
# Pleated Filtration

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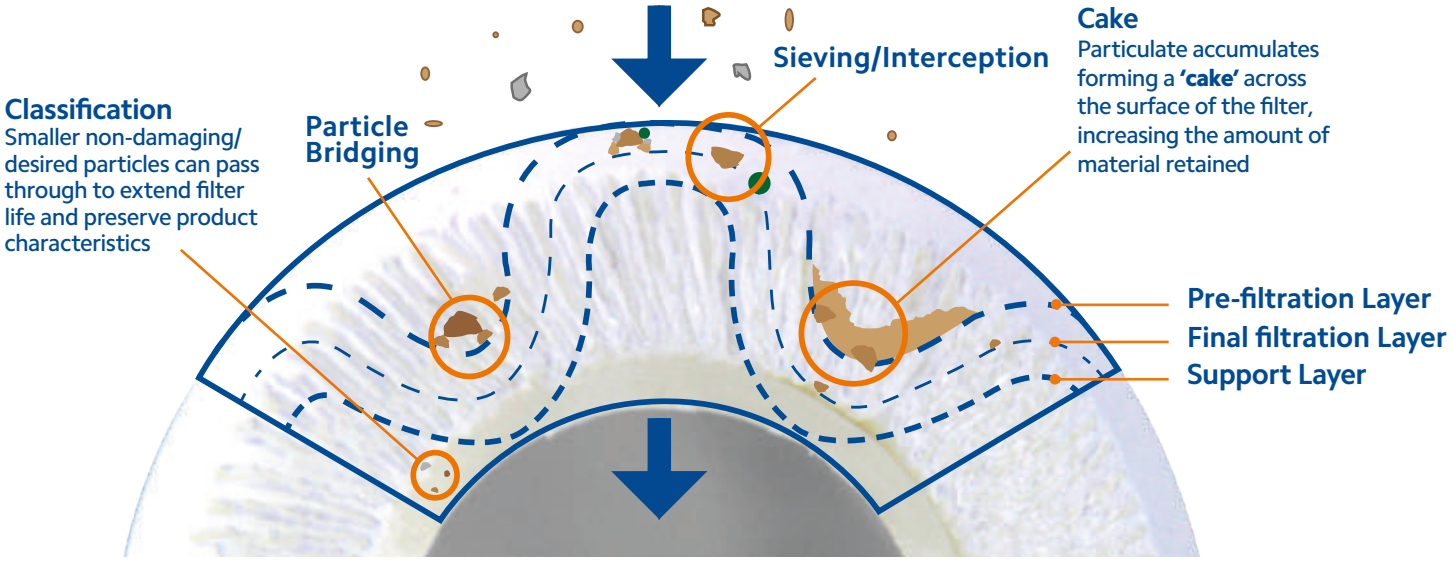
# Pleated Technology

## Pleated filters are widely used as effective surface filtration due to their excellent flow rates and high efficiency.

Pleating dramatically increases available surface area whilst maintaining high dirt loading and low pressure drops. Much of the media used in pleated cartridges also has some depth characteristics, thanks to its multi-layer construction, thereby aiding particle retention and classification.

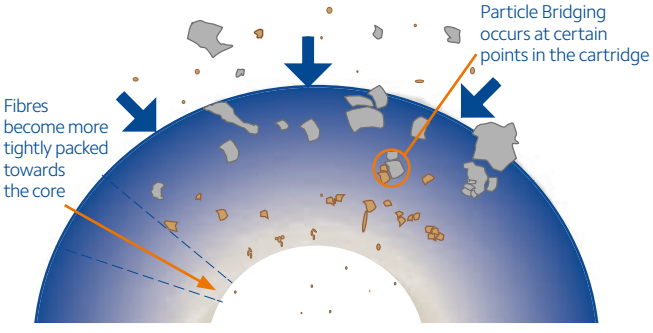



### Surface Filtration Technology

Pleated filters are the ideal technology of choice over depth filtration for retention of known or uniformly sized particles.

The Standard (SPE) range of cartridges features a single layer media, which filters on the principles of direct interception and 'caking' where multiple particles accumulate across the media pore. Over time this leads to partial closure, which can increase efficiency and the chance to target finer particles.

The entire Premier range includes support and pre-filtration layers providing an element of depth characteristics. These layers retain larger particles, ensuring the specified micron rating of the cartridge can be utilised for exacting classification.




### Depth Filtration Technology

The fibres become more tightly packed throughout a depth cartridge, progressively reducing the size of particles that can pass through the filter.

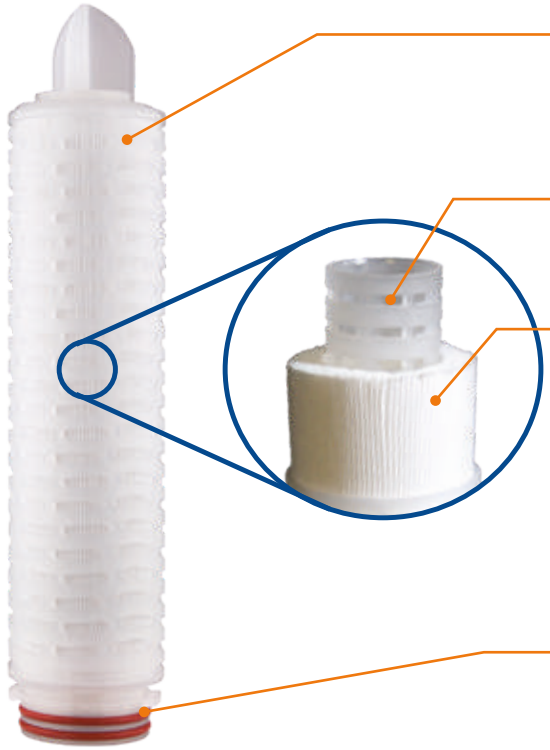
**Advantage:** Economic to produce.

**Disadvantage:** Higher pressure drop means a shorter service life compared to pleated cartridges.

# Premier Pleat Construction

The Premier Pleat, Crypto and Bubble Point ranges are all constructed with a rigid inner core and outer polypropylene cage. Offering protection for the pleat pack, the cage also allows a variety of end-caps to be thermally bonded to the cartridge. This secure construction technique prevents bypass, creating a seal strong enough for repeated steam or chemical sterilisation as well as cartridge integrity testing.

Developments in 2018 see a new outer cage design that increases its void volume by over 10%. Whilst maintaining cartridge strength, increasing the open area allows a more uniform distribution of flow across the entire pleat pack ensuring low pressure drop and maximised dirt holding capacity.



### Outer support cage

- Provides product strength and rigidity.
- Protects the pleat pack, ensuring media integrity.
- New outer cage design with increased void volume.

### Inner support cage

- End-caps are bonded to the support core for product security and strength, ensuring no bypass and enabling integrity testing.

### Media

- Pleated construction increases surface area, delivering high flow rates, low initial clean pressure drop and optimised dirt holding.
- Designed with an optimum balance of filtration media and void volume, the pleat pack is engineered to ensure that the entire surface area of the cartridge is used.

### Thermally bonded end-cap

- No adhesive ensures no leaching of additives.
- Numerous end-caps and seals available to suit various housings (refer to pages 32 and 33).

# Identification

### Lot Coded

- Laser etched lot code on membrane and Cryto cartridges
- Traceable back to raw materials

### QR Code

- Links directly to further information for each product

### Barcode

- Product traceability
- Stock management integration


# Packaging

### Four Protective Layers

- Vacuum sealed inner packaging
- Tough outer polybag layer provides additional protection
- Individual product boxes
- Heavy duty outer carton

SPECTRUM



# Premier Pleat Polyethersulfone

## 0.05-0.65 micron

Manufactured using German engineered and produced high quality polyethersulfone media, the SPECTRUM PPPES provides assured and certified absolute bacteria retention characteristics. Lot coded and 100% individually tested, the high surface area media contains no adhesives or binders, with low extractable content offering consistent final product quality. Meeting industry standard requirements, the cartridges are WRAS approved, FDA Title 21 Compliant and meet USP Class VI-121°C Plastics.

Absolute rated polyethersulfone media has become the recognised requirement for bacterial reduction, offering a certified and proven method of controlling product specification and protection.

The asymmetric pore structure of the SPECTRUM PPPES utilises a unique manufacturing technique to develop multifunctional characteristics into the media. With pore sizes of 0.05 to 0.65 micron, the PPPES meets the requirements of many varied applications.

### Bacteria Protection

Certified to Log 7 reduction of *Brevundimonas diminuta*, the 0.2 micron PPPES is an effective barrier filter for various bacterial applications.

### Food Preparation

As a physical barrier, PES media is commonly installed to protect against varying bacteria challenges in the filtration of flavourings, essences and colourants.

### Medical

Once a microorganism becomes dissociated it breaks down, releasing endotoxins. These can be removed using absolute 0.05 micron membrane filtration.

## Quality Assurance Certificate

Each PPPES cartridge is shipped with a Quality Assurance Certificate, which provides the typical media properties and membrane performance characteristics of the polyethersulfone media used in the construction of the cartridge. The certificate contains the following typical information:

- Materials of construction
- Bacteria retention
- Bubble point values
- Diffusional flow rate
- Membrane performance characteristics

## Hygiene and Traceability

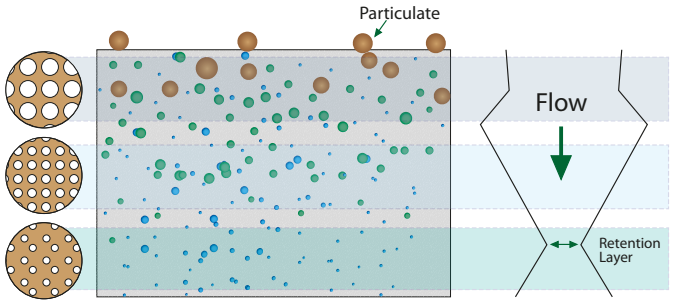
- 100% integrity tested and manufactured in a clean room environment to protect against unwanted contaminants.
- Quality Assurance Certificate supplied with every cartridge.
- Lot coded on the polypropylene cage for tracking and tracing.
- Each cartridge has double layered packaging. The inner plastic wrap is vacuum sealed and a tough outer layer provides further protection and cleanliness.
- Individually labelled and boxed for security and ease of product identification.

## Asymmetric Pore Construction

The success of the SPECTRUM PPPES resides in its multifunctional membrane characteristics, including excellent wetting out properties, high fluid throughput and exacting contaminant removal.

Offering a significant financial saving over targeted PES media, such as beverage and electronics grades, the PPPES range uses an asymmetric construction. This provides a balanced absolute rated cartridge, with high initial flow rates and lower clean pressure drop due to its naturally hydrophilic properties.

## Cross-section of PPPES Membrane Structure




Pore Size Variation | Cross Section of Media | Cross Section of Pore Structure

The structure of the PPPES range, with its narrower initial pore structure, provides a perfect blend between a membrane cartridge with highly selective classification characteristics and one that ensures enhanced retention over time.

## PPPES Quality from Start to Finish

Utilising even the most advanced polyethersulfone media would be ineffective if the cartridge manufacturing process did not meet the required standards and quality controls. SPECTRUM's meticulous and exacting specification means that every individual cartridge is subject to a rigorous multi-stage quality check.

### 1 Raw Material Check

The flat sheet PES membrane's physical and performance characteristics are analysed and validated, including:

- Pore size
- Media thickness
- Tensile strength
- Burst pressure

### 2 Performance Validation

Both the permeability and bubble point are determined and compared to the cartridges stated specification.

### 3 Cartridge Construction

The tested PES membrane flat sheet is combined with two layers of polypropylene media, in a clean room environment, to provide additional media strength and support.

### 4 Final Checks

- Before shipping, each individual element is again 100% quality checked.
- Diffusional flow and bubble point are verified to ensure that the cartridges perform to the expected criteria.
- Cartridges are laser etched with the lot code, vacuum sealed and bagged again to ensure complete cartridge traceability and cleanliness.

## Efficiency

| | | Bacteria Rentention Efficiency | | | | |
|---|---|---|---|---|---|---|
| | | 0.05 µm | 0.1 µm | 0.2 µm | 0.45 µm | 0.65 µm |
| Cartridge Micron Rating | 0.05 µm | **99.99998%** | 99.99999% | 99.999998% | 99.999999% | 99.9999996% |
| | 0.1 µm | 99.9998% | **99.99996%** | 99.99999% | 99.999998% | 99.999999% |
| | 0.2 µm | 99.999% | 99.987% | **99.9999%** | 99.999992% | 99.999998% |
| | 0.45 µm | 99.98% | 99.981% | 99.992% | **99.99999%** | 99.999992% |
| | 0.65 µm | 99.9% | 99.91% | 99.98% | 99.9999% | **99.99999%** |

Bacteria retention efficiencies are determined using Brevundimonas diminuta live bacteria dispersed in water at a constant flow rate up to a differential pressure of 2.75 bar.

## Materials of Construction

**Filter Media**
Polyethersulfone

**Support Media**
Polypropylene

**End-cap**
Polypropylene
Polypropylene with stainless steel ring (Q and Z)

**Core**
Polypropylene

**Cage**
Polypropylene

**Seal**
Silicone (as standard)

## Compliance

BS6920 Approved
FDA Compliant Materials
WRAS Approved
USP Class VI - 121°C Plastics
Regulation (EC) 1935/2004
Regulation (EU) No10/2011

## Configurations

**Micron (µm)**

| 0.05 | 0.1 | 0.2 | 0.45 | 0.65 |
|---|---|---|---|---|

**Length (")**

| 9¾ | 10 | 20 | 30 | 40 |
|---|---|---|---|---|

**End-cap (refer to page 32)**

| AA | CG | EG | EH | FG | FH | MG |
|---|---|---|---|---|---|---|
| MH | QG | ZH | | | | |

**Seals**

| S = Silicone | E = EPDM | V = Viton® |
|---|---|---|

## Specification

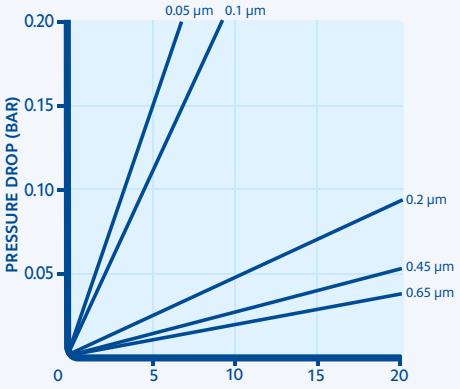
**Efficiency**
99.9 - 99.99999%

**Max. Operating Temperature**
82°C

**Max. Sterilising Cycles**
5 x 20 min cycles at 120°C. Requires stainless steel encapsulated end-caps Q (222) and Z (226).

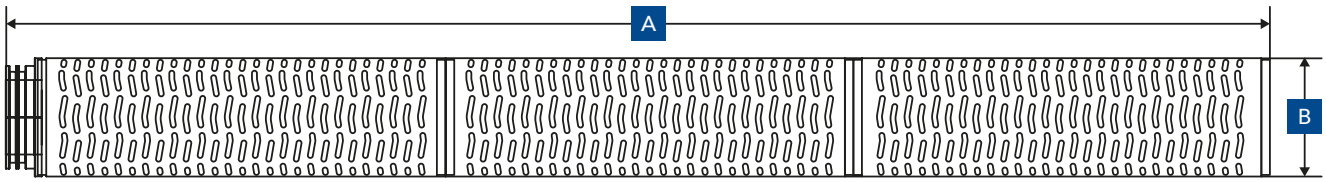
**Surface Area**
0.55 $m^2$ per 10"

**Max. Operating Pressure Differential**
6 bar at 21°C



Water at 20°C. 10" cartridge.

## Dimensions & Packaging




| | A (mm) | | | | B (mm) | Packaging | |
|---|---|---|---|---|---|---|---|
| Length | AA | CG | EG/FG/MG/QG | EH/FH/MH/ZH | | Box Qty | Box Weight (kg) |
| 9¾" | 248 | - | - | - | 70 | 9 | 4 |
| 10" | - | 241 | 270 | 310 | 70 | 9 | 4 |
| 20" | 508 | 506 | 520 | 560 | 70 | 9 | 7 |
| 30" | 750 | - | 770 | 810 | 70 | 9 | 10 |
| 40" | 1000 | - | 1020 | 1060 | 70 | 9 | 14 |

# Part Number

| Code | Micron | Length | End-cap | Seal |
|---|---|---|---|---|
| PPPES – | 0.05, 0.1, 0.2, 0.45, 0.65 – | 9¾ | AA | S, E, V |
| | | 10, 20, 30, 40 | CG, EG, EH, FG, FH, MG, MH, QG, ZH | |

e.g. PPPES-0.2-10CGS

# End-Caps

## Pleated Cartridge Configurations

Where product codes indicate an optional end-cap is available, a choice can be made from the following styles. End-cap variations are made to suit housing designs and application requirements, which dictate the reliability and integrity of the seal, along with the ease of cartridge change out.

### AA

Double Open Ended

Open-end gaskets, for use with housings containing a knife edge seal mechanism.

### CG

213 with Closed Recess

Single internal O-ring, seals onto housings that have a spigot.

### EG / MG

222/224 with Closed Recess

Double external O-rings seal into female housing receiver with a closed, recessed end, which is for housings with spigots.

### EH / MH

222/224 with Fin Adaptor

Double external O-rings seal into female housing receiver whilst the Fin locates into housing plate holes to maintain vertical orientation.

### FG

226 with Closed Recess

Bayonet type tabs lock into female housing receiver whilst the recessed end locates into housings with spigots.

### FH

226 with Fin Adaptor

Bayonet type tabs lock into female housing receiver whilst the Fin locates into housing plate holes to maintain vertical orientation.

## Stainless Steel Encapsulated End-Caps

### QG

222 with Closed Recess

Suitable for high temperature housings, the QG configuration is suitable for repeated sterilisation and offers one of the best seals possible with its double O-ring fitting and stainless steel insert.

### ZH

226 with Fin Adaptor

Suitable for multi-round high temperature housings, the ZH configuration provides the most positive seal with double O-rings and twin locking tabs. The encapsulated stainless steel insert makes the Z fitting suitable for repeated sterilisation.

# Seals

## Pleated Cartridge Configurations

Providing a water-tight seal between the housing and cartridge, O-rings and gaskets are essential to the integrity of the filter and come in a range of materials, including Silicone, EPDM, Teflon® and Viton® to suit most applications.

Silicone

EPDM



Teflon®

Viton®

### Chemical Compatibility

The below table details the different compatibility of each O-ring within different applications. (Source: Cole-Parmer)

| | Silicone | EPDM | Teflon | Viton® |
|---|---|---|---|---|
| **Beer** | Excellent | Excellent | Excellent | Excellent |
| **Whisky & Wine** | Excellent | Excellent | Excellent | Excellent |
| **Deionised Water** | Fair | Excellent | Excellent | Excellent |
| **Alcoholic Methyl** | Excellent | Excellent | Excellent | Fair |
| **Aromatic Hydrocarbons** | Poor | Poor | Excellent | Excellent |
| **Sodium Hydroxide** | Excellent | Good | Excellent | Poor |
| **Hydrochloric Acid** | Poor | Poor | Excellent | Excellent |
| **Synthetic Hydraulic Oil** | Good | Excellent | Excellent | Excellent |

### O-ring Sizing

This actual size chart is a useful aid in identifying common replacement O-rings. Place your current O-ring onto the chart to match the size required.