Integrity testing equipment

## VALAIRDATA 3

- Aerosol challenge testing
- Integrity testing of gas filters



## BEVCHECK

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



## BEVCHECK PLUS

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



# Compressed air pre-treatment

## OIL-X

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



## PCO<sub>2</sub>

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



## MAXIGAS

- Low life-cycle ownership cost and elimination of costs associated with a cylinder supply
- On-demand functionality limits waste
- Energy efficient: operates from a small compressor



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GL\_BW\_12\_05\_12\_Rev. 1C



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