Graver Technologies

THERMAX

LIQUID PROCESS FILTERS (LPF)

Thermax is one of World's leading Co. manufacturing chemicals, boilers, absorption chillers, air pollution control systems, providing water & waste solutions, etc. Thermax has come up with a new product inline with above products called **Liquid Process Cartridge Filters** in collaboration with a US based company **Graver Technologies**, which specializes in providing **high performance solutions in liquid process filtration applications**. These are used in typical applications like clarifying, classifying, prefiltration applications, bottling, pre RO applications, tank vent, make up water, syrup filtration and final filtration applications. These filters specialize in trace contaminant removal, dirt holding, microbes removal, removal of carbon and resin fines, and purification of process water. These filters range from 0.01 to 100 micron.

DEPTH

0.5, 1, 3, 5, 10, 20 µm
10 & 20"

Applications

- Ultra Pure Water
- Flavorings
- Fine Chemicals
- Beverages
- Pharma
- Paint/ Ink
- Petrochemical
- Utility Water
- CMP Slurry

PLEATED

0.2, 0.45, 0.5 1, 3, 5, 10, 20 µm
10 & 20"

Applications

- Food & Beverages
- Bottled water
- Cosmetics
- Pharma
- Paint / Adhesives
- Oil & Gas
- Brewery & Winery
- Solvents
- Chemicals

MEMBRANE

0.03, 0.1, 0.2, 0.45, 0.65 µm
10 & 20"

Applications

- Acids/ Bases
- Cosmetics
- Reagent Chemicals
- Brewery & Winery
- Spirits
- Soft Drinks & Juices
- Ophthalmic solutions
- DI water
- Culture media

SPECIALITY

0.5, 2, 5, 10, 15, 25, 35, 50, 75, 100 µm
9.75 , 10, 20, 40, 60"

Applications

- Oil & Grease
- Cyst reduction
- Chlorine/ odor removal
- Cryogenic fluids
- Catalyst recovery
- Microelectronics
- Specialty Chemicals
- Viscous solutions
- Corrosive liquid & gases


Winery


Juices


Bottled water


Refinery


Distillery


Food


Soft drink


Pharma

THERMAX LIMITED, 4 MUMBAI - PUNE ROAD, SHIVAJINAGAR, PUNE 411005, INDIA | Email: channelm@thermaxindia.com

Graver Technologies

A Marmon Water / Berkshire Hathaway Company

THERMAX

LIQUID PROCESS FILTERS / CARTRIDGE FILTERS

Products

- **Membrane Filters**
  - Polyethersulfone/ PTFE
- **Pleated Filters**
  - Polypropylene/Glass
  - Absolute and Nominal Rated
  - Single and Multi Layer
- **Depth Filters**
  - Melt Blown Polypropylene
  - Bicomponent
- **Specialty Filters**
  - Sintered Titanium
  - Resin Bonded
  - Carbon Block
  - Capsules
- **Housings**
  - Sanitary and Industrial
  - ASME code or Non-code

Quality | Performance | Value

Applications

- Microelectronics
  - CMP Slurries
  - Wet Bench
  - Bulk Gases
  - Specialty Chemicals
- Water
  - Process Water
  - Pre RO
  - USP Water
  - Ultrapure Water
- Food & Beverage
  - Wine/Beer/Spirits
  - Bottled Water
  - Soft Drinks
  - Dairy
  - Steam
- Pharmaceutical
  - Tank Vents
  - LVP's
  - Fermentation
  - Intermediates
- Chemicals
  - Fine and Specialty Chemicals
  - Ink Jet Inks
  - Paints & Coatings
  - Pulp & Paper

Customer Care : 1800 209 0115

SUSTAINABLE SOLUTIONS IN ENERGY & ENVIRONMENT

Depth Filters

Graver Product Type	Media	Hardware	Retention Ratings (µm)	Efficiency
COAX Bicomponent/Melt Blown	Polypropylene Polyethylene	Polypropylene Coreless	0.5, 1, 3, 5, 10, 25	Nominal
Crystal MBF Melt blown	Polypropylene	Polypropylene Fiber Core	1, 3, 5, 10, 20, 30, 50, 75	Nominal
MBC Melt blown	Polypropylene	Polypropylene Molded Core	1, 3, 5, 10, 20, 30, 50, 75	Nominal
Stratum A Melt blown	Polypropylene	Polypropylene Molded Core	0.5, 1, 3, 5, 10, 20, 30, 50, 70	Absolute Beta 1000
Stratum C Melt blown	Polypropylene	Polypropylene Molded Core	0.5, 1, 3, 5, 10, 20, 50, 75	Nominal Beta 10

COAX™ Series Filter Cartridges

Two Stage Depth Filter Cartridge

The COAX Depth Filter cartridge is an integral two stage depth filter. The first stage is made of nonwoven melt blown polypropylene to trap coarser particles. The second stage is composed of a bicomponent polypropylene and polyethylene fiber to provide fine particle retention. This unique design provides a true graded, two zone structure that offers a marked increase in useful life and dirt capacity. In addition, the rigid nature means there is no flexing of the cartridge and greatly reducing media migration and particle unloading.

Features–Benefits

- Two stage depth filter
- Maximum dirt holding and useful life
- Inert pure polyolefin construction, non-shedding media
- Broad chemical compatibility
- Low extractables
- Extensive range of lengths and configurations
- Rigid construction resists unloading

Product Specifications

Media:	*Thermally bonded Polypropylene/polyethylene fiber*
End caps:	*Polypropylene (when used)*
Gaskets/O-Rings :	*Silicone, EPDM, Buna N, Santoprene, Viton, Teflon encapsulated Viton (O-Rings only)*
Micron ratings:	*0.5, 1, 3, 5, 10, 25 µm*
Dimensions	
Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.6" (6.5 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Operating Parameters	
Maximum operating	*140 °F (60°C)*
Maximum differential pressure:	*100 psid @ 70°F (7 bar @ 21°C) 2 psid @ 176°F (0.14 bar @ 80°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Performance Specifications

Sanitization

Hot water at 176°F (80°C) at 2 psid (0.14 bar) for 30 min.
In-line steam at 257°F (125°C) at 1 psid (0.07 bar) for 30 min.
Autoclavable at 257°F (125°C) for 30 min.

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

Typical Applications

- Paint
- Perfumes
- Cutting Oils
- CMP Slurries
- Magnetic Slurries
- Corn Syrup
- Plating Solutions
- Pre R.O.
- Coatings

COAX Nomenclature Information

COAX	25	-40	RL	P3	B

COAX Series Filters

Retention Rating (microns)

0.5	3	10
1	5	25

Nominal Length (inches)

-5	-10	-30
-9.75	-20	-40

Length Option

Blank	Standard length
RL	Reduced length

End Configuration

P	Double Open End
P2	226/Flat Single Open End
P3	222/Flat Single Open End
P6	Self-Seal Spring on One End
P7	226/Fin Single Open End
P8	222/Fin Single Open End
PX	Extended Core
N	None (Cut Ends)
AM	Single Open End, internal O-Ring
DBG	Direct Bond Santoprene Gaskets

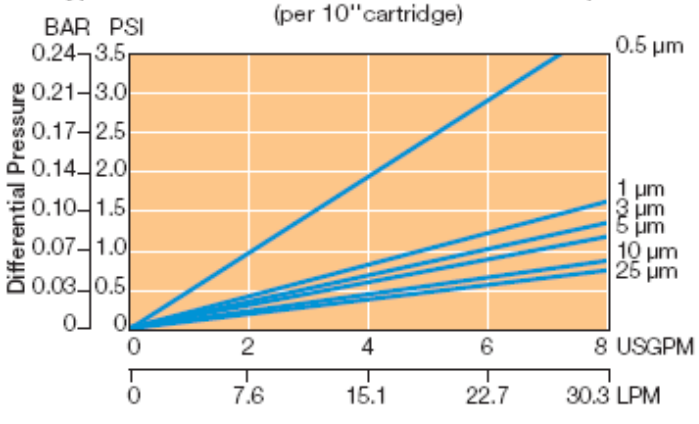
Gasket or O-Ring

S	Silicone
B	Buna-N
E	EPDM
V	Viton
T	Teflon endcap. Viton (O-Rings only)
N	None

Example: COAX 25-40RLP3B

COAX FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10" cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Beta Ratio Efficiency	*Beta 10 90%*	*Beta 20 95%*	*Beta 100 99%*
0.5 micron	*0.5*	*2.0*	*4.0*
1 micron	*1.0*	*3.0*	*8.0*
3 microns	*3.0*	*5.0*	*12.0*
5 microns	*5.0*	*8.0*	*20.0*
10 microns	*10.0*	*13.0*	*30.0*
25 microns	*25.0*	*30.0*	*50.0*

Crystal MBF Series Filter Cartridges

Melt Blown Filters

An economical, disposable, filter element that can be used in a wide range of applications. The Crystal MBF depth filter is constructed of 100% polypropylene media for chemical compatibility with a variety of process fluids. The unique Crystal Core prevents collapse even at elevated temperatures.

Features–Benefits

- Available in nominal ratings from 1 to 75 microns
- Formed Crystal Core for excellent collapse strength
- Graded pore construction for long on-stream life
- Melt blown media resists dirt unloading as differential pressure increases
- Non-shedding
- High dirt holding capacity
- Economical depth filtration
- Thermal bonded endcaps optional
- Free of binders, adhesives and surfactants
- Highly consistent performance

Product Specifications

Media:	*Polypropylene*
End caps/Center core:	*Polypropylene*
Gaskets/O-Rings:	*Silicone, EPDM, Buna N, Santoprene, Viton, Teflon encapsulated Viton (O-Rings only)*
Micron ratings:	*1, 3, 5, 10, 20, 30, 50, 75 µm*
Dimensions	
Nominal lengths:	*9.75", 10", 20", 30", 40", 50" (24.8, 25.4, 50.8, 76.2, 101.6, 127 cm) Other lengths available*
Outside diameter:	*2.5" (6.35 cm), 2.63"* (6.7 cm) Endcapped*
Inside diameter:	*1.1" (2.79 cm)*
Operating Parameters	
Maximum differential pressure:	*65 psid @ 68°F (4.5 bar @ 20°C) 50 psid @ 100°F (3.4 bar @ 38°C) 25 psid @ 170°F (1.7 bar @ 77°C)*
Recommended changeout differential pressure:	*35psid (2.4 bar)*

*NSF61 applies to NN, P6 and PX styles only

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

NSF 61 - Certified to NSF/ANSI STD 61 for materials requirements only - Component.

NSF

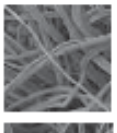
Certified to NSF/ANSI Standard 61 for materials requirements only.

COMPONENT

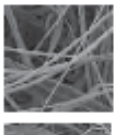
Typical Applications

- RO Prefilters
- Wastewater
- Food & beverage
- Chemicals
- Blowdown post filter
- Rad waste
- Aqueous solutions
- Inks

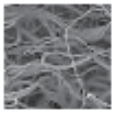
Outer prefilter zone



Inner prefilter zone



Final prefilter zone



Final filtration zone

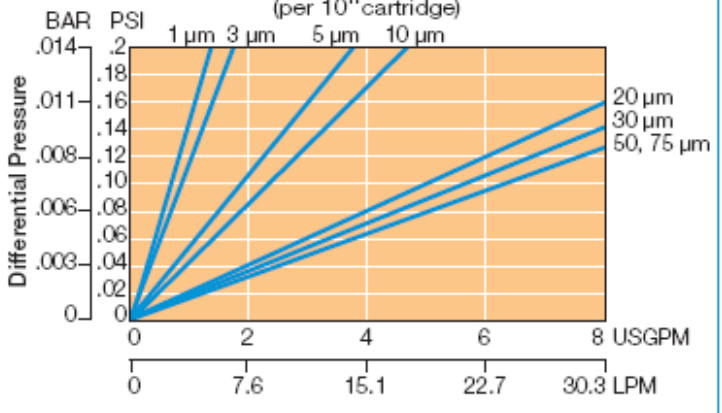
Crystal MBF Nomenclature Information

CMBF	10	-20	N	N	-BB
Filter Type Crystal MBF Series Filters		**Nominal Length (inches)** -4 -5 -9.75 -10 -19.5 -20 -29.25 -30 -39 -40 -50	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P6** Self-Seal Spring on One End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **PX** Extended Core **N** None (Cut Ends) **DBG** Direct Bond Santoprene Gaskets	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only) **N** None	**Blank** Individually bagged **-BB** Single bulk bag
Retention Rating (microns) **1** **20** **3** **30** **5** **50** **10** **75**					

Example: CMBF 10-20NN-BB

Crystal MBF FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10" cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

MBC™ Series Filter Cartridges

Melt Blown Filters

An economical, disposable, filter element that can be used in a wide range of applications. The MBC depth filter is constructed of 100% polypropylene media for chemical compatibility with a variety of process fluids. The molded core prevents collapse even at elevated temperatures.

Features–Benefits

- Available in nominal ratings from 1 to 75 microns
- Molded core for excellent collapse strength
- Graded pore construction for long on-stream life
- Melt blown media resists dirt unloading as differential pressure increases
- Non-shedding
- High dirt holding capacity
- Economical depth filtration
- Thermal bonded endcaps optional
- Free of binders, adhesives and surfactants

Product Specifications

Media:	*Polypropylene*
End caps/Center core:	*Polypropylene*
Gaskets/O-Rings:	*Silicone, EPDM, Buna N, Santoprene, Viton and Teflon encapsulated Viton (O-Rings only)*
Micron ratings:	*1, 3, 5, 10, 20, 30, 50, 75 µm*
Dimensions	
Nominal lengths:	*9.75", 10", 20", 30", 40" (24.8, 25.4, 50.8, 76.2, 101.6 cm) Other lengths available*
Outside diameter:	*2.5" (6.35 cm), 2.63" (6.7 cm) Endcapped*
Inside diameter:	*1.0" (2.54 cm)*
Operating Parameters	
Maximum differential pressure:	*150 psid @ 68°F (10.3 bar @ 20°C) 90 psid @ 150°F (6.2 bar @ 66°C) 35 psid @ 176°F (2.4 bar @ 80°C)*
Recommended changeout differential pressure:	*35 psid (2.4 bar)*

**NSF61 applies to NN, P6 and PX styles only*

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

NSF 61 - Certified to NSF/ANSI STD 61 for materials requirements only - Component.

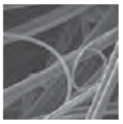
NSF

Certified to NSF/ANSI Standard 61 for materials requirements only.

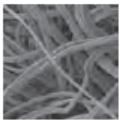
COMPONENT

Typical Applications

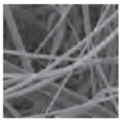
- RO Prefilters
- Wastewater
- Food & beverage
- Chemicals
- Blowdown post filter
- Rad waste
- Aqueous solutions
- Inks



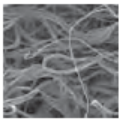
Outer prefilter zone



Inner prefilter zone



Final prefilter zone



Final filtration zone

MBC Nomenclature Information

MBC	10	-20	N	N
Filter Type MBC Series Filters		**Nominal Length (inches)** -4 -5 -9.75 -10 -19.5 -20 -29.25 -30 -39 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P6** Self-Seal Spring on One End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **PX** Extended Core **N** None (Cut Ends) **DBG** Direct Bond Santoprene Gaskets	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only) **N** None

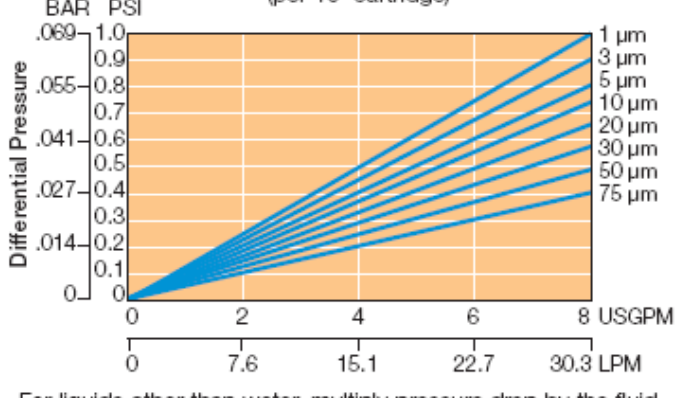
Retention Rating (microns)

1	20
3	30
5	50
10	70

Example: MBC 10-20NN

MBC FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Stratum™ A Series Filter Cartridges

Absolute Rated Melt Blown Filters

Stratum A Series melt blown depth filters deliver 99.9% efficiency at the stated micron for the most demanding applications. By utilizing ultra fine fibers and controlled thermal bonding, the Stratum A series retains captured contaminant even at higher differential pressures.

Features - Benefits

- Absolute retention ratings from 0.5 to 70 microns
- Multi-zone melt blown depth filter with a graded pore structure for maximum dirt holding capacity
- Thermally bonded fibers for high void volume and long on-stream life
- Lot traceable filters come with certificate of conformance.
- 100% pure virgin polypropylene
- Molded center core for higher temperature and pressure capability
- Free of surfactants, binders and adhesives

Product Specifications

Media:	*Polypropylene*
End caps/center core:	*Polypropylene*
Gaskets/O-Rings:	*Silicone, EPDM, Buna N, Santoprene, Viton, Teflon encapsulated Viton (O-Rings only)*
Micron ratings:	*0.5, 1, 3, 5, 10, 20, 30, 50, 70 µm*
Dimensions	
Nominal lengths:	*4", 5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40" (10.2, 12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 101.6 cm)*
Outside diameter:	*2.5" (6.35 cm)*
Inside diameter:	*1" (2.54 cm)*
Operating Parameters	
Maximum differential pressure:	*150 psid @ 68°F (10.3 bar @ 20°C) 90 psid @ 150°F (6.2 bar @ 66°C) 35 psid @ 176°F (2.4 bar @ 80°C)*
Recommended changeout differential pressure:	*35 psid (2.4 bar)*
Steam Sterilization:	*Stratum single open end style filters may be autoclaved under no end load conditions for 30 minutes at 121°C. Filters should be cooled to normal operating temperatures prior to use.*

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

NSF 61 - Certified to NSF/ANSI STD 61 for materials requirements only - Component.

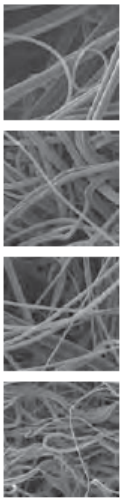
NSF

Certified to NSF/ANSI Standard 61 for materials requirements only.

COMPONENT

Typical Applications

- Chemicals
- Pharmaceuticals
- Paint/Inks
- Food and beverages
- Water
- Microelectronics
- Plating
- Cosmetics



Outer prefilter zone

Inner prefilter zone

Final prefilter zone

Final filtration zone

Stratum A Nomenclature Information

STA	0.5	-10	P2	T
Filter Type STA - Stratum A Series Filters		**Nominal Length (inches)** -4 -5 -9.75 -10 -19.5 -20 -29.25 -30 -39 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P6** Self-Seal Spring on One End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **PX** Extended Core **N** None (Cut Ends) **DBG** Direct Bond Santoprene Gaskets **AM** Single open end, internal O-Ring **NPC** Double open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only) **N** None

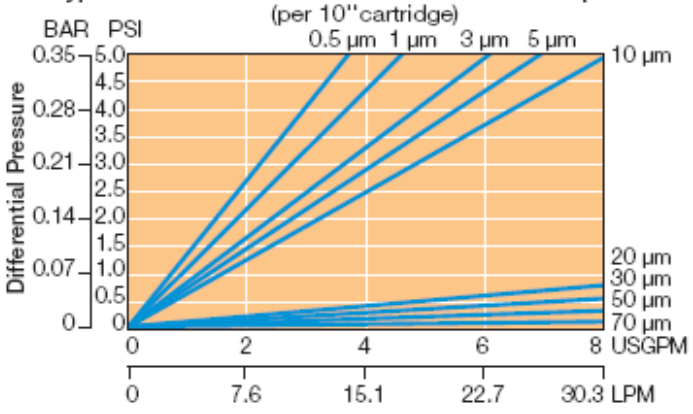
Retention Rating (microns)

0.5	20
1	30
3	50
5	70
10	

Example: STA 0.5-30NN

Stratum A FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Micron Rating Beta Ratio	*99.9% Beta 1000*	*99% Beta 100*	*90% Beta 10*
0.5 micron	*0.6*	*0.5*	*0.4*
1 micron	*1.0*	*.8*	*.5*
3 micron	*3*	*2.3*	*1.4*
5 micron	*5*	*4.0*	*2.7*
10 micron	*10*	*7*	*4*
20 micron	*20*	*15*	*12*
30 micron	*30*	*20*	*14*
50 micron	*50*	*34*	*25*
70 micron	*70*	*50*	*39*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 3 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

Stratum™ C Series Filter Cartridges

High Performance Filters

For critical customer applications requiring precise and repeatable depth filtration, the Graver Stratum C series melt blown filters deliver exceptional performance. With a multi- zoned construction, true clarifying filtration is achieved with no unloading of captured contaminant.

Features - Benefits

- Multi-zone melt blown depth filter with a true graded pore structure
- Thermally bonded fibers for high void volume and long on-stream life
- Available in precise 90% removal efficiencies from 0.5 to 75 microns
- 100% pure virgin polypropylene
- Molded center core for higher temperature and pressure capability
- Free of surfactants, binders and adhesives

Product Specifications

Media:	*Polypropylene*
End caps/center core:	*Polypropylene*
Gaskets/O-Rings:	*Silicone, EPDM, Buna N, Santoprene, Viton, Teflon encapsulated Viton (O-Rings only)*
Micron ratings:	*0.5, 1, 3, 5, 10, 20, 50, 75 µm*
Dimensions	
Nominal lengths:	*4", 5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40" (10.2, 12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 101.6 cm)*
Outside diameter:	*2.5" (6.35 cm), 2.63" (6.7 cm) Endcapped*
Inside diameter:	*1" (2.54 cm)*
Operating Parameters	
Maximum differential pressure:	*150 psid @ 68°F (10.3 bar @ 20°C) 90 psid @ 150°F (6.2 bar @ 66°C) 35 psid @ 176°F (2.4 bar @ 80°C)*
Recommended changeout differential pressure:	*35 psid (2.4 bar)*
Steam Sterilization:	*Stratum single open end style filters may be autoclaved under no end load conditions for 30 minutes at 121°C. Filters should be cooled to normal operating temperatures prior to use.*

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

NSF 61 - Certified to NSF/ANSI STD 61 for materials requirements only - Component.

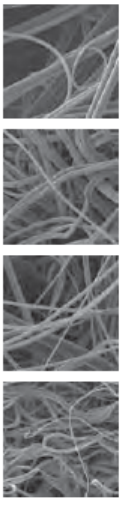
NSF

Certified to NSF/ANSI Standard 61 for materials requirements only.

COMPONENT

Typical Applications

- Chemicals
- Pharmaceuticals
- Paint/Inks
- Food and beverages
- Water
- Microelectronics
- Plating
- Cosmetics



Outer prefilter zone

Inner prefilter zone

Final prefilter zone

Final filtration zone

Stratum C Nomenclature Information

STC	5	-10	P3	V
Filter Type STC - Stratum C Series Filters		**Nominal Length (inches)** -4 -5 -9.75 -10 -19.5 -20 -29.25 -30 -39 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P6** Self-Seal Spring on One End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **PX** Extended Core **N** None (Cut Ends) **DBG** Direct Bond Santoprene Gaskets **AM** Single open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only) **N** None

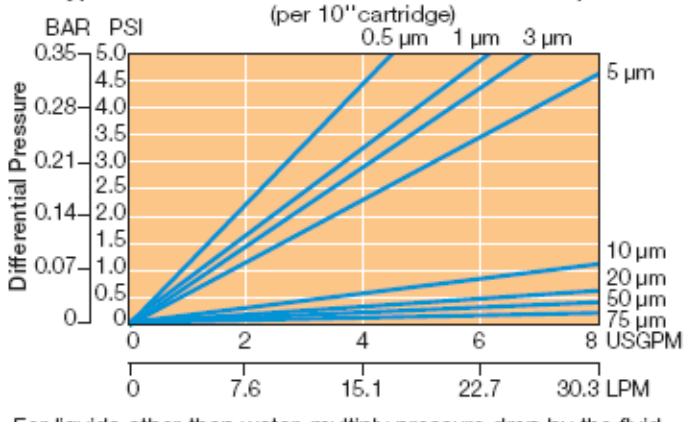
Retention Rating (microns)

0.5	20
1	50
3	70
5	
10	

Example: STC 5-10P3V

Stratum C FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Pleated Filters

Graver Product Type	Media	Hardware	Retention Ratings (µm)	Efficiency
GFC Pleated Microfiberglass	Micro fiberglass	Polypropylene	0.2, 0.45, 1, 3, 10, 30	Nominal Beta 10
GFP Pleated Microfiberglass	Micro fiberglass	Polyester	0.2, 0.45, 1, 3, 10, 30	Nominal Beta 10
High Flow Pleated Melt Blown Sheet	Polypropylene	Polypropylene	1, 3, 5, 10, 20, 40, 60, 100	Absolute Beta 1000
High Flow GF Pleated Microfiberglass	Microfiberglass	Polypropylene, Polyacetal/Polyester	1, 2.5, 4.5, 10, 20	Absolute Beta 1000
PMA Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.2, 0.45, 1, 2.5, 5, 10, 25, 50, 100	Absolute Beta 5000
PMC Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.2, 0.25, 0.45, 0.5, 1, 2, 5, 10, 25, 50	Nominal Beta 10
QCR Pleated Melt Blown Sheet	Polypropylene	Polypropylene	1	Absolute NSF/ANSI 53
QMA Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.2, 0.45, 1, 2.5, 5, 10, 20	Absolute Beta 5000
QMC Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.1, 0.2, 0.4, 0.6, 1, 3, 5, 10	Nominal Beta 20
QXL Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.45, 0.5, 1, 3, 5, 10, 20, 40	Absolute Beta 100

GFC™ Series Filter Cartridges

Glass Fiber Cartridges (GFC)

This high efficiency, disposable filter element is suited for a wide range of applications. The filter is constructed of pleated Borosilicate Microfiberglass filter media with greater surface area for high system flow rate.

Features–Benefits

- Micron ratings from 0.2 to 30 µm – Broad application range
- Uniform pore size – High removal efficiency
- High surface area – High flow capability and dirt holding capacity
- Long service life – Minimizes maintenance costs
- Fixed pore construction – Eliminates dirt unloading at maximum differential pressure

Product Specifications

Media:	*Borosilicate Microfiberglass with Acrylic Binder*
Inner core:	*Polypropylene*
Support layers:	*Polyester*
End caps:	*Polypropylene*
Cage:	*Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*0.2, 0.45, 1.0*, 3.0, 10, 30 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*

Operating Parameters

Maximum operating temperature:	*176 °F (80°C)*
Maximum differential pressure:	*80 psid @ 70°F (5.5 bar @ 21°C)* *40 psid @ 150°F (2.8 bar @ 65°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

* 1 micron grade features all FDA listed materials of construction.

Typical Applications

- Wine prefiltration
- Chemicals
- Blowdown post filter
- Inks
- Magnetic tape coatings
- Oil & Gas

GFC Nomenclature Information

GFC	3	-10	P7	B	-I

Filter Type
GFC Series Filters

Retention Rating (microns)

0.2	3
0.45	10
1	30

Nominal Length (inches)

-5	-20
-9.75	-30
-10	-40

End Configuration

- **P** Double Open End
- **P2** 226/Flat Single Open End
- **P3** 222/Flat Single Open End
- **P7** 226/Fin Single Open End
- **P8** 222/Fin Single Open End
- **AM** Single open end, internal O-Ring
- **NPC** Double open end, internal O-Ring

Gasket or O-Ring

- **S** Silicone
- **B** Buna-N
- **E** EPDM
- **V** Viton
- **T** Teflon endcap. Viton (O-Rings only)

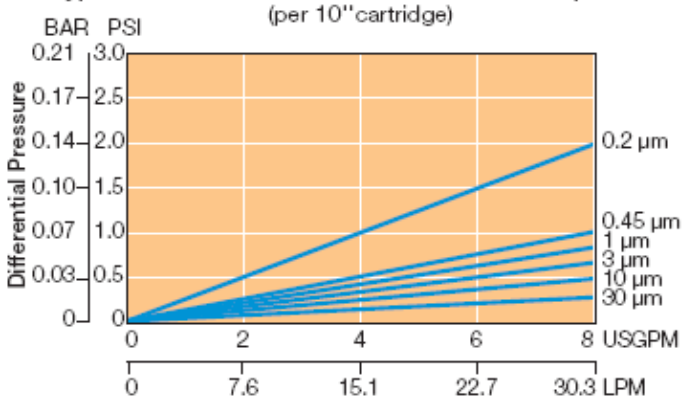
Insert

- **-I** endcap insert for steaming

Example: GFC 3-10P7B-1

GFC FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Beta Ratio Efficiency	*Beta 10 90%*	*Beta 20 95%*	*Beta 100 99%*	*Beta 1000 99.9%*	*Beta 5000 99.98%*
0.2 micron	*0.2*	*0.3*	*0.6*	*0.8*	*1.0*
0.45 micron	*0.45*	*0.6*	*0.8*	*1.8*	*2.0*
1 micron	*1.0*	*1.3*	*2.0*	*3.5*	*4.0*
3 microns	*3.0*	*4.0*	*5.5*	*9.0*	*10.0*
10 microns	*10.0*	*12.0*	*15.0*	*17.0*	*18.0*
30 microns	*30.0*	*35.0*	*38.0*	*42.0*	*45.0*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 2.5 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

GFP™ Series Filter Cartridges

High Temperature
Glass Fiber Cartridges (GFP)
This high efficiency, disposable filter element is suited for a wide range of applications. The filter is constructed of pleated Borosilicate Microfiberglass filter media with greater surface area for high system flow rate.

Features–Benefits

- Polyester hardware extends application range beyond the limits of polypropylene.
- Higher temperature capability of 230°F (110°C)
- Micron ratings from 0.2 to 30 µm – Broad application range
- Uniform pore size – High removal efficiency
- High surface area – High flow capability and dirt holding capacity
- Long service life – Minimizes maintenance costs
- Fixed pore construction – Eliminates dirt unloading at maximum differential pressure

Product Specifications

Media:	*Borosilicate Microfiberglass with Acrylic Binder*
Inner core:	*Polyester*
Support layers:	*Polyester*
End caps:	*Polyester*
Cage:	*Polyester*
Gaskets/O-Rings :	*Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*0.2, 0.45, 1.0, 3.0, 10, 30 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*

Operating Parameters

Maximum operating temperature:	*230 °F (110°C)*
Maximum differential pressure:	*75 psid @ 70°F (5.2 bar @ 21°C)* *60 psid @ 200°F (4.1 bar @ 93°C)* *50 psid @ 230°F (3.4 bar @ 110°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Typical Applications

- Petrochemicals
- Chemicals
- Solvents
- Inks
- Oil & Gas
- Lube Oil

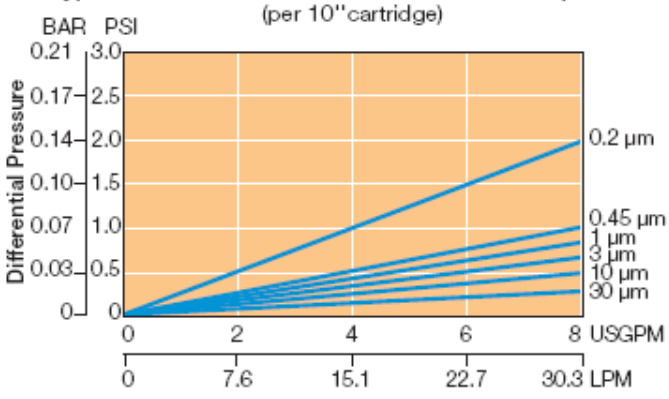
GFP Nomenclature Information

GFP	3	-10	P3	B
Filter Type GFP Series Filters	**Retention Rating (microns)** 0.2 0.45 1 3 10 30	**Nominal Length (inches)** -5 -9.75 -10 -20 -30 -40	**End Configuration** P Double Open End P2 226/Flat Single Open End P3 222/Flat Single Open End P7 226/Fin Single Open End P8 222/Fin Single Open End	**Gasket or O-Ring** S Silicone B Buna-N E EPDM V Viton T Teflon endcap. Viton (O-Rings only)

Example: GFP 3-10P3B

GFP FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Beta Ratio Efficiency	*Beta 10 90%*	*Beta 20 95%*	*Beta 100 99%*	*Beta 1000 99.9%*	*Beta 5000 99.98%*
0.2 micron	*0.2*	*0.3*	*0.6*	*0.8*	*1.0*
0.45 micron	*0.45*	*0.6*	*0.8*	*1.8*	*2.0*
1 micron	*1.0*	*1.3*	*2.0*	*3.5*	*4.0*
3 microns	*3.0*	*4.0*	*5.5*	*9.0*	*10.0*
10 microns	*10.0*	*12.0*	*15.0*	*17.0*	*18.0*
30 microns	*30.0*	*35.0*	*38.0*	*42.0*	*45.0*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 2.5 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

High Flow GF Series Filter Cartridges

Large Geometry Pleated Filters for High Flow

Graver High Flow GF Series filters feature microfiberglass media in a larger geometry to handle higher flows with fewer filter elements. The result is much faster, easier filter changeouts. In addition, the inside to outside flow allows for excellent dirt holding capacity, extending the time between filter changeouts. Filter housings are also available and because of the filters high flow and dirt holding capacity, smaller systems are possible, reducing upfront capital costs.

Features - Benefits

- Materials of construction allow compatibility with some chemistries not served by all polypropylene elements.
- 6" diameter, large geometry for high flows
- Absolute retention ratings from 1 to 20 microns
- Capable of flow rates up to 500 GPM in a single 60" element
- Inside-out flow retains contaminant even during changeout
- Outer cage prevents media extrusion problem experienced with some competitive offerings
- Unique Quad Seal gasket provides maximum seal integrity
- Retrofits competitive high flow filter housings
- Thermally bonded construction

Product Specifications

Media:	*Microfiberglass*
Support/Cage:	*Polyester or polypropylene*
End caps:	*Polyacetal or polypropylene*
O-Rings:	*EPDM, Silicone, Buna-N, Viton*
Micron ratings:	*1, 2.5, 4.5, 10, 20 µm*

Dimensions

Nominal lengths:	*20", 40", 60" (50.8, 101.6, 152.4 cm)*
Outside diameter:	*6.0" (15.2 cm)*
Surface area:	*24 ft². (2.2 m²) per 20" element 49 ft². (4.6 m²) per 40" element 73 ft². (6.8 m²) per 60" element*

Operating Parameters

Maximum operating temperature:
polyacetal hardware - 70°F @ 75 psid (21°C @ 5.2 bar)
230°F @ 50 psid (110°C @ 3.4 bar)
polypropylene hardware - 77°F @ 50 psid (25°C @ 3.4 bar)
180°F @ 20 psid (82°C @1.4 bar)

Recommended changeout differential pressure:	*35 psid (2.4 bar)*
Maximum flow rates:	*60" element up to 500 GPM (1892 lpm) 40" element up to 350 GPM (1325 lpm) 20" element up to 175 GPM (662 lpm)*

* Consult factory for sizing assistance based on particle loads.

Typical Applications

- Fuel Oil
- Chemicals
- Petrochemicals
- Solvents
- Oil & Gas

High Flow GF Nomenclature Information

High Flow GF	-A	2.5	-60	E
Filter Type High Flow GF Series Filters	**Hardware Material** **P** Polypropylene **A** Polyacetal caps polyester cage	**Retention Rating (microns)** 1 10 2.5 20	**Length (inches)** -20 -40 -60	**O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton

Example: HFGF -A2.5-60E

High Flow GF Pressure Drop

Micron	Element Pressure Drop psid/gpm			Element Pressure Drop Mbar/M^3/Hr		
	20"	40"	60"	20"	40"	60"
1	0.0394	0.0197	0.0131	11.9419	5.9709	3.9806
2.5	0.0183	0.0091	0.0061	5.5385	2.7692	1.8462
4.5	0.0144	0.0072	0.0048	4.3549	2.1775	1.4516
10	0.0095	0.0048	0.0032	2.8830	1.4415	0.9610
20	0.0069	0.0035	0.0023	2.0940	1.0470	0.6980

Note: For chemical compatibility, flow rates, and temperature requirements please consult the factory or your local Graver distributor.

Removal Efficiency

Micron Rating Beta Ratio	*99.9% Beta 1000*	*99% Beta 100*	*90% Beta 10*
1 micron	*1*	*0.6*	*0.2*
2.5 micron	*2.5*	*0.8*	*10.45*
4.5 micron	*4.5*	*42*	*1*
10 micron	*10*	*5.5*	*3*
20 micron	*20*	*15*	*10*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 3 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

High Flow Series Filter Cartridges

Large Geometry Pleated Filters for High Flow

Graver High Flow Series filters feature a larger geometry to handle higher flows with fewer filter elements. The result is much faster, easier filter changeouts. In addition, the inside to outside flow allows for excellent dirt holding capacity, extending the time between filter changeouts. Filter housings are also available and because of the filters high flow and dirt holding capacity, smaller systems are possible, reducing upfront capital costs.

Features - Benefits

- 6" diameter, large geometry for high flow rates
- Absolute retention ratings from 1 to 100 microns
- Capable of flow rates up to 500 GPM in a single 60" element
- Inside-out flow retains contaminant even during changeout
- Multi layer pleated construction with optimized surface area
- Outer cage prevents media extrusion problem experienced with some competitive offerings
- Unique Quad Seal gasket provides maximum seal integrity
- Retrofits competitive high flow filter housings
- Thermally bonded construction

Product Specifications

Media/Support/Cage:	*Polypropylene*
End caps:	*Polypropylene*
O-Rings:	*EPDM, Silicone, Buna-N, Viton*
Micron ratings:	*1, 3, 5, 10, 20, 40, 60, 100 µm*

Dimensions

Nominal lengths:	*20", 40", 60" (50.8, 101.6, 152.4 cm)*
Outside diameter:	*6.0" (15.2 cm)*
Surface area:	*24 ft². (2.2 m²) per 20" elementt 49 ft². (4.6 m²) per 40" element 73 ft². (6.8 m²) per 60" element*

Operating Parameters

Maximum operating temperature:	*180°F @ 20 psid (82°C @ 1.4 bar) 160°F @ 30 psid (71°C @ 2.1 bar) 77°F @ 50 psid (25°C @ 3.4 bar)*
Recommended changeout differential pressure:	*35 psid (2.4 bar)*
Maximum flow rates:*	*60" element up to 500 GPM (1892 lpm) 40" element up to 350 GPM (1325 lpm) 20" element up to 175 GPM (662 lpm)*

* Consult factory for sizing assistance based on particle loads.

** O-ring should be replaced after 5 cycles or when a loosening of the seal is detected.

Certifications

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

NSF 61 - Certified to NSF/ANSI STD 61 for materials requirements only - Component.

Typical Applications

- Water Systems
- Chemicals
- Food and Beverage
- Pre RO

NSF

Certified to NSF/ANSI Standard 61 for materials requirements only.

COMPONENT

Performance Specifications

Cleaning/Sanitization

Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information. Cartridge will withstand up to ten 30 minute hot water cycles** at 181°F (83°C) at 5 psid (0.35 bar).

Steam/Autoclave

Cartridges may be steamed for at least twenty 15 minute cycles** @ 230°F (110°C) not to exceed 3 psid (0.21 bar).

High Flow Nomenclature Information

High Flow	5	-60	E
Filter Type High Flow Series Filters	**Retention Rating (microns)** 1 20 3 40 5 60 10 100	**Length (inches)** -20 -40 -60	**O-Ring** S Silicone B Buna-N E EPDM V Viton

Example: HF 5-60E

High Flow Pressure Drop

Micron	Element Pressure Drop psid/gpm			Element Pressure Drop Mbar/M^3/Hr		
	20"	40"	60"	20"	40"	60"
1	0.0200	0.0097	0.0065	6.0845	2.9395	1.9820
3	0.0167	0.0081	0.0054	5.0705	2.4495	1.6516
5	0.0076	0.0037	0.0025	2.3179	1.1198	0.7550
10	0.0046	0.0022	0.0015	1.3908	0.6719	0.4530
20	0.0021	0.0010	0.0007	0.6374	0.3079	0.2076
40	0.0017	0.0008	0.0006	0.5215	0.2520	0.1699
60	0.0015	0.0007	0.0005	0.4552	0.2199	0.1483
100	0.0010	0.0005	0.0003	0.3035	0.1466	0.0989

Note: For chemical compatibility, flow rates, and temperature requirements please consult the factory or your local Graver distributor.

Removal Efficiency

Micron Rating Beta Ratio	*99.9% Beta 1000*	*99% Beta 100*	*90% Beta 10*
1 micron	*1*	*0.6*	*0.2*
3 micron	*3*	*2*	*1.5*
5 micron	*5*	*4*	*3*
10 micron	*10*	*8.5*	*6.5*
20 micron	*22*	*19*	*14*
40 micron	*38*	*18*	*15*
60 micron	*60*	*35*	*20*
100 micron	*100*	*75*	*45*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 3 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

PMA™ Series Filter Cartridges

"Absolute" Rated Pleated Filter Cartridges

This all polypropylene filter retains particles with absolute efficiency. Available in a broad range of pore sizes, it is suitable for a wide range of applications. The pleated construction provides a high surface area to offer outstanding overall filtration economy.

Features–Benefits

- Micron ratings from 0.2 to 100 µm – Broad application range
- "Absolute" Efficiency – Rated at 99.98% (Beta 5000)
- Competitive surface area – High flow rates, and long on-line service – Minimize maintenance cost
- Fixed pore structure – Eliminates dirt unloading at maximum differential pressure
- Polypropylene Construction – Inert to many process fluids
- Various Gasket/O-Ring materials – Compatible with a variety of fluids
- Manufactured in continuous lengths up to 40 inches

Product Specifications

Media:	*Polypropylene*
Inner core:	*Polypropylene*
End caps:	*Polypropylene*
Cage:	*Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only), Teflon (gasket only)*
Polypropylene micron ratings:	*0.2, 0.45, 1.0, 2.5, 5.0, 10, 25, 50, 100 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.86 cm)*
Inside diameter:	*1.0" (2.54 cm)*

Operating Parameters

Maximum operating temperature:	*176 °F (80 °C)*
Maximum differential pressure:	*75 psid @ 70 °F (5.2 bar @ 21°C) 40 psid @ 176 °F (2.8 bar @ 80°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

PMA Nomenclature Information

PMA	2.5	-10	P	V
Filter Type PMA Series Filters		**Nominal Length (inches)** -5 -20 -9.75 -30 -10 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **AM** Single open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap.Viton (O-Rings only) **T** Teflon (gasket only)

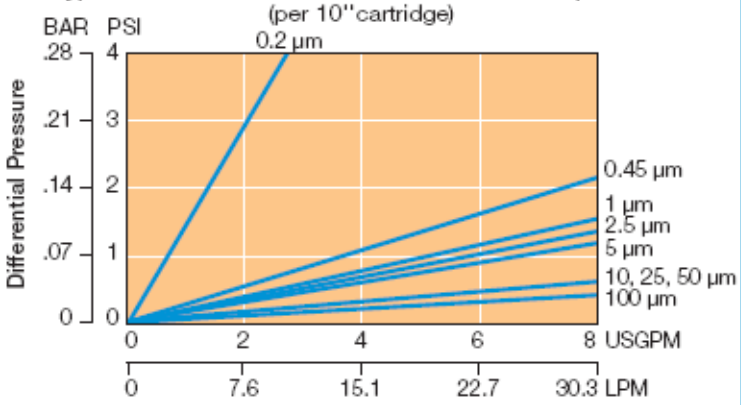
Retention Rating (microns)

0.2	10
0.45	25
1	50
2.5	100
5	

Example: PMA 2.5-10PV

PMA FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Beta Ratio Efficiency	*Beta 5000 99.98%*	*Beta 100 99%*	*Beta 50 98%*
0.2 micron	*0.20*	*0.10*	*0.05*
0.45 micron	*0.45*	*0.30*	*0.20*
1 micron	*1.0*	*0.60*	*0.30*
2.5 microns	*2.5*	*2.0*	*1.5*
5 microns	*5.0*	*4.0*	*3.0*
10 microns	*10.0*	*8.0*	*7.0*
25 microns	*25.0*	*19.0*	*15.0*
50 microns	*45.0*	*35.0*	*28.0*
100 microns	–	*100.0*	*85.0*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 3 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

PMC™ Series Filter Cartridges

Economically Efficient Pleated Filter Cartridges

This cost effective, disposable filter element can be used for a wide range of applications. The filter is constructed of pleated polypropylene filter media with high surface area that allows for greater system flow rate.

Features–Benefits

- Micron ratings from 0.2 to 50 µm – Broad application range
- Fixed pore structures – Resists unloading of captured contaminant
- Polypropylene Construction – Inert to many process fluids
- Various Gasket/O-Ring materials – Compatible with a variety of fluids
- Economically efficient filtration
- Manufactured in continuous lengths up to 40 inches

Product Specifications

Media:	*Polypropylene*
Inner core:	*Polypropylene*
End caps:	*Polypropylene*
Cage:	*Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only), Teflon (gasket only)*
*Micron ratings: **	*0.2, 0.25, 0.45, 0.5, 1.0, 2.0, 5.0, 10, 25, 50 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.86 cm)*
Inside diameter:	*1.0" (2.54 cm)*

Operating Parameters

Maximum operating temperature:	*176 °F (80°C)*
Differential pressure:	*75 psid @ 70°F (5.2 bar @ 21°C) 40 psid @ 176°F (2.8 bar @ 80°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

** Other micron rated media available upon request*

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

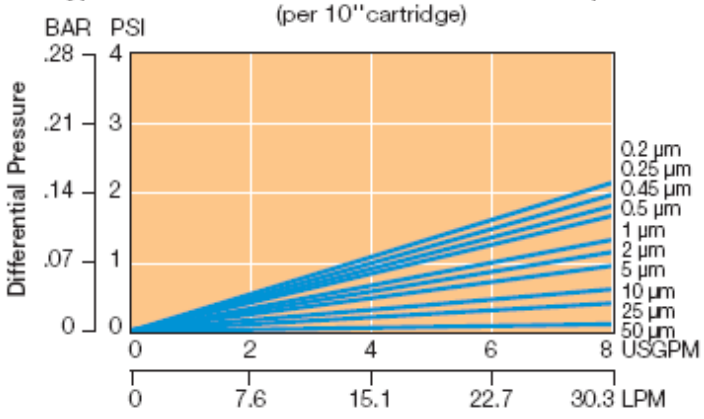
PMC Nomenclature Information

PMC	2	-20	P8	V
Filter Type PMC Series Filters		**Nominal Length (inches)**	**End Configuration**	**Gasket or O-Ring**
Retention Rating (microns) 0.2 2 0.25 5 0.45 10 0.5 25 1 50		-5 -9.75 -10 -20 -30 -40	**P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **AM** Single open end, internal O-Ring **NPC** Double open end, internal O-Ring	**S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only) **T** Teflon (gasket only)

Example: PMC 2-20P8V

PMC FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Beta Ratio Efficiency	*Beta 50 98%*	*Beta 10 90%*
0.2 micron	*0.28*	*0.20*
0.25 micron	*0.35*	*0.25*
0.45 micron	*0.6*	*0.45*
0.5 micron	*0.7*	*0.5*
1 micron	*1.5*	*1.0*
2 microns	*2.7*	*2.0*
5 microns	*7.0*	*5.0*
10 microns	*12.0*	*10.0*
25 microns	*32.0*	*25.0*
50 microns	*70.0*	*50.0*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 3 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

QCR™ Series Filter Cartridges

Health Dangers of Cryptosporidium

In recent years, significant outbreaks of water borne disease have been traced to Cryptosporidium and Giardia parasites. These naturally occurring organisms are present in many surface water sources and are highly resistant to inactivation by conventional water treatment processes such as chlorination. Healthy individuals typically recover from the common gastrointestinal effects within a few weeks, however for individuals with weakened or undeveloped immune systems, it can be life threatening.

In order to ensure the safety of the water supply, standards have been established that define the minimum performance requirements for materials and components of water treatment systems. The QCR Cyst Reduction filter contains an absolute 1 micron filter media designed to exceed the ANSI/NSF Standard 53 of 99.95% for the removal of cysts based upon the polystyrene challenge in water*.

Features–Benefits

- Constructed entirely of polypropylene – Compatible with most solutions
- Double O-Ring style ends for the highest seal integrity
- 7.0 ft² (0.65 m²) of effective filter area – High flow rates at low pressure drop – High dirt capacity
- Various O-Ring materials and configurations – Easily retrofits most systems
- High surface area – High flow rates and long on-line service

Product Specifications

Media:	*Polypropylene*
Core/cage:	*Polypropylene*
End caps:	*Polypropylene*
O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton*
Micron rating:	*1.0 µm*
End styles:	*P2 (226/flat), P3 (222/flat), P7 (226/fin), P8 (222/fin)*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.86 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*7.0 ft². (0.65 m²)*

* Performance tested and verified by Independent Laboratory Testing. Only the filter end styles offered are certified to meet the cyst reduction claim.

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

NSF 53 - Performance tested and verified by outside lab to comply with NSF/ANSI Standard 53 for reduction of cryptosporidium and giardia cysts.

Operating Parameters

Maximum operating temperature:	*176°F (80°C)*
Maximum differential pressure:	*75 psid @ 70°F (5.2 bar @ 21°C)* *40 psid @ 176°F (2.8 bar @ 80°C)* *15 psid @ 190°F (1.03 bar @ 88°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

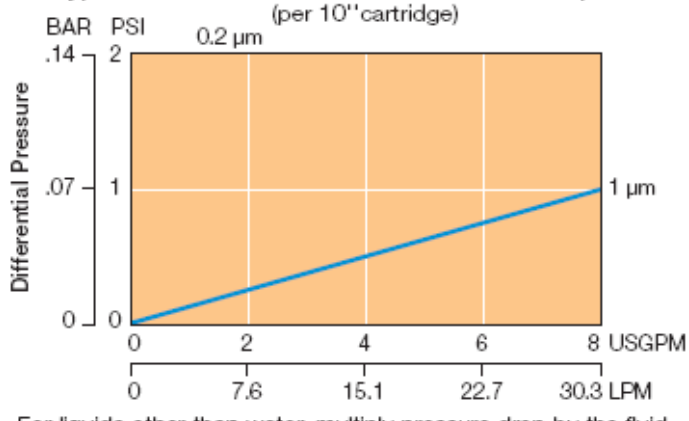
QCR Nomenclature Information

QCR	1	-30	P7	V
Filter Type QCR Series Filters		**Nominal Length (inches)** -5 -20 -9.75 -30 -10 -40	**End Configuration** **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End	**O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton
Retention Rating (microns) 1				

Example: QCR 1-30P37V

QCR FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10''cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Performance Specifications

Sterilization

Cartridges may be autoclaved for 30 minutes at 250°F (121°C) under no end load conditions. May be in-line sanitized one time only in forward flow direction with 185°F (85°C) hot water – do not exceed 3 psid.

QMA™ Series Filter Cartridges

"Absolute" Rated High Performance Pleated Polypropylene Filter Cartridge

This filter is constructed with a high surface area melt blown polypropylene media for low initial pressure drop, high dirt holding capacity, and high efficiency performance.

Features–Benefits

- Micron ratings from 0.2 to 20 µm – Broad application range
- "Absolute" Efficiency – Rated at 99.98% (Beta 5000)
- High surface area – High flow rate, and long service life – Minimize maintenance cost
- Fixed Pore construction – Resists dirt unloading at maximum differential pressure
- Polypropylene Construction – Inert to many process fluids
- Various Gasket/O-ring materials – Compatible with many fluids
- Heavy duty molded cage – High structural strength
- Highly consistent melt blown media for consistent performance

Product Specifications

Construction material:	*Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only), Teflon (gasket only)*
Micron ratings:	*0.2, 0.45, 1.0, 2.5, 5.0, 10, 20 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.86 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*up to 7.0 ft². (0.65 m²)*

Operating Parameters

Maximum operating temperature:	*176°F (80°C)*
Maximum differential pressure:	*75 psid @ 70°F (5.2 bar @ 21°C)* *40 psid @ 176°F (2.8 bar @ 80°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Performance Specifications

Cleaning/Sanitization

Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information. Cartridge will withstand hot water at 176°F (80°C) at 5 psid (0.35 bar) for 30 minutes.

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

Endotoxin level - Limulus Amebocyte Lysate CB028 test indicated bacterial endotoxins were not present in distilled water at 0.25 EU / ml.

Extractable content - Test indicate that Non-Volatile Residue, Residue on Ignition and Heavy Metals meet USP limits.

Typical Applications

- Food & beverage
- Aqueous solutions
- Chemicals
- Bottled water
- Pharmaceuticals
- Cosmetics
- Process water
- RO Prefilters
- Inks

Steam/Autoclave

Cartridges may be autoclaved for 30 minutes at 250 °F (121°C) under no end load conditions. Cartridges fitted with steam insert may be steamed for at least 10 thirty minute cycles @ 275°F (135°C) not to exceed 3 psid (0.21 bar).

QMA Nomenclature Information

QMA	1	-20	P3	V	-R	-I
Filter Type QMA Series Filters		**Nominal Length (inches)** -5 -20 -9.75 -30 -10 -40			**Pre-Rinse Option** -R Factory Pre-Rinse	**Insert** -I End cap insert for steaming

Retention Rating (microns)

0.2, 0.45, 1, 2.5, 5, 10, 20

End Configuration

- **P** Double Open End
- **P2** 226/Flat Single Open End
- **P3** 222/Flat Single Open End
- **P7** 226/Fin Single Open End
- **P8** 222/Fin Single Open End
- **PX** Extended Core
- **AM** Single open end, internal O-Ring
- **NPC** Double open end, internal O-Ring

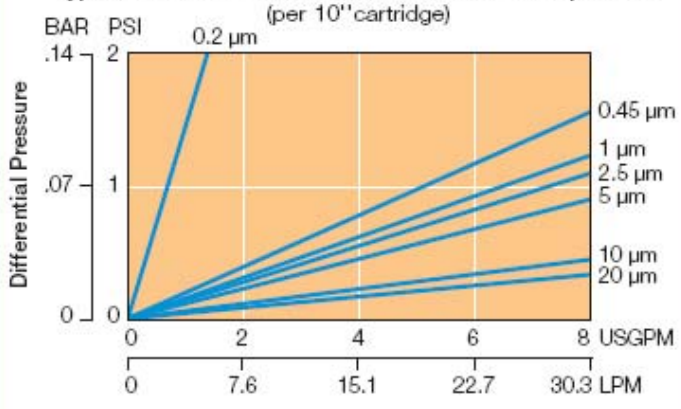
Gasket or O-Ring

- **S** Silicone
- **B** Buna-N
- **E** EPDM
- **V** Viton
- **T** Teflon endcap. Viton (O-Rings only)
- **T** Teflon (Gasket only)

Example: QMA 1-20P3V-R-I

QMA FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10" cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Beta Ratio Efficiency	*Beta 5000 99.98%*	*Beta 100 99%*	*Beta 50 98%*
0.2 micron	*0.20*	*0.10*	*0.05*
0.45 micron	*0.45*	*0.30*	*0.20*
1.0 micron	*1.0*	*0.60*	*0.30*
2.5 microns	*2.5*	*2.0*	*1.5*
5.0 microns	*5.0*	*4.0*	*3.0*
10.0 microns	*10.0*	*8.0*	*7.0*
20.0 microns	*20.0*	*17.0*	*15.0*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 2.5 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

QMC™ Series Filter Cartridges

High Efficiency Polypropylene Filter Cartridge

An innovative product manufactured with multiple layers of melt blown polypropylene media. This unique structure allows high flow rates while maintaining low differential pressure and ideal depth filtration characteristics.

Features–Benefits

- Micron ratings from 0.1 to 10 µm – Broad application range
- High Filtration Efficiency – 95%
- Graded pore structure – Multilayer, media for high dirt holding capacity
- Fixed pore construction – Resists dirt unloading at maximum differential pressure
- Polypropylene construction – Inert to many process fluids
- Various Gasket/O-ring materials – Compatible with many fluids

Product Specifications

Construction material:	*Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*0.1, 0.2, 0.4, 0.6, 1.0, 3.0, 5.0, 10.0 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*

Operating Parameters

Maximum operating temperature:	*176 °F (80°C)*
Maximum differential pressure:	*80 psid @ 70°F (5.5 bar @ 21°C)* *40 psid @ 176°F (2.8 bar @ 80°C)*
Maximum reverse differential pressure:	*40 psid @ 70°F (2.8 bar @ 21°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Performance Specifications

Sanitization

Hot water at 176°F (80°C) at 5 psid (0.35 bar) for 30 min.
In-line steam at 257°F (125°C) at 1 psid (0.07 bar) for 30 min.
Autoclavable at 257°F (125°C) for 30 min.

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

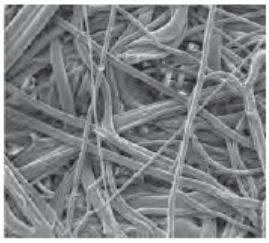
FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

Endotoxin level - Limulus Amebocyte Lysate CB028 test indicated bacterial endotoxins were not present in distilled water at 0.25 EU / ml.

Extractable content - Test indicate that Non-Volatile Residue, Residue on Ignition and Heavy Metals meet USP limits.

Typical Applications

- Food & beverage
- Aqueous solutions
- Chemicals
- Pharmaceuticals
- Cosmetics
- Ultrapure water
- RO Prefilters
- Ink
- DE trap
- Photoresists



QMC Nomenclature Information

QMC	0.6	-10	P2	T
Filter Type QMC Series Filters		**Nominal Length (inches)** -5 -9.75 -10 -20 -30 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **PX** Extended Core **AM** Single open end, internal O-Ring **NPC** Double open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only)

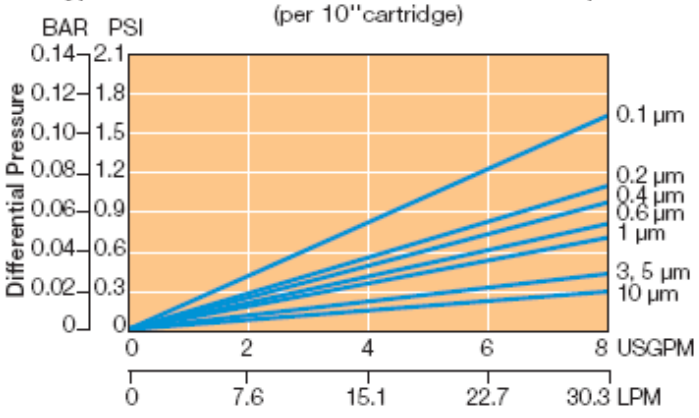
Retention Rating (microns)

0.1	1
0.2	3
0.45	5
0.6	10

Example: QMC 0.6-10P2T

QMC FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Beta Ratio Efficiency	*Beta 100 99%*	*Beta 20 95%*
0.1 micron	*0.8*	*0.1*
0.2 micron	*1.0*	*0.2*
0.4 micron	*2.0*	*0.4*
0.6 micron	*3.0*	*0.6*
1 micron	*6.0*	*1.0*
3 micron	*14*	*3.0*
5 microns	*17*	*5.0*
10 microns	*25*	*10.0*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 3 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

QXL™ Series Filter Cartridges

Absolute Rated Filtration for Inks, Slurries and Coatings

With its extra-loft, extra-life depth filter configuration, the QXL is designed for the filtration of industrial solutions containing agglomerated particles and gels or with high viscosity. Consistent absolute retention performance is achieved throughout the pleated, layered microfiber matrix. The state-of-the-art, optimized structure provides significantly higher flow rates and throughputs than cylindrical melt blown filters.

Features–Benefits

- Hybrid pleated depth construction combines graded pore structure with high surface area.
- Constructed entirely of polypropylene – Compatible with a broad range of solutions and chemicals
- Optimized pleat configuration – Provides the ideal combination of retention, flow rate and throughput
- Excellent gel and agglomerated particle retention reduces defects
- Available in common end cap configurations – Retrofits easily into most filter housings

Product Specifications

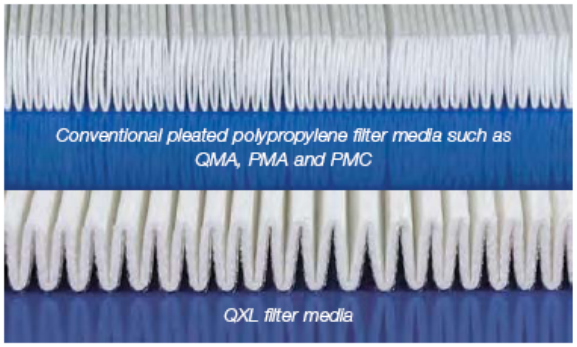
Media:	*Polypropylene*
Core,Cage, End Caps:	*Polypropylene*
Gaskets/O-Rings:	*Silicone, Viton, EPDM, Buna, Teflon encapsulated Viton (O-Rings only)*
Micron Ratings:	*0.45, 0.5, 1, 3, 5, 10, 20, 40 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)*
Outside Diameter:	*2.7" (6.86 cm)*
Inside Diameter:	*1.0" (2.54 cm)*

Operating Parameters

Maximum Operating Temperature:	*176°F (80°C)*
Maximum Differential Pressure:	75 psid @ 70°F (5.2 bar @ 21°C) 40 psid @ 176°F (2.8 bar @ 80°C)
Maximum Reverse Differential Pressure:	*35 psid @ 80°F (2.4 bar @ 27°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*
Sterilization:	*Cartridges may be autoclaved for 30 minutes at 250°F (121°C) under no end load conditions. May be in-line sanitized one time only in forward flow direction with 185°F (85°C) hot water – do not exceed 3 psid.*



Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, and 177.1520, as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

Typical Applications

- CMP P-O-U and bulk slurries
- Adhesives
- Paints
- Beverages
- Coatings
- Inks

QXL Nomenclature Information

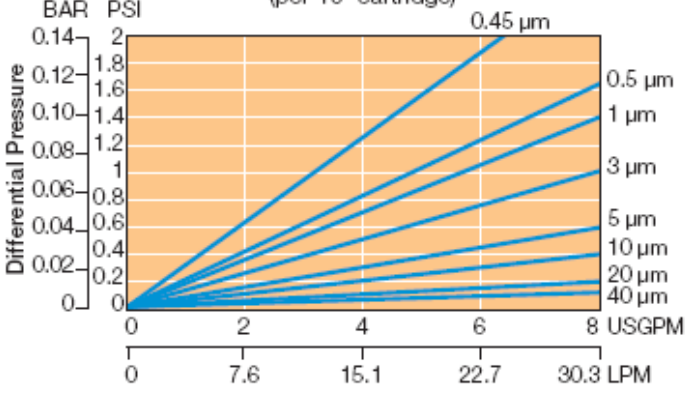
QXL	5	-10	P8	S
Filter Type QXL Series Filters		**Nominal Length (inches)**	**End Configuration**	**Gasket or O-Ring**
Retention Rating (microns) **0.45*** 5 **0.5**** 10 **1** 20 **3** 40		**-5** **-9.75** **-10** **-20** **-30** **-40**	**P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **AM** Single open end, internal O-Ring **NPC** Double open end, internal O-Ring	**S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only)

Example: QXL 5-10P8S

* Special CMP slurry formulation.
** Special ink formulation.

QXL FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature (per 10" cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Removal Efficiency

Beta Ratio Efficiency	*Beta 1000 99.9%*	*Beta 100 99%*	*Beta 50 98%*
0.45 micron	*0.45*	*0.3*	*0.2*
0.5 micron	*0.65*	*0.45*	*0.3*
1 micron	*1.5*	*0.8*	*0.6*
3 microns	*3*	*2*	*1*
5 microns	*5*	*4*	*3*
10 microns	*10*	*8*	*7*
20 microns	*20*	*19*	*17*
40 microns	*40*	*35*	*25*

$$\text{Beta Ratio} = \frac{\text{Upstream particle counts}}{\text{Downstream particle counts}}$$

The micron ratings shown at various efficiency and beta ratio value levels were determined through laboratory testing, and can be used as a guide for selecting cartridges and estimating their performance. Under actual field conditions, results may vary somewhat from the values shown due to the variability of filtration parameters.

Testing was conducted using the single-pass test method, water at 3 gpm/10" cartridge. Contaminant's included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

Membrane Filters

Graver Product	Media	Hardware	Retention Ratings (µm)	Efficiency
TefTec	PTFE	Polypropylene	0.05, 0.1, 0.2, 0.45, 1.0	Absolute
WaterTec	Polyethersulfone	Polypropylene	0.05, 0.1, 0.2, 0.45, 0.65	Absolute
ZTEC B	Polyethersulfone	Polypropylene	0.2, 0.45, 0.65	Absolute
ZTEC E	Polyethersulfone	Polypropylene	0.03, 0.1, 0.2, 0.45	Absolute
ZTEC G	Polyethersulfone	Polypropylene	0.1, 0.2, 0.45, 0.65	Absolute
ZTEC P	Polyethersulfone	Polypropylene	0.2	Absolute
ZTEC WB	Polyethersulfone	Polypropylene	0.2, 0.45, 0.65, 1.2	Absolute

TefTEC™ Series Filter Cartridges

Absolute Rated PTFE Membrane Filter Cartridges

TefTEC cartridge filters are constructed with naturally hydrophobic PTFE membrane and polypropylene support layers and components. The HIMA retentive PTFE membrane offers superior hydrophobicity and water intrusion resistance compared to PVDF and polypropylene membranes, and the cartridge construction offers a cost-effective alternative to all-fluorocarbon filters. TefTEC filters are ideal for gas/vent applications and the filtration of aggressive chemicals and solvents.

Features–Benefits

- High surface area, single-layer construction provides superior flow rates and minimizes filtration system size
- 100% Flushed with 18 MΩ-cm DI water and integrity tested
- Filters are manufactured, flushed, tested and packaged in an ISO Class 7 Cleanroom Environment.
- Each filter element stamped with pore size, lot and serial number for identification and traceability.
- Complete qualification guide available

Product Specifications

Media:	*Expanded PTFE membrane*
Inner core, end caps, cage:	*Polypropylene*
Support layers:	*Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-rings only). Teflon (gasket only)*
Micron ratings:	*0.05, 0.1, 0.2, 0.45, 1.0 µm*

Dimensions

Typical Nominal lengths:	5", 9.75", 10", 20", 30", 40" (12.7, 24.8, 25.4, 50.8, 76.2, 101.6 cm)
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*8.5 ft². (0.79 m²) – 10" element*

Operating Parameters

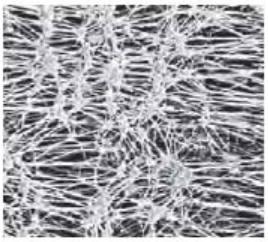
Maximum operating temperature:	*203°F (95°C)*
Maximum differential pressure:	*75 psid @ 70°F (5.2 bar @ 21°C)* *40 psid @ 176°F (2.8 bar @ 80°C)* *15 psid @ 203°F (1.03 bar @ 95°C)*
Maximum reverse differential pressure:	*40 psid @ 70°F (2.8 bar @ 21°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, 177.1520, and 177.1550, as applicable for food and beverage contact.

Typical Applications



- Aggressive chemicals
- Strong acids/bases
- Solvents
- Tank Vents
- Compressed gases
- Photoresists
- Hot DI water
- Pharmaceutical Intermediates
- Fermentation air

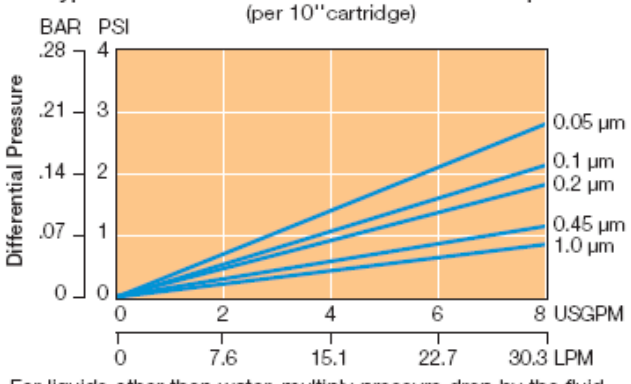
TefTEC Nomenclature Information

TefTEC	0.1	-20	P2	S
Filter Type TefTEC Series Filters		**Nominal Length (inches)**	**End Configuration**	**Gasket or O-Ring**
Retention Rating (microns)		-5	**P** Double Open End	**S** Silicone
0.05 **0.45**		-9.75	**P2** 226/Flat Single Open End	**B** Buna-N
0.1 **1**		-10	**P3** 222/Flat Single Open End	**E** EPDM
0.2		-20	**P7** 226/Fin Single Open End	**V** Viton
		-30	**P8** 222/Fin Single Open End	**T** Teflon endcap. Viton (O-Rings only)
		-40	**AM** Single open end, internal O-Ring **NPC** Double Open End, internal O-Ring	**T** Teflon (gasket only)

Example: TefTEC 0.1-20P2S

TefTEC FLOW RATE

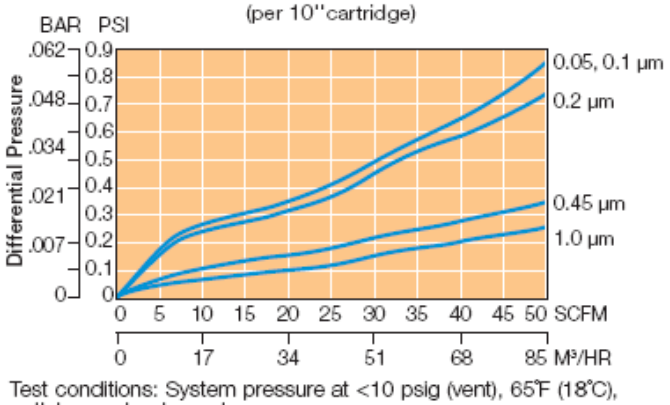
Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

TefTEC AIR FLOW RATE

Air Flow Rate
(per 10"cartridge)



Test conditions: System pressure at <10 psig (vent), 65°F (18°C), outlet open to atmosphere

Performance Specifications

Steam/Autoclave

Cartridges will withstand at least 100 steam/autoclave 30 minute cycles @ 275°F (135°C)

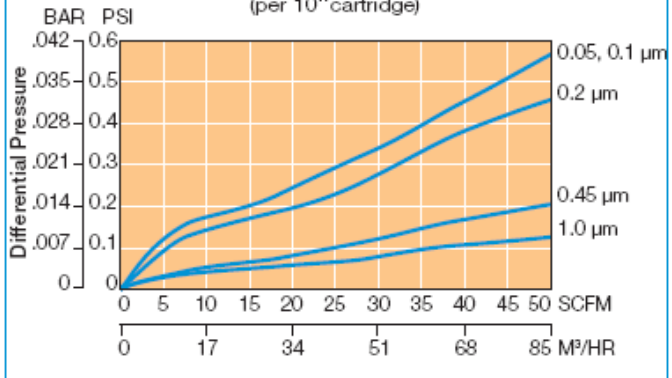
Integrity Test Values

Air Diffusion per 10 inch cartridge wet with 60/40 IPA/water. Contact Graver Technologies for specific method.

Pore Size	Specification
0.05 µm:	≤ 50 cc/min @ 22 psig (1.5 bar)
0.1 µm:	≤ 50 cc/min @ 18 psig (1.2 bar)
0.2 µm:	≤ 20 cc/min @ 12 psig (0.8 bar)
0.45 µm:	≤ 15 cc/min @ 5 psig (0.34 bar)
1.0 µm:	≤ 15 cc/min @ 3 psig (0.2 bar)

TefTEC AIR FLOW RATE

Air Flow Rate
(per 10"cartridge)



Test conditions: System pressure at 30 psig, 65°F (18°C)

WaterTEC™ Series Filter Cartridges

Absolute Rated Polyethersulfone Membrane Filter Cartridges

The WaterTEC filter series is constructed of absolute rated, hydrophilic, asymmetric polyethersulfone membrane and polypropylene components. The filter is designed for overall filtration economy and provides excellent flow rates and throughputs.

Features–Benefits

- Low pressure drop reduces energy costs
- High dirt holding capacity minimizes change-outs and down time
- All thermal bonded construction with no adhesives
- Available in all common configurations to allow use of existing filter housings
- Cost effective absolute filtration

Product Specifications

Media:	*Asymmetric polyethersulfone*
Inner core, end caps, cage:	*Polypropylene*
Support layers:	*Spunbonded Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only), Teflon (gasket only)*
Micron ratings:	*0.05, 0.1, 0.2, 0.45, 0.65 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10', 20", 30', 40" (12.7, 24.7, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7' (6.9 cm)*
Inside diameter:	*1.0' (2.54 cm)*
Surface area:	*6 ft². (0.56 m²) per 10 inch element*

Operating Parameters

Maximum sustained operating temperature:	*180°F (82°C) at 20 psid (1.38 bar)*
Maximum differential pressure:	*60 psid @ 80°F (4.14 bar @ 27°C)* *30 psid @ 160°F (2.07 bar @ 71°C)* *15 psid @ 200°F (1.03 bar @ 93.3°C)*
Maximum reverse differential pressure:	*40 psid @ 70°F (2.8 bar @ 21°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Certifications

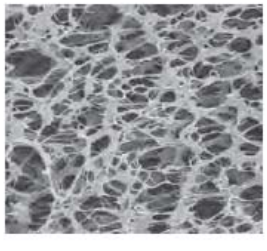
USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, 177.1520, and 177.2440 as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

Typical Applications

- General water filtration
- DI water prefilter
- DI water post filter
- Aqueous based chemical processing

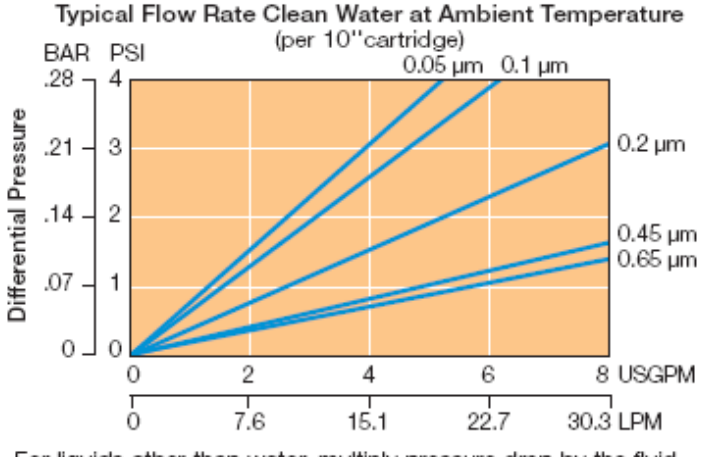


WaterTEC Nomenclature Information

WaterTEC	0.2	-10	P2	E	-R
Filter Type WaterTEC Series Filters		**Nominal Length (inches)** -5 -9.75 -10 -20 -30 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **AM** Single open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only) **T** Teflon (gasket only)	**Pre-Rinse Option** **-R** Factory Pre-Rinse
Retention Rating (microns) 0.05 0.1 0.2 0.45 0.65					

Example: WaterTEC 0.2-10P2E

WaterTEC FLOW RATE



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Performance Specifications

Cleaning/Sanitization

Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information.

ZTEC™ B Series Filter Cartridges

Pleated Polyethersulfone (PES) Membrane for Bioburden Reduction in Beverages and Biopharmaceuticals

ZTEC B Bioburden Reduction grade membrane cartridges provide highly consistent performance for bioburden reduction and particle removal across a wide range of beverage, pharmaceutical and biological fluids. The naturally hydrophilic PES membrane filters provide exceptional flow rates, long on-stream life, broad chemical compatibility and have no added surfactants to contribute to extractables. The cartridges are integrity testable and steamable to assure reliable service in critical applications.

Features–Benefits

- Manufactured in an ISO Class 7 Cleanroom Environment
- 100% flushed with ultrapure DI water and integrity tested
- Repeatably Steamable/Sanitizable
- High retentions up to 10^7/cm² challenged for bacteria and yeast
- Pore size, lot and serial number are stamped on each filter element for identification and traceability
- Complete qualification guide available
- Quick wet treatment available

Product Specifications

Media:	*Asymmetric Polyethersulfone membrane*
Inner core, end caps, cage:	*Polypropylene*
Support layers:	*Spunbonded Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*0.2, 0.45, 0.65 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.7, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*7.6 ft². (0.7 m²) per 10" element*

Operating Parameters

Maximum sustained operating temperature:	*176°F (80°C) at 20 psid (1.38 bar)*
Maximum differential pressure:	*60 psid @ 80°F (4.14 bar @ 27°C)* *30 psid @ 160°F (2.07 bar @ 71°C)* *15 psid @ 200°F (1.03 bar @ 93.3°C)*
Maximum reverse differential pressure:	*40 psid @ 70°F (2.8 bar @ 21°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Certifications

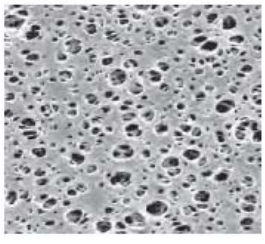
USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, 177.1520, and 177.2440 as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

Typical Applications

- Bottled Water
- Ophthalmic Solutions
- Culture Media
- Reagent Chemicals
- LVPs
- Buffers
- Juices

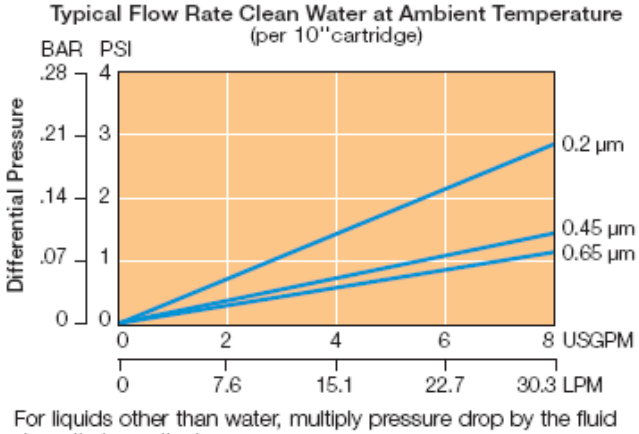


ZTEC B Nomenclature Information

ZTEC B	0.2	-20	P2	E	-QW
Filter Type ZTEC B Series Filters		**Nominal Length (inches)** -5 -9.75 -10 -20 -30 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **AM** Single open end, internal O-Ring **NPC** Double open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only)	Quickwet treatment
Retention Rating (microns) 0.2 0.45 0.65					

Example: ZTECB 0.2-20P2E

ZTEC B FLOW RATE



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Performance Specifications

Hot DI Water

Filter cartridge will withstand temperatures of 185°F (85°C) for up to 30 consecutive minutes.

Cleaning/Sanitization

Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information.

Steam/Autoclave

Cartridges may be steamed or autoclaved for at least 50 thirty minute cycles @ 275°F (135°C).

Typical Bacterial Retention Performance

0.2 µm: LRV for *B. diminuta* ≥ 7.8
0.45 µm: LRV for *S. marcescens* ≥ 8.5
0.65 µm: LRV for *S. cerevisiae* ≥ 11

Integrity Test Specifications

Minimum Bubble Point values and maximum Diffusive Air Flow (per 10-inch cartridge) values for ZTEC-B filters wet with water:

Pore Size	Bubble Point	Diffusive Air Flow
0.2 µm:	≥ 38 psig (2.6 bar)	≤ 35 cc/min @ 30 psig (2.1 bar)
0.45 µm:	≥ 25 psig (1.7 bar)	≤ 35 cc/min @ 20 psig (1.4 bar)
0.65 µm:	≥ 18 psig (1.2 bar)	≤ 35 cc/min @ 15 psig (1.0 bar)

ZTEC™ E Series Filter Cartridges

Pleated Polyethersulfone (PES) Membrane for Final Filtration of Ultrapure Water

ZTEC E microelectronics grade cartridges represent Graver's latest development in ultrapure water filtration technology. The filters are inherently hydrophilic and contain no added surfactants or wetting agents that could contaminate pure and ultrapure water streams. The PES membrane offers superior flow characteristics, high contaminant capacity and consistent removal of sub-micron particles. The cartridges exhibit rapid rinse-up to 18 MΩ-cm resistivity and single digit ppb levels of TOC.

Features–Benefits

- Manufactured, flushed, tested and packaged, in an ISO Class 7 Cleanroom Environment.
- Filters are100% flushed with 18 MΩ-cm DI water and integrity tested.
- Resistivity rinse-up to 18 MΩ-cm and single digit ppb TOC levels with minimal throughput.
- Available in a variety of end cap/adapter configurations to fit all industry-standard housings.
- Pore size, lot and serial number are stamped on each filter element for identification and traceability.
- Complete qualification guide available.

Product Specifications

Media:	*Asymmetric Polyethersulfone membrane*
Inner core, end caps, cage:	*Polypropylene*
Support layers:	*Spunbonded Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*0.1, 0.2, 0.45, 0.65 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.7, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*7.0 ft². (0.65 m²) per 10" element*

Operating Parameters

Maximum sustained operating temperature:	*176°F (80°C) at 20 psid (1.38 bar)*
Maximum differential pressure:	*60 psid @ 80°F (4.14 bar @ 27°C)* *30 psid @ 160°F (2.07 bar @ 71°C)* *15 psid @ 200°F (1.03 bar @ 93.3°C)*
Maximum reverse differential pressure:	*40 psid @ 70°F (2.8 bar @ 21°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Certifications

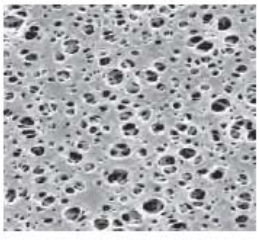
ZTEC E filters were tested by outside laboratory, CT Associates in November, 2011 for the following:

- TOC Rinse-up to 0.5 ppb
- Resistivity Rinse-up to 18 MΩ-cm
- Non-Volatile Residue
- Particle Rinse-up
- Trace Metal Extractables
- Anion and Cation Extractables

Please request Graver ZTEC E Qualification Guide for details and complete test reports.

Typical Applications

- DI water
- High purity chemicals

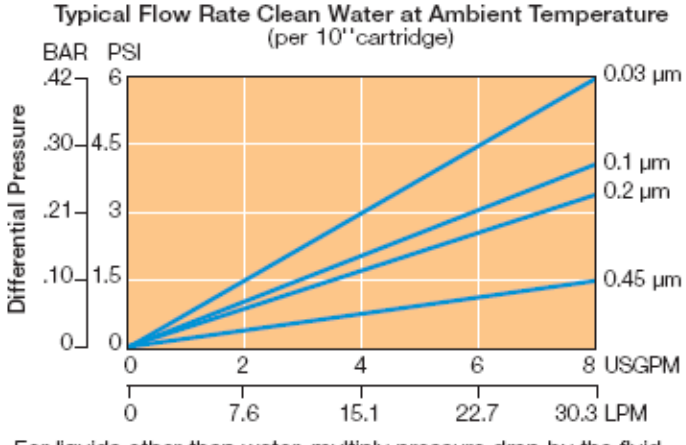


ZTEC E Nomenclature Information

ZTEC E	0.45	-30	P8	T
Filter Type ZTEC E Series Filters		**Nominal Length (inches)** -5 -9.75 -10 -20 -30 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **AM** Single open end, internal O-Ring **NPC** Double open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only)
Retention Rating (microns) 0.03 0.1 0.2 0.45				

Example: ZTECE 0.45-30P8T

ZTEC E FLOW RATE



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Performance Specifications

Hot DI Water

Filter cartridge will withstand temperatures of 185°F (85°C) for up to 30 consecutive minutes.

Cleaning/Sanitization

Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information.

Rinse-Up Volumes

- Resistivity rinse-up to 18 MΩ-cm: <30 minutes at a flow of 3 gpm per 10-inch element.
- Rinse-up to single digit ppb TOC in <120 minutes at a flow of 3 gpm per 10-inch element.

Integrity Test Specifications

Minimum Bubble Point values and maximum Diffusive Air Flow (per 10-inch cartridge) values for ZTEC-E filters wet with water:

Pore Size	Diffusive Air Flow
0.03 µm:	≤ 50 cc/min @ 50 psig (3.1 bar)
0.1 µm:	≤ 50 cc/min @ 40 psig (2.8 bar)
0.2 µm:	≤ 35 cc/min @ 30 psig (2.1 bar)
0.45 µm:	≤ 35 cc/min @ 20 psig (1.4 bar)

ZTEC™ G Series Filter Cartridges

Absolute Rated Polyethersulfone Membrane Pleated Filter Cartridges

This pleated, disposable filter element is constructed of absolute rated, hydrophilic, asymmetric polyethersulfone membrane with extended filter area to allow for a high system flow rate.

Features–Benefits

- 7.0 ft² (0.65 m²) of membrane surface area per 10" element – High throughput – Longer on-line service reduces costly maintenance time
- Absolute rated membrane from 0.1 to 0.65 µm
- Manufactured in an ISO Class 7 cleanroom environment
- 100% flushed with 18 MΩ-cm DI water and gross integrity tested
- Fixed pore construction eliminates dirt unloading as differential pressure increases
- Low extractables

Product Specifications

Media:	*Asymmetric Polyethersulfone membrane*
Inner core, end caps, cage:	*Polypropylene*
Support layers:	*Spunbonded Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*0.1, 0.2, 0.45, 0.65 µm*

Dimensions

Nominal lengths:	*5", 9.75", 10", 20", 30", 40" (12.7, 24.7, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*7.0 ft². (0.65 m²) per 10" element*

Operating Parameters

Maximum sustained operating temperature:	*176°F (80°C) at 20 psid (1.38 bar)*
Maximum differential pressure:	*60 psid @ 80°F (4.14 bar @ 27°C) 30 psid @ 160°F (2.07 bar @ 71°C) 15 psid @ 200°F (1.03 bar @ 93.3°C)*
Maximum reverse differential pressure:	*40 psid @ 70°F (2.8 bar @ 21°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Certifications

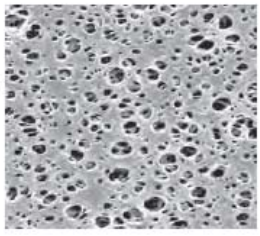
USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, 177.1520, and 177.2440 as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

Typical Applications

- Food & Beverage
- Filtration of acids and bases
- Cosmetics
- Ink
- Chemicals
- Ultra pure water
- Aqueous solutions

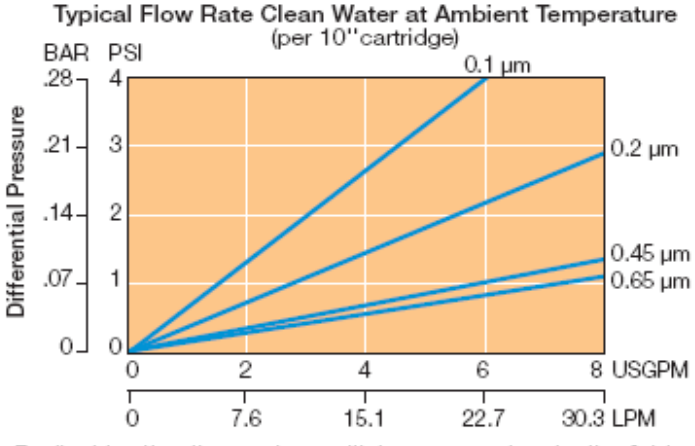


ZTEC G Nomenclature Information

ZTEC G	0.1	-10	P7	T
Filter Type ZTEC G Series Filters		**Nominal Length (inches)** -5 -9.75 -10 -20 -30 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **AM** Single open end, internal O-Ring **NPC** Double open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only)
Retention Rating (microns) 0.1 0.2 0.45 0.65				

Example: ZTECG 0.1-10P7S

ZTEC G FLOW RATE



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Performance Specifications

Hot DI Water

Filter cartridge will withstand temperatures of 185°F (85°C) for up to 30 consecutive minutes.

Cleaning/Sanitization

Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information.

Steam/Autoclave

Cartridges may be steamed or autoclaved for at least 50 thirty minute cycles @ 275°F (135°C).

ZTEC™ P Series Filter Cartridges

Pleated Polyethersulfone (PES) Membrane for Sterile Filtration

ZTEC P Sterilizing Grade membrane cartridges are HIMA validated for complete bacterial retention to yield product sterility in biopharmaceutical final filtration applications. The naturally hydrophilic and low protein binding characteristics of polyethersulfone membrane ensure maximum transmission of active ingredients making it ideal for a wide range of pharmaceutical and biological liquid applications, including the filtration of therapeutics, vaccines, antibiotics, bulk pharmaceutical and other critical biotechnology products. The double-layer PES 0.2 micron membrane filters are manufactured in a cleanroom environment, and integrity tested before shipment to assure consistent performance and quality.

Features–Benefits

- Manufactured in an ISO Class 7 Cleanroom Environment
- 100% flushed with ultrapure DI water
- Meets ASTM Standards for Sterility
- Repeatably Steamable/Sanitizable
- 100% Integrity tested prior to release
- Pore size, lot and serial number are stamped on each filter element for identification and traceability
- Complete validation guide available

Product Specifications

Media:	*Asymmetric Polyethersulfone membrane*
Inner core, end caps, cage:	*Polypropylene*
Support layers:	*Spunbonded Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*0.2 µm*

Dimensions

Nominal lengths:	*10", 20", 30", 40" (25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*6.8 ft². (0.63 m²) per 10" element*

Operating Parameters

Maximum sustained operating temperature:	*176°F (80°C) at 20 psid (1.38 bar)*
Maximum differential pressure:	*60 psid @ 80°F (4.14 bar @ 27°C) 30 psid @ 160°F (2.07 bar @ 71°C) 15 psid @ 200°F (1.03 bar @ 93.3°C)*
Maximum reverse differential pressure:	*40 psid @ 70°F (2.8 bar @ 21°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Certifications

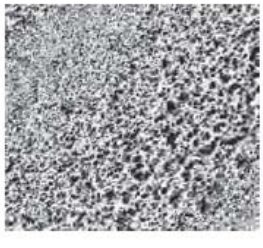
USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, 177.1520, and 177.2440 as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

Typical Applications

- Diagnostics
- Ophthalmic Solutions
- Culture Media
- Reagent Chemicals
- LVPs
- Buffers
- Vaccines



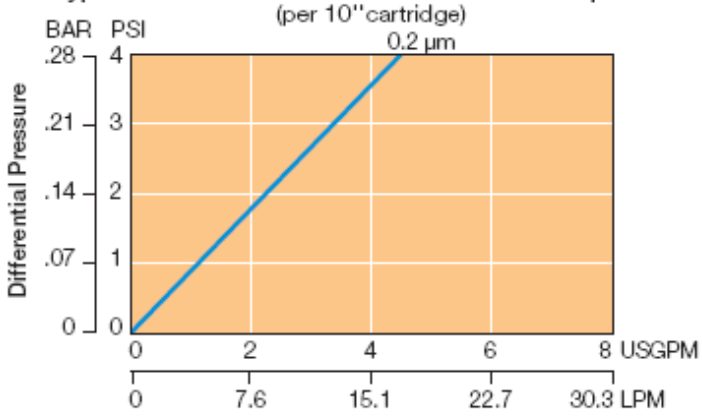
ZTEC P Nomenclature Information

ZTEC P	0.2	-20	P2	S
Filter Type ZTEC P Series Filters		**Nominal Length (inches)** -10 -20 -30 -40	**End Configuration** **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only)
Retention Rating (microns) 0.2				

Example: ZTECP 0.2-20P2S

ZTEC P FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10" cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Performance Specifications

Hot DI Water

Filter cartridge will withstand temperatures of 185°F (85°C) for up to 30 consecutive minutes.

Cleaning/Sanitization

Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information.

Steam/Autoclave

Cartridges may be steamed or autoclaved for at least 50 thirty minute cycles @ 275°F (135°C).

Typical Bacterial Retention Performance

Cartridges have been validated for the complete retention of Brevundimonas diminuta at a challenge level of 10^7 organisms/cm² as prescribed in ASTM 838-05.

Integrity Test Specifications

Minimum Bubble Point values and maximum Diffusive Air Flow (per 10-inch cartridge) values for ZTEC-P filters wet with water:

Pore Size	Bubble Point	Diffusive Air Flow
0.2 µm:	≥ 40 psig (2.8 bar)	≤ 30 cc/min @ 32 psig (2.2 bar)

ZTEC™ WB Series Filter Cartridges

Pleated Polyethersulfone (PES) Membrane for Critical Filtration in Beverage Applications

Protect your beverage from spoilage. ZTEC WB cartridge filters utilize a special polyethersulfone membrane to provide consistent removal of spoilage organisms and inorganic particulate. The product offers excellent retention efficiency and extended on-stream life making it an ideal filter for the clarification of beer, wine and bottled water. The PES membrane, available from 0.2 to 1.2 µm pore sizes, is designed to meet and surpass the filtration criteria necessary to maintain product quality and characteristics. Produced in an ISO Class 7 cleanroom, the cartridges are integrity tested during production to assure performance and consistency.

Features–Benefits

- Manufactured in an ISO Class 7 Cleanroom Environment
- 100% flushed with ultrapure DI water and integrity tested
- Low adsorption of protein, color and flavor components
- Steamable/sanitizable for cleaning and reuse
- High log reduction values for spoilage organisms
- PES membrane provides high capacity contaminant loading
- Complete qualification guide available
- Quick wet treatment available

Product Specifications

Media:	*Asymmetric Polyethersulfone membrane*
Inner core, end caps, cage:	*Polypropylene*
Support layers:	*Spunbonded Polypropylene*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*0.2, 0.45, 0.65, 1.2 µm*

Dimensions

Nominal lengths:	*9.75" 10", 20", 30", 40" (24.7, 25.4, 50.8, 76.2, 101.6 cm)*
Outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*7.6 ft². (0.7 m²) per 10" element*

Operating Parameters

Maximum sustained operating temperature:	*176°F (80°C) at 20 psid (1.38 bar)*
Maximum differential pressure:	*80 psid @ 70°F (5.5 bar @ 21°C)* *40 psid @ 176°F (2.8 bar @ 80°C)*
Maximum reverse differential pressure:	*40 psid @ 70°F (2.8 bar @ 21°C)*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Certifications

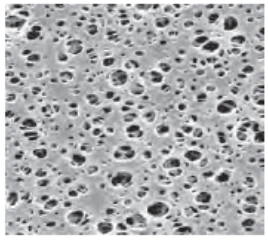
USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, 177.1520, and 177.2440 as applicable for food and beverage contact.

European Directive for Direct Food Contact - European Regulations No 1935/2004 and European directive 82/711/EEC: Tested for migration behavior in direct food contact. Minimal rinse required for use. Data available upon request.

Typical Applications

- White Wine
- Red Wine
- Sparkling Wine
- Wine/Malt Coolers
- Champagne
- Distilled Spirits
- Bottled Water
- Beer



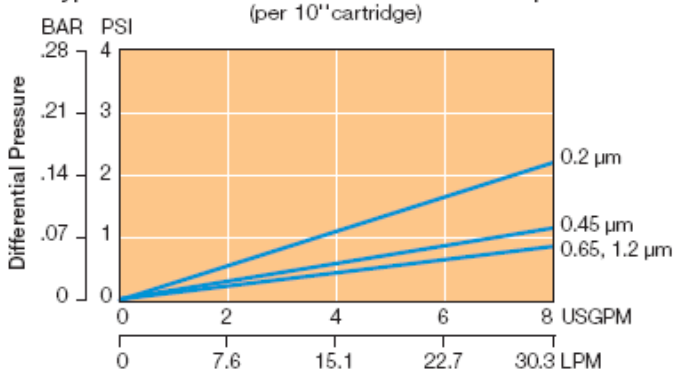
ZTEC WB Nomenclature Information

ZTEC WB	0.45	-20	P2	S	-QW
Filter Type ZTEC WB Series Filters		**Nominal Length (inches)** -5 -9.75 -10 -20 -30 -40	**End Configuration** **P** Double Open End **P2** 226/Flat Single Open End **P3** 222/Flat Single Open End **P7** 226/Fin Single Open End **P8** 222/Fin Single Open End **AM** Single open end, internal O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon endcap. Viton (O-Rings only)	Quickwet treatment
Retention Rating (microns) 0.2 0.45 0.65 1.2					

Example: ZTECWB 0.45-20P2E

ZTEC WB FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10" cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Performance Specifications

Hot DI Water

Filter cartridge will withstand temperatures of 185°F (85°C) for up to 30 consecutive minutes.

Cleaning/Sanitization

Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information.

Steam/Autoclave

Cartridges may be steamed or autoclaved for at least 50 thirty minute cycles @ 275°F (135°C).

Typical Bacterial Retention Performance

0.20µm: LRV for *Pseudomon aeruginosa* ≥ 11
0.45µm: LRV for *Lactobacillus brevis* ≥ 7.6
0.45µm: LRV for *Oenococcus oeni* ≥ 10.0
0.45µm: LRV for *S. cerevisiae* ≥ 11
0.65µm: LRV for *S. cerevisiae* ≥ 8.7
1.2µm: LRV for *S. cerevisiae* ≥ 8

Integrity Test Specifications

Minimum Bubble Point values and maximum Diffusive Air Flow (per 10-inch cartridge) values for ZTEC WB filters wet with water:

Pore Size	Bubble Point	Diffusive Air Flow
0.20 µm:	≥ 30 psig (2.1 bar)	≤ 35 cc/min @ 25 psig (1.7 bar)
0.45 µm:	≥ 20 psig (1.4 bar)	≤ 35 cc/min @ 16 psig (1.1 bar)
0.65 µm:	≥ 17 psig (1.2 bar)	≤ 35 cc/min @ 14 psig (1.0 bar)
1.2 µm:	≥ 13 psig (0.9 bar)	≤ 35 cc/min @ 11 psig (0.8 bar)

Specialty Filters

Graver Product Type	Media	Hardware	Retention Ratings (um)	Efficiency
GSTACK Modules Lenticular	Cellulose with DE or Perlite	Polypropylene	0.25 to 15	Nominal
RTEC P Resin bonded	Acrylic/Phenolic	Polyester available	5, 10, 25, 50, 75, 100	Nominal
Steris Replacement Pleated	PES membrane or polypropylene sheet	Polypropylene	0.2	Nominal or Absolute
TPM Sintered Powder Metal	Titanium	Titanium	0.5, 2, 5, 10, 15, 35	Nominal Beta 200

GSTACK Series Filter Modules

Lenticular Depth Filter Modules

GStack Series depth filter modules are designed in a lenticular format for fluid clarification applications. Consisting of either cellulose with diatomaceous earth or cellulose with perlite, a formulation is available to achieve excellent particle and haze removal. Grades are also available with water absorbing capability or that meet pharmaceutical requirements.

Features–Benefits

- Proven performance cellulose based filter sheet media
- Choice of DE or perlite filter aids
- Nominal retention ratings from 0.25 to 15 microns
- High efficiency due to positive zeta potential
- Exceptional mechanical strength
- Choice of flat gasket seal or double o-ring seal
- Choice of economical stainless steel bands or rigid molded polypropylene core
- Special water absorbing component is available in the 10 and 15 micron grades
- Steam sterilizable
- Media grade stamped on sheets for easy identification

Product Specifications

Media/Microns (nominal):	
Cellulose/DE -	*0.25, 0.3, 0.5, 0.8, 1.0, 2.5, 5, 10*
Cellulose/Perlite -	*0.5, 1.0, 2.5, 5, 10, 15*
Water absorbing -	*10, 15*
Hardware:	
End caps & cell edge seals -	*Polypropylene*
Center support -	*Stainless steel bands or polypropylene core*
O-Rings:	*Buna-N, Silicone, EPDM, Viton, Teflon*
Filtration Area:	
12"/16 cell -	*18.5 sq ft (1.7 sq m)*
16"/16 cell -	*40 sq ft (3.7 sq m)*
12"/14 cell water absorbing grade -	*16.2 sq ft (1.5 sq m)*
Dimensions	
Nominal diameter:	*12" or 16" (287 mm, 405 mm)*
# of Cells per stack	*16 (14 for water absorbing grade)*
Height:	*10 7/8" (276 mm)*
Operating Parameters	
Maximum operating temperature:	*176°F (80°C)*
Maximum differential pressure:	*35 psid (2.4 bar)*
Steam in place:	*266°F (130°C) for 30 minutes at 25 psid maximum (1.7 bar)*
Hot water sanitization:	*176°F (80°C) for 30 minutes at up to 14 psid (1 bar)*

Certifications

USP Class V - Meets USP Class V Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Section 177.2260, as applicable for food and beverage contact.

Typical Applications

- Wine/Beer
- Sweeteners
- Silicone oils
- Cosmetics
- Adhesives
- Pharmaceuticals
- Flavors/Fragrances
- Edible oils
- Distilled spirits

GSTACK Nomenclature Information

GS	2	16	D2.5	P	C	B
Filter Type GSTACK Series Filters		**Cells** 16 14 (W grade)			**Core/End Style** **S** SS bands **C** PP core/flat gasket **O** PP core/O-Ring	**Gasket or O-Ring** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **T** Teflon

Diameter
2 12"
6 16"

Media

Cellulose/DE	Cellulose Perlite	Water Absorbing *
D0.25	L0.3	W10
D0.3	L0.5	W15
D0.5	L1	
D0.8	L2.5	
D1	L5	
D2.5	L10	
D5	L15	
D10		

Grade
Blank Industrial
P Pharmaceutical

Example: GS 216D2.5PCB

* Water grade is only available in 12" with SS bands.

GSTACK Flow Rate

Media Grade			Nominal Retention Rating (microns)	Practical Water Flow Rate (GPM)		
Cellulose/DE	Cellulose/Perlite	Water Absorbing		12", 16 cell	16", 16 cell	Water Absorbing 12"
D0.25			0.25 - 0.5	1 - 2	2 - 4	
D0.3	L0.3		0.3 - 0.5	2 - 3	4 - 6	
D0.5	L0.5		0.5 - 0.8	3 - 4	6 - 8	
D0.8			0.8 - 2	4 - 5	8 - 10	
D1	L1		1.0 - 3.0	6 - 7	12 - 14	
D2.5	L2.5		2.5 - 4	6 - 10	13 - 21	
D5	L5		5 - 12	20 - 26	43 - 56	
D10	L10	W10	10 - 25	25 - 35	50 - 60	18
	L15	W15	15 - 40	40 - 50	60 - 70	18

NOTE: Flow rate applies to water at 70°F at 1 psid clean differential. For different fluid characteristics, testing is highly recommended for proper sizing.

RTEC™ P Series Filter Cartridges

Rigid Resin Bonded Filters

RTEC P Series filters feature an polyester fiber/phenolic resin construction that produces an extremely rigid pore structure. This construction allows the filter to withstand extremes of viscosity and temperature without compression or collapse. In addition, a true graded density construction allows complete utilization of the filter's depth, with coarse particles captured in the outer zones and finer particles captured nearer the core.

Features–Benefits

- Rigid polyester fiber/phenolic resin construction prevents unloading even at high differential pressures
- Grooved outer surface increases surface area for longer on-stream life
- Available in a wide range of removal efficiencies from 1 to 100 microns
- Available with optional end configurations for installation in most housings
- No metal or plastic cores for easier disposal
- Broad chemical compatibility

Product Specifications

Media:	*Polyester Fiber/Phenolic Resin*
Optional End Caps:	*Polyester*
Multi length bonding agent:	*Polyamide Hot Melt*
Gaskets/O-Rings:	*Buna-N, EPDM, Silicone, Viton, Teflon Encapsulated Viton (O-Rings only)*
Micron ratings:	*1, 5, 10, 25, 50, 75, 100 µm*
Dimensions	
Nominal lengths:	*9.75", 10" 19.5", 20", 29.25", 30", 39", 40" (24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 101.6 cm)*
Outside diameter:	*2.45" (6.22 cm)*
Inside diameter:	*.98 - 1.10" (25 - 28 mm) tapered*
Operating Parameters	
*Maximum operating temperature: **	*75 psid @ 68°F (5.2 bar 20°C)* *15 psid @ 200°F (1.0 bar 93°C)* *for lengths >10" with glued segments* *20 psid 220°F (1.4 bar 104°C)* *for 10" lengths 200°F (93°C) in gas*
Recommended change-out pressure:	*35 psid (2.4 bar)*

* Always check compatibility with the specific process fluid at the specific application temperature.

Typical Applications *

- Paints, Inks
- Sealants
- Adhesives
- Lacquers, Varnishes, Shellacs
- Fuel Oils, Crude Oils, Grease
- Machine Coolants
- Silicones
- Antifreeze
- Plasticizers
- Animal Oils

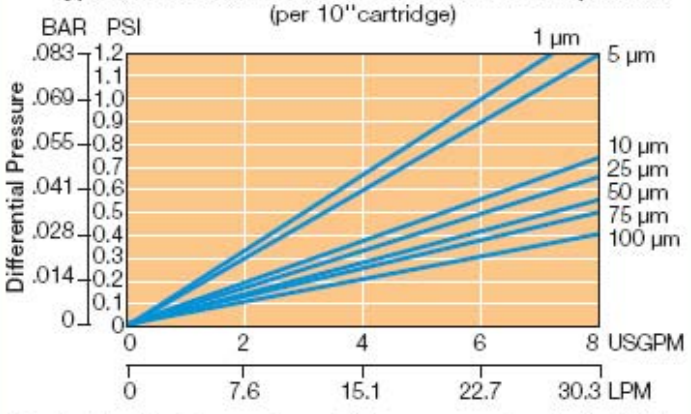
RTEC P Nomenclature Information

RTEC P	5	-20	N	N
Filter Type RTEC P Series Filters		**Nominal Length (inches)** -9.75 -10 -19.5 -20 -29.25 -30 -39 -40	**End Configuration** P Double Open End P2 226/Flat Single Open End P3 222/Flat Single Open End P7 226/Fin Single Open End P8 222/Fin Single Open End N None	**Gasket or O-Ring** S Silicone B Buna-N E EPDM V Viton T Teflon endcap. Viton (O-Rings only) N None
Retention Rating (microns) 1 50 5 75 10 100 25				

Example: RTEC P 5-20NN

RTEC P FLOW RATE

Typical Flow Rate Clean Water at Ambient Temperature
(per 10"cartridge)



For liquids other than water, multiply pressure drop by the fluid viscosity in centipoise

Note:
For chemical compatibility, flow rates, and temperature requirements please consult the factory or your local Graver distributor.

Steris® Replacement Series Filter Cartridges

Graver Technologies' replacement A and B filters, for Steris machines offer excellent protection for the final sterile filter.

Features–Benefits

- Replacement A & B filters are designed to effectively protect and extend the life of the final sterile filter
- Choice of endcap styles to fit your housings
- Meets FDA Standards – All material used in the construction of the filters meets FDA (Food and Drug Administration) Title 21 of the CFR
- Clean manufacturing process is used which eliminates the use of glues or epoxies
- End caps are thermo-bonded to the media and support hardware
- High dirt holding capacity
- Longer on-line service reduces valuable maintenance time
- Fixed pore construction eliminates dirt unloading or fiber releasing

Certifications

USP Class VI - Meets USP Class VI Biological Test for Plastics.

FDA Listed Materials - All Materials comply with FDA Title 21 of the Code of Federal Regulations Sections 174.5, 177.1520, and 177.2440 as applicable for food and beverage contact.

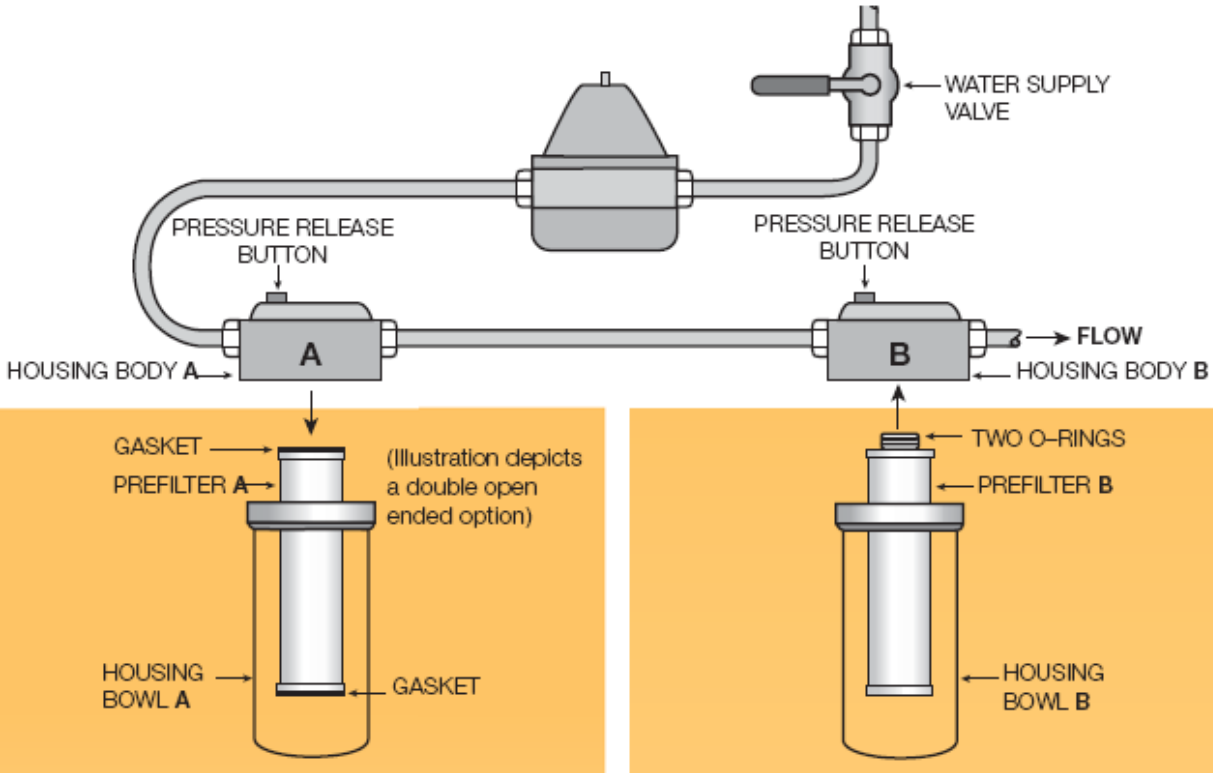
Product Specifications - Steris "A" Replacement

Media:	*Polypropylene*
Inner core, end caps, cage:	*Polypropylene*
Gaskets/O-Rings:	*Silicone*
Nominal micron rating:	*0.2 µm*
Dimensions	
Nominal length:	*9.8" (24.9 cm) DOE*
Nominal outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*4.4 ft². (0.41 m²) for SOE 5.1 ft². (0.47 m²) for DOE*
Operating Parameters	
Maximum operating temperature:	*175°F (80°C)*
Maximum differential pressure:	*40 psid @ 175°F (2.8 bar @ 80°C)*
Nominal flow rates:	*6 GPM/psid (22 LPM/0.07 bar)*

Product Specifications - Steris "B" Replacement

Media:	Polyethersulfone membrane
Inner core, end caps, cage:	*Polypropylene*
O-Rings:	*Silicone or EPR*
Absolute micron rating:	*0.2 µm*
Dimensions	
Nominal length:	*10.8" (27.4 cm) SOE*
Nominal outside diameter:	*2.7" (6.9 cm)*
Inside diameter:	*1.0" (2.54 cm)*
Surface area:	*7 ft². (0.56 m²)*
Operating Parameters	
Maximum operating temperature:	*180°F (82°C)*
Maximum differential pressure:	*30 psid @ 160°F (2.07 bar @ 71°C)*
Nominal flow rates:	*2.15 GPM/psid (8.1 LPM/0.07 bar)*

Steris Replacement Filter Specifications



Note: For chemical compatibility, flow rates, and temperature requirements please consult the factory or your local Graver distributor.

Steris Replacement Configuration Options

	Part Number	Description
"A" Filter	FPLGT00100	Double open end with silicone flat gasket seal.
	F801030000	Single open end with internal 214 silicone O-Ring. Recessed cup on closed end to fit over housing post.
"B" Filter	FPLGT00200	Single open end with 2-222 silicone O-Rings. Flat cap on closed end.
	F80D000013	Single open end with 2-222 EPR O-Rings. Recessed cup on closed end to fit over housing post.

TPM™ Series Filter Cartridges

Titanium Porous Metal Technology

TPM series filters are porous titanium filters designed for applications involving heat, gases, aggressive chemicals, cryogenics or polymers. Made from titanium powder, that is sintered to form a rugged, fixed pore structure, TPM filters are made to withstand temperature extremes, high pressures and repeated cleaning/backwash cycles. There are no longitudinal seams, for improved mechanical strength and corrosion resistance. TPM filters are produced in a range of configurations and micron ratings to perform in a variety of liquid and gas applications.

Features–Benefits

- Constructed entirely of sintered titanium powder – Offers high corrosion resistance
- Cleanable/Backwashable – Allows for re-use – Maximum economy
- High Temperature Sintering – No media migration
- Various gasket/O-Ring materials and configurations – Easily retrofits most systems

Product Specifications

Media:	*Titanium*
End caps:	*Titanium*
Gaskets/O-Rings:	*EPR, Buna-N, Viton, Teflon Encapsulated Viton (O-Rings only), Teflon (gasket only)*
Micron ratings:	*0.5, 2, 5, 10, 15, 35 µm*
Dimensions	
Nominal lengths:	*10'', 20'', 30'' (25.4, 50.8, 76.2 cm)*
Outside diameter:	*2.75'' (70 mm) or 2.36'' (60 mm)*
Operating Parameters	
Maximum operating	*700°F (371°C)**
Maximum differential pressure:	*250 psid (17.4 bar) forward) 50 psid (3.5 bar) reverse*
Recommended change-out pressure:	*35 psid (2.4 bar)*

Typical Applications

- Corrosive liquids and gases
- Cryogenic fluids
- High viscosity solutions
- Process steam
- High temperature liquids and gases
- Catalyst recovery

Filter Housings

Graver Product	Code or Non-Code	Material of Construction	Cartridge End Configuration	Number of Filters	Max Operating Pressure (psig/bar)
GSTACK	Code & Non-Code	316L	DOE or Double O-ring	1, 2, 3, 4	100/6.9
High Flow	Code & Non-Code	304, 316, and Carbon Steel	Special Quad Seal	1, 3, 4, 7	150/10.3
IHP	Non-Code	316L SS	DOE, 222, 226	1, 3, 5, 7, 12, 21	125 or 200/8.6 or 13.8
LPF	Non-Code	304L or 316L SS	DOE, 222, 226	3, 5, 7, 12, 21	150/10.3
MC	Non-Code	304L or 316L SS	DOE	4, 5, 7, 12, 22, 36, 52	150/10.3
SC	Non-Code	304L or 316L SS	DOE or 222	1	250 or 300/17.2 or 20.7
SHP	Non-Code	316L SS	DOE, 222, 226	1, 3, 5, 7	125 or 200/8.6 or 13.8
Custom	Code & Non-Code	Call Factory			

GSTACK Series Filter Housings

Lenticular Depth Filter Housings

Sanitary Housing, designed for use with Graver GSTACK Series Depth Filter Modules. GSTACK housings feature highly polished finish, sanitary fittings, vent connection, and no internal threads to meet the needs of high purity applications. The vertical configured housings are constructed of all 316L SS materials as standard in sizes to hold from 1 to 4 modules. The split dome in the 3 and 4 high allow flexibility to run different number of modules and also facilitates complete cleaning when disassembled.

Features–Benefits

- Accepts flat gasket or o-ring style lenticular filter elements
- Select from 2 diameters to accept either 12" or 16" modules
- 316L stainless steel with 180 grit finish
- 1.5" Sanitary tri-clamp Inlet & Outlet with 90 deg elbows
- Split dome for size flexibility and easy cleaning
- 0-60 psi stainless steel non-sanitary gauge
- V-Band Clamp Closure
- 60 PSIG Design Pressure
- EPDM Elastomers/Gaskets
- Non-Adjustable Legs with foot pads
- Top Vent

Product Specifications

Construction:	*316 L Stainless Steel wetted parts*
Shell Gasket Standard:	*EPDM*
Optional Gaskets:	*Buna-N, Neoprene, Viton, Silicone, Teflon Encapsulated Silicone*

Operating Parameters

Maximum operating pressure:	*100 psig (6.9 bar) @ 200°F (93°C) in aqueous solutions 175°F (79°C) for oil based solutions*
Flow Rate:	*1 GPM/ft² of media surface area*

Available Options

- Electropolish or <30 Ra polish for liquid contact parts
- ASME Code available
- Drains

Typical Applications

- Pharmaceuticals
- Chemicals
- Cosmetics
- Food and beverage

GSTACK Housing Nomenclature Information

GSH	12	03	FG	TC1.5	E	-EP
Model GSTACK Series **Module Diameter** **12** 12" **16** 16"		**# of Modules** **01** 1 **02** 2 **03** 3 **04** 4	**Adapter Style** **OR** O-Ring **FG** Flat gasket	**Inlet/Outlet** **TC1.5** 1.5" Tri-clamp (for 12") **TC2** 2" Tri-clamp (for 16")	**Gasket** **S** Silicone **B** Buna-N **E** EPDM **V** Viton **N** Nitrile **T** Teflon encap. silicone	**Options** **EP** Electropolished **D** Drain **G** Pressure gauge

Example: GSH 1203FGTC1.5E-EP

GSTACK Housing Specifications

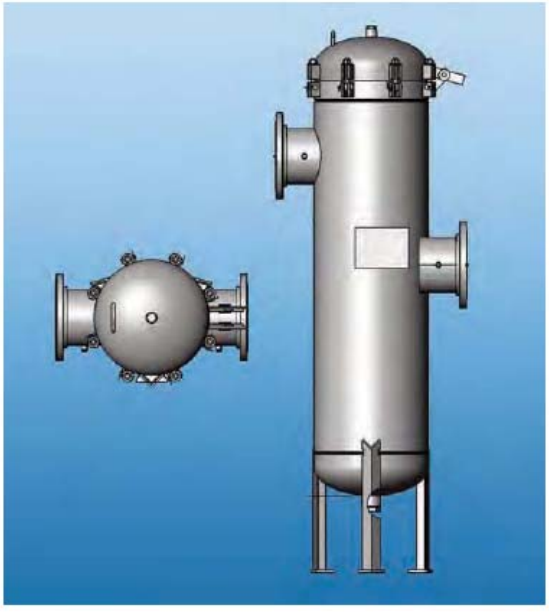
Model	Height		Base Width		Weight Empty		Filter Area*	
	(in)	(mm)	(in)	(mm)	(lbs)	(kg)	(ft^2)	(m^2)
GSH1201	39.6	1006	19.1	485	75	34.1	18.5	1.72
GSH1202	50.9	1293	19.1	485	93	42	37	3.44
GSH1203	62.1	1577	19.1	485	114	51.8	55.5	5.16
GSH1204	73.4	1864	19.1	485	132	59.7	64	5.95
GSH1601	39.6	1006	23.1	587	122	55.3	39.5	3.67
GSH1602	50.9	1293	23.1	587	145	65.7	79	7.34
GSH1603	62.1	1577	23.1	587	174	78.8	118.5	11.01
GSH1604	73.4	1864	23.1	587	197	89.2	158	14.68

* Based on 16 cell pack.
Dimensions include support legs.

High Flow Series Filter Housings

Filter Housings for High Flow Applications

Graver High Flow Series filter housings are designed to accept Graver and competitive High Flow Series large geometry filter elements. Available in both vertical and horizontal orientations, the High Flow housings can accept from 1 to 7 filter elements. Also available is a single round tipped horizontal design that allows easier removal without the need for a platform and readily drains from back of vessel to eliminate fluid spills.



Features–Benefits

- Industrial grade housings available in 304, 316 and carbon steel wetted parts
- ASME U code available
- Designs for 1, 3, 4 or 7 filters per housing for flows up to 3500 GPM*
- 150 psig designs
- Accepts 20", 40" and 60" High Flow cartridges
- Vertical and horizontal designs offered
- Hold down plate prevents elements from unseating due to back pressure
- Filter removal tool available to facilitate element changeout
- Swing bolts on 150 psig design
- Equipped with 1" vent and 2" drain (1" drain on tipped horizontal style).

Product Specifications

Shell O-ring	*Buna N, Viton, EPDM, Silicone*
Optional	*300 psig (20.6 bar) Flanged Head designs available – Consult Factory* *Not for use with compressed gases*

Operating Parameters

Maximum operating pressure:

Carbon Steel	*150 psig (10.3 bar) @ 500°F (260°C) in liquid service*
Stainless Steel	*150 psig (10.3 bar) @ 300°F(149°C) in liquid service* *Not for use with compressed gases*

Note:

1. Flow capacity based on light dirt load and low viscosity. Actual flow rate may be lower with vessel sizing based on fluid dirt loads, nature of contaminant, viscosity, micron rating and temperature.

Available Options

- Vertical Housing Inlet/outlet
  Side in/side out, Side in/bottom out
- Horizontal Housing Inlet/Outlet
  Side in/bottom out
- Tilted Horizontal
  Side in/side out, Side in/bottom out
- Gauge ports
- Hinged cover
- Davit arm

Typical Applications

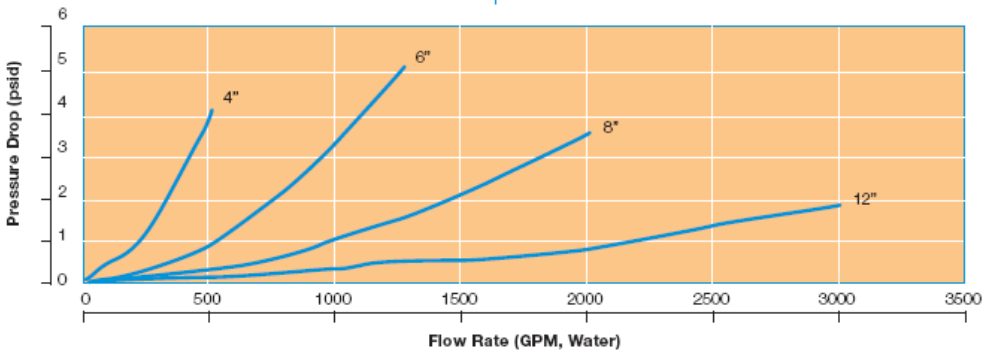
- Pre RO
- Water
- Desalination
- Food and Beverage
- Pulp and Paper
- Oil and Gas
- Petrochemicals

HFH Nomenclature Information

HFH	1	H	40	T	4	SS	150	-S	-H
Model HFH Series		**Orientation** **V** Vertical **H** Horizontal **HT** Tipped Horizontal (1 round only)			**Inlet/Outlet Size** 4, 6, 8, 12			**Gasket** **B** Buna-N **S** Silicone **E** EPDM **V** Viton	**Options** **H** Hinge **DA** Davit arm
# of Filters **1** 1 **3** 3 **4** 4 **7** 7		**Cartridge Height (inches)** 20, 40, 60			**Inlet/Outlet Config.** **SS** Side in/side out **SB** Side in/bottom out				
		Material of Construction **R** 304L SS **C** Carbon Steel **T** 3016L SS			**Pressure Rating** **150** 150 psig **300** 150 psig (consult factory)				

Example: HFH 1H40T4SS150-S-H

HFH Pressure Drop for various Pipe Sizes



HFH Dimensional Data - Horizontal/Swing Bolt

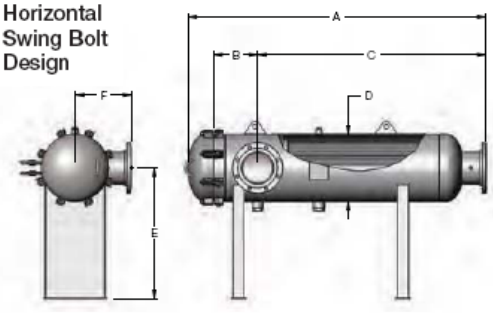
Model	Rate Flow Capacity GPM (LPM)	No. 10" Elements	Filter Lengths	Dim. "A" inches (cm)	Dim. "B" inches (cm)	Dim. "C" 1 inches (cm)	Dim. "D" 1 inches (cm)	Dim. "E" inches (cm)	Dim. "F" 1 inches (cm)	Max. Flange size (in)	Drain	Vent	Gauge
HFH 3H-40	1050 (3975)	3	40	79 ¾" (203)	11 ¾" (30)	61 ⅛" (155)	18" (46)	44" (112)	15" (38)	8	2" NPT	1" NPT	¼" NPT
HFH 4H-40	1400 (5300)	4	40	80 ¼" (204)	11 ¾" (30)	61 ⅛" (155)	20" (51)	46" (117)	16" (41)	8	2" NPT	1" NPT	¼" NPT
HFH 7H-40	2450 (9275)	7	40	91 ⅞" (233)	15 ½" (39)	68" (173)	24" (61)	48" (122)	18" (46)	12	2" NPT	1" NPT	¼" NPT
HFH 1H-60	500 (1893)	1	60	85" (216)	8" (20)	73" (185)	8 ⅝" (22)	40" (102)	9" (23)	4	2" NPT	1" NPT	¼" NPT
HFH 3H-60	1500 (5680)	3	60	99 ¾" (253)	11 ¾" (30)	81 ⅛" (206)	18" (46)	44" (112)	15" (38)	8	2" NPT	1" NPT	¼" NPT
HFH 4H-60	2000 (7570)	4	60	100 ¼" (255)	11 ¾" (30)	81 ⅛" (206)	20" (51)	46" (117)	16" (41)	8	2" NPT	1" NPT	¼" NPT
HFH 7H-60	3500 (13248)	7	60	111 ⅞" (284)	15 ½" (39)	88" (224)	24" (61)	48" (122)	18" (46)	12	2" NPT	1" NPT	¼" NPT

Notes:

1. Dimensions are based on the maximum connection sizes.
2. Dimensions include support legs.
3. Dim. "A" will increase by approx. 3" for S.S. swing bolt housings.

HFH Housing Dimensional Drawing

Horizontal Swing Bolt Design



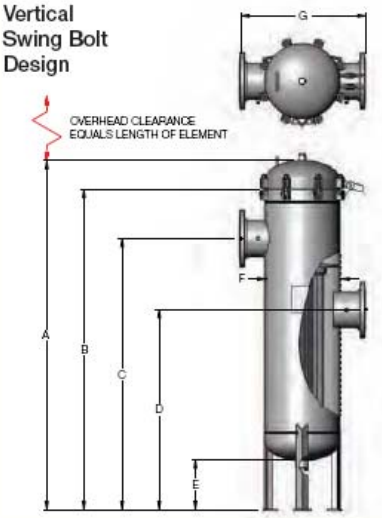
HFH Dimensional Data - Vertical/Swing Bolt

Model	Rate Flow Capacity GPM (LPM)	No. 10" Elements	Filter Lengths	Dim. "A" inches (cm)	Dim. "B" inches (cm)	Dim. "C" [1] inches (cm)	Dim. "D" [1] inches (cm)	Dim. "E" inches (cm)	Dim. "F" [1] inches (cm)	Dim. "G" inches (cm)	Max. Flange size (in)	Drain	Vent	Gauge
HFH 1V-20	175 (662)	1	20	51 ⅛" (132)	48" (122)	40" (102)	28" (71)	12" (30)	8 ⅝" (22)	18" (46)	4	2" NPT	1" NPT	¼" NPT
HFH 3V-20	525 (1986)	3	20	63 ⅝" (162)	56 ¾" (144)	45" (114)	28" (71)	12" (30)	18" (46)	30" (76)	8	2" NPT	1" NPT	¼" NPT
HFH 1V-40	350 (1325)	1	40	71 ⅛" (183)	68" (173)	60" (152)	48" (122)	12" (30)	8 ⅝" (22)	18" (46)	4	2" NPT	1" NPT	¼" NPT
HFH 3V-40	1050 (3975)	3	40	83 ⅝" (212)	76 ¾" (195)	65" (165)	48" (122)	12" (30)	18" (46)	30" (76)	8	2" NPT	1" NPT	¼" NPT
HFH 4V-40	1400 (5300)	4	40	84 ⅛" (214)	76 ¾" (195)	65" (165)	48" (122)	12" (30)	20" (51)	32" (81)	8	2" NPT	1" NPT	¼" NPT
HFH 7V-40	2450 (9275)	7	40	95 ⅞" (244)	87 ½" (222)	72" (183)	52" (132)	12" (30)	24" (61)	36" (91)	12	2" NPT	1" NPT	¼" NPT

Notes:
1. Dimensions are based on the maximum connection sizes.
2. Dimensions include support legs.
3. Dim. "A" will increase by approx. 3" for S.S. swing bolt housings.

HFH Housing Dimensional Drawing

Vertical
Swing Bolt
Design



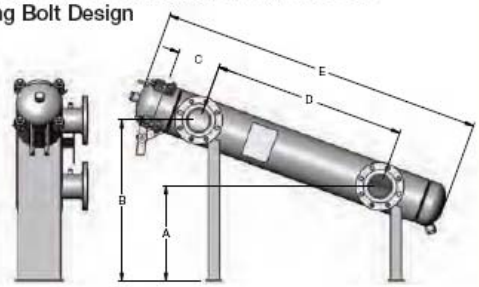
HFH Dimensional Data - Horizontal Tipped (Side in/Side out, Swing Bolt)

Model	Rate Flow Capacity GPM (LPM)	No. 10" Elements	Filter Lengths	Dim. "A" inches (cm)	Dim. "B" inches (cm)	Dim. "C" inches (cm)	Dim. "D" inches (cm)	Dim. "E" [1] inches (cm)	Max. Flange size (in)	Drain	Vent	Gauge
HFH 1HT-20	175 (662)	1	20	18" (46)	23 ½" (60)	8" (20)	16" (41)	40 ½" (103)	4	1" NPT	1" NPT	¼" NPT
HFH 1HT-40	350 (1325)	1	40	18" (46)	30 5/16" (77)	8" (20)	36" (91)	60 ½" (154)	4	1" NPT	1" NPT	¼" NPT
HFH 1HT-60	525 (1986)	1	60	18" (46)	37 ⅛" (94)	8" (20)	56" (142)	80 ½" (204)	4	1" NPT	1" NPT	¼" NPT

Notes:
1. Dim. "E" will increase by approx. 3" for S.S. swing bolt housings.

HFH Housing Dimensional Drawing

1-Around Tilted Horizontal Side in/Side out
Swing Bolt Design



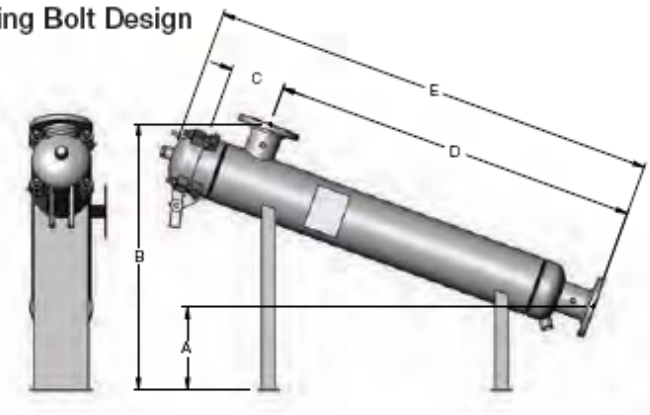
HFH Dimensional Data - Horizontal Tipped (Side in/Bottom out, Swing Bolt)

Model	Rate Flow Capacity GPM (LPM)	No. 10" Elements	Filter Lengths	Dim. "A" inches (cm)	Dim. "B" inches (cm)	Dim. "C" inches (cm)	Dim. "D" inches (cm)	Dim. "E" 1 inches (cm)	Max. Flange size (in)	Drain	Vent	Gauge
HFH 1HT-20	175 (662)	1	20	12" (30)	31 15/16" (81)	8" (20)	33 ½" (85)	45 3/8" (115)	4	1" NPT	1" NPT	¼" NPT
HFH 1HT-40	350 (1325)	1	40	12" (30)	38 ¾" (98)	8" (20)	53 ½" (136)	65 3/8" (166)	4	1" NPT	1" NPT	¼" NPT
HFH 1HT-60	525 (1986)	1	60	12" (30)	45 5/8" (116)	8" (20)	73 ½" (187)	85 3/8" (217)	4	1" NPT	1" NPT	¼" NPT

Notes:
1. Dim. "E" will increase by approx. 3" for S.S. swing bolt housings.

HFH Housing Dimensional Drawing

1-Around Tilted Horizontal Side in/Bottom out Swing Bolt Design



IHP™ Series Filter Housings

High-Purity Industrial Housings

The IHP Series of industrial housings are engineered for filtration applications involving chemical systems, high-purity water or critical process streams requiring high-purity output. These rugged vessels are constructed entirely of 316L stainless steel to optimize corrosion resistance. Design characteristics minimize hold-up volumes, provide for easy draining and optimized cleanability. Available as bottom open "T" style for 3 round – 7 round and top open "T" style for 12 and 21 round.

Features–Benefits

- Constructed of 316L stainless steel wetted parts
  Maximum corrosion resistance and purity
- Unique bolt-down design
  Simple, convenient and assures seal integrity
- Easy draining
  Tapered bottom permits complete draining
- Available in three round to 21 round, from 10" to 40" high
- Accommodates industry standard cartridge configurations

Product Specifications

Materials:	*316L Stainless Steel* *EPDM O-ring (other options available)*
Filter connections:	*DOE, 226, 222*
Closure:	*Opti–Clamp Bolt down*
Surface Finish:	
External surfaces:	*Bead-blasted and passivated*
Internal surfaces:	*Mill finish and passivated*
Dimensions	
Sizes:	*3, 5, 6, 7, 12, 21 round*
Filter Lengths:	*10", 20", 30", 40"* *(25.4, 50.8, 76.2, 101.6 cm)*
Operating Parameters	
Maximum operating pressure:	*125 psi @ 200°F (8.6 bar @ 93°C)*

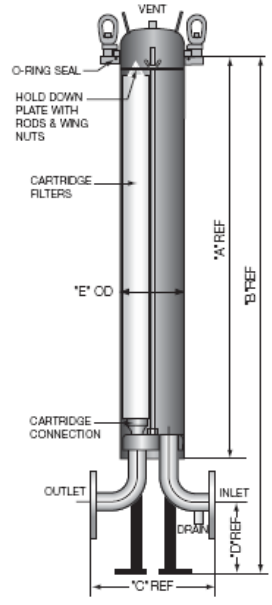
Available Options

- 150lb ANSI raised face flange
- Multiple Triclamp/NPT Inlet/Outlet sizes
- Electropolished

Typical Applications

- High Purity Chemicals
- High Purity Water
- Edible Oils
- Beverages

IHP Housing Dimensional Drawing



IHP Housing Nomenclature Information

5IHP	3	-222	-NPT	-NPT	-2	-E	-EP
Model 3IHP, 5IHP, 6IHP, 7IHP, 12IHP, 21IHP Series			**Vent/Drain** NPT, TC			**Gasket** **S** Silicone **E** EPDM **V** Viton **T** Teflon encap. Viton	**Option** **EP** Electropolished
Cartridge Height (10" lengths) 1, 2, 3, 4			**Inlet/Outlet** NPT, TC, F				
Cartridge Connection DOE, 222, 226			**Inlet/Outlet Size** **2** 2" **3** 3" **4** 4"				

Example: 5IHP 3-222-NPT-NPT-2-E-EP

IHP Housing Dimensional Data

Model	Vent/Drain	Inlet/Outlet	A	B	C	D	E
3IHP-1	½" Triclamp/NPT	2" Triclamp/NPT	18.25"	28.50"	13.50"	6.0"	6.6"
3IHP-2	½" Triclamp/NPT	2" Triclamp/NPT	28.35"	38.50"	13.50"	6.0"	6.6"
3IHP-3	½" Triclamp/NPT	2" Triclamp/NPT	38.25"	48.50"	13.50"	6.0"	6.6"
3IHP-4	½" Triclamp/NPT	2" Triclamp/NPT	48.25"	58.50"	13.50"	6.0"	6.6"
5IHP-1	½" Triclamp/NPT	2" Triclamp/NPT	18.25"	28.50"	13.0"	6.0"	8.62"
5IHP-2	½" Triclamp/NPT	2" Triclamp/NPT	28.35"	38.50"	13.0"	6.0"	8.62"
5IHP-3	½" Triclamp/NPT	2" Triclamp/NPT	38.25"	48.50"	13.0"	6.0"	8.62"
5IHP-4	½" Triclamp/NPT	2" Triclamp/NPT	48.25"	58.50"	13.0"	6.0"	8.62"
7IHP-1	½" Triclamp/NPT	2 or 3" Triclamp/NPT	19.50"	31.75"	18.13"	6.50"	10.0"
7IHP-2	½" Triclamp/NPT	2 or 3" Triclamp/NPT	29.50"	41.75"	18.13"	6.50"	10.0"
7IHP-3	½" Triclamp/NPT	2 or 3" Triclamp/NPT	39.50"	51.75"	18.13"	6.50"	10.0"
7IHP-4	½" Triclamp/NPT	2 or 3" Triclamp/NPT	49.50"	61.75"	18.13"	6.50"	10.0"
12IHP-1*	½" Triclamp/NPT	3 or 4" Triclamp/NPT	21.50"	33.75"	19.75"	6.50"	12.75"
12IHP-2*	½" Triclamp/NPT	3 or 4" Triclamp/NPT	31.50"	43.75"	19.75"	6.50"	12.75"
12IHP-3*	½" Triclamp/NPT	3 or 4" Triclamp/NPT	41.50"	53.75"	19.75"	6.50"	12.75"
12IHP-4*	½" Triclamp/NPT	3 or 4" Triclamp/NPT	51.50"	63.75"	19.75"	6.50"	12.75"
21IHP-1*	½" Triclamp/NPT	3 or 4" Triclamp/NPT	20.50"	35.75"	25.0"	6.50"	18.0"
21IHP-2*	½" Triclamp/NPT	3 or 4" Triclamp/NPT	30.50"	45.75"	25.0"	6.50"	18.0"
21IHP-3*	½" Triclamp/NPT	3 or 4" Triclamp/NPT	40.50"	55.75"	25.0"	6.50"	18.0"
21IHP-4*	½" Triclamp/NPT	3 or 4" Triclamp/NPT	50.50"	65.75"	25.0"	6.50"	18.0"

* Top open design

LPF Series Filter Housings

High Quality Multi-Cartridge Filter Housings

LPF Series filter housings are constructed of durable stainless steel and meet general purpose industrial and commercial filtration needs. All wetted welded surfaces are stainless steel. External surfaces are bead blasted for a consistent, easy care finish.

Features–Benefits

- Durable 304L or 316L stainless steel wetted parts for excellent corrosion resistance
- Universal seat cups accept DOE or 222 style filters; 226 cups optional
- Choice of V-band clamp or swing bolts for convenient cartridge change outs
- Eye nuts on swing bolt style facilitate removal with minimal tools
- Accepts 10", 20", 30", and 40" cartridges
- Fully threaded tie rod allows for fitment of various style/lengths of filters; wing nut for ease of removal
- Removable cartridge posts for easy cleanouts
- Suitable for flow rates from 21 to 588 GPM
- Accommodates up to 2 ¾" OD cartridges
- Equipped with ¼" vent and ½" drain

Product Specifications

Materials:	*304L or 316L Stainless Steel*
Shell O-ring:	*Buna N, Viton, EPDM, Teflon encapsulated Viton*
Internal Components:	*316L compression plate and tie rod are included for use with single open end filters. If double open end filters will be used, specify IP (internal parts) in the housing description to obtain tube guides and springs.*

Operating Parameters

Maximum operating pressure:	*150 psig (10.3 bar) @ 200°F in liquid service Not for use with compressed gases*

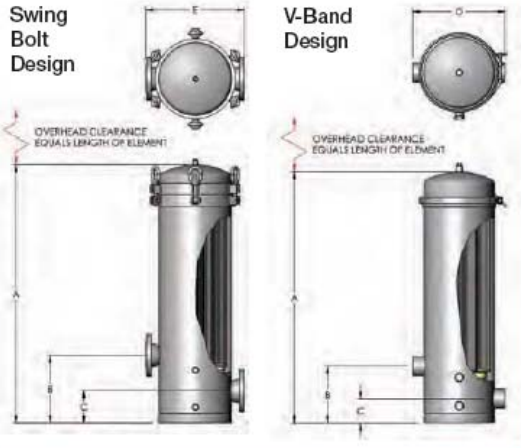
Available Options

- 150lb ANSI raised face flange
- Various MNPT Inlet/Outlet sizes
- Legs for maximum stability (standard for LPF 7 and up)
- Mounting tabs (option for LPF 3 and LPF 5)
- 226 configuration
- Gauge ports
- Hinge or davit arm optional on 21 around

Typical Applications

- Potable water
- Edible oils
- Cutting oils
- Process water
- Lubricants
- Solvents

LPF Housing Dimensional Drawing



- Coatings
- Coolants

LPF Housing Nomenclature Information

LPF	03	R	2	-N	2	-U	-VB	-E	-GPX-T-IP
Model LPF Series	**# of Filters** **03** 3 around **05** 5 around **07** 7 around **12** 12 around **21** 21 around	**Material of Construction** **R** 304L SS **T** 3016L SS **Cartridge Height (10" lengths)** 1, 2, 3, 4 **Inlet/Outlet** **N** NPT **F** Flange			**Inlet/Outlet Size** 1.5, 2, 3, 4 **Seat Cup Style** **U** Universal (DOE or 222) **X** 226 **Closure Type** **VB** V-band **SB** Swing bolts			**Gasket** **N** Buna-N **E** EPDM **V** Viton **T** Teflon	**Option** **T** Tabs **H** Hinge **L** Legs **GPX** Gauge port **GPG** Gauge port and gauge **IP** Internal parts (tube guides and springs) **DA** Davit arm

Example: 5IHP 3-222-NPT-NPT-2-E-EP

LPF Housing Dimensional Data

Model	Rate Flow Capacity[3] gpm (lpm)	No. 10" Elements	Dim. "A" inches (cm)	Dim. "B" inches (cm)	Dim. "C" inches (cm)	Dim. "D" [1] inches (cm)	Dim. "E" [1] inches (cm)	Std. Conn. size/type	Drain	Vent
LPF 03-1	21 (79)	3	20 7/8" (53)	7" (17.8)	3" (7.6)	9 1/2" (24.1)	10 5/8" (27)	1 1/2" MNPT	1/2" NPT	1/4" NPT
LPF 03-2	42 (159)	6	30 7/8" (78.4)	7" (17.8)	3" (7.6)	9 1/2" (24.1)	10 5/8" (27)	1 1/2" MNPT	1/2" NPT	1/4" NPT
LPF 03-3	63 (238)	9	40 7/8" (12.4)	7" (17.8)	3" (7.6)	9 1/2" (24.1)	10 5/8" (27)	1 1/2" MNPT	1/2" NPT	1/4" NPT
LPF 03-4	84 (318)	12	50 7/8" (129.2)	7" (17.8)	3" (7.6)	9 1/2" (24.1)	10 5/8" (27)	1 1/2" MNPT	1/2" NPT	1/4" NPT
LPF 05-1	35 (132)	5	20 7/8" (53)	7" (17.8)	3" (7.6)	11 1/4" (28.6)	12 3/4" (32.4)	2" MNPT	1/2" NPT	1/4" NPT
LPF 05-2	70 (265)	10	30 7/8" (78.4)	7" (17.8)	3" (7.6)	11 1/4" (28.6)	12 3/4" (32.4)	2" MNPT	1/2" NPT	1/4" NPT
LPF 05-3	105 (398)	15	40 7/8" (12.4)	7" (17.8)	3" (7.6)	11 1/4" (28.6)	12 3/4" (32.4)	2" MNPT	1/2" NPT	1/4" NPT
LPF 05-4	140 (530)	20	50 7/8" (129.2)	7" (17.8)	3" (7.6)	11 1/4" (28.6)	12 3/4" (32.4)	2" MNPT	1/2" NPT	1/4" NPT
LPF 07-1	49 (185)	7	28 3/4" (73)	16" [2] (40.6)	9 3/4"[2] (24.8)	13 1/2" (34.3)	14 3/4" (37.5)	2" MNPT	1/2" NPT	1/4" NPT
LPF 07-2	98 (371)	14	38 3/4" (98.4)	16" [2] (40.6)	9 3/4"[2] (24.8)	13 1/2" (34.3)	14 3/4" (37.5)	2" MNPT	1/2" NPT	1/4" NPT
LPF 07-3	147 (557)	21	48 3/4" (123.8)	16" [2] (40.6)	9 3/4"[2] (24.8)	13 1/2" (34.3)	14 3/4" (37.5)	2" MNPT	1/2" NPT	1/4" NPT
LPF 07-4	196 (742)	28	58 3/4" (149.2)	16" [2] (40.6)	9 3/4"[2] (24.8)	13 1/2" (34.3)	14 3/4" (37.5)	2" MNPT	1/2" NPT	1/4" NPT
LPF 12-2	168 (636)	24	39 3/8" (97.5)	16" [2] (40.6)	9 3/4"[2] (24.8)	17 1/4" (43.8)	17 1/4" (43.8)	3"-150# flange	1/2" NPT	1/4" NPT
LPF 12-3	252 (954)	36	49 3/8" (125.4)	16" [2] (40.6)	9 3/4"[2] (24.8)	17 1/4" (43.8)	17 1/4" (43.8)	3"-150# flange	1/2" NPT	1/4" NPT
LPF 12-4	336 (1272)	48	59 3/8" (150.8)	16" [2] (40.6)	9 3/4"[2] (24.8)	17 1/4" (43.8)	17 1/4" (43.8)	3"-150# flange	1/2" NPT	1/4" NPT
LPF 21-3	441 (1669)	63	49 3/8" (125.4)	16" [2] (40.6)	9 3/4"[2] (24.8)	21 5/8" (54.9)	21 5/8" (54.9)	4"-150# flange	1/2" NPT	1/4" NPT
LPF 21-4	588 (2226)	84	59 3/8" (150.8)	16" [2] (40.6)	9 3/4"[2] (24.8)	21 5/8" (54.9)	21 5/8" (54.9)	4"-150# flange	1/2" NPT	1/4" NPT

NOTES:

[1] Dimensions are based on th standard connection sizes.

[2] Dimensions include support legs.

[3] Flow capacity based on pleated filters rated at 7GPM per 10" equivalent. Actual flow rate is dependant upon cartridge type and application.

MC™ Series Filter Housings

High Quality Multi-Cartridge Filter Housings

The MC Series filter housings are constructed of durable stainless steel and meet general purpose industrial and commercial filtration needs. All wetted welded surfaces are stainless steel. External surfaces are sand blasted for a consistent, easy care finish.

Features–Benefits

- Durable 304L or 316L stainless steel for corrosion resistance
- Shouldered seal plates provide a solid fit into the cartridge core to ensure a positive cartridge seal
- V-band clamp and swing bolts for quick and easy cartridge changeouts
- Accepts 10", 20", 30" and 40" DOE cartridges
- Removable cartridge posts for easy cleanouts
- Suitable for flow rates from 28 to 1456 gpm
- Accommodates up to 2 ¾" OD cartridges

Product Specifications

Shell O-ring	
Standard:	*Buna N*
Optional:	*Viton, EPDM, Silicone*
Construction:	
Head & Bottom Seat Plates:	*316L stainless steel wetted parts*
Shell, Vent Plug, Drain Cap:	*304L stainless steel wetted parts*
Internal Components:	*316L stainless steel compression seat plate assemblies and tube guides are included with the MC Series*

Operating Parameters

Maximum operating pressure:	*150 psig (10.3 bar) @ 200°F in liquid service Not for use with compressed gases*

Available Options

- 150lb ANSI raised face flange
- Multiple MNPT or FNPT Inlet/Outlet sizes
- Legs (standard for 7MC and up)
- Mounting tabs (option for 4MC, 5MC)
- 222/226 configuration
- Gauge ports

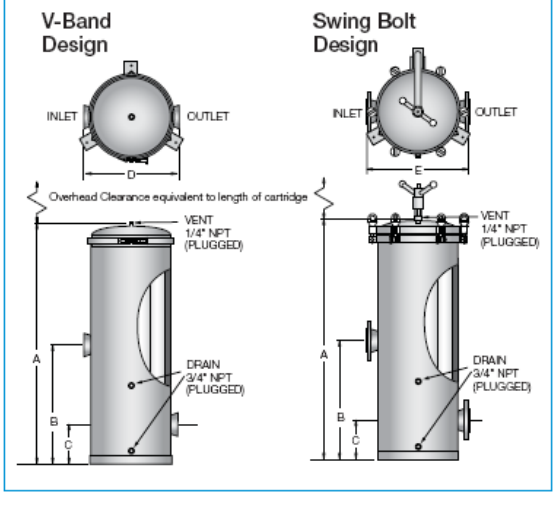
Typical Applications

- Potable water
- Process water
- Coatings
- Edible oils
- Lubricants
- Coolants
- Cutting oils
- Solvents

Connections

Size	Vent	Drain	Inlet/Outlet
4MC	*¼" (0.6 cm) NPT*	*½" (1.3 cm) NPT*	*1½" (3.8 cm) NPT*
5MC	*¼" (0.6 cm) NPT*	*½" (1.3 cm) NPT*	*2" (5.1 cm) NPT*
7MC	*¼" (0.6 cm) NPT*	*½" (1.3 cm) NPT*	*2" (5.1 cm) NPT*
12MC	*¼" (0.6 cm) NPT*	*½" (1.3 cm) NPT*	*3" (7.6 cm) Flange*
22MC	*¼" (0.6 cm) NPT*	*½" (1.3 cm) NPT*	*4" (10.2 cm) Flange*
36MC	*¼" (0.6 cm) NPT*	*¾" (1.9 cm) NPT*	*6" (15.2 cm) Flange*
52MC	*¼" (0.6 cm) NPT*	*¾" (1.9 cm) NPT*	*6" (15.2 cm) Flange*

MC Housing Dimensional Drawing



MC Housing Nomenclature Information

22MC	3	-SB	-304L	-F	4	-B
Model 4MC 5MC 7MC 12MC 22MC 36MC[1] 52MC[1]	**Cartridge Height (10" lengths)** **1** 10" **2** 20" **3** 30" **4** 40"	**Closure Type** **VB** V-band **SB** Swing bolts	**Material of Construction** 304L 316L	**Inlet/Outlet** **N** NPT **F** Flange	**Inlet/Outlet Size (inches)** 1.5 2 3 4 6	**Gasket** **B** Buna-N **E** EPDM **V** Viton **T** Teflon

Example: 22MC3-SB-304L-F4-B

MC Housing Dimensional Data

Model	Rated Flow Capacity[2] gpm (lpm)	No. 10" Elements	Dim. "A" V-Band inches (cm)	Dim. "A" Swing Bolt inches (cm)	Dim. "B" inches (cm)	Dim. "C" inches (cm)	Dim. "D" inches (cm)	Dim. "E" inches (cm)	Shipping Weight lbs (kg)
4MC-1	28 (106)	4	20 7/8" (53.0)	22 1/4" (56.5)	7" (17.8)	3" (7.6)	10 1/2" (26.7)	12 1/2" (31.8)	20 (9.1)
4MC-2	56 (212)	8	30 7/8" (78.4)	32 1/4" (81.9)	7" (17.8)	3" (7.6)	10 1/2" (26.7)	12 1/2" (31.8)	30 (13.6)
4MC-3	84 (318)	12	40 7/8" (103.8)	42 1/4" (107.3)	7" (17.8)	3" (7.6)	10 1/2" (26.7)	12 1/2" (31.8)	40 (18.1)
4MC-4	112 (424)	16	50 7/8" (129.2)	52 1/4" (132.7)	7" (17.8)	3" (7.6)	10 1/2" (26.7)	12 1/2" (31.8)	50 (22.7)
5MC-1	35 (132)	5	20 7/8" (53.0)	22 1/4" (56.5)	7" (17.8)	3" (7.6)	10 1/2" (26.7)	12 1/2" (31.8)	26 (11.8)
5MC-2	70 (265)	10	30 7/8" (78.4)	32 1/4" (81.9)	7" (17.8)	3" (7.6)	10 1/2" (26.7)	12 1/2" (31.8)	32 (14.5)
5MC-3	105 (398)	15	40 7/8" (103.8)	42 1/4" (107.3)	7" (17.8)	3" (7.6)	10 1/2" (26.7)	12 1/2" (31.8)	43 (19.5)
5MC-4	140 (530)	20	50 7/8" (129.2)	52 1/4" (132.7)	7" (17.8)	3" (7.6)	10 1/2" (26.7)	12 1/2" (31.8)	48 (21.8)
7MC-1	49 (185)	7	20 1/2" (52.1)	21 (53.3)	8 1/16" (20.5)	3 5/16" (8.4)	12 1/2" (31.8)	14 1/2" (36.8)	44 (20.0)
7MC-2	98 (371)	14	30 1/2" (77.5)	31 (78.7)	8 1/16" (20.5)	3 5/16" (8.4)	12 1/2" (31.8)	14 1/2" (36.8)	53 (24.0)
7MC-3	147 (557)	21	40 1/2" (102.9)	41 (104.1)	8 1/16" (20.5)	3 5/16" (8.4)	12 1/2" (31.8)	14 1/2" (36.8)	70 (31.8)
7MC-4	196 (742)	28	50 1/2" (128.3)	51 (129.5)	8 1/16" (20.5)	3 5/16" (8.4)	12 1/2" (31.8)	14 1/2" (36.8)	91 (41.3)
12MC-2	168 (636)	24	39 1/2" (100.3)	40 1/2" (102.9)	15 1/8" (38.4)	9 3/4" (24.8)	12 1/2" (31.8)	14 1/2" (36.8)	86 (39.0)
12MC-3	252 (954)	36	49 1/2" (125.7)	50 1/2" (128.3)	15 1/8" (38.4)	9 3/4" (24.8)	12 1/2" (31.8)	14 1/2" (36.8)	92 (41.7)
12MC-4	336 (1272)	48	59 1/2" (151.1)	60 1/2" (153.7)	15 1/8" (38.4)	9 3/4" (24.8)	12 1/2" (31.8)	14 1/2" (36.8)	100 (45.4)
22MC-3[3,4]	462 (1749)	66	50 3/8" (127.5)	50 3/8" (127.5)	15 1/4" (38.7)	9 1/2" (24.1)	20 1/2" (52.1)	22 1/2" (57.2)	140 (63.5)
22MC-4[3,4]	616 (2332)	88	60 3/8" (152.9)	60 3/8" (152.9)	15 1/4" (38.7)	9 1/2" (24.1)	20 1/2" (52.1)	22 1/2" (57.2)	165 (74.8)
36MC-3[3,4]	756 (2861)	108	n/a	69 3/4" (177.2)	32 3/8" (82.2)	14 (35.6)	n/a	25 7/8" (65.7)	340 (154.2)
36MC-4[3,4]	1008 (3816)	144	n/a	74 3/4" (189.9)	32 3/8" (82.2)	14 (35.6)	n/a	25 7/8" (65.7)	360 (163.3)
52MC-3[3,4]	1092 (4134)	156	n/a	65 15/16" (167.5)	32 3/8" (82.2)	14 (35.6)	n/a	29 7/8" (75.9)	520 (235.9)
52MC-4[3,4]	1456 (5512)	208	n/a	75 15/16" (192.9)	32 3/8" (82.2)	14 (35.6)	n/a	29 7/8" (75.9)	550 (249.5)

NOTES:

[1] 36MC and 52MC Series Housings only available with SB closures.

[2] Flow capacity based on pleated filters rated at 7GPM per 10" equivalent. Actual flow rate is dependant upon cartridge type and application.

[3] Dimensions include support legs.

[4] Housing accepts a maximum of 2 5/8" cartridges.

SC™ Series Filter Housings

Single Cartridge Filter Housings

The SC Series of single cartridge metal filter housings are available in 304L or 316L stainless steel wetted parts with either bolt or ring seal closure to service a wide range of general purpose filter applications. The SCR Ring Closure Series provide superior design features to serve higher pressure applications, allow full sump drainage and utilize a wider range of cartridge configurations. The SCB Bolt Closure Series is an economical design for double open ended cartridges.

Features–Benefits

- Single shell construction for quick spill-free cartridge replacement
- In-line pipe connections for easy installation in ½, ¾ and 1 inch pipe sizes
- Drains built in
- Rated for flow rates to 7 GPM (26.5 lpm) per 10 inch filter cartridge length
- Mounting brackets are available
- Housing pressure drop is 0.6 psid at 7 gpm (.04 bar @ 26.5 lpm)

SCR (with Ring Seal Closure)

- Superior design accommodates most cartridges, higher pressure and complete housing drainage
- High pressure seal design supports pressures to 300 psi (20.7 bar) @ 200°F (93°C)
- Center rod is eliminated to permit the use of double open end or single open end cartridges
- Tapered housing bottom permits complete drainage
- Model available for 222 and 226 O-ring style cartridge in all 316L stainless steel wetted parts

SCB (with Bolt Closure)

- Economical design accommodates DOE cartridges
- Optional T-handle available for sump removal
- Temperature rated to 250°F (121°C) and 250 psi (17.23 bar) maximum pressure

Typical Applications

- Process water
- Potable liquids
- Petro chemicals
- Coolants
- Hydraulic oils
- Solvents

SCR Ring Closure Housing

SCB Bolt Closure Housing

SC Housing Nomenclature Information

SCR	10	BSS	075	DOE	-E
Model SCB, SCR	**Cartridge Height (10" lengths)** 04 4 ⅛" 09 9 ¾" 10 10" 20 20" 30 30"	**Material of Construction** BSS 304L[1] 316L	**Inlet/Outlet Size** **050** 0.50" **075** 0.75" **100** 1.00" **Connector** DOE, 222[2], 226[2]		**Gasket** **B** Buna-N **S** Silicone **E** EPR **V** Viton **T** Teflon

Legend

SCB	Single Cartridge (with Bolt Closure)
SCR	Single Cartridge (with Ring Closure)
304L	304L Sump, 316L Head
316L	316L Sump & Head
BSS	Brass Head, 304L Sump

Example: SCR 10BSS075DOE-E

[1] *Not available in SCR.* [2] *Available as 316L only.*

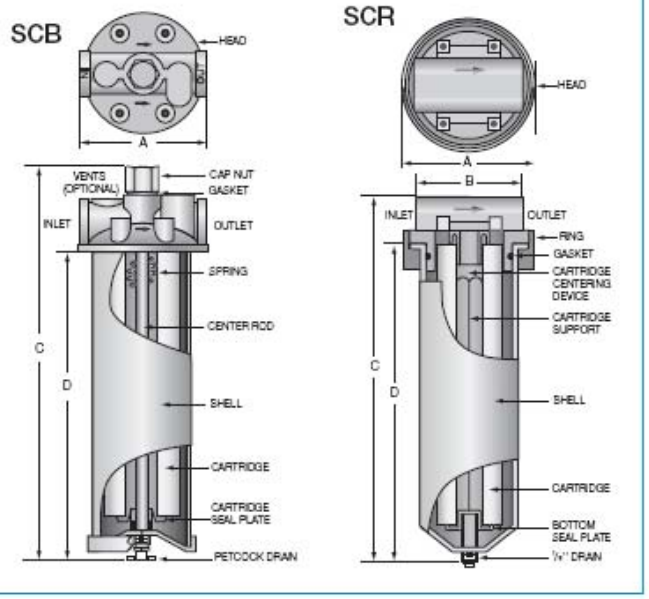
SC Housing Specifications

Model	Cartridge Length inches (cm)	Rated Capacity GPM (LPM)	Shipping Weight lbs (kg)	Cartridge Endcap Type	Maximum Pressure PSIG (bar)	Maximum Temp. °F (°C)
SCB-04	4 ⅛" (12.4)	3.5 (13.3)	4 (1.8)	DOE	250 (17.2)	250 (121.1)
SCB-09	9 ¾" (24.8)	7 (26.5)	7 (3.2)	DOE	250 (17.2)	250 (121.1)
SCB-10	10" (25.4)	7 (26.5)	7 (3.2)	DOE	250 (17.2)	250 (121.1)
SCB-20	20" (50.8)	14 (53.0)	10 (4.5)	DOE	250 (17.2)	250 (121.1)
SCB-30	30" (76.2)	21 (79.5)	12 (5.4)	DOE	250 (17.2)	250 (121.1)
SCR-09	9 ¾" (24.8)	7 (26.5)	7 (3.2)	SOE or DOE	300 (20.7)	200 (93.3)
SCR-10	10" (25.4)	7 (26.5)	7 (3.2)	SOE or DOE	300 (20.7)	200 (93.3)
SCR-20	20" (50.8)	14 (53.0)	10 (4.5)	SOE or DOE	300 (20.7)	200 (93.3)
SCR-30	30" (76.2)	21 (79.5)	12 (5.4)	SOE or DOE	300 (20.7)	200 (93.3)

SC Housing Dimensional Data

Model	A inches (cm)	B inches (cm)	C inches (cm)	D inches (cm)
SCB-04	4" (10.2)	n/a	8 ⅛" (22.6)	6" (15.2)
SCB-09	4" (10.2)	n/a	13 ¾" (34.9)	11" (27.9)
SCB-10	4" (10.2)	n/a	13 ¾" (34.9)	11" (27.9)
SCB-20	4" (10.2)	n/a	23 ⅞" (60.6)	21" (53.3)
SCB-30	4" (10.2)	n/a	33 ⅞" (86.0)	31" (78.7)
SCR-09	4 ½" (11.4)	3 ⅝" (8.4)	13 ⅛" (33.3)	11 ⅜" (28.9)
SCR-10	4 ½" (11.4)	3 ⅞" (8.7)	13 ¼" (33.7)	11 ½" (29.2)
SCR-20	4 ½" (11.4)	3 ⅞" (8.7)	23 ¼" (59.1)	21 ½" (54.6)
SCR-30	4 ½" (11.4)	3 ⅞" (8.7)	33 ¼" (84.5)	31 ½" (80.0)
SCR-10-222/226	4 ½" (11.4)	3 ⅞" (8.7)	18" (45.7)	16 ¼" (41.8)
SCR-20-222/226	4 ½" (11.4)	3 ⅞" (8.7)	28" (71.1)	26 ¼" (66.7)
SCR-30-222/226	4 ½" (11.4)	3 ⅞" (8.7)	18" (96.5)	36 ¼" (92.1)

SC Housing Dimensional Drawing



SHP™ Series Filter Housings

High-Purity Sanitary Housings

The SHP Series of sanitary housings are engineered using 3A sanitary standards for filtration applications involving ultrapure chemical systems, ultrapure water or critical process streams requiring sanitary production stream. These rugged vessels are constructed entirely of 316L stainless steel to optimize corrosion resistance. Design characteristics minimize hold-up volumes, provide for easy draining and optimized cleanability. Available as "T" style or inline (one round only).

Features–Benefits

- Constructed of 316L stainless steel wetted parts
  Maximum corrosion resistance and purity
- Meets 3A Sanitary Design Standards
- Unique bolt-down design on multi-round
  Simple, convenient and assures seal integrity
- Easy draining
  Tapered bottom permits complete draining
- Available in one round to 7 round, from 10" to 40" high
- Accommodates industry standard 222 and 226 cartridge configurations

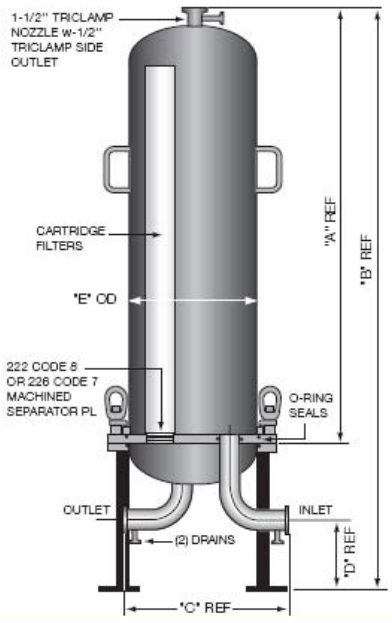
Product Specifications

Materials:	*316L Stainless Steel wetted parts* *EPDM O-ring (other options available)*
Filter connections:	*226, 222*
Closure:	*304 SS Clamp (1 round only)* *Opti–Clamp Bolt down*
Surface Finish:	
External surfaces:	*20 RA, Electropolished*
Internal surfaces:	*20 RA, Electropolished*
Dimensions	
Sizes:	*1, 3, 5, 7 Round*
Filter Lengths:	*10", 20", 30", 40"* *(25.4, 50.8, 76.2, 101.6 cm)*
Operating Parameters	
Maximum operating pressure:	*125 psi @ 200°F (8.6 bar @ 93°C)*

Typical Applications

- Ultrapure Chemicals
- Wine/Beer
- Diagnostics
- Ultrapure Water
- Vaccines

SHP Housing Dimensional Drawing



SHP Housing Nomenclature Information

5SHP	3	-222	-TC	-TC	-2	-E	-EP
Model 1SHP, 1SHP-L Inline, 3SHP, 5SHP, 7SHP Series			**Vent/Drain** TC Triclamp			**Gasket** **S** Silicone **E** EPDM **V** Viton **T** Teflon encap. Viton	**EP** Electropolished
Cartridge Height (10" lengths) 1, 2, 3, 4			**Inlet/Outlet** TC Triclamp				
Cartridge Connection 222, 226			**Inlet/Outlet Size** **1** 1" **1.5** 1.5" **2** 2"				

Example: 5ISHP 3-222-TC-TC-2-E-EP

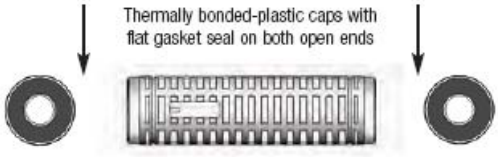
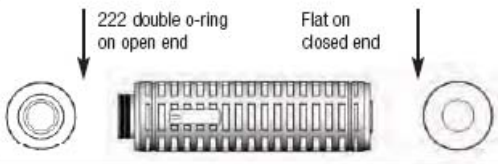
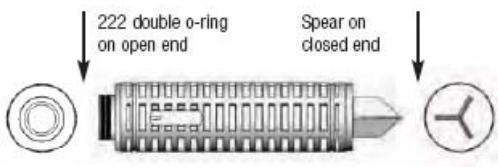
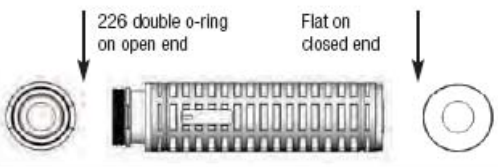
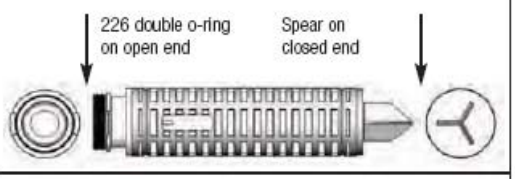
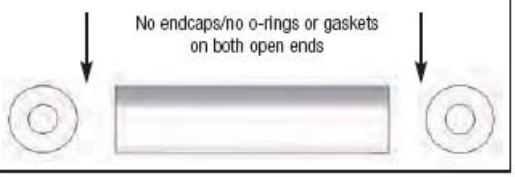
SHP Housing Dimensional Data

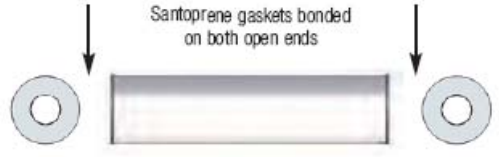
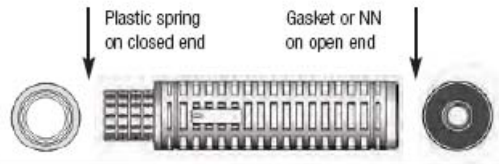
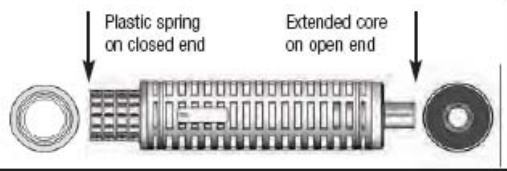
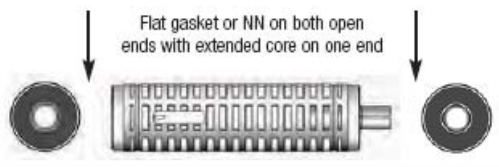
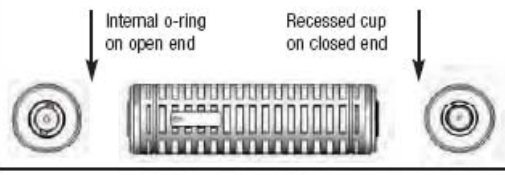
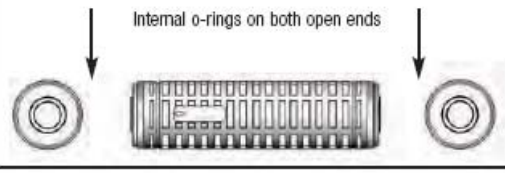
Model	Vent/Drain	Inlet/Outlet	A	B	C	D	E
1SHP-1*	½" Triclamp/1.4"	1.0" Triclamp	13.75"	22.0"	9.75"	6.0"	4.0"
1SHP-2*	½" Triclamp/1.4"	1.0" Triclamp	23.75"	32.0"	9.75"	6.0"	4.0"
1SHP-3*	½" Triclamp/1.4"	1.0" Triclamp	33.75"	42.0"	9.75"	6.0"	4.0"
1SHP-L1*	½" Triclamp/1.4"	1.5" Triclamp	13.75"	19.5"	NA	NA	4.0"
1SHP-L2*	½" Triclamp/1.4"	1.5" Triclamp	23.75"	29.5"	NA	NA	4.0"
1SHP-L3*	½" Triclamp/1.4"	1.5" Triclamp	33.75"	39.5"	NA	NA	4.0"
3SHP-1	½" Triclamp/1.4"	2" Triclamp	15.90"	28.50"	13.55"	6.0"	6.6"
3SHP-2	½" Triclamp/1.4"	2" Triclamp	25.90"	38.50"	13.55"	6.0"	6.6"
3SHP-3	½" Triclamp/1.4"	2" Triclamp	35.90"	48.50"	13.55"	6.0"	6.6"
3SHP-4	½" Triclamp/1.4"	2" Triclamp	45.90"	58.50"	13.55"	6.0"	6.6"
5SHP-1	½" Triclamp/1.4"	2" Triclamp	15.65"	28.25"	14.38"	6.0"	10.75"
5SHP-2	½" Triclamp/1.4"	2" Triclamp	25.65"	38.25"	14.38"	6.0"	10.75"
5SHP-3	½" Triclamp/1.4"	2" Triclamp	35.65"	48.25"	14.38"	6.0"	10.75"
5SHP-4	½" Triclamp/1.4"	2" Triclamp	45.65"	58.25"	14.38"	6.0"	10.75"
7SHP-1	½" Triclamp/1.4"	2" Triclamp	15.65"	28.25"	14.38"	6.0"	10.75"
7SHP-2	½" Triclamp/1.4"	2" Triclamp	25.65"	38.25"	14.38"	6.0"	10.75"
7SHP-3	½" Triclamp/1.4"	2" Triclamp	35.65"	48.25"	14.38"	6.0"	10.75"
7SHP-4	½" Triclamp/1.4"	2" Triclamp	45.65"	58.25"	14.38"	6.0"	10.75"

* Top open design

Filter End Configurations

Gravers offers a wide variety of end configurations on our filter cartridges to meet customer requirements and for fit in installed housings. The following guide will familiarize you with the options available.

Style	DOE or SOE	
P	DOE	
P3	SOE	
P8	SOE	
P2	SOE	
P7	SOE	
NN	DOE	

Style	DOE or SOE	
DBG	DOE	
P6	SOE	
P9	SOE	
PX	DOE	
AM	SOE	
NPC	DOE	

* DOE = Double Open End / SOE = Single Open End
Note: that not all configurations are available on every product. Please consult specific product data sheets for more detail.

Graver Technologies

THERMAX

Cartridge Filter Competitive Information and Process Questionnaire

Filtration-Key Required Information **Customer Name & location:** _____

Your Name: _____

If existing competitive filtration is in place:

1. Manufacturer name _____ Product Brand name_____
2. Product model description_____ Pleated or Depth_____
3. Micron rating (indicate if absolute or nominal)_____micron
4. Cartridge Dimensions: Overall length _____in. OD (outer diameter)_____ in.
5. Type of end adapters: open end, closed end, o-ring (222,226, 213, etc), fin, gasket, etc._____
6. Media composition (cotton string, resin bond, polypropylene, pleated, PTFE, Nylon, metal, glass, etc)

   _____
7. If in a housing, what type of housing (manufacturer)_____ and how many filters are in each housing_____
8. Estimate on cost of the competitive filter element in consideration $_____
9. Typical life of the filter (days in operation, gallons processed, etc.) _____ and total number of the filters consumed. _____
10. If available, a manufacturer's product specification sheet is highly valuable.

Information regarding the fluid application

1. Type of fluid being filtered. _____ Application/Filtration objective_____

   The chemical composition will be needed in order to determine chemical compatibility with filter media, therefore the chemical composition is important:
2. Temperature of fluid – max (critical)_____ F or C and operating _____ F or C
3. Viscosity of fluid. _____ pH of fluid _____
4. Level of Suspended Solids_____ (ppm, mg/L, or SDI)
5. Operating pressure, _____ psig/bar
6. Max differential pressure across the filter element, _____psid/bar
7. Terminal pressure-drop point in which the filter change-out is required. _____psi/bar
8. Total fluid flow, _____gpm/m3/hr
9. If a multi-round housing is in place, the number of filters and length of those filters are needed.

   _____number, _____length (in)
10. Desired removal rate (micron size). Establish true quantitative objective of filtering the fluid—this should be correlated back to particle micron retention. _____micron
11. Nature of contaminant—any information on the problematic particles in the fluid stream is valuable._____
12. Nature of the process: batch or continuous.
13. Please attach flow schematic if possible.