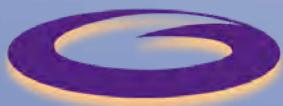




PRODUCT CATALOG

Liquid Process Filters



Graver Technologies



PROCESS WATER



POWER GENERATION



FOOD & BEVERAGE



DRINKING WATER



PHARMACEUTICAL



CHEMICAL

Table of Contents

Company Profile	i
Filter End Configurations	ii
Membrane Filters	2
Citadel®	3
TefTEC™	5
TefTEC™ P	7
TefTEC™ V	9
WaterTEC™	11
ZTEC™ B	13
ZTEC™ E	15
ZTEC™ G	17
ZTEC™ P	19
ZTEC™ WB	21
Pleated Filters	24
GFC™	25
GFP™	27
High Flow	29
High Flow GF	31
High Flow RF	33
PMA™	35
PMC™	37
PME	39
PMG	41
QCR™	43
QMA™	45
QMC™	47
QSL™	49
QXL™	51
Depth Filters	54
COAX®	55
Crystal MBF	57
MBC™	59
Stratum® A	61
Stratum® C	63
Specialty Filters	66
RTEC™ G	67
Steris® Replacement Filter	69
TPE	71
Filter Housings	74
GHP™	75
GLP™	77
GSC™	79
HFH	81
Terms and Conditions of Sale	85

Company Profile

Graver Technologies offers a broad selection of liquid process filters, high performance specialty ion exchange resins and services, and proprietary adsorbents for the most demanding application environments. We also supply filtration products to manufacturers of pumps, turbines, compressors, medical devices, and consumer and industrial vacuums. Because of the breadth of our technologies and the depth of our scientific and analytical resources, we are often called upon to solve our customers’ most challenging problems.

LIQUID PROCESS FILTER GROUP

The products found in this catalog are offered by Graver’s Liquid Process Filter Group. Graver Technologies offers an extensive line of filter cartridges and housings to provide high performance and cost effective solutions for liquid process applications. With filters suitable for common industrial, high purity water and other critical process streams, Graver Technologies liquid process filters service a wide array of applications in the beverage, chemical, microelectronics, and biopharmaceutical markets. Our membrane filters are constructed in a state-of-the-art manufacturing facility that includes an ISO Class 7 clean room to meet the most demanding customer requirements. Graver Technologies liquid process filters are also available in a wide range of media types, cartridge designs, micron ratings, and configurations to optimize filtration efficiency while providing dependable performance and long service life.

GLOBAL PRESENCE

Exporting on average more than 35% of our products, Graver Technologies is recognized worldwide. Our global presence extends from North and South America, across Europe and into Asia– including the Pacific Rim, Japan, and Australia. We are headquartered in Glasgow, Delaware, with additional manufacturing and marketing facilities in Newark, New Jersey and Honeoye Falls, New York.

OUR PARENT COMPANY

Graver Technologies is a member of The Marmon Group (a Berkshire Hathaway company), an international corporation with more than \$7 billion in annual sales. Around the corner or around the world, Graver Technologies is a fast-growing company with the technical resources and financial strength that make us the perfect partner for your business.

QUALITY SYSTEM

Graver Technologies is an ISO 9001 registered firm under BSI Management Systems.



Quality at Graver means:

- Every employee is responsible for quality
 - Continuous improvements in products and processes
 - Doing the job right the first time
 - Continually monitoring key processes
 - Preventing nonconformance
 - Producing to established specifications
- Providing consistent and reliable products
 - Monitoring and improving customer satisfaction levels
 - On time delivery
 - Working with capable vendors
 - Understanding our customer’s needs
 - Delighting our customers

At Graver, our people and our products reflect our commitment to provide the best value to our customers, to create products that reflect the most advanced technology, and to adhere to manufacturing practices that deliver consistent, high performance products and service each and every time.

Filter End Configurations

Graver 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	Visual	Style	DOE or SOE	Visual
P	DOE	Thermally bonded-plastic caps with flat gasket seal on both open ends 	DBG	DOE	Santoprene gaskets bonded on both open ends 
P3	SOE	222 double o-ring on open end Flat on closed end 	P6	SOE	Plastic spring on closed end Gasket or NN on open end 
P8	SOE	222 double o-ring on open end Spear on closed end 	P9	SOE	Plastic spring on closed end Extended core on open end 
P2	SOE	226 double o-ring on open end Flat on closed end 	PX	DOE	Flat gasket or NN on both open ends with extended core on one end 
P7	SOE	226 double o-ring on open end Spear on closed end 	AM	SOE	Internal o-ring on open end Recessed cup on closed end 
NN	DOE	No endcaps, o-rings or gaskets on either open ends 	NPC	DOE	Internal o-rings on both open ends 

The following trademarks are used throughout:

Viton® — Registered trademark of DuPont Performance Elastomers
Teflon® — Registered trademark of Dupont
Chemraz® — Registered trademark of Greene Tweed

Kalrez® — Registered trademark of DuPont Performance Elastomers
Santoprene® — Registered trademark of Advanced Elastomer Systems

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



Membrane Filters

Graver Product	Media	Hardware	Retention Ratings (µm)	Efficiency
Citadel	PTFE	PFA	0.05, 0.1, 0.2, 0.45, 1	Absolute
TefTEC	PTFE	Polypropylene	0.05, 0.1, 0.2, 0.45, 1.0	Absolute
TefTEC P	PTFE	Polypropylene	0.2	Absolute
TefTEC V	PTFE	Polypropylene	0.2	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	Absolute



Citadel® Series Filter Cartridges

100% integrity tested to ensure
performance standards

Product Specifications

Media: PTFE Membrane

Inner core, end caps, cage: PFA

Support layers:

FEP, Expanded PTFE

Gaskets/O-Rings:

Chemraz®, Kalrez®,
Teflon Encapsulated Viton

Micron ratings:

0.05, 0.1, 0.2, 0.45, 1 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: 7.9 ft² (0.71 m²)
per 10-inch

Operating Parameters

Maximum differential pressure:

80 psid (5.5 bar) @ 24°C (75°F)
55 psid (3.8 bar) @ 75°C (167°F)
30 psid (2.0 bar) @ 125°C (257°F)
15 psid (1.0 bar) @ 150°C (300°F)

Maximum reverse pressure:

50 psid (3.4 bar) @ 24°C (75°F)
15 psid (1.0 bar) @ 121°C (250°F)

ALL-FLUOROPOLYMER CARTRIDGE FILTERS FOR AGGRESSIVE APPLICATIONS

Citadel pleated membrane cartridges feature a PTFE membrane and PFA structural components to provide excellent chemical and temperature resistance for aggressive chemical applications such as etchers, strippers, cleaners and bulk chemicals. The all- fluoropolymer construction provides for the highest level of fluid purity and will exhibit rapid rinse-up to 18 MΩ-cm resistivity and single digit ppb levels of TOC. Citadel filter cartridges are produced and manufactured in an ISO cleanroom and are 100% integrity tested to ensure performance standards.

FEATURES & BENEFITS

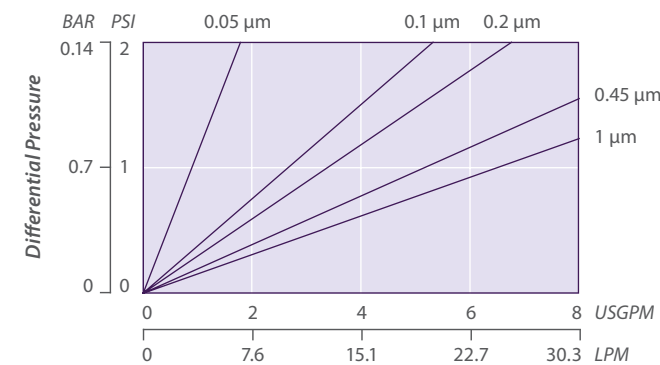
- Manufactured, flushed, tested and packaged in an ISO Class 7 Cleanroom Environment
- Filters are flushed with 18 MΩ-cm DI water to ensure low extractables and low particle shedding
- 100% integrity tested to provide reliable performance
- Resistivity rinse-up to 18 MΩ-cm and single digit ppb TOC levels with minimal throughput
- Pore size ratings from 0.05 to 1 micron to meet a broad range of applications
- Wet-Pack option available to eliminate the requirement for solvent pre-wetting in aqueous applications

CITADEL NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)	End Configuration	Gasket or O-Ring		Option
Citadel Series Filters	0.05	0.45	–10	P3 222/Flat Single Open End	C	Chemraz	–W Pre-Wet
	0.1	1	–20		K	Kalrez	
	0.2		–30		T	Teflon encap. Viton (Standard)	
			–40				
Example: CTL 0.05–20P3T–W							
CTL	0.05		–20	P3	T		–W

CITADEL FLOW RATE

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



RINSE-UP VOLUMES

Resistivity rinse-up to 18 MΩ-cm	< 5 liters
Particle cleanliness	< 10 particles/mL > 0.1 µm
Extractable levels	< 25 ppb total in 5% HCl

INTEGRITY TEST SPECIFICATIONS

Maximum Diffusive Air Flow (per 10-inch cartridge)
values for Citadel filters wet with 60/40 IPA/water:

Pore Size	Specification
0.05 µm	≤ 90 cc/min @ 22 psig (1.5 bar)
0.1 µm	≤ 50 cc/min @ 18 psig (1.2 bar)
0.2 µm	≤ 50 cc/min @ 12 psig (0.8 bar)
0.45 µm	≤ 50 cc/min @ 5 psig (0.34 bar)
1 µm	≤ 50 cc/min @ 3 psig (0.2 bar)





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
- Available prewet for use with aqueous based chemicals

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

PERFORMANCE SPECIFICATIONS

- Steam/Autoclave: Cartridges will withstand at least 100 steam/autoclave thirty-minute cycles @ 275°F (135°C)

Product Specifications

Media: Expanded PTFE Membrane

Inner core, end caps, cage: Polypropylene

Support layers: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon
Encapsulated Viton (O-Rings only),
Teflon (gaskets), Viton

Micron ratings: 0.05, 0.1, 0.2, 0.45, 1.0 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)

Surface area: 8.5 ft² (0.79 m²)
per 10" element

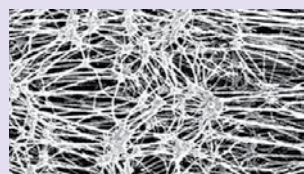
Operating Parameters

Maximum operating temperature:
203°F (95°C)

Maximum differential pressure:
80 psid @ 70°F (5.5 bar @ 21°C)
40 psid @ 160°F (2.8 bar @ 71°C)

Maximum reverse differential pressure:
40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:
35 psid (2.4 bar)



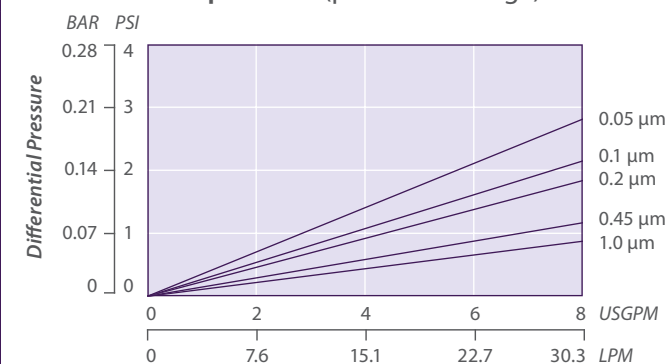
TefTEC NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (in)		End Configuration		Gasket or O-Ring		Options
TefTEC Series	0.05	0.45	-5	-20	P	Double Open End	B	Buna-N	-W Pre-Wet
	0.1	1	-9.75*	-30	P2	226/Flat Single Open End	E	EPDM	
	0.2		-10	-40	P3	222/Flat Single Open End	S	Silicone	
					P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only)	
					P8	222/Fin Single Open End			
					AM	Single Open End, Internal O-Ring	T	Teflon (gaskets)	
					NPC	Double Open End, Internal O-Ring	V	Viton	
Example: TefTEC 0.1-20P2S-W									
TefTEC	0.1		-20		P2		S		-W

*Available only for DOE (P) configuration

TefTEC FLOW RATE

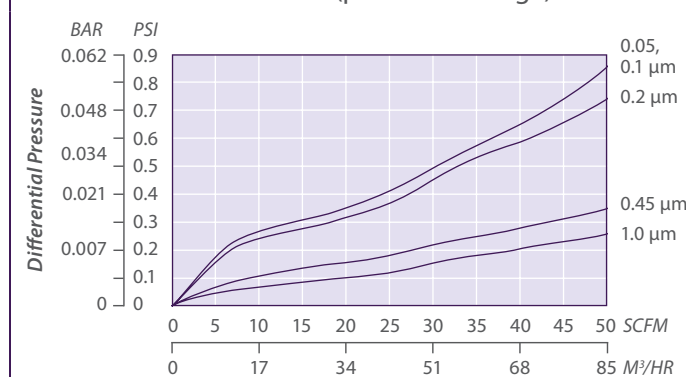
Typical Flow Rate Clean Water at Ambient Temperature (per 10" cartridge)



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

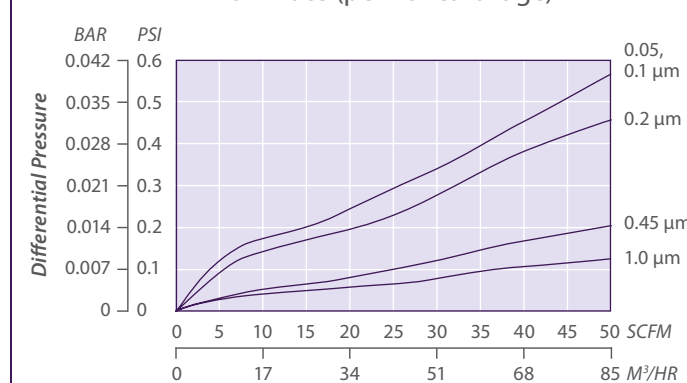
INTEGRITY TEST SPECIFICATIONS

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	≤ 35 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)

Customer Service/Technical Support: 1-888-353-0303

Europe (UK): +44-1424-777791 | China: +86-21-5238-6576 | Asia: +65-9635-7690

302-731-1700 | 800-249-1990 | Fax: 1-302-369-0938 | info@gravertech.com | www.gravertech.com





TefTEC™ P Series Filter Cartridges

Sterilizing Grade PTFE Membrane Filter Cartridges

TefTEC P membrane cartridges are validated for complete bacterial retention to yield product sterility in biopharmaceutical final filtration applications. TefTEC P cartridge filters are constructed with naturally hydrophobic e-PTFE membrane with polypropylene support layers and components. The sterilizing grade PTFE membrane cartridges are well suited for compressed air applications, fermentation feed air and tank vent applications where absolute microbial retention is critical. Additionally, TefTEC P has demonstrated viral aerosol retention to provide essential protection for final products.

FEATURES & BENEFITS

- Single-layer construction provides superior flow rates and minimizes filtration system size
- 100% Flushed with 18 megohm 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 bacterial removal in liquid at a challenge level of 107 Brevundimonas diminuta/10" cartridge
- Retentive for aerosolized virus
- Validation guide available

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.

PERFORMANCE SPECIFICATIONS

- Steam/Autoclave: Cartridges will withstand at least 100 steam/autoclave 30 minute cycles @ 275°F (135°C)
- Integrity Test Values: Bubble Point and Air Diffusion per 10 inch cartridge wet with 60/40 IPA/water. Contact Graver Technologies for specific method.
- Published Water Intrusion values

Product Specifications

Media: Expanded PTFE Membrane

Inner core, end caps, cage: Polypropylene

Support layers: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Teflon (gaskets), Viton

Micron rating: 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: 8.6 ft² (0.80 m²) per 10" element

Operating Parameters

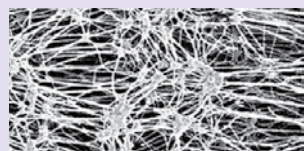
Maximum operating temperature: 195°F (90°C)

Maximum differential pressure:

75 psid @ 70°F (5.2 bar @ 21°C)
30 psid @ 176°F (2.1 bar @ 80°C)
15 psid @ 195°F (1.03 bar @ 95°C)

Maximum reverse differential pressure: 40 psid @ 70°F (2.8 bar @ 21°C)

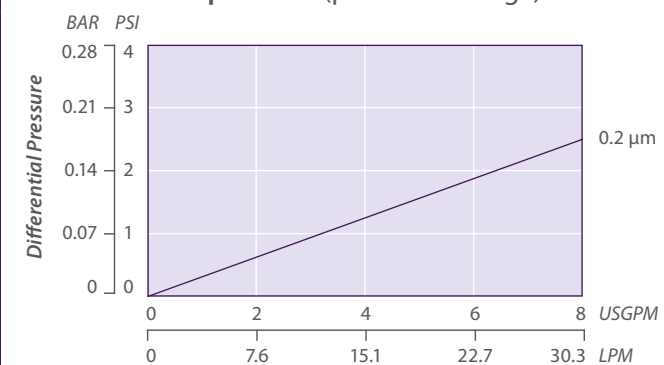
Recommended change-out pressure: 35 psid (2.4 bar)



TefTEC P NOMENCLATURE INFORMATION						
Filter Type	Retention Rating (microns)	Nominal Length (inches)		End Configuration		Gasket or O-Ring
TefTEC P Series	0.2	-10	-30	P2	226/Flat Single Open End	B Buna-N
		-20	-40	P3	222/Flat Single Open End	E EPDM
				P7	226/Fin Single Open End	S Silicone
				P8	222/Fin Single Open End	T Teflon encap. Viton (O-Rings only)
Example: TefTEC P 0.2-20P2S						V Viton
TefTEC P	0.2	-20		P2		S

TefTEC P FLOW RATE

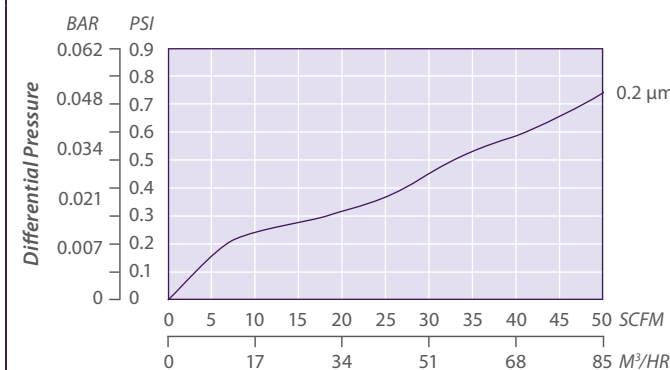
Typical Flow Rate Clean Water at Ambient Temperature (per 10" cartridge)



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

TefTEC P 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

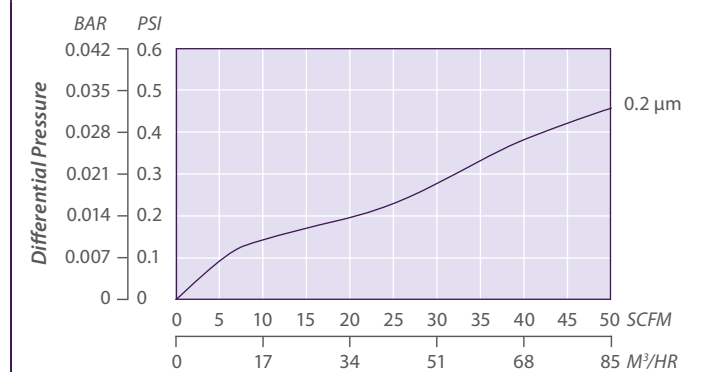
INTEGRITY TEST SPECIFICATIONS

Integrity Test values per 10-inch cartridge wet with 60/40 IPA/water. Contact Graver Technologies for specific method.

Pore Size	Diffusion Flow	Bubble Point
0.2 µm	≤ 20 cc/min @ 12 psig (0.83 bar)	≥ 26 psig

TefTEC P AIR FLOW RATE

Air Flow Rate (per 10" cartridge)



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

Customer Service/Technical Support: 1-888-353-0303

Europe (UK): +44-1424-777791 | China: +86-21-5238-6576 | Asia: +65-9635-7690

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TefTEC™ V Series Filter Cartridges

Economical Absolute Rated PTFE Membrane Filter Cartridges

TefTEC V cartridge filters are constructed with naturally hydrophobic PTFE membrane and polypropylene support layers and components. The economical PTFE membrane cartridge filter provides superior hydrophobicity as compared to polypropylene filters commonly used in compressed air applications, making it ideally suited for utility as well as tank vent applications, without the higher costs of the typical PTFE filter. Additionally, the filter has been demonstrated to produce sterile air utilizing a bacterial aerosol challenge methodology, emulating the actual removal character of the filter in vent applications.

FEATURES & BENEFITS

- Single-layer construction provides superior flow rates and minimizes filtration system size
- 100% Flushed with 18 megohm 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
- Demonstrated bacterial removal in air with an aerosol challenge level of 10⁷ Brevundimonas diminuta/10" cartridge
- Complete qualification guide available

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

- Tank Vents
- Aggressive chemicals
- Solvents
- Compressed gases
- Strong acids/bases

PERFORMANCE SPECIFICATIONS

- Steam/Autoclave: Cartridges will withstand at least 50 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.

Product Specifications

Media: Expanded PTFE Membrane

Inner core, end caps, cage: Polypropylene

Support layers: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon
Encapsulated Viton (O-Rings only),
Teflon (gaskets), Viton

Micron rating: 0.2 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)

Surface area: 7.3 ft² (0.68 m²)
per 10" element

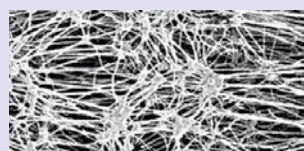
Operating Parameters

Maximum operating temperature:
195°F (90°C)

Maximum differential pressure:
75 psid @ 70°F (5.2 bar @ 21°C)
30 psid @ 176°F (2.1 bar @ 80°C)
15 psid @ 195°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)



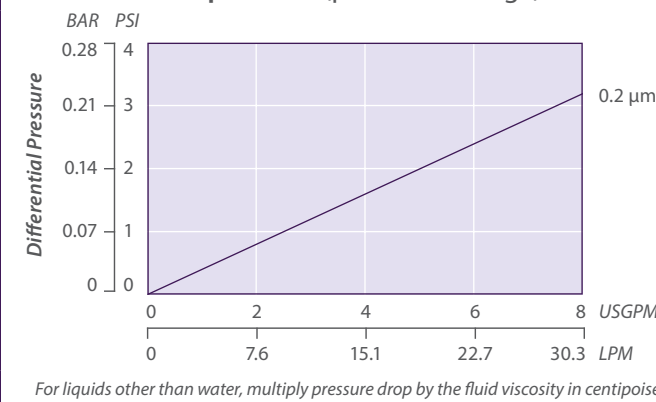
TefTEC V NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)	Nominal Length (inches)		End Configuration		Gasket or O-Ring	
TefTEC V Series	0.2	-5	-20	P	Double Open End	B	Buna-N
		-9.75*	-30	P2	226/Flat Single Open End	E	EPDM
		-10	-40	P3	222/Flat Single Open End	S	Silicone
				P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only)
				P8	222/Fin Single Open End	T	Teflon (gaskets)
				AM		Single Open End, Internal O-Ring	V
Example: TefTEC V 0.2-20P2S		NPC	Double Open End, Internal O-Ring				
TefTEC V	0.2	-20		P2		S	

*Available only for DOE (P) configuration

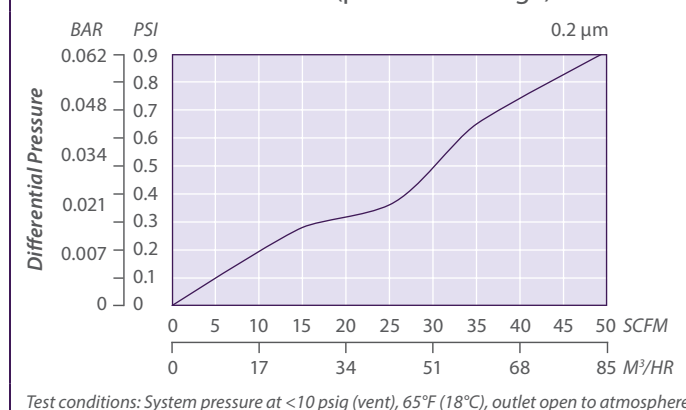
TefTEC V FLOW RATE

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



TefTEC V AIR FLOW RATE

Air Flow Rate (per 10" cartridge)



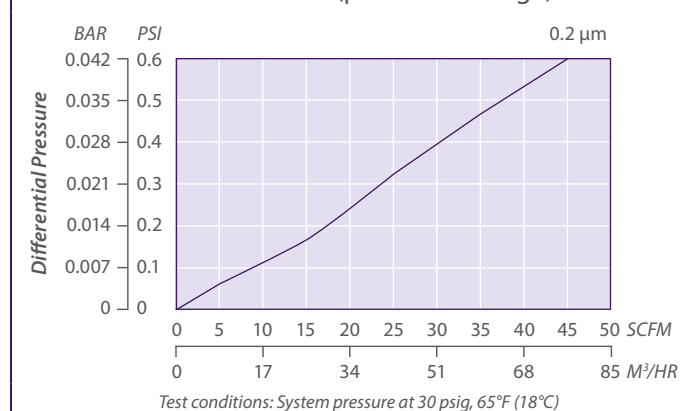
INTEGRITY TEST SPECIFICATIONS

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

Pore Size	Specification
0.2 µm	≤ 30 cc/min @ 9 psig (0.6 bar)

TefTEC V AIR FLOW RATE

Air Flow Rate (per 10" cartridge)



Customer Service/Technical Support: 1-888-353-0303

Europe (UK): +44-1424-777791 | China: +86-21-5238-6576 | Asia: +65-9635-7690

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Product Specifications

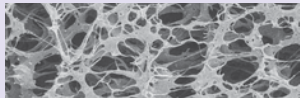
Media: Asymmetric Polyethersulfone Membrane
Inner core, end caps, cage: Polypropylene
Support layers: Spunbonded Polypropylene
Gaskets/O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Teflon (gaskets), Viton
Micron ratings: 0.05, 0.1, 0.2, 0.45, 0.65 µm

Dimensions

Nominal lengths:
5" 9.75" 10" 20" 30" 40"
12.7 24.8 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: 6.0 ft² (0.56 m²) per 10" element

Operating Parameters

Maximum sustained operating temperature:
176°F (80°C) at 20 psid (1.38 bar)
Maximum differential pressure:
75 psid @ 70°F (5.2 bar @ 21°C)
30 psid @ 176°F (2.0 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)



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

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 Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

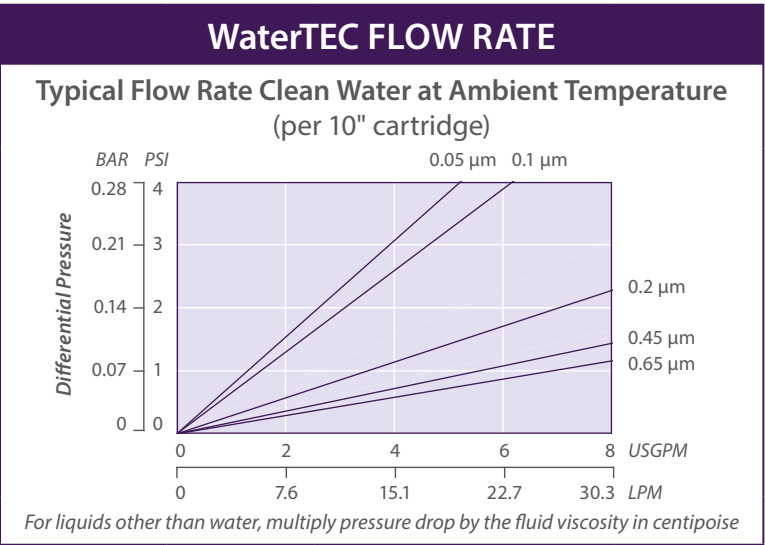
- General water filtration
- DI water post filter
- DI water prefilter
- Aqueous based chemical processing

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.
- 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).

WaterTEC NOMENCLATURE INFORMATION									
Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring		Options
WaterTEC Series	0.05	0.45	–5	–29.25 ¹	P	Double Open End	B	Buna-N	–I End Cap Insert
	0.1	0.65	–9.75 ¹	–30	P2	226/Flat Single Open End	E	EPDM	
	0.2		–10	–39 ¹	P3	222/Flat Single Open End	S	Silicone	–R Factory Pre-Rinse
			–19.5 ¹	–40	P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only) ²	
			–20		P8	222/Fin Single Open End			
					AM	Single Open End, Internal O-Ring			
					NPC	Double Open End, Internal O-Ring	T	Teflon Gasket	
							V	Viton	
Example: WaterTEC 0.2–10P2E–R									
WaterTEC	0.2		–10		P2		E		–R

¹Available only for DOE (P) configuration ²Not available in AM style





ZTEC™ B Series Filter Cartridges

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

Product Specifications

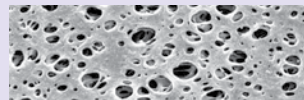
Media: Asymmetric Polyethersulfone Membrane
Inner core, end caps, cage: Polypropylene
Support layers: Spunbonded Polypropylene
Gaskets/O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Teflon (gaskets), Viton
Micron ratings: 0.2, 0.45, 0.65 µm

Dimensions

Nominal lengths:
9.75" 10" 20" 30" 40"
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: 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 (4.14 bar @ 21°C)
40 psid @ 160°F (2.8 bar @ 71°C)
Maximum reverse differential pressure:
40 psid @ 70°F (2.8 bar @ 21°C)
Recommended change-out pressure:
35 psid (2.4 bar)



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 10⁷/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

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 Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

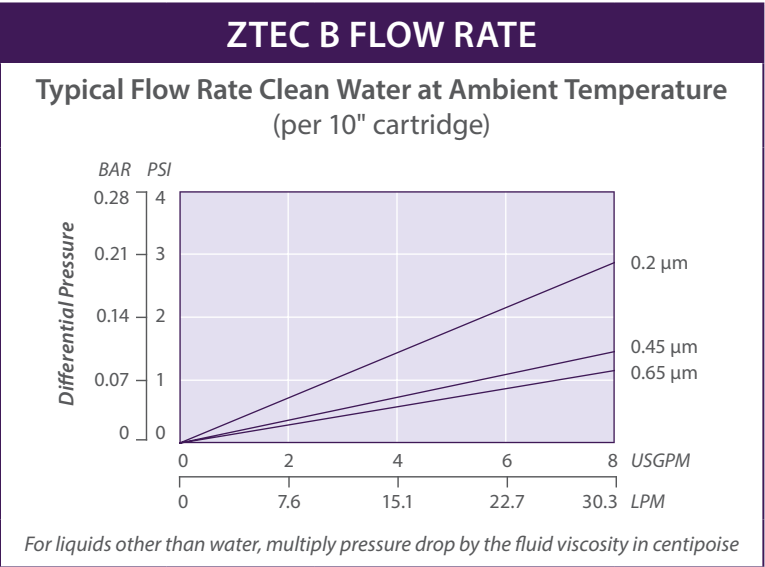
- Bottled Water
- Reagent Chemicals
- Buffers
- Ophthalmic Solutions
- LVPs
- Juices
- Culture Media

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 B NOMENCLATURE INFORMATION					
Filter Type	Retention Rating (microns)	Nominal Length (inches)		End Configuration	Gasket or O-Ring
ZTEC B Series	0.2	–5	–20	P Double Open End	B Buna-N
	0.45	–9.75*	–30	P2 226/Flat Single Open End	E EPDM
	0.65	–10	–40	P3 222/Flat Single Open End	S Silicone
				P7 226/Fin Single Open End	T Teflon encap. Viton (O-Rings only)
				P8 222/Fin Single Open End	
				AM Single Open End, Internal O-Ring	T Teflon (gaskets)
				NPC Double Open End, Internal O-Ring	V Viton
Example: ZTEC B 0.2–20P2E					
ZTEC B	0.2	–20		P2	E

*Available only for DOE (P) configuration



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 (2.8 bar)	≤ 35 cc/min @ 30 psig (2.0 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)

TYPICAL BACTERIAL RETENTION

0.2 µm	LRV for <i>B. diminuta</i> ≥ 7.8
0.45 µm	LRV for <i>S. marcescens</i> ≥ 8.5
0.65 µm	LRV for <i>S. cerevisiae</i> ≥ 11





Product Specifications

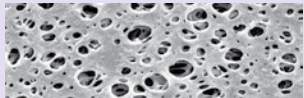
Media: Asymmetric Polyethersulfone Membrane
Inner core, end caps, cage: Polypropylene
Support layers: Spunbonded Polypropylene
Gaskets/O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton O-Rings, Teflon (gaskets), Viton
Micron ratings: 0.03, 0.1, 0.2, 0.45 µm

Dimensions

Nominal lengths:
9.75" 10" 20" 30" 40"
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: 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 @ 160°F (2.8 bar @ 71°C)
Maximum reverse differential pressure:
40 psid @ 70°F (2.8 bar @ 21°C)
Recommended change-out pressure:
35 psid (2.4 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 submicron 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 are 100% 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/adaptor 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.

CERTIFICATIONS

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

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

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

TYPICAL APPLICATIONS

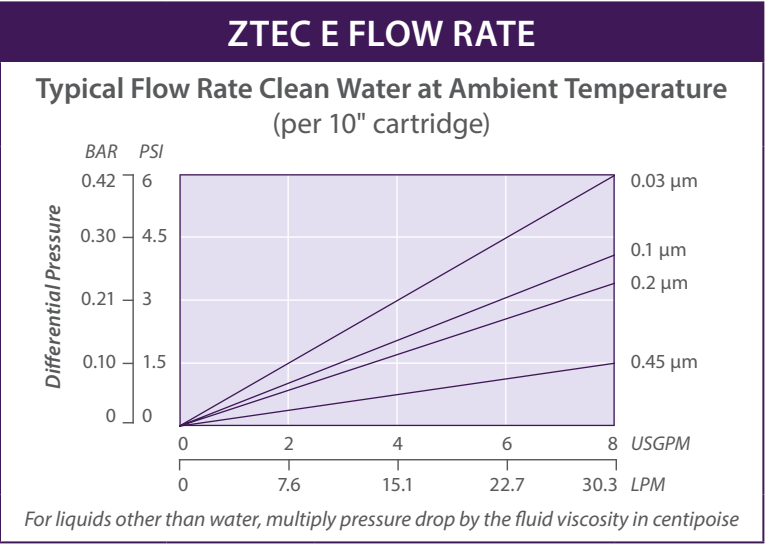
- DI water
- High purity chemicals

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 (11.3 lpm) per 10" element.
Rinse-up to single digit ppb TOC in <120 minutes at a flow of 3 gpm (11.3 lpm) per 10" element.

ZTEC E NOMENCLATURE INFORMATION						
Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration	Gasket or O-Ring
ZTEC E Series	0.03	0.2	–5	–20	P Double Open End	B Buna-N
	0.1	0.45	–9.75*	–30	P2 226/Flat Single Open End	E EPDM
			–10	–40	P3 222/Flat Single Open End	S Silicone
					P7 226/Fin Single Open End	T Teflon encap. Viton (O-Rings only)
					P8 222/Fin Single Open End	T Teflon (gaskets)
Example: ZTEC E 0.45–30P8T					AM Single Open End, Internal O-Ring	V Viton
					NPC Double Open End, Internal O-Ring	
ZTEC E	0.45		–30		P8	T

*Available only for DOE (P) configuration



INTEGRITY TEST SPECIFICATIONS	
<i>Minimum Bubble Point values and maximum Diffusive Air Flow (per 10-inch cartridge) values for ZTEC E filters wet with water:</i>	
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)





Product Specifications

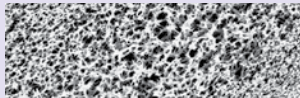
Media: Asymmetric Polyethersulfone Membrane
Inner core, end caps, cage: Polypropylene
Support layers: Spunbonded Polypropylene
Gaskets/O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Teflon (gaskets), Viton
Micron ratings: 0.1, 0.2, 0.45, 0.65 µm

Dimensions

Nominal lengths:
9.75" 10" 20" 30" 40"
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: 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:
80 psid @ 70°F (4.14 bar @ 21°C)
40 psid @ 160°F (2.8 bar @ 71°C)
Maximum reverse differential pressure:
40 psid @ 70°F (2.8 bar @ 21°C)
Recommended change-out pressure:
35 psid (2.4 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

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 Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

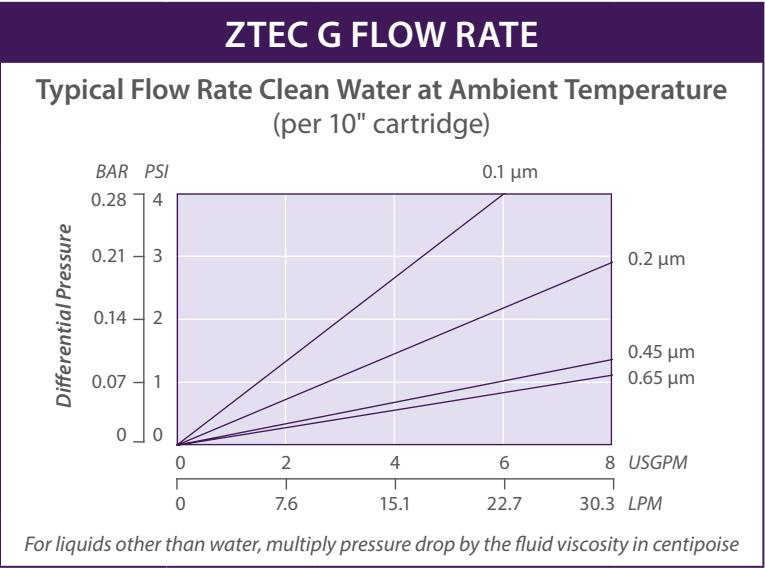
- Food and Beverage
- Inks
- Ultra pure water
- Filtration of acids and bases
- Chemicals
- Aqueous solutions
- Cosmetics

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 G NOMENCLATURE INFORMATION									
Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring		
ZTEC G Series	0.1	0.45	−5	−20	P	Double Open End		B	Buna-N
		0.65	−9.75*	−30	P2	226/Flat Single Open End		E	EPDM
	−10		−40	P3	222/Flat Single Open End		S	Silicone	
				P7	226/Fin Single Open End		T	Teflon encap.	
				P8	222/Fin Single Open End		Viton (O-Rings only)		
	AM		Single Open End, Internal O-Ring		T	Teflon (gaskets)			
	NPC	Double Open End, Internal O-Ring		V	Viton				
Example: ZTEC G 0.1−10P7S									
ZTEC G	0.1		−10		P7			S	

*Available only for DOE (P) configuration





ZTEC™ P Series Filter Cartridges

*Pleated Polyethersulfone (PES)
Membrane for Sterile Filtration*

Product Specifications

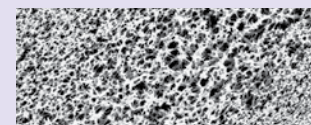
Media: Asymmetric Polyethersulfone Membrane
Inner core, end caps, cage: Polypropylene
Support layers: Spunbonded Polypropylene
O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton O-Rings, Viton
Micron rating: 0.2 µm

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:
80 psid @ 70°F (4.14 bar @ 21°C)
40 psid @ 160°F (2.8 bar @ 71°C)
Maximum reverse differential pressure:
40 psid @ 70°F (2.8 bar @ 21°C)
Recommended change-out pressure:
35 psid (2.4 bar)



ZTEC P Sterilizing Grade membrane cartridges are 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

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 Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

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

PERFORMANCE SPECIFICATIONS

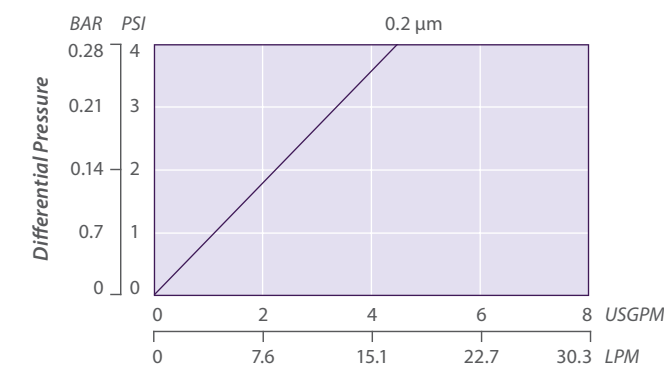
- Hot DI Water: Filter cartridge will withstand temperatures of 185°F (85°C) for up to 30 consecutive minutes.
- Cleaning/Sanitization: Compatible with most common chemical cleaning, sanitizing and sterilizing agents and with pH range from 1–14. Consult factory for specific compatibility information.
- 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 10⁷ organisms/cm² as prescribed in ASTM 838-05.

ZTEC P NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)	Nominal Length (inches)		End Configuration	Gasket or O-Ring			
ZTEC P Series	0.2	–10	–30	P2	226/Flat Single Open End		B	Buna-N
		–20	–40	P3	222/Flat Single Open End		E	EPDM
				P7	226/Fin Single Open End		S	Silicone
				P8	222/Fin Single Open End		T	Teflon encap. Viton (O-Rings only)
Example: ZTEC P 0.2–20 P2S						V	Viton	
ZTEC P	0.2	–20		P2			S	

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

INTEGRITY TEST SPECIFICATIONS

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)





Product Specifications

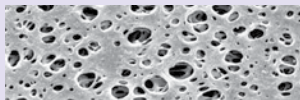
Media: Asymmetric Polyethersulfone Membrane
Inner core, end caps, cage: Polypropylene
Support layers: Spunbonded Polypropylene
Gaskets/O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Teflon (gaskets), Viton
Micron ratings: 0.2, 0.45, 0.65 µm

Dimensions

Nominal lengths:
9.75" 10" 20" 30" 40"
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: 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 @ 160°F (2.8 bar @ 71°C)
Maximum reverse differential pressure:
40 psid @ 70°F (2.8 bar @ 21°C)
Recommended change-out pressure:
35 psid (2.4 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. PES membrane available with 0.2, 0.45 and 0.65 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

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 Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

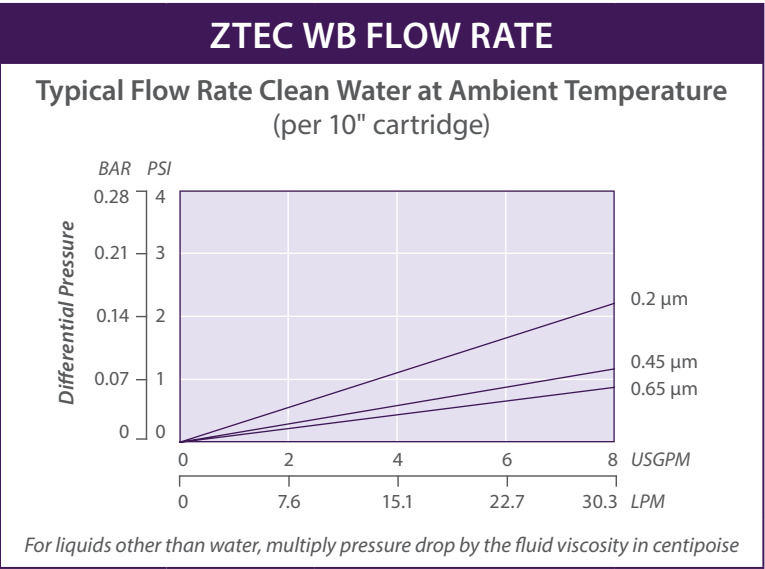
- White Wine
- Sparkling Wine
- Champagne
- Bottled Water
- Red Wine
- Wine/Malt Coolers
- Distilled Spirits
- Beer

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 WB NOMENCLATURE INFORMATION									
Filter Type	Retention Rating (microns)	Nominal Length (inches)		End Configuration		Gasket or O-Ring		Options	
ZTEC WB Series	0.2	–5	–20	P	Double Open End	B	Buna-N	–QW	Quick Wet Treatment
	0.45	–9.75*	–30	P2	226/Flat Single Open End	E	EPDM		
	0.65	–10	–40	P3	222/Flat Single Open End	S	Silicone		
				P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only)		
				P8	222/Fin Single Open End				
				AM	Single Open End, Internal O-Ring	T	Teflon (gaskets)		
						V	Viton		
Example: ZTEC WB 0.45–20P2E–QW									
ZTEC WB	0.45	–20		P2		E		–QW	

*Available only for DOE (P) configuration



TYPICAL BACTERIAL RETENTION	
0.2 µm	LRV for <i>Pseudomon aeruginosa</i> ≥ 11
0.45 µm	LRV for <i>Lactobacillus brevis</i> ≥ 7.6 LRV for <i>Oenococcus oeni</i> ≥ 10.0
0.65 µm	LRV for <i>S. cerevisiae</i> ≥ 8.7

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
0.2 µm	≥ 26 psig (2.1 bar)	≤ 35 cc/min @ 21 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)





Pleated Filters

Graver Product	Media	Hardware	Retention Ratings (µm)	Efficiency
GFC Pleated Microfiberglass	Microfiberglass	Polypropylene	0.2, 0.45, 1, 3, 10, 30	Nominal Beta 10
GFP Pleated Microfiberglass	Microfiberglass	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
High Flow RF Pleated Melt Blown Sheet	Polypropylene	Polypropylene	1, 3, 5, 10, 20, 40, 60, 100	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
PME Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.2, 0.45, 1.0, 2.5, 5.0, 10, 25, 50	Absolute Beta 5000
PMG Pleated Microfiberglass	Microfiberglass	Polypropylene	0.45, 1.0, 3.0, 10, 30	Nominal Beta 10
QCR Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.8, 1	Absolute EPA LT2
QMA Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.2, 0.45, 1, 2.5, 5, 10	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
QSL Pleated Melt Blown Sheet	Polypropylene	Polypropylene	0.5	
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

Product Specifications

Media: Borosilicate Microfiberglass with Acrylic Binder

Inner Core: Polypropylene

Support Layers: Polyester

Cage, End Caps: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon
Encapsulated Viton (O-Rings only),
Teflon (gaskets), Viton

Micron rating:

0.2, 0.45, 1*, 3, 10, 30 µm

*1 micron grade features all FDA listed materials of construction

Dimensions

Nominal lengths:

5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 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)
30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure:

40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:

35 psid (2.4 bar)

This high efficiency, economical filter element is constructed of pleated Borosilicate Microfiberglass media that combines excellent flow rates with exceptional service life. The nominally-rated borosilicate microfiber depth matrix has a natural positive charge that aids in the retention of negatively charged particulates such as colloidal materials or contaminants that may form haze within a fluid. The depth characteristic of glass media also provides enhanced retention of deformable particles as compared to typical polypropylene media. The GFC filter cartridge is an economical solution for both liquids and gases in a wide variety of prefiltration applications.

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

TYPICAL APPLICATIONS

- Wine prefiltration
- Chemicals
- Blowdown post filter
- Inks
- Oil & Gas
- Serum
- Tissue culture media
- Cutting oils

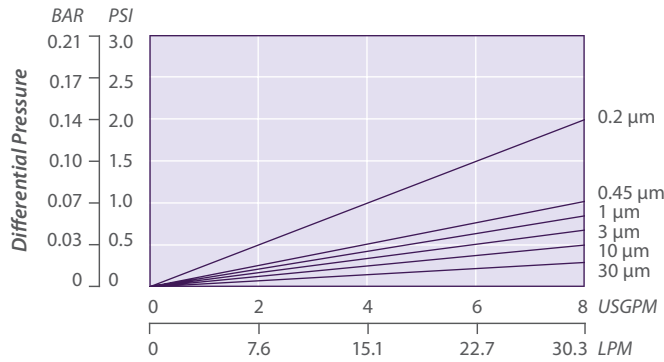
GFC NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring		Options
GFC Series	0.2	3	–5	–29.25 ¹	P	Double Open End	B	Buna-N	–I End Cap Insert for Steaming
	0.45	10	–9.75 ¹	–30	P2	226/Flat Single Open End	E	EPDM	
	1	30	–10	–39 ¹	P3	222/Flat Single Open End	S	Silicone	
			–19.5 ¹	–40	P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only) ²	
			–20		P8	222/Fin Single Open End	V	Viton	
					AM	Single Open End, Internal O-Ring			
Example: GFC 3–10P7B–I					NPC	Double Open End, Internal O-Ring			
GFC	3		–10		P7		B		–I

¹Available only for DOE (P) configuration ²Not available in AM style

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 µm	0.2	0.3	0.6	0.8	1.0
0.45 µm	0.45	0.6	0.8	1.8	2.0
1 µm	1.0	1.3	2.0	3.5	4.0
3 µm	3.0	4.0	5.5	9.0	10.0
10 µm	10.0	12.0	15.0	17.0	18.0
30 µm	30.0	35.0	38.0	42.0	45.0

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. Contaminants 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

Product Specifications

Media: Borosilicate Microfiberglass with Acrylic Binder

Inner Core: Polyester

Support Layers: Polyester

Cage, End Caps: Polyester

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Teflon (gaskets), Viton

Micron rating:

0.2, 0.45, 1, 3, 10, 30 µm

Dimensions

Nominal lengths:

5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40" (12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 101.6 cm)

Outside diameter: 2.7" (6.86 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)

Maximum reverse pressure:

40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:

35 psid (2.4 bar)

This high efficiency, economical filter element is constructed of pleated Borosilicate Microfiberglass media that combines excellent flow rates with exceptional service life. The polyester supports of the GFP filter cartridge provide enhanced thermal tolerance for applications for higher temperature applications. The nominally-rated borosilicate microfiber depth matrix has a natural positive charge that aids in the retention of negatively charged particulates and combined with the depth characteristics of glass media, works well in the removal of both deformable and non-deformable particles. The GFP filter cartridge is an economical solution for both liquids and gases in a wide variety of filtration applications.

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

TYPICAL APPLICATIONS

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

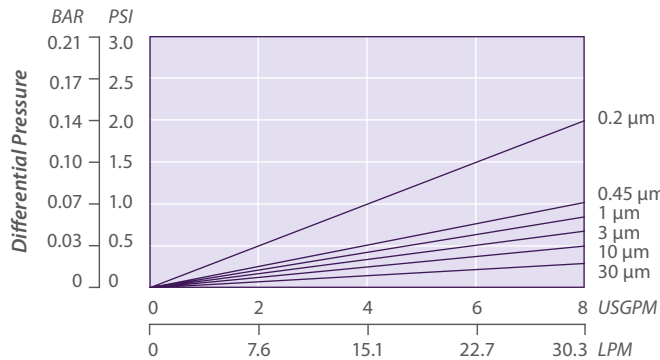
GFP NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring	
GFP Series	0.2	3	–5	–29.25*	P	Double Open End	B	Buna-N
	0.45	10	–9.75*	–30	P2	226/Flat Single Open End	E	EPDM
	1	30	–10	–39*	P3	222/Flat Single Open End	S	Silicone
			–19.5*	–40	P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only)
			–20		P8	222/Fin Single Open End	T	Teflon Gasket
							V	Viton
Example: GFP 3–10P3B								
GFP	3		–10		P3		B	

*Available only for DOE (P) configuration

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 µm	0.2	0.3	0.6	0.8	1.0
0.45 µm	0.45	0.6	0.8	1.8	2.0
1 µm	1.0	1.3	2.0	3.5	4.0
3 µm	3.0	4.0	5.5	9.0	10.0
10 µm	10.0	12.0	15.0	17.0	18.0
30 µm	30.0	35.0	38.0	42.0	45.0

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.





Product Specifications

Media/Support/Cage: Polypropylene

End Caps: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Viton

Micron rating:

1, 3, 5, 10, 20, 40, 60, 75, 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" element

49 ft² (4.6 m²) per 40" element

73 ft² (6.8 m²) per 60" element

Operating Parameters

Maximum operating

temperature: 176°F (80°C)

Maximum differential pressure:

75 psid @ 70°F (5.2 bar @ 21°C)

30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure:

40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out 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.

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 filter's 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

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.
- European Directive for Direct Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.
- NSF 61: Certified to NSF/ANSI STD 61 for materials requirements only — Component.

TYPICAL APPLICATIONS

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

HIGH FLOW SERIES NOMENCLATURE INFORMATION

Product Series	Retention Rating (microns)		Length (inches)	Gasket or O-Ring	Packaging	
HF Series	1	20	–20	B Buna-N	Blank	Individual Box
	3	40	–40	E EPDM	2 pk	2 Pack Box, 60" Only
	5	60	–60	S Silicone	4 pk	4 Pack Box, 60" Only
	10	75		V Viton		
Example: HF 5–60E		100				
HF	5		–60	E		

HIGH FLOW PRESSURE DROP

Micron	Element Pressure Drop psid/gpm			Element Pressure Drop Mbar/M³/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
75	0.0012	0.0006	0.0004	0.3636	0.1815	0.1204
100	0.0010	0.0005	0.0003	0.3035	0.1466	0.0989

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

REMOVAL EFFICIENCY

Beta Ratio Efficiency	Beta 1000 99.9%	Beta 100 99%	Beta 10 90%
1 µm	1.0	0.6	0.2
3 µm	3.0	2.0	1.5
5 µm	5.0	4.0	3.0
10 µm	10.0	8.5	6.5
20 µm	22.0	19.0	14.0
40 µm	38.0	18.0	15.0
60 µm	60.0	35.0	20.0
75 µm	75.0	48.0	35.0
100 µm	100.0	75.0	45.0

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.



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

Customer Service/Technical Support: 1-888-353-0303
Europe (UK): +44-1424-777791 | China: +86-21-5238-6576 | Asia: +65-9635-7690
302-731-1700 | 800-249-1990 | Fax: 1-302-369-0938 | info@gravertech.com | www.gravertech.com





High Flow GF Series Filter Cartridges

Large Geometry Pleated Filters for High Flow

Product Specifications

Media: Microfiberglass
Support/Cage: Polyester or polypropylene
End Caps: Polyacetal or polypropylene
Gaskets/O-Rings: Buna-N, EPDM, Silicone, Viton
Micron rating: 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:
32 ft² (3.0 m²) per 20" element
64 ft² (5.9 m²) per 40" element
96 ft² (8.9 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)
Maximum reverse pressure:
40 psid @ 70°F (2.8 bar @ 21°C)
Recommended change-out 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.

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 filter's 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

TYPICAL APPLICATIONS

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

HIGH FLOW GF SERIES NOMENCLATURE INFORMATION

Product Series	Hardware Material	Retention Rating (microns)		Length (inches)	Gasket or O-Ring	Packaging	
HFGF Series	-P Polypropylene	-1	-10	-20	B Buna-N	Blank	Individual Box
	-A Acetal Caps	-2.5	-20	-40	E EPDM	2 pk	2 Pack Box, 60" Only
	Polyster Cage	-4.5		-60	S Silicone	4 pk	4 Pack Box, 60" Only
					V Viton		
Example: HFGF-A-2.5-60E							
HFGF	-A	-2.5		-60	E		

HIGH FLOW GF PRESSURE DROP

Micron	Element Pressure Drop psid/gpm			Element Pressure Drop Mbar/M³/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

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

REMOVAL EFFICIENCY

Beta Ratio Efficiency	Beta 1000 99.9%	Beta 100 99%	Beta 10 90%
1 µm	1.0	0.6	0.2
2.5 µm	2.5	0.8	0.45
4.5 µm	4.5	4.2	1.0
10 µm	10.0	5.5	3.0
20 µm	20.0	15.0	10.0

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.





High Flow RF Series Filter Cartridges

Large Geometry Pleated Filters
for High Dirt Loading

Product Specifications

Media/Support/Cage: Polypropylene
End Caps: Polypropylene
Gaskets/O-Rings:
Buna-N, EPDM, Silicone,
Teflon Encapsulated Viton
Micron rating:
1, 3, 5, 10, 20, 40, 60, 75, 100 µm

Dimensions

Nominal length:
40" 60"
101.6 152.4 cm
Outside diameter: 6.5" (16.5 cm)
Surface Area:
43 ft² (4.0 m²) per 40" element
64 ft² (5.9 m²) per 60" element

Operating Parameters

Maximum operating temperature: 176°F (80°C)
Maximum differential pressure:
60 psid @ 70°F (4.1 bar @ 21°C)
30 psid @ 176°F (2.0 bar @ 80°C)
Maximum reverse pressure:
25 psid @ 70°F (2.0 bar @ 21°C)
Recommended change-out pressure:
35 psid (2.4 bar)
Maximum flow rates*:
Up to 80 GPM (302 lpm) for P2
Up to 500 GPM (1890 lpm) for P30

*Consult factory for sizing assistance based on particle loads.

Graver High Flow RF Series filter is another in the series of larger geometry filters to handle higher volume applications with fewer filter elements. The result is much faster, easier filter changeouts. In addition, the multi-layer media construction allows for excellent dirt holding capacity, extending the time between filter changeouts. Filter housings are also available and because of the filter's high dirt holding capacity, smaller systems are possible, reducing upfront capital costs.

FEATURES & BENEFITS

- 6.5" diameter, large geometry for high flow rates
- Absolute retention ratings from 1 to 100 microns
- Capable of flow rates up to 80 GPM in the P2 configuration and 500 GPM in the P30 configuration
- Multi-layer pleated construction with optimized surface area
- Retrofits competitive large diameter filter housings utilizing the "740" design or the large diameter 338 o-ring design
- Thermally bonded construction
- All polypropylene construction provides for a high level of chemical compatability

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.
- European Directive for Direct Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Pending
- NSF 61: Certified to NSF/ANSI STD 61 for materials requirements only — Component.

TYPICAL APPLICATIONS

- Water Systems
- Refinery Operations
- Wastewater Processes
- Chemicals
- Food and Beverage

HIGH FLOW RF NOMENCLATURE INFORMATION							
Product Series	Retention Rating (microns)		Length (inches)	End Configuration		Gasket or O-Ring	
HF RF Series	1	40	−40	P2	226/Flat Single Open End*	B	Buna-N
	3	60	−60	P30	338/Flat Single Open End	E	EPDM
	5	75				S	Silicone
	10	100				T	Teflon encap. Viton
	20					V	Viton
Example: HF RF 5−40P2E							
HF RF	5		−40	P2		E	

*Available only as 40" nominal length

HIGH FLOW RF PRESSURE VALUES									
Clean Pressure Drop versus Flow at Ambient Temperature — PSID (mbar)									
Flow (LPM)	1 µm	3 µm	5 µm	10 µm	20 µm	40 µm	60 µm	75 µm	100 µm
20 GPM (75.7)	0.6 (41)	0.3 (20)	0.2 (13)	0.2 (13)	0.2 (13)	0.2 (13)	0.2 (13)	0.2 (13)	0.1 (7)
40 GPM (151.4)	0.9 (62)	0.6 (41)	0.5 (34)	0.5 (34)	0.5 (34)	0.4 (27)	0.4 (27)	0.35 (24)	0.2 (13)
60 GPM (227.1)	1.6 (110)	1.1 (75)	0.9 (62)	0.9 (62)	0.9 (62)	0.75 (51)	0.75 (51)	0.6 (42)	0.5 (34)
80 GPM (302.8)	2.2 (151)	1.4 (96)	1.2 (82)	1.2 (82)	1.2 (82)	0.9 (62)	0.9 (62)	0.85 (58)	0.75 (51)

REMOVAL EFFICIENCY			
Beta Ratio Efficiency	Beta 1000 99.9%	Beta 100 99%	Beta 10 90%
1 µm	1.0	0.6	0.2
3 µm	3.0	2.0	1.5
5 µm	5.0	4.0	3.0
10 µm	10.0	8.5	6.5
20 µm	22.0	19.0	14.0
40 µm	38.0	18.0	15.0
60 µm	60.0	35.0	20.0
75 µm	75.0	48.0	35.0
100 µm	100.0	75.0	45.0

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.





Product Specifications

Media: Polypropylene

Inner core, end caps, cage: Polypropylene

Gaskets/O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Teflon (gaskets), Viton

Micron ratings: 0.2, 0.45, 1, 2.5, 5, 10, 25, 50, 100 µm

Dimensions

Nominal lengths: 5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40" (12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 101.6 cm)

Outside diameter: 2.7" (6.86 cm)

Inside diameter: 1.0" (2.54 cm)

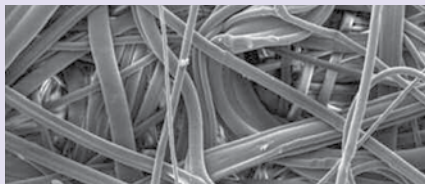
Operating Parameters

Maximum operating temperature: 176°F (80°C)

Maximum differential pressure: 75 psid @ 70°F (5.2 bar @ 21°C) 30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure: 40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure: 35 psid (2.4 bar)



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 online 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

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 Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

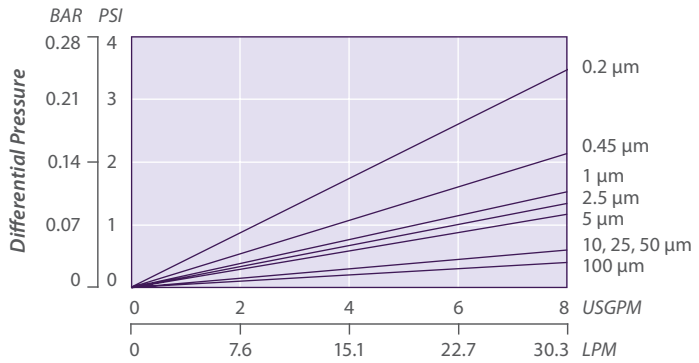
PMA NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring	Options
PMA Series	0.2	10	–5	–29.25 ¹	P	Double Open End	B Buna-N	–I End Cap Insert
	0.45	25	–9.75 ¹	–30	P2	226/Flat Single Open End	E EPDM	
	1	50	–10	–39 ¹	P3	222/Flat Single Open End	S Silicone	–R Factory Pre-Rinse
	2.5	100	–19.5 ¹	–40	P7	226/Fin Single Open End	T Teflon encap. Viton (O-Rings only) ²	
	5		–20		P8	222/Fin Single Open End		
					AM	Single Open End, Internal O-Ring		
					NPC	Double Open End, Internal O-Ring	T Teflon Gasket	
							V Viton	
Example: PMA 2.5–10PV–R								
PMA	2.5		–10		P		V	–R

¹Available only for DOE (P) configuration ²Not available in AM style

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

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

REMOVAL EFFICIENCY

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

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





PMC™ Series Filter Cartridges

*Economically Efficient
Pleated Filter Cartridges*

Product Specifications

Media: Polypropylene

Inner core, end caps, cage:
Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon
Encapsulated Viton (O-Rings only),
Teflon (gaskets), Viton

Micron ratings:

0.2, 0.25, 0.45, 0.5, 1, 2, 5, 10, 25, 50 µm

Dimensions

Nominal lengths:

5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2,
99.1, 101.6 cm)

Outside diameter: 2.7" (6.86 cm)

Inside diameter: 1.0" (2.54 cm)

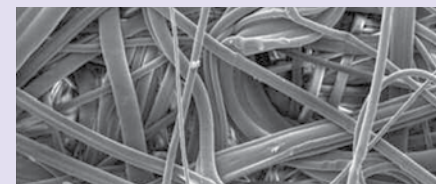
Operating Parameters

Maximum operating temperature:
176°F (80°C)

Maximum differential pressure:
75 psid @ 70°F (5.2 bar @ 21°C)
30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure:
40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:
35 psid (2.4 bar)



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

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 Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

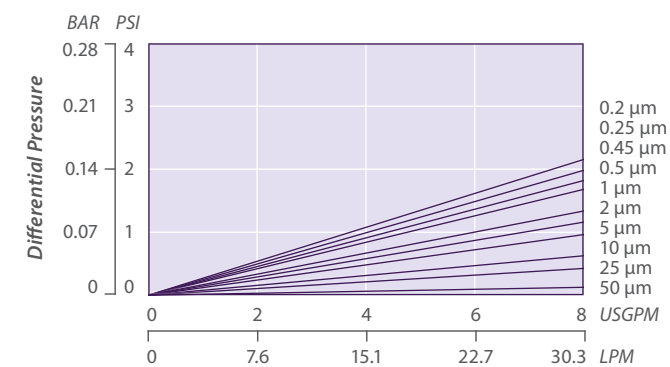
PMC NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration	Gasket or O-Ring
PMC Series	0.2	2	–5	–29.25 ¹	P Double Open End	B Buna-N
	0.25	5	–9.75 ¹	–30	P2 226/Flat Single Open End	E EPDM
	0.45	10	–10	–39 ¹	P3 222/Flat Single Open End	S Silicone
	0.5	25	–19.5 ¹	–40	P7 226/Fin Single Open End	T Teflon encap. Viton (O-Rings only) ²
	1	50	–20		P8 222/Fin Single Open End	T Teflon Gasket
					AM Single Open End, Internal O-Ring	V Viton
Example: PMC 2–20P8V						
PMC	2		–20		P8	V

¹Available only for DOE (P) configuration ²Not available in AM style

PMC FLOW RATE

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



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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

REMOVAL EFFICIENCY

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

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

Customer Service/Technical Support: 1-888-353-0303

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PME Series Filter Cartridges

*“Absolute” Rated Economical
Pleated Filter Cartridges*

Product Specifications

Media: Polypropylene

Inner core, end caps, cage:
Polypropylene

Gaskets/O-Rings:
Buna-N, EPDM, Silicone, Viton, Teflon
Encapsulated Viton (O-Rings only)

Micron ratings:
0.2, 0.45, 1, 2.5, 5, 10, 25, 50 µm

Dimensions

Nominal lengths:
5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2,
99.1, 101.6 cm)

Outside diameter: 2.55" (6.48 cm)

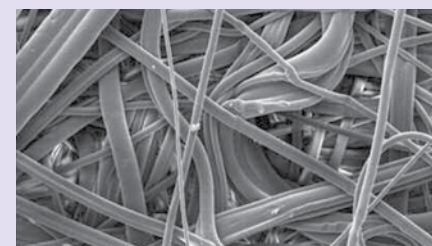
Inside diameter: 1.0" (2.54 cm)

Operating Parameters

Maximum operating temperature:
176°F (80°C)

Maximum differential pressure:
50 psid @ 70°F (3.4 bar @ 21°C)
25 psid @ 176°F (1.7 bar @ 80°C)

Recommended change-out pressure:
35 psid (2.4 bar)



For applications requiring an economical solution, choose the PME Series to deliver absolute efficiency in a broad range of particle sizes. This all polypropylene filter is suitable for a wide range of applications and provides industry certifications to satisfy most critical requirements. In addition, the slightly smaller diameter ensures easy retrofit in installed housings designed to accept depth filters. The pleated construction provides high dirt holding capability and low pressure drops.

FEATURES & BENEFITS

- Micron ratings from 0.2 to 50 µm — Broad application range
- 2.55" diameter to fit installed housings with ease
- “Absolute” Efficiency — Rated at 99.98% (Beta 5000)
- Optimized surface area — High dirt holding for long service life
- 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

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.

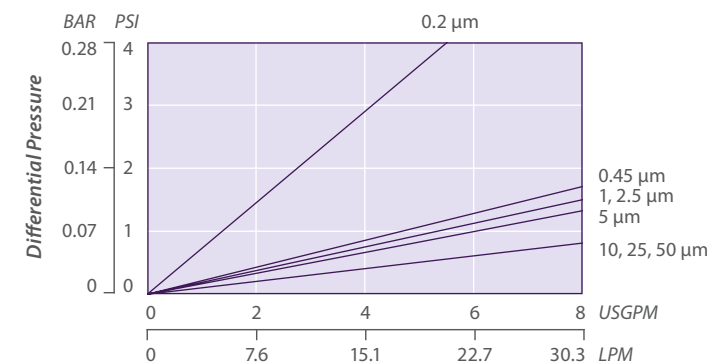
PME NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration	Gasket or O-Ring
PME Series	0.2	5	–5	–29.25*	P Double Open End	B Buna-N
	0.45	10	–9.75*	–30	P2 226/Flat Single Open End	E EPDM
	1	25	–10	–39*	P3 222/Flat Single Open End	S Silicone
	2.5	50	–19.5*	–40	P7 226/Fin Single Open End	T Teflon encap. Viton (O-Rings only)
Example: PME 5–10P3B						V Viton
PME	5		–10		P3	B

*Available only for DOE (P) configuration

PME 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 10 90%
0.2 µm	0.20	0.08
0.45 µm	0.45	0.25
1 µm	1.0	0.5
2.5 µm	2.5	1.0
5 µm	5.0	1.8
10 µm	10.0	6.0
25 µm	25.0	11.0
50 µm	45.0	25.0

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

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

Customer Service/Technical Support: 1-888-353-0303

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PMG Series

Filter Cartridges

Glass Fiber Cartridges

Product Specifications

Media: Borosilicate Microfiberglass with Acrylic Binder

Inner Core: Polypropylene

Support Layers: Polyester

Cage, End Caps: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Viton

Micron rating:

0.45, 1.0*, 3.0, 10, 30 µm

*1 micron grade features all FDA listed materials of construction

Dimensions

Nominal lengths:

5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40" (12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 101.6 cm)

Outside diameter: 2.55" (6.48 cm)

Inside diameter: 1.0" (2.54 cm)

Operating Parameters

Maximum operating

temperature: 176°F (80°C)

Maximum differential pressure:

50 psid @ 70°F (3.4 bar @ 21°C)

25 psid @ 176°F (1.7 bar @ 80°C)

Maximum reverse pressure:

15 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:

35 psid (2.4 bar)

This high efficiency, economical filter element is constructed of pleated Borosilicate Microfiberglass media that combines excellent flow rates with exceptional service life to support a wide range of chemical and industrial applications. The nominally-rated borosilicate microfiber depth matrix has a natural positive charge that aids in the retention of negatively charged particulates such as colloidal materials or contaminants that may form haze within a fluid. The depth characteristic of glass media also provides enhanced retention of deformable particles as compared to typical polypropylene media. In addition, the slightly smaller diameter ensures easy retrofit in installed housings designed to accept depth filters.

FEATURES & BENEFITS

- Micron ratings from 0.2 to 30 µm — Broad application range
- Uniform pore size — High removal efficiency
- Long service life — Minimizes maintenance costs
- Fixed pore construction — Eliminates dirt unloading at maximum differential pressure
- Manufactured in continuous lengths up to 40 inches

TYPICAL APPLICATIONS

- Chemicals
- Blowdown post filter
- Inks
- Oil & Gas
- Cutting oils
- Paints
- Coatings

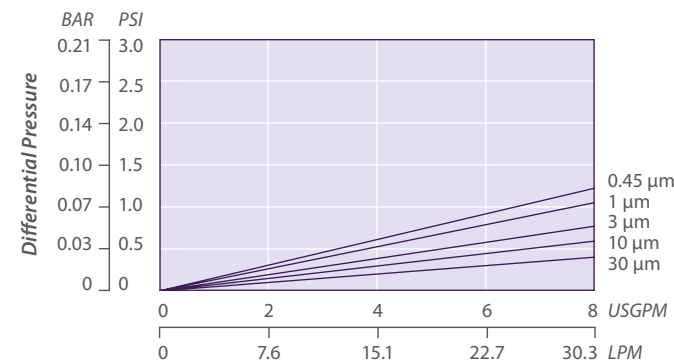
PMG NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring
PMG Series	0.45	10	−5	−29.25*	P	Double Open End	B Buna-N
	1	30	−9.75*	−30	P2	226/Flat Single Open End	E EPDM
	3		−10	−39*	P3	222/Flat Single Open End	S Silicone
			−19.5*	−40	P7	226/Fin Single Open End	T Teflon encap. Viton (O-Rings only)
			−20		P8	222/Fin Single Open End	V Viton
Example: PMG 3–10P7B							
PMG	3		−10		P7		B

*Available only for DOE (P) configuration

PMG 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%
0.45 µm	0.45	0.6	0.8	1.8	2.0
1 µm	1.0	1.3	2.0	3.5	4.0
3 µm	3.0	4.0	5.5	9.0	10.0
10 µm	10.0	12.0	15.0	17.0	18.0
30 µm	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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

Customer Service/Technical Support: 1-888-353-0303

Europe (UK): +44-1424-777791 | China: +86-21-5238-6576 | Asia: +65-9635-7690

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Product Specifications

Media: Polypropylene, Polyethersulfone (0.8)

Inner core, end caps, cage: Polypropylene

Gaskets/O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton, Viton

Micron rating: 0.8, 1.0

End styles: P2 (226/flat), P3 (222/flat), P7 (226/fin), P8 (222/fin)

Dimensions

Nominal lengths: 5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40" (12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 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)

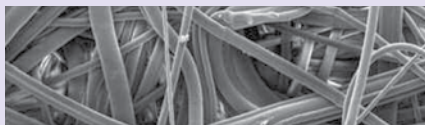
Operating Parameters

Maximum operating temperature: 176°F (80°C)

Maximum differential pressure: 75 psid @ 70°F (5.2 bar @ 21°C) 30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure: 40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure: 35 psid (2.4 bar)



QCR™ Series Filter Cartridges

Helping to ensure the safety of the water supply

HEALTH DANGERS OF CRYPTOSPORIDIUM

Water borne disease has been traced to Cryptosporidium and Giardia parasites that may be present in many surface water sources. Healthy individuals typically recover from the common gastrointestinal effects, however for individuals with weakened or undeveloped immune systems, it can be life threatening. These naturally occurring organisms are highly resistant to inactivation by conventional water treatment processes such as chlorination and thus require high performance mechanical removal technologies.

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 provide a minimum log reduction credit of >3.0 for cysts based on the test requirements of the Long term 2 Enhanced Surface Water Treatment Rule (LT2).

FEATURES & BENEFITS

- Constructed of polypropylene or polypropylene and polyethersulfone — compatible with most fluids
- Double O-Ring style ends for the highest seal integrity
- 7.0 ft² (0.65 m²) of effective filter area
- Various O-Ring materials and configurations — easily retrofits most systems
- High surface area — high flow rates and long on-line service

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.
- LT2: Performance tested and verified by independent 3rd party laboratory to comply with Long Term 2 Enhanced Surface Water Treatment Rule for reduction of cysts. Data available upon request.

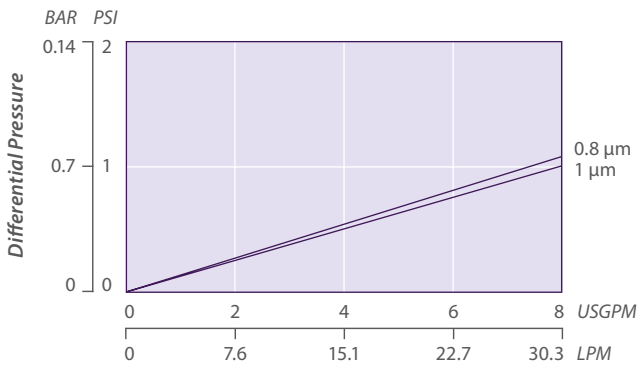
QCR NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)	Nominal Length (inches)		End Configuration	Gasket or O-Ring	Options	
QCR Series	0.8 1	-5	-29.25*	P2	226/Flat Single Open End	B Buna-N	-I Steam Insert
		-9.75*	-30	P3	222/Flat Single Open End	E EPDM	
		-10	-39*	P7	226/Fin Single Open End	S Silicone	
		-19.5*	-40	P8	222/Fin Single Open End	T Teflon encap. Viton (O-Rings only)	
		-20			V Viton		
Example: QCR 1-30P7S-I							
QCR	1	-30		P7		S	-I

*Available only for DOE (P) configuration

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. Cartridges fitted with steam insert may be steamed for at least 10 30-minute cycles @ 275°F (135°C) not to exceed 3 psid (0.21 bar).





Product Specifications

Media: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon
Encapsulated Viton (O-Rings only),
Teflon (gasket only), Viton

Micron ratings:

0.2, 0.45, 1, 2.5, 5, 10 µm

Dimensions

Nominal lengths:

5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2,
99.1, 101.6 cm)

Outside diameter: 2.7" (6.86 cm)

Inside diameter: 1.0" (2.54 cm)

Surface Area: up to 7.0 ft²

Operating Parameters

Maximum operating temperature:

176°F (80°C)

Maximum differential pressure:

75 psid @ 70°F (5.2 bar @ 21°C)

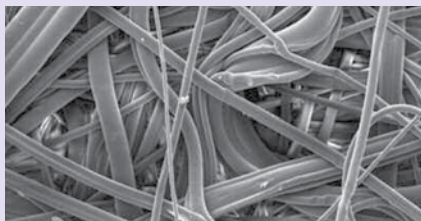
30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure:

40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:

35 psid (2.4 bar)



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

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 Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

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

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.
- 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).

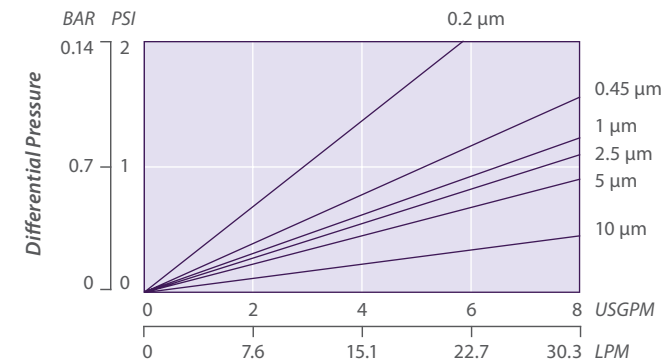
QMA NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring		Options	
QMA Series	0.2	5	–5	–29.25 ¹	P	Double Open End	B	Buna-N	–I	End Cap
	0.45	10	–9.75 ¹	–30	P2	226/Flat Single Open End	E	EPDM		Insert for Steaming
	1	20	–10	–39 ¹	P3	222/Flat Single Open End	S	Silicone	–R	Factory Pre-Rinse
	2.5		–19.5 ¹	–40	P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only) ²		
					P8	222/Fin Single Open End				
					PX	Extended Core				
					AM	Single Open End, Internal O-Ring	T	Teflon Gasket		
Example: QMA 1–20P3V–R				NPC	Double Open End, Internal O-Ring	V	Viton			
QMA	1		–20		P3		V		–R	

¹Available only for DOE (P) configuration ²Not available in AM style

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 µm	0.20	0.10	0.05
0.45 µm	0.45	0.30	0.20
1 µm	1.0	0.60	0.30
2.5 µm	2.5	2.0	1.5
5 µm	5.0	4.0	3.0
10 µm	10.0	8.0	7.0

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

Customer Service/Technical Support: 1-888-353-0303
Europe (UK): +44-1424-777791 | China: +86-21-5238-6576 | Asia: +65-9635-7690
302-731-1700 | 800-249-1990 | Fax: 1-302-369-0938 | info@gravertech.com | www.gravertech.com





Product Specifications

Media: Polypropylene

Inner Core, end caps, cage:
Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon
Encapsulated Viton (O-Rings only),
Teflon (gaskets), Viton

Micron rating:

0.1, 0.2, 0.4, 0.6, 1, 3, 5, 10 µm

Dimensions

Nominal lengths:

5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2,
99.1, 101.6 cm)

Outside diameter: 2.7" (6.86 cm)

Inside diameter: 1.0" (2.54 cm)

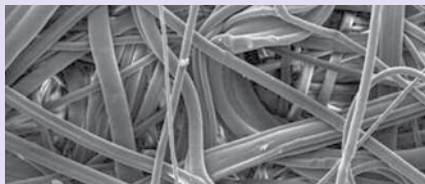
Operating Parameters

Maximum operating temperature:
176°F (80°C)

Maximum differential pressure:
75 psid @ 70°F (5.2 bar @ 21°C)
30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure:
40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:
35 psid (2.4 bar)



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

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

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

PERFORMANCE SPECIFICATIONS

- Cleaning/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 1psid (0.07 bar) for 30 min
 - Autoclavable at 257°F (125°C) for 30 min

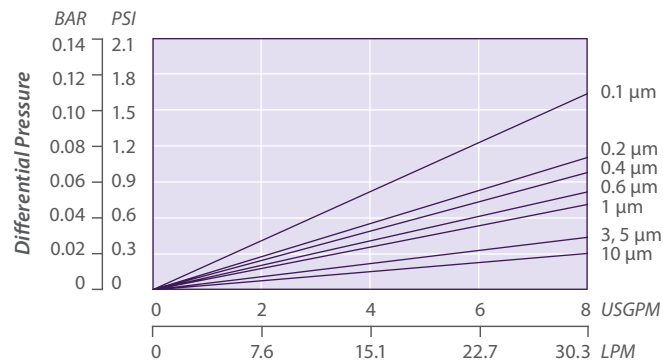
QMC NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring	
QMC Series	0.1	1	−5	−29.25 ¹	P	Double Open End	B	Buna-N
	0.2	3	−9.75 ¹	−30	P2	226/Flat Single Open End	E	EPDM
	0.4	5	−10	−39 ¹	P3	222/Flat Single Open End	S	Silicone
	0.6	10	−19.5 ¹	−40	P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only) ²
			−20		P8	222/Fin Single Open End	T	Teflon Gasket
Example: QMC 1−20P3V					PX	Extended Core	V	Viton
					AM	Single Open End, Internal O-Ring		
					NPC	Double Open End, Internal O-Ring		
QMC	1		−20		P3		V	

¹Available only for DOE (P) configuration ²Not available in AM style

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 µm	0.8	0.1
0.2 µm	1.0	0.2
0.4 µm	2.0	0.4
0.6 µm	3.0	0.6
1 µm	6.0	1.0
3 µm	14.0	3.0
5 µm	17.0	5.0
10 µm	25.0	10.0

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.





Product Specifications

Media: Polypropylene & Polyethersulfone

Inner core, end caps, cage: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone, Teflon
Encapsulated Viton, Viton

Micron rating: 0.5

End styles: P (DOE), P2 (226/flat), P3 (222/flat), P7 (226/fin), P8 (222/fin), AM, NPC

Dimensions

Nominal lengths:
5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 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)

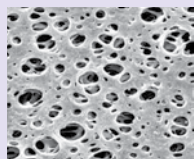
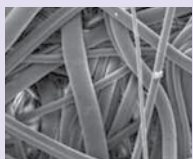
Operating Parameters

Maximum operating temperature:
176°F (80°C)

Maximum differential pressure:
75 psid @ 70°F (5.2 bar @ 21°C)
30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure:
40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:
35 psid (2.4 bar)



QSL™ Series Filter Cartridges

Serial Layered Design for Optimized Prefiltration

Incorporating a polypropylene microfiber media over a polyethersulfone membrane, the serial layered QSL cartridge design offers excellent retention characteristics and extended life to provide long lasting protection of downstream final filters. By preventing early blockage of downstream filters, the QSL contributes significantly to an economical overall design of your filtration system.

FEATURES & BENEFITS

- Serial layered design — enhances capacity and simplifies prefiltration requirements
- Absolute rated (99.98%) at 0.5 micron — acts as an ideal prefilter for 0.2 micron and 0.45 micron membrane filters
- Fixed pore construction — resists dirt unloading at maximum differential pressure
- High surface area — high flow rate, and long service life — minimize maintenance cost
- Available with various gasket/O-ring materials — compatible with many fluids

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 Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

- Wine/beer bottling
- Aqueous solutions
- Culture Media
- Bottled water
- Active Intermediates
- Cosmetics
- Process water
- Diagnostic Reagents

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.
- 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).

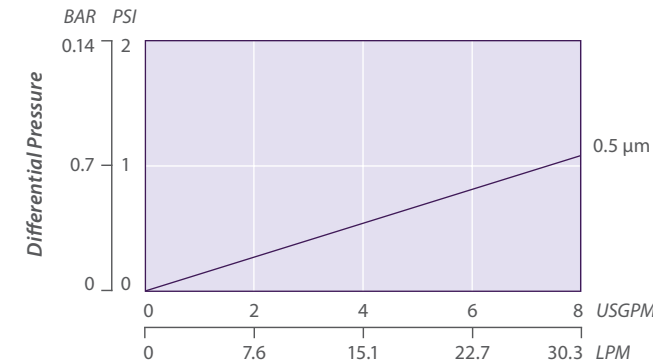
QSL NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)	Nominal Length (inches)	End Configuration		Gasket or O-Ring	Options			
QSL Series	0.5	–5	–29.25 ¹	P	Double Open End	B	Buna-N	–R	Factory Rinse
		–9.75 ¹	–30	P2	226/Flat Single Open End	E	EPDM	–I	Steam Insert
		–10	–39 ¹	P3	222/Flat Single Open End	S	Silicone		
		–19.5 ¹	–40	P7	226/Fin Single Open End	T	Teflon encap. Viton		
		–20		P8	222/Fin Single Open End	T	Teflon encap. Viton (O-Rings Only) ²		
				AM	Single Open End, Internal O-Ring	V	Viton		
Example: QSL0.5-20P3S-I				NPC	Double Open End, Internal O-Ring				
QSL	0.5	–20		P3		S		–I	

¹Available only for DOE (P) configuration ²Not available in AM style

QSL 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





Product Specifications

Media: Polypropylene

Core, Cage, End Caps: Polypropylene

Gaskets/O-Rings: Buna-N, EPDM, Silicone, Teflon Encapsulated Viton (O-Rings only), Teflon (gaskets), Viton

Micron rating:
0.2, 0.45, 0.5, 1, 3, 5, 10, 20, 40 µm

Dimensions

Nominal lengths:
5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2, 99.1, 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)
30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure:
40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out pressure:
35 psid (2.4 bar)



Conventional pleated polypropylene filter media such as QMA, PMA and PMC



QXL filter media

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

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 Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

- CMP P-O-U and Bulk Slurries
- Beverages
- Adhesives
- Coatings
- Paints
- Inks

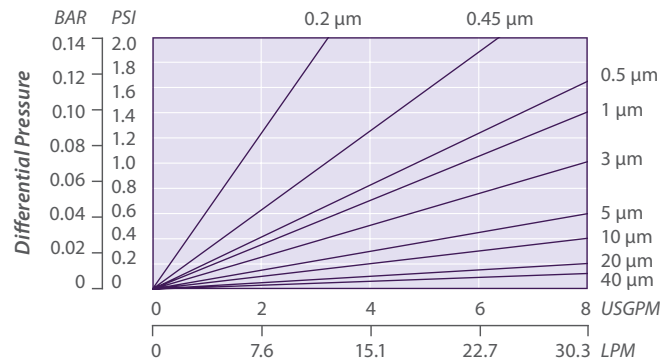
QXL NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring		Options	
QXL Series	0.2	5	-5	-29.25 ³	P	Double Open End	B	Buna-N	-I	End Cap Insert
	0.45 ¹	10	-9.75 ³	-30	P2	226/Flat Single Open End	E	EPDM		
	0.5 ²	20	-10	-39 ³	P3	222/Flat Single Open End	S	Silicone	-R	Factory Pre-Rinse
	1	40	-19.5 ³	-40	P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only) ⁴		
	3		-20		P8	222/Fin Single Open End	T	Teflon encap. Viton (O-Rings only) ⁴		
					AM	Single Open End, Internal O-Ring	T	Teflon Gasket		
							V	Viton		
Example: QXL 5-10P8S-I										
QXL	5		-10		P8		S		-I	

¹Special CMP slurry formulation ²Special ink formulation ³Available only for DOE (P) configuration ⁴Not available in AM style

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 5000 99.98%	Beta 100 99%	Beta 50 98%
0.2 µm	0.2	0.1	0.07
0.45 µm	0.45	0.3	0.2
0.5 µm	0.65	0.45	0.3
1 µm	1.5	0.8	0.6
3 µm	3.0	2.0	1.0
5 µm	5.0	4.0	3.0
10 µm	10.0	8.0	7.0
20 µm	20.0	19.0	17.0
40 µm	40.0	35.0	25.0

PERFORMANCE SPECIFICATIONS

Sterilization

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 30-minute cycles @ 275°F (135°C) not to exceed 3 psid (0.21 bar).





Depth Filters

Graver Product	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

Product Specifications

Media: Thermally bonded Polypropylene/polyethylene fiber

End Caps: Polypropylene (when used)

Gaskets/O-Rings: Buna-N, EPDM, Santoprene, Silicone, Teflon Encapsulated Viton (O-Rings only), Viton

Micron rating: 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 temperature: 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)

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

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

PERFORMANCE SPECIFICATIONS

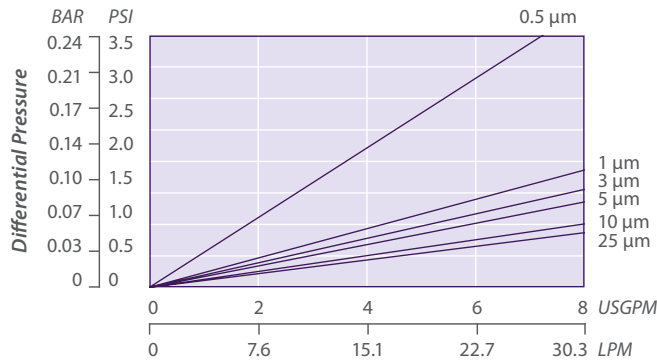
- Sanitization:
 - Hot water at 176°F (80°C) at 5 psid (0.35 bar) for 30 min
 - In-line steam at 257°F (125°C) at 1 psid (0.07 bar) for 30 min
 - Autoclavable at 257°F (125°C) for 30 min

COAX NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring	
COAX Series	0.5	5	–5	–20	P	Double Open End (Hard Endcaps)	B	Buna-N
	1	10	–9.75	–30	P2	226/Flat Single Open End	E	EPDM
	3	25	–10	–40	P3	222/Flat Single Open End	N	None
					P7	226/Fin Single Open End	S	Silicone
					P8	222/Fin Single Open End	T	Teflon encap. Viton (O-Rings only)*
					PX	Extended Core		
					N	None		
					AM	Single Open End, Internal O-Ring	V	Viton
Example: COAX 25–40P3B								
COAX	25		–40		P3		B	

COAX FLOW RATE

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



REMOVAL EFFICIENCY

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

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





Crystal MBF Series Filter Cartridges

Melt Blown Filters

An economical, melt blown 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.

Product Specifications

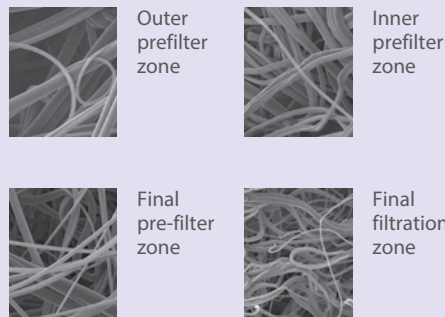
Media: Polypropylene
End caps/Center Core: Polypropylene
Micron rating:
1, 3, 5, 10, 20, 30, 50, 75 µm

Dimensions

Nominal lengths:
5", 9.75", 10", 19.5", 20", 29.25", 30",
39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2,
99.1, 101.6 cm)
(Other lengths available)
Outside diameter: 2.5" (6.35 cm),
2.63" (6.7 cm) End capped
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 change-out pressure:
35 psid (2.4 bar)



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
- Free of binders, adhesives and surfactants
- Highly consistent performance

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
- European Directive for Direct Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

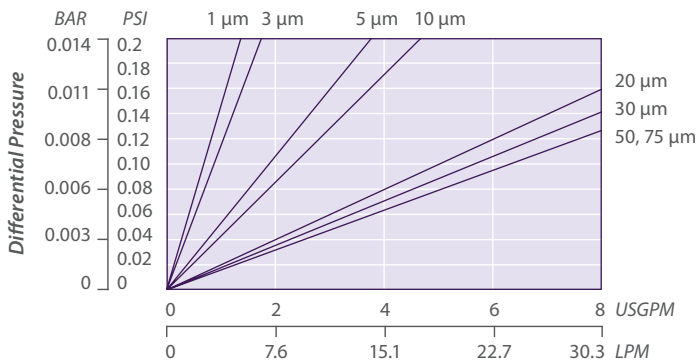
- RO Prefilters
 - Wastewater
 - Food and beverages
- Chemicals
 - Blowdown post filter
 - Radwaste
- Aqueous solutions
 - Inks

CRYSTAL MBF NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration	Gasket or O-Ring
CMBF Series	1	20	-5	-29.25	N None (Cut Ends)	N None
	3	30	-9.75	-30		
	5	50	-10	-39		
	10	75	-19.5	-40		
			-20			
Example: CMBF 10-20NN						
CMBF	10		-20		N	N

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



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





MBC™ Series Filter Cartridges

Melt Blown Filters

Product Specifications

Media: Polypropylene

End caps/Center Core: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Santoprene,
Silicone, Teflon Encapsulated
Viton (O-Rings only), Viton

Micron rating:

1, 3, 5, 10, 20, 30, 50, 75 µm

Dimensions

Nominal lengths:

5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(12.7, 24.8, 25.4, 49.5, 50.8, 74.3, 76.2,
99.1, 101.6 cm)

(Other lengths available)

Outside diameter: 2.5" (6.35 cm), 2.63"
(6.7 cm) End capped

Inside diameter: 1.0" (2.54 cm)

Operating Parameters

Maximum differential pressure:

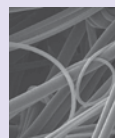
150 psid @ 68°F (10.3 bar @ 20°C)

90 psid @ 150°F (6.2 bar @ 66°C)

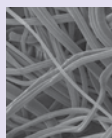
35 psid @ 176°F (2.4 bar @ 80°C)

Recommended change-out pressure:

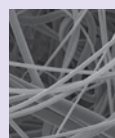
35 psid (2.4 bar)



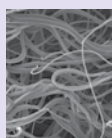
Outer
prefilter
zone



Inner
prefilter
zone



Final
pre-filter
zone



Final
filtration
zone

An economical, melt blown 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

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
- European Directive for Direct Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

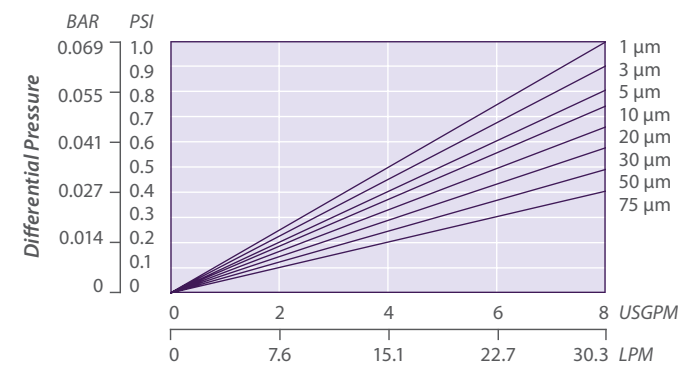
- RO Prefilters
- Wastewater
- Chemicals
- Blowdown post filter
- Radwaste
- Aqueous solutions
- Inks

MBC NOMENCLATURE INFORMATION

Filter Type	Retention Rating (microns)		Nominal Length (inches)		End Configuration	Gasket or O-Ring
MBC Series	1	20	-5	-29.25	P Double Open End (Hard Endcaps)	B Buna-N
	3	30	-9.75	-30	P2 226/Flat Single Open End	E EPDM
	5	50	-10	-39	P3 222/Flat Single Open End	N None
	10	75	-19.5	-40	P6 Self-Seal Spring on One End	S Silicone
			-20		P7 226/Fin Single Open End	T Teflon encap. Viton (O-Rings only)
					P8 222/Fin Single Open End	V Viton
					PX Extended Core	
					N None (Cut Ends)	
					DBG Direct Bond Santoprene Gaskets	
Example: MBC 10-20NN						
MBC	10		-20		N	N

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



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

Customer Service/Technical Support: 1-888-353-0303

Europe (UK): +44-1424-777791 | China: +86-21-5238-6576 | Asia: +65-9635-7690

302-731-1700 | 800-249-1990 | Fax: 1-302-369-0938 | info@gravertech.com | www.gravertech.com





Product Specifications

Media: Polypropylene

End caps/Center Core: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Santoprene,
Silicone, Teflon Encapsulated
Viton (O-Rings only), Viton

Micron rating:

0.3, 0.5 1, 3, 5, 10, 20, 30, 50, 70, 100 µm

Dimensions

Nominal lengths:

5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40"
(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: 1.0" (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)

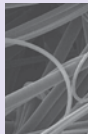
35 psid @ 176°F (2.4 bar @ 80°C)

Recommended change-out pressure:

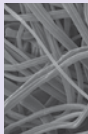
35 psid (2.4 bar)

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.



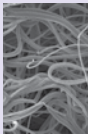
Outer pre-
filter zone



Inner pre-
filter zone



Final pre-
filter zone



Final filtra-
tion zone

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 0.3 to 100 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

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
- European Directive for Direct Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

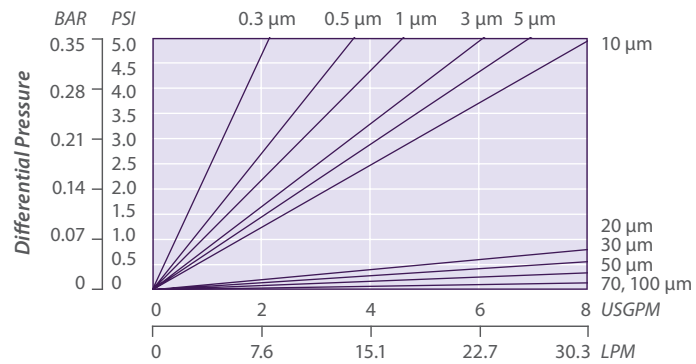
- Chemicals
 - Pharmaceuticals
 - Paint/Inks
- Food and beverages
 - Water
 - Microelectronics
- Plating
 - Cosmetics
 - CMP Slurry

STRATUM A NOMENCLATURE INFORMATION

Product Series	Retention Rating (microns)		Nominal Length (inches)		End Configuration	Gasket or O-Ring
STA Series	0.3	20	-5	-29.25	P Double Open End (Hard Endcaps)	B Buna-N
	0.5	30	-9.75	-30	P2 226/Flat Single Open End	E EPDM
	1	50	-10	-39	P3 222/Flat Single Open End	N None
	3	70	-19.5	-40	P6 Self-Seal Spring on One End	S Silicone
	5	100	-20		P7 226/Fin Single Open End	T Teflon encap. Viton (O-Rings only)
	10				P8 222/Fin Single Open End	V Viton
Example: STA 0.5-30NN					PX Extended Core	
					N None (Cut Ends)	
					DBG Direct Bond Santoprene Gaskets	
					AM Single Open End, Internal O-Ring	
STA	0.5		-30		N	N

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

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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.



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

REMOVAL EFFICIENCY

Beta Ratio Efficiency	Beta 1000 99.9%	Beta 100 99%	Beta 10 90%
0.3 µm	0.5	0.4	0.3
0.5 µm	0.6	0.5	0.4
1 µm	1.0	0.8	0.5
3 µm	3.0	2.3	1.4
5 µm	5.0	4.0	2.7
10 µm	10.0	7.0	4.0
20 µm	20.0	15.0	12.0
30 µm	30.0	20.0	14.0
50 µm	50.0	34.0	25.0
70 µm	70.0	50.0	39.0
100 µm	100.0	85.0	60.0

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





Product Specifications

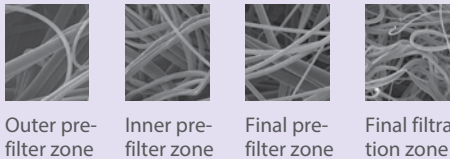
Media: Polypropylene
End caps/Center Core: Polypropylene
Gaskets/O-Rings: Buna-N, EPDM, Santoprene, Silicone, Teflon Encapsulated Viton (O-Rings only), Viton
Micron rating: 0.5, 1, 3, 5, 10, 20, 50, 75, 100 µm

Dimensions

Nominal lengths: 5", 9.75", 10", 19.5", 20", 29.25", 30", 39", 40" (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) End capped
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 change-out 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.



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 100 microns
- 100% pure virgin polypropylene
- Molded center core for higher temperature and pressure capability
- Free of surfactants, binders and adhesives

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
- European Directive for Direct Food Contact: European Regulation No. 1935/2004 and European Regulation 10/2011: Tested for migration behavior and is suitable for contact with all kinds of foodstuffs with minimal rinse-up. Data available upon request.

TYPICAL APPLICATIONS

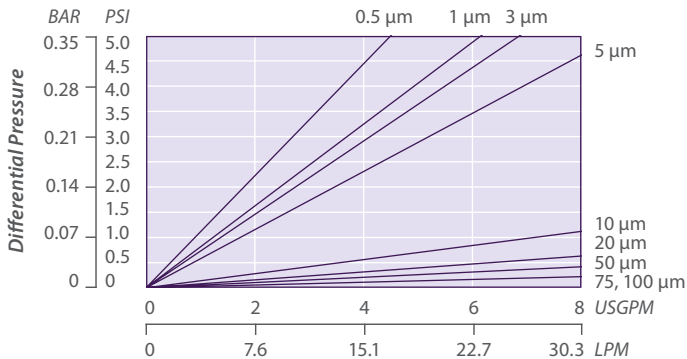
- Chemicals
- Food and beverages
- Plating
- Pharmaceuticals
- Water
- Cosmetics
- Paint/Inks
- Microelectronics

STRATUM C NOMENCLATURE INFORMATION

Product Series	Retention Rating (microns)		Nominal Length (inches)		End Configuration		Gasket or O-Ring	
STC Series	0.5	20	−5	−29.25	P	Double Open End (Hard Endcaps)	B	Buna-N
	1	50	−9.75	−30	P2	226/Flat Single Open End	E	EPDM
	3	75	−10	−39	P3	222/Flat Single Open End	N	None
	5	100	−19.5	−40	P6	Self-Seal Spring on One End	S	Silicone
	10				P7	226/Fin Single Open End	T	Teflon encap. Viton (O-Rings only)
					P8	222/Fin Single Open End		
					PX	Extended Core		
					N	None (Cut Ends)		
Example: STC 5–10P3V				DBG	Direct Bond Santoprene Gaskets	V	Viton	
				AM	Single Open End, Internal O-Ring			
STC	5		−10		P3		V	

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

PERFORMANCE SPECIFICATIONS

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.



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





Specialty Filters

Graver Product	Media	Hardware	Retention Ratings (µm)	Efficiency
RTEC G Resin bonded	Acrylic/Phenolic	Polyester Available	5, 10, 25, 50, 75, 100	Nominal
Steris Replacement Pleated	PES membrane or polypropylene sheet	Polypropylene	0.1, 0.2	Nominal or Absolute
TPE Porous metal	Titanium, 316 Stainless Steel	Titanium, 316 Stainless Steel	0.5, 1, 5, 10, 15, 35, 50, 100	Absolute Beta 200



RTEC™ G Series Filter Cartridges

Rigid Resin Bonded Filters

Product Specifications

Media:

Microfiberglass/Phenolic Resin

Core:

Tin Coated Steel

Outer Sleeve:

Cotton

Micron rating:

0.5, 1, 5, 10, 25, 50, 75, 100, 150 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: 2.6" (66 mm)

Inside diameter:

1" (25.4 mm) tapered

Operating Parameters

Maximum operating temperature:*

150 psid @ 200°F (10 bar 93°C)

50 psid @ 375°F (3.4 bar 190°C)

Recommended change-out

pressure: 35 psid (2.4 bar)

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

RTEC G Series filters feature a microfiberglass/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 microfiberglass/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 0.5 to 150 microns
- Broad chemical compatibility
- Provided with outer cotton wrap to aid in handling and protect the surface

TYPICAL APPLICATIONS

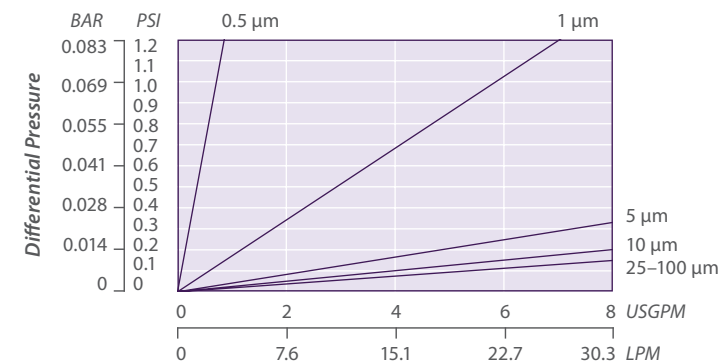
- Paints, Inks
- Sealants
- Adhesives
- Lacquers, Varnishes, Shellacs
- Fuel Oils, Crude Oils, Grease
- Machine Coolants
- Silicones
- Antifreeze
- Plasticizers
- Animal Oils

RTEC G NOMENCLATURE INFORMATION

Product Series	Retention Rating (microns)		Length (inches)		End Configuration		Gasket or O-Ring	
RTEC G Series	0.5	50	−9.75	−29.25	N	None	N	None
	1	75	−10	−30				
	5	100	−19.5	−39				
	10	150	−20	−40				
	25							
Example: RTEC G 5−20NN								
RTEC G	5		−20		N		N	

RTEC G 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

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





Steris® Replacement Series Filter Cartridges

Protection for the Final Sterile Filter

STERIS “A” REPLACEMENT

Product Specifications

Media: Polypropylene

Gaskets/O-Rings:

Buna-N, EPDM, Silicone,
Teflon Encapsulated

Viton (O-Rings only), Viton

Polypropylene micron ratings:
0.2 (nominal)

Other micron ratings are available.

Dimensions

Nominal lengths:

10" (25.4 cm)

Other lengths are available.

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)

30 psid @ 176°F (2.0 bar @ 80°C)

Maximum reverse pressure:

40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out

pressure: 35 psid (2.4 bar)

Nominal flow rates:

6 GPM/psid (22 LPM/0.07 bar)

STERIS “B” REPLACEMENT

Product Specifications

Media: Asymmetric

Polyethersulfone Membrane

Inner core, end caps, cage:

Polypropylene

Support layers:

Spunbonded Polypropylene

Gaskets/O-Rings: Buna-N, EPDM,

Silicone, Teflon Encapsulated

Viton (O-Rings only), Viton

Micron ratings: 0.1, 0.2 µm

Dimensions

Nominal lengths:

10" (25.4 cm)

Other lengths are available.

Outside diameter: 2.7" (6.9 cm)

Inside diameter: 1.0" (2.54 cm)

Operating Parameters

Maximum sustained

operating temperature:

176°F (80°C) at 20 psid (1.38 bar)

Maximum differential pressure:

80 psid @ 70°F (4.14 bar @ 21°C)

40 psid @ 160°F (2.8 bar @ 71°C)

Maximum reverse differential

pressure: 40 psid @ 70°F (2.8 bar @ 21°C)

Recommended change-out

pressure: 35 psid (2.4 bar)

Nominal flow rates:

2.15 GPM/psid (8.1 LPM/0.07 bar)

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

FEATURES & BENEFITS

- Replacement A and 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

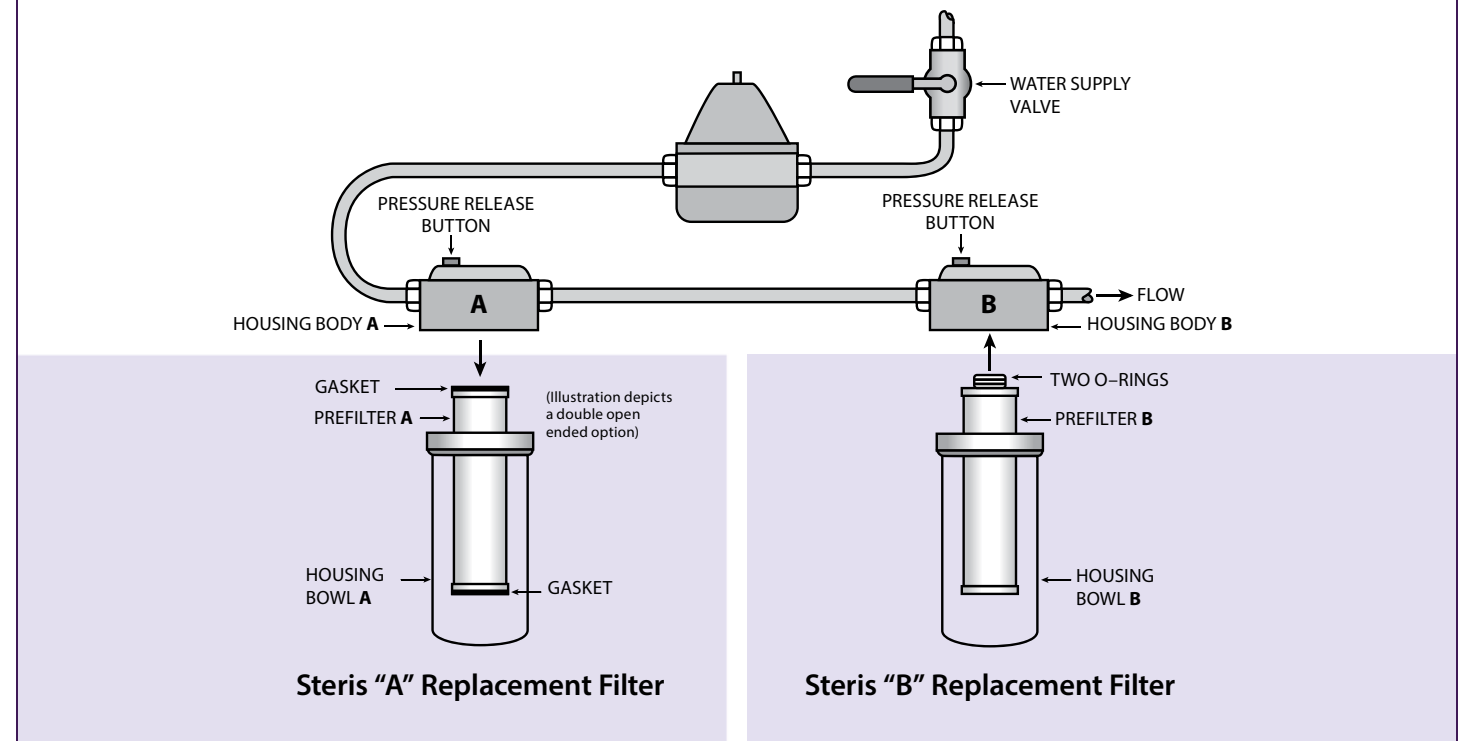
CERTIFICATIONS

- 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, and 177.1520, as applicable for food and beverage contact.

STERIS REPLACEMENT CONFIGURATION OPTIONS

Filter	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	FPLGT00100	Single open end with 2-222 silicone O-Rings. Flat cap on closed end, 0.1 micron.
	FPLGT00200	Single open end with 2-222 silicone O-Rings. Flat cap on closed end, 0.2 micron.

STERIS REPLACEMENT FILTER SPECIFICATIONS



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

Customer Service/Technical Support: 1-888-353-0303

Europe (UK): +44-1424-777791 | China: +86-21-5238-6576 | Asia: +65-9635-7690

302-731-1700 | 800-249-1990 | Fax: 1-302-369-0938 | info@gravertech.com | www.gravertech.com





TPE Series Filter Cartridges

Improved mechanical strength
and corrosion resistance

Product Specifications

Media:
Titanium, 316 Stainless Steel

End caps:
Titanium, 316 Stainless Steel

Gaskets/O-Rings:
Buna-N, EPDM, Silicone, Teflon
Encapsulated Viton (O-Rings only),
Teflon (Gasket only), Viton

Micron ratings:
0.5, 1, 5, 10, 15, 35, 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:
2.36" (60 mm)

Operating Parameters

Maximum operating temperature:
700°F (371°C) (threaded connection)

Maximum differential pressure:
250 psid (17.4 bar) forward
50 psid (3.5 bar) reverse

TITANIUM POROUS METAL TECHNOLOGY

TPE series filters are porous metal filters designed for applications involving heat, gases, aggressive chemicals, cryogenics or polymers. Made from metal powder, that is sintered to form a rugged, fixed pore structure, TPE 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. TPE 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 or 316 Stainless Steel powder — offers high corrosion resistance
- Cleanable/backwashable — allows for re-use, maximum economy
- High temperature sintering — no media migration, high pressure capabilities
- Various gasket/O-Ring materials and configurations — easily retrofits most systems

TYPICAL APPLICATIONS

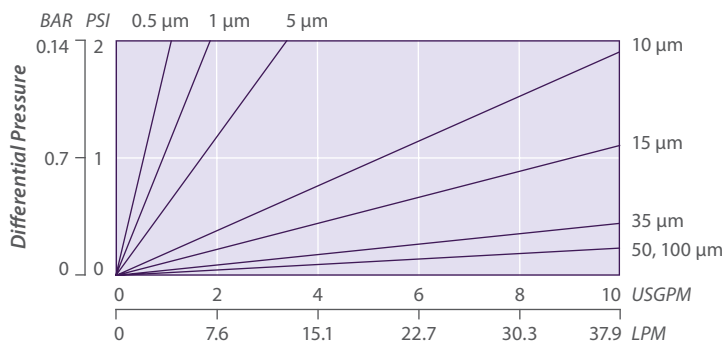
- Corrosive liquids and gases
- Cryogenic fluids
- High viscosity solutions
- Process steam
- High temperature liquids and gases
- Catalyst recovery

TPE NOMENCLATURE INFORMATION

Filter Type	Material	Retention Rating (microns)		Nominal Length (in)	End Configuration	Gasket or O-Ring
TPE Series 60 mm Diameter	S 316 Stainless Steel	0.5	15	−5	P Double Open End (Hard Endcaps)	B Buna-N
		1	35	−9.75		E EPDM
	T Titanium	5	50	−10	P2 226/Flat Single Open End	N None
		10	100	−20	P3 222/Flat Single Open End	S Silicone
				−30		T Teflon encap. Viton (O-Rings only)
				−40	M1 ¾ Inch MNPT Threads	T Teflon Gasket
Example: TPET 5−40M1N			M2 1 Inch MNPT Threads	V Viton		
TPE	T	5		−40	M1	N

TPE FLOW RATE

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



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. Contaminants included latex beads, coarse and fine test dust. Removal efficiencies were determined using dual laser source particle counters.

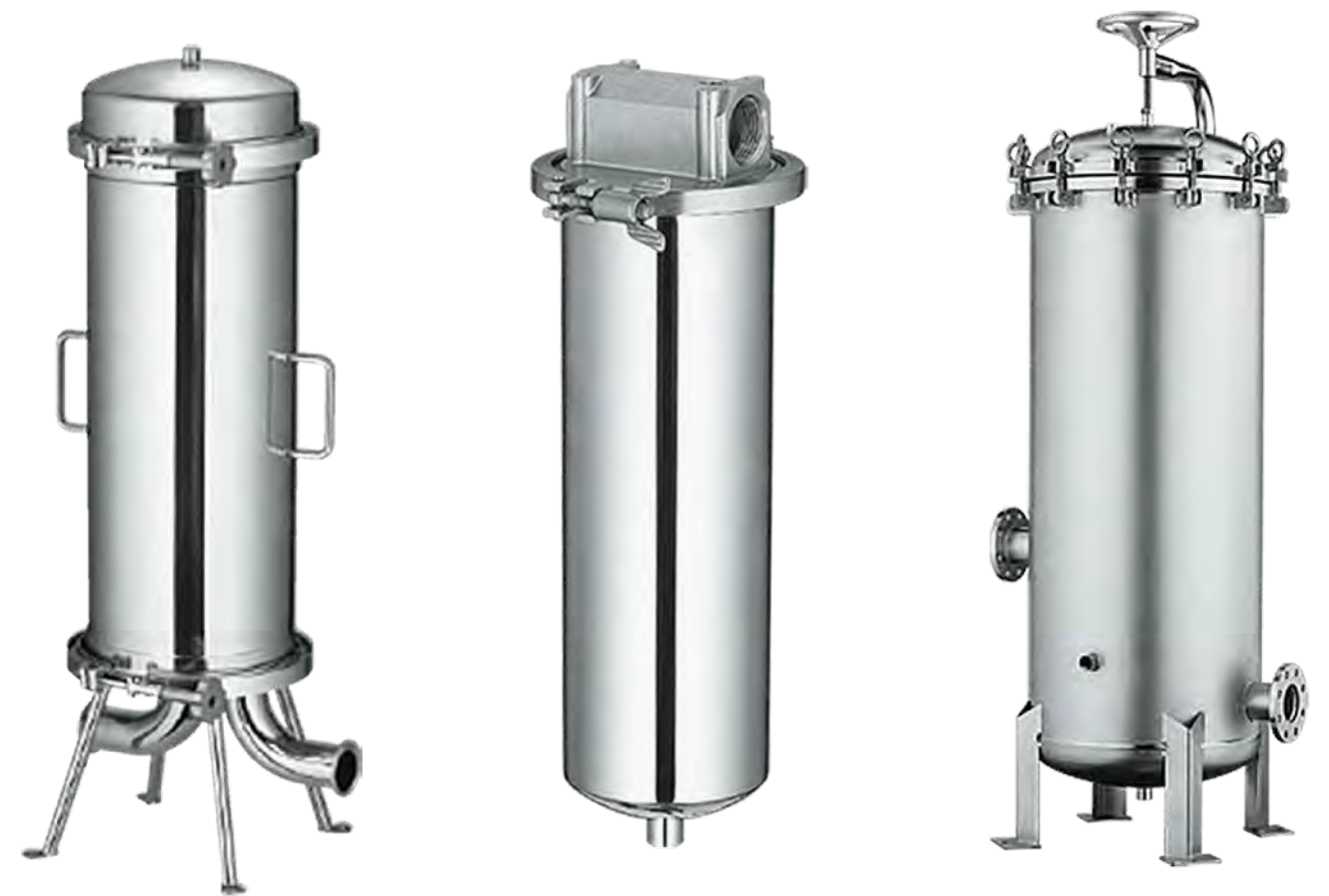
REMOVAL EFFICIENCY

Beta Ratio Efficiency	Beta 200 99.5%	Beta 20 95%	Beta 10 90%
0.5 µm	0.5	0.3	0.1
1 µm	1.0	0.8	0.4
5 µm	5.0	3.0	1.0
10 µm	10.0	8.0	5.0
15 µm	15.0	12.0	10.0
35 µm	35.0	32.0	28.0

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



Filter Housings





GHP™ Series Filter Housings

High-Purity Vessels

The GHP Series filter housings are constructed of 316L stainless steel and engineered using 3A standards for filtration applications requiring high purity production streams. Design characteristics minimize hold up volumes, provide for easy draining and optimized cleanability. External surfaces mechanically polished and internal surface is acid washed for a consistent, easy care finish.

FEATURES & BENEFITS

- Durable 316L stainless steel for corrosion resistance
- V-band clamp or swing bolt for quick and easy cartridge changeouts
- Accepts 5", 10", 20", 30" and 40" cartridges with DOE, 222/226 configuration options
- Accommodates up to 2 ¾" OD cartridges

TYPICAL APPLICATIONS

- Ultrapure Chemicals
- Ultrapure Water
- Wine/Beer
- Bottled Water
- Vaccines
- Diagnostics
- Edible Oils
- Tank Vents

Product Specifications

Materials:

316L Stainless Steel

Mechanical Polish:

External Surfaces:

32 RA

Internal Surfaces:

25 RA

Inlet/Outlet Style:

Tri-clamp, ANSI Flange, DIN

Standard Configuration

1 Round:

"T" Style: 1" Tri-clamp, legs

In-Line: 1.5" Tri-clamp

3 & 5 Round Clamp:

Dual Clamp Closure, 2" Inlet/Outlet, Legs

7 & 12 Round Swing Bolt Closure:

3" Inlet/Outlet, Legs, Handles

21 & 26 Round Swing Bolt Closure:

4" Inlet/Outlet, Legs, Handles &

Eye-bolt lift sockets

36 Round Swing Bolt Closure:

6" Inlet/Outlet, Legs, Handles

& Eye-bolt lift sockets

Operating Parameters

Maximum operating pressure:

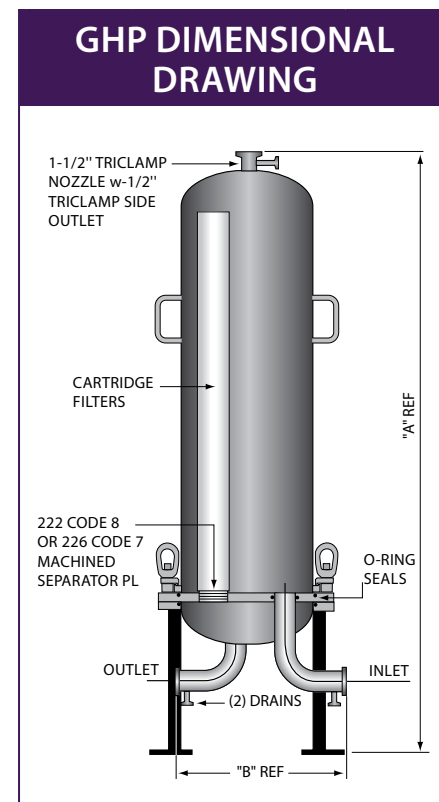
Design pressures limits of 140 PSIG

(9.8 bar) @ 212°F (100°C)

Recommended operating pressure:

Limits of 100 PSIG (6.8 bar)

@ 165°F (74°C)



GHP SERIES HOUSING NOMENCLATURE INFORMATION

Model		Cartridge Length		Inlet/Outlet Type		Vent/Drain		Cartridge Type		Gasket	
1GHP	12GHP	05	5"	-A	150# Flange	-N	½" NPT	-0	DOE	-B	Buna-N
1GHPI	21GHP	10	10"	-D	DIN	-G	Gauge Port/Vent	-3	222	-E	EPDM
3GHP	26GHP	20	20"	-T	Tri-clamp	-T	Triclamp (1/2")	-7	226	-S	Silicone
5GHP	36GHP	30	30"							-T	Teflon (Silicone)
7GHP		40	40"							-V	Viton
Example: 12GHP30-T-G-7-B											
12GHP		30		-T		-G		-7		-B	

GHP DIMENSIONAL DATA

Model	Number of Elements	Dimension A				Dimension B	Approximate Weight (lb)				Inlet/Outlet
		10"	20"	30"	40"		10"	20"	30"	40"	
1GHP	1	19.7"	29.5"	39.4"	49.2"	8.1"	10	13	17	22	1"
1GHPI	1	17.0"	26.8"	36.7"	46.5"	5.4"	8	11	14	17	1.5"
3GHP	3	26.6"	36.4"	46.3"	56.1"	13.1"	47	58	65	73	2"
5GHP	5	26.6"	36.4"	46.3"	56.1"	13.1"	47	58	65	73	2"
7GHP	7	30.0"	40.0"	50.0"	60.0"	14.4"	128	141	154	167	3"
12GHP	12	30.8"	40.8"	50.8"	60.8"	18.3"	173	191	209	227	3"
21GHP	21	--	--	51.4"	61.4"	21.5"	--	--	275	299	4"
26GHP	26	--	--	51.4"	61.4"	21.5"	--	--	275	299	4"
36GHP	36	--	--	52.0"	62.0"	24.8"	--	--	364	398	6"

Customer Service/Technical Support: 1-888-353-0303

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302-731-1700 | 800-249-1990 | Fax: 1-302-369-0938 | info@gravertech.com | www.gravertech.com



Product Specifications

Materials:

316 Stainless Steel

Surface Finish:

External Surfaces:

Electrolyzed

Internal Surfaces:

Acid Washed (Pickled)

Gauge Ports (2): 1/2" NPT

Vent Port: 1/4" NPT

Standard Configuration

3 & 5 Round Clamp/Swing

Bolt Closure:

2" NPT Inlet/Outlet, Tabs

7 Round Clamp Closure:

2" NPT Inlet/Outlet, Legs

7 & 12 Round Swing Bolt Closure:

2" NPT or 3" Flange Inlet/Outlet, Legs

21 & 26 Round Swing Bolt Closure:

4" Flange Inlet/Outlet, Davit, Legs

36 Round Swing Bolt Closure:

6" Flange Inlet/Outlet, Davit, Legs

Operating Parameters

Maximum operating pressure:

Design pressures limits of 140 PSIG
(9.8 bar) @ 212°F (100°C)

Recommended operating pressure:

Limits of 100 PSIG (6.8 bar)
@ 165°F (74°C)

GLP™ Series Filter Housings

Multi-Cartridge Filter Series

The GLP 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 surface is electrolyzed and internal surface is acid washed for a consistent, easy care finish.

FEATURES & BENEFITS

- Durable 316 stainless steel for corrosion resistance
- V-band clamp or swing bolts for quick and easy cartridge changeouts
- Accepts 10", 20", 30" and 40" cartridges with DOE, 222 and 226 configuration options
- Accommodates up to 2 3/4" OD cartridges
- Universal design has components to allow both DOE and 222 o-ring cartridge configurations to be used

TYPICAL APPLICATIONS

- Potable water
 - Edible oils
 - Cutting oils
- Process water
 - Lubricants
 - Solvents
- Coatings
 - Coolants
 - RO/DI Water



GLP SERIES HOUSING NOMENCLATURE INFORMATION

Model		Cartridge Length		Material		Inlet/Outlet Size		Inlet/Outlet Type		Cartridge Type		Gasket	
3GLPC	7GLP	10	10"	-T	316	Blank	Standard	-A	150# Flange	-U	Universal	-B	Buna-N
5GLPC	12GLP	20	20"							-7	226"	-E	EPDM
7GLPC	21GLP	30	30"					-B	BSPT			-S	Silicone
3GLP	26GLP	40	40"					-N	NPTF			-T	Teflon (Silicone)
5GLP	36GLP											-V	Viton
Example: 7GLP30-T-A-U-B													
7GLP		30		-T				-A		-U		-B	

*226 option not available on 7GLP or 7GLPC

GLP DIMENSIONAL DATA

Model	Number of Elements	Overall Height				Overall Width	Approximate Weight (lb)				Inlet/Outlet
		10"	20"	30"	40"		10"	20"	30"	40"	
3GLPC	3	24.4"	34.8"	44.8"	54.8"	11.8"	33	39	44	49	2"
5GLPC	5	24.4"	34.8"	44.8"	54.8"	13.9"	46	55	61	68	2"
7GLPC	7	24.4"	34.8"	44.8"	54.8"	13.9"	46	55	61	68	2"
3GLP	3	24.8"	31.3"	41.3"	51.3"	11.8"	55	66	77	88	2"
5GLP	5	25.1"	31.2"	41.3"	51.3"	14.1"	66	77	88	101	2"
7GLP	7	25.1"	31.2"	41.3"	51.3"	14.1"	66	77	88	101	2" (3" flange)
12GLP	12	44.3"	54.4"	64.5"	74.3"	19.9"	133	151	169	187	2" (3" flange)
21GLP	21	--	--	67.2"	77.1"	27.0"	--	--	264	319	4"
26GLP	26	--	--	67.2"	77.1"	27.0"	--	--	264	319	4"
36GLP	36	--	--	67.9"	77.8"	29.9"	--	--	418	496	6"





Product Specifications

Materials:
316 Stainless Steel

Surface Finish:
External Surfaces:
Mechanically Polished
Internal Surfaces:
Acid Washed (Pickled)

Operating Parameters

Maximum operating pressure:
Design pressures limits of 140 PSIG (9.8 bar) @ 212°F (100°C)

Recommended operating pressure:
Limits of 100 PSIG (6.8 bar) @ 165°F (74°C)

Other Details

- Economical design accommodates cartridges up to 2.75" OD
- ¼" ports in the head and sump to allow alternate installation positions for draining/venting
- Models available for DOE, 222 and 226 cartridge connections
- Center Rod with top seal nut in DOE creates an ideal seal to accommodate industry cartridge length variations

GSC™ Series Filter Housings

Single Cartridge Filter Series

The GSC Series of single cartridge metal filter cartridge housings are constructed of 316 stainless steel with a clamp closure to service a wide range of general purpose filter applications. The design allows for full sump drainage and is available to accommodate a range of cartridge configurations.

FEATURES & BENEFITS

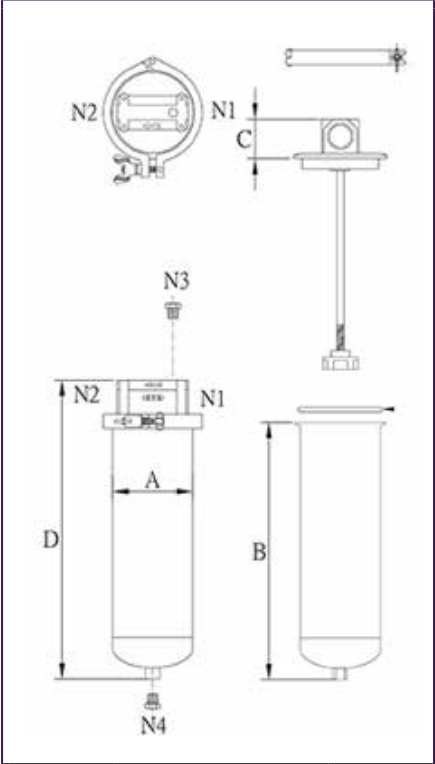
- Single shell construction for quick spill-free cartridge replacement
- In-line ¾" and 1" inlet/outlet connections for ease of installation
- Drains/Vent built in
- Flow rates of up to 7 GPM (26.5 lpm) per 10" filter cartridge
- Housing pressure drop is 0.6 PSID at 7 GPM (40mbar @ 26.5 lpm)
- Mounting bracket available

TYPICAL APPLICATIONS

- Process Water
- Petrochemicals
- Coolants
- Paints/Inks
- Hydraulic fluids
- Solvents
- Plating solutions



GSC DIMENSIONAL DRAWING



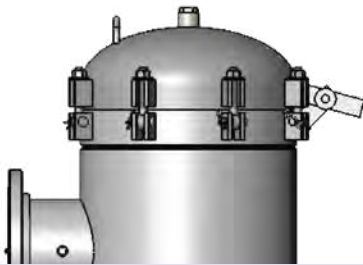
GSC SERIES HOUSING NOMENCLATURE INFORMATION

Model	Cartridge Length	Inlet / Outlet Size (inches)	Inlet/Outlet Type	Cartridge Type	Gasket
GSC	10 10"	–075 0.75"	–A 150# Flange	–0 DOE	–B Buna-N
	20 20"	–100 1.0"	–B BSPT	–3 222	–E EPDM
	30 30"		–N NPTF	–7 226	–S Silicone
	40 40"				–T Teflon (Silicone)
Example: GSC10–075–N–0–B					
GSC	10	–075	–N	–0	–B

GSC DIMENSIONAL DATA

Model	A	B	C	D	Weight
GSC10	4.2" (106 mm)	13.4" (340 mm)	2.1" (52 mm)	16.4" (422 mm)	8.8 lb (4 kg)
GSC20	4.2" (106 mm)	23.2" (590 mm)	2.1" (52 mm)	26.5" (672 mm)	12.1 lb (5.5 kg)
GSC30	4.2" (106 mm)	33.1" (840 mm)	2.1" (52 mm)	36.3" (922 mm)	15.4 lb (7.0 kg)
GSC40	4.2" (106 mm)	42.9" (1090 mm)	2.1" (52 mm)	46.1" (1172 mm)	18.7 lb (8.5 kg)





Product Specifications

Shell/O-Ring:
Buna-N, EPDM, Silicone, Viton

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

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

High Flow Series Filter Housings

Filter Housings for High Flow Applications

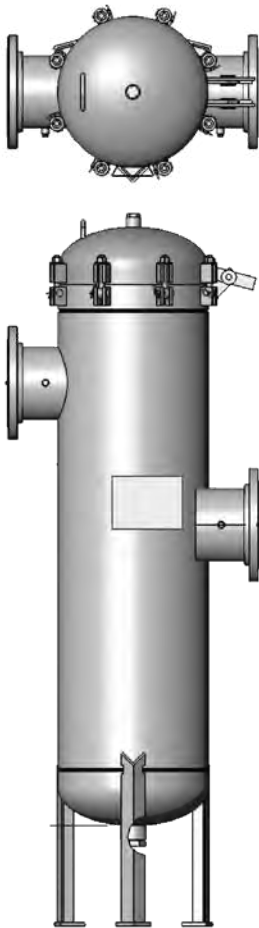
Graver High Flow Series filter housings are designed to accept Graver and competitive High Flow Series large geometry filter elements. Available in both vertical and horizontal orientations, the High Flow housings can accept from 1 to 7 filter elements. Also available is a single round tipped horizontal 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).

TYPICAL APPLICATIONS

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

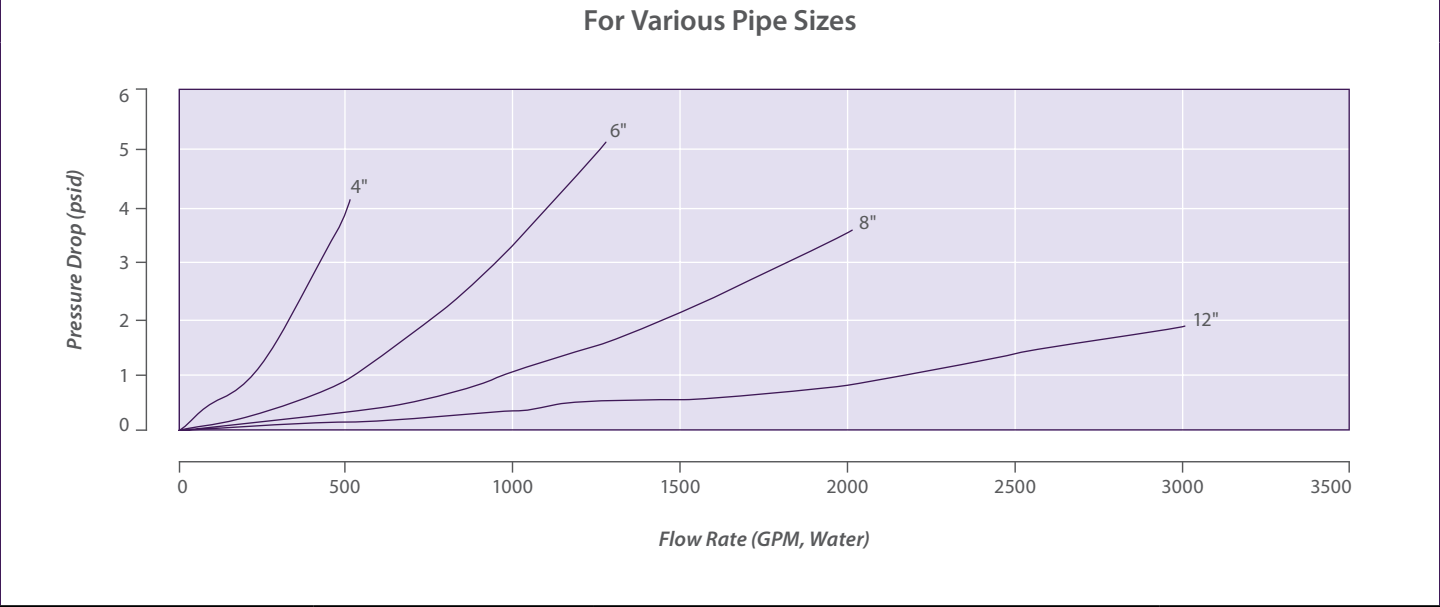


FLOW CAPACITY

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.

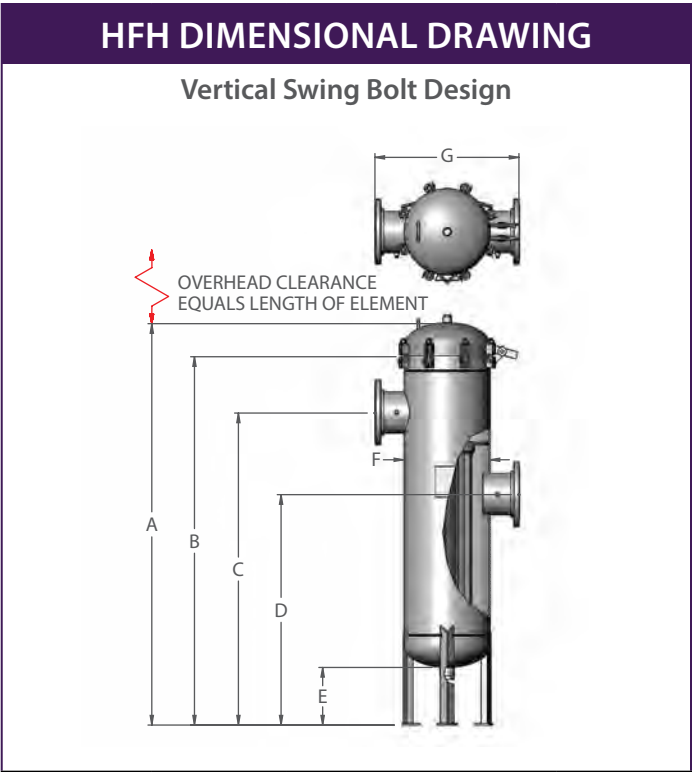
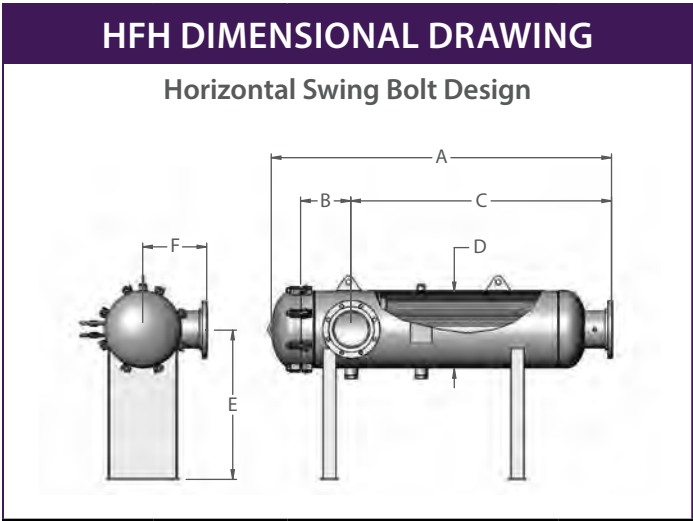
HIGH FLOW NOMENCLATURE INFORMATION									
Model	Number of Filters Around	Orien- tation	Cartridge Height (inches)	Material	Inlet/ Outlet Size	Inlet/ Outlet Config.	Pressure Rating	Gasket	Options
HFH Series	-1	V Vertical H Horizontal HT Tipped Horizontal (1 Round Only)	20	R 304 SS	-4		150 150 psig	-B Buna-N	
	-3		40	T 316 SS	-6		300 300 psig	-E EDPM	
	-4		60	C Carbon Steel	-8		(Consult Factory)	-S Silicone	
	-7			-12			-V Viton		
					-SS Side In/ Side Out			-H Hinge	
					-SB Side In/ Bottom Out			-DA Davit Arm	
								-PA Passivation	
Example: HFH1H40T-4-SS150-S-H									
HFH	1	H	40	T	-4	-SS	150	-S	-H

HIGH FLOW HOUSING PRESSURE DROP



HFH DIMENSIONAL DATA: HORIZONTAL/SWING BOLT													
Model	Rated Flow Capacity ¹ GPM (LPM)	No. 10" Elements	Filter Lengths	Dim. "A" inches (cm)	Dim. "B" inches (cm)	Dim. "C" inches (cm)	Dim. "D" ² inches (cm)	Dim. "E" ² inches (cm)	Dim. "F" ² inches (cm)	Max. Flange	Drain	Vent	Gauge
HFH 3H-40	1050 (3975)	3	40	79 ¾" (203)	11 ¾" (30)	61 ⅞" (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 ⅞" (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 ⅞" (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 ⅞" (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

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

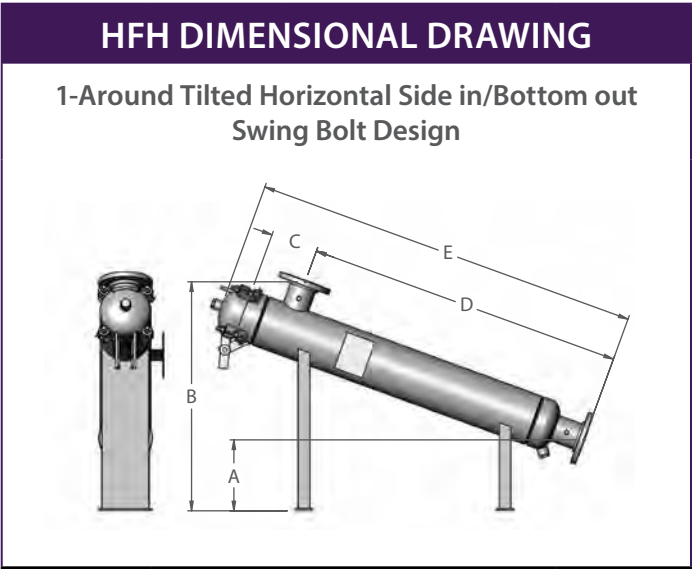
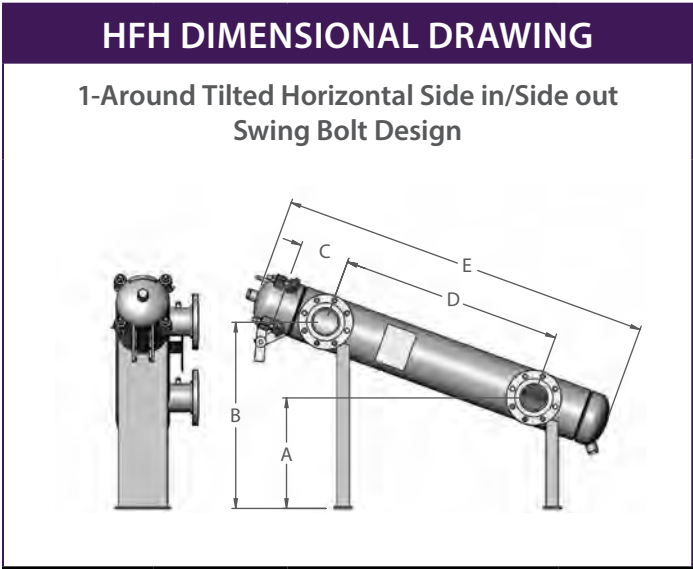


HFH DIMENSIONAL DATA: VERTICAL/SWING BOLT														
Model	Rated Flow Capacity ¹ GPM (LPM)	No. 10" Elements	Filter Lengths	Dim. "A" in (cm)	Dim. "B" in (cm)	Dim. "C" in (cm)	Dim. "D" ² in (cm)	Dim. "E" ² in (cm)	Dim. "F" ² in (cm)	Dim. "G" ² in (cm)	Max. Flange	Drain	Vent	Gauge
HFH 1V-20	175 (662)	1	20	51 ⅞" (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 ⅞" (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 ⅞" (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

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

HFH DIMENSIONAL DATA: HORIZONTAL TIPPED (SIDE IN/SIDE OUT, SWING BOLT)												
Model	Rated 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	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 ⅝" (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 ⅞" (94)	8" (20)	56" (142)	80 ½" (204)	4"	1" NPT	1" NPT	¼" NPT

¹Dim. "E" will increase by approx. 3" for SS swing



HFH DIMENSIONAL DATA: HORIZONTAL TIPPED (SIDE IN/BOTTOM OUT, SWING BOLT)												
Model	Rated 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	Drain	Vent	Gauge
HFH 1HT-20	175 (662)	1	20	12" (30)	31 15⁄16" (81)	8" (20)	33 1⁄2" (85)	45 3⁄8" (115)	4"	1" NPT	1" NPT	1⁄4" NPT
HFH 1HT-40	350 (1325)	1	40	12" (30)	38 3⁄4" (98)	8" (20)	53 1⁄2" (136)	65 3⁄8" (166)	4"	1" NPT	1" NPT	1⁄4" NPT
HFH 1HT-60	525 (1986)	1	60	12" (30)	45 5⁄8" (116)	8" (20)	73 1⁄2" (187)	85 3⁄8" (217)	4"	1" NPT	1" NPT	1⁄4" NPT

¹Dim. "E" will increase by approx. 3" for SS swing bolt housings.

Customer Service/Technical Support: 1-888-353-0303
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Terms and Conditions of Sale

1. **ENTIRETY.** These Terms and Conditions of Sale and all documents referenced herein (collectively, the “Terms”) are the only terms and conditions which govern the sale of goods (“Goods”) and/or services (“Services” and together with Goods, the “Deliverables”) by Graver Technologies, LLC (“Seller”) to the buyer (“Buyer”) and supersede all other terms and conditions, oral or written, and all other communications between the parties suggesting additional or different terms. These Terms represent the final and complete understanding of the parties and may be amended or cancelled only by mutual written agreement. Acceptance is expressly limited to these Terms. Any proposal for additional or different terms or any attempt by Buyer to vary these Terms is hereby deemed material and is objected to and rejected. No terms of any document or form submitted by Buyer shall be effective to alter or add to these Terms. The earlier of Seller’s commencement of performance or Buyer’s receipt of any of the Deliverables shall constitute acceptance of these Terms.

2. **PRICES.** Prices quoted are in U.S. Dollars and based on the price at the time of quotation and are subject to change without notice. Clerical errors are subject to correction without liability.

3. **TAXES.** Prices do not include any sales, use, excise, privilege, ad valorem, or other taxes, duties, tariffs or assessments now or hereafter imposed or levied (“Taxes”) by or under the authority of any foreign, federal, state, provincial, or local law, rule, or regulation (collectively, “Law”) concerning the Deliverables or the manufacture or sale thereof. If Seller pays any such Taxes, Buyer shall, upon demand, immediately reimburse Seller for such amounts.

4. **TERMS OF PAYMENT.** Unless otherwise provided on invoice, all payments are due within 30 days from date of invoice. Orders are subject to acceptance in writing by Seller. All payments shall be made without abatement, deduction, discount or setoff. Late payments are subject to a service charge of the lesser of 1.5% per month or the highest rate permitted under applicable Law. Buyer shall be liable for all costs and expenses related to collection of past due amounts, including, without limitation, attorneys’ fees and costs. If, in Seller’s judgment, the financial condition of Buyer does not justify continuance on the terms of payment above, Seller may require full or partial payment in advance or otherwise adjust the terms including ceasing to supply Buyer.

5. **DELIVERY.** Unless otherwise provided in writing, delivery shall be made EXW Seller’s facility and title and risk of loss passes to Buyer at such time. Delivery/performance dates are estimates only. Seller shall not be liable for any claim, loss, expense, or damage of any kind whatsoever for delays, or loss or damage in transit. Claims for loss or damage shall be made solely against the carrier. Seller may, in its sole discretion, without liability or penalty, make partial shipments of Goods to Buyer. Each shipment will constitute a separate sale, and Buyer shall pay for the units shipped whether such shipment is in whole or partial fulfillment of Buyer’s purchase order.

6. **INSPECTION.** Buyer shall inspect the Goods upon receipt and Services upon performance, and Buyer shall immediately notify Seller in writing of any claims that the Deliverables are different than identified in Buyer’s purchase order whereupon Seller shall determine the remedy pursuant to Section 12. Failure to give such written notice upon receipt will constitute irrevocable acceptance by Buyer of all Deliverables.

7. **CHANGES OR CANCELLATION.** Changes in specifications or designs to any Deliverables, changes in delivery or performance schedules or reschedules or cancellations of orders are not permitted unless Seller has accepted same in writing, has determined the additional charge to be made, if any, and the same has been paid by the Buyer. Once ordered, deliverables that are made to order, discontinued or custom products (“Special Order Goods”) may not be cancelled by Buyer. Seller reserves the right to cancel any purchase orders or releases thereunder, or terminate any agreement relating to purchase of Seller’s Deliverables, upon 10 days’ notice to Buyer.

8. **RETURNS.** Goods may not be returned without prior written authorization of Seller and compliance with Seller’s return policies and procedures then in effect.

9. **STORAGE.** In the absence of agreed shipping dates, Seller may invoice Buyer and ship the Deliverables once they are ready for shipment. If, because of Buyer’s inability to take delivery on a mutually agreed delivery date, the Deliverables are not shipped, stopped in transit or returned, Seller may store them for Buyer at Buyer’s expense and title and risk of loss shall pass to Buyer when the Deliverables are placed in storage and such date shall constitute the date of shipment for purposes of beginning the warranty and payment periods.

10. **SERVICE TERMS.** (a) Services will be provided at Seller’s then current service rates; (b) If the site is not prepared for the Services upon Seller’s arrival, Seller may charge a service fee and for any delay and/or travel time; (c) Buyer shall provide Seller with advance notice of any rules, requirements and Laws; (d) Seller may refuse, without any liability, to provide Services and to allow Seller service personnel to suspend Services or vacate any site where, in Seller’s opinion, provision of Services would pose a risk to the safety of any person. In such event, Buyer is responsible for payment of any delay and/or travel time at Seller’s regular service rates; (e) Buyer is solely liable for all damages or injuries caused or contributed to by Buyer that may occur; and (f) Buyer must provide at least 72 hours’ notice of cancellation of any Service order. If Buyer cancels with less than 72 hours’ notice, Buyer is responsible for any costs incurred by Seller caused by such cancellation.

11. **INSURANCE.** Buyer shall, at its own expense, maintain and carry insurance in full force and effect which includes, but is not limited to, commercial general liability (including product liability) in a sum no less than \$2 million per occurrence, \$2 million products-completed operations aggregate and \$2 million general aggregate with insurance carriers having an AM Best rating of “A- VIII” or better. Upon Seller’s request, Buyer shall provide Seller with a certificate of insurance from Buyer’s insurer evidencing the insurance coverage specified in these Terms. Buyer shall provide Seller with 30 days’ advance written notice in the event of a cancellation or material reduction of coverage in Buyer’s insurance policy. Except where prohibited by law, Buyer shall waive, and shall require its insurer to waive, all rights of subrogation against Seller’s insurers and Seller.

12. **LIMITED WARRANTIES.** Unless otherwise provided by Seller in its written warranty, Seller warrants that (i) Goods designed and manufactured by Seller will be free from defects in material and workmanship at delivery; and (ii) Services will be performed in a timely and competent manner in accordance with industry standards. THESE ARE SELLER’S ONLY WARRANTIES. SELLER DISCLAIMS ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT AND FITNESS FOR A PARTICULAR PURPOSE. If during the warranty period, Buyer notifies Seller in writing that the Deliverables are not in conformity with the warranty and Seller agrees, after Seller’s inspection (at its option), then: (a) for Goods, Seller will repair, replace or refund the total amount received by Seller therefor, at its sole option, provided Buyer returns such Goods to Seller’s plant for inspection; and (b) for Services, Buyer’s sole remedy is for Seller, at its sole option, to re-perform the Services or credit Buyer’s account therefor. These shall be Buyer’s exclusive remedies for Seller’s liability. Any claims not made during the warranty period are deemed waived. Seller’s warranty does not attach to Deliverables or parts not manufactured by Seller. Any contract created between Seller and Buyer is subject to the specific conditions that (a) Seller is not obligated to provide insurance or indemnify Buyer, and (b) there are no flow-downs from any person or entity including the federal government that become part of the contract. Upon the occurrence of any event described in Section 14(e)(i)-(vi) without the prior written consent of Seller, this warranty shall be void.

13. **LIMITATION OF LIABILITY.** SELLER SHALL NOT BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY INCIDENTAL, CONSEQUENTIAL, EXEMPLARY, PUNITIVE OR SPECIAL DAMAGES OR ANY OTHER LOSSES, DAMAGES OR EXPENSES WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, REGARDLESS OF WHETHER SUCH DAMAGES WERE FORESEEABLE AND WHETHER OR NOT SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING THE FAILURE OF ANY AGREED OR OTHER REMEDY OF ITS ESSENTIAL PURPOSE. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY AMOUNT IN EXCESS OF THE PRICE RECEIVED BY SELLER FOR THE DELIVERABLES WITH RESPECT TO WHICH SUCH LIABILITY IS CLAIMED.
14. **INDEMNIFICATION.** Buyer shall defend, indemnify and hold Seller, its affiliates and their respective officers, directors, members, managers, representatives, agents and employees harmless from and against all claims, suits, demands, losses, liabilities, damages (including injury and death) and expenses (including reasonable attorneys’ fees) (collectively, “Losses”), arising out of or relating to: (a) Buyer’s or its agents provided specifications, design, structure, operation, material or method of making Deliverables (“Buyer’s Specifications”), including without limitation, any resulting violation of intellectual property or proprietary rights; (b) Buyer’s use, misuse or disposal of Deliverables or materials; (c) Buyer’s non-compliance with any Law; (d) breach of these Terms by Buyer; and (e) Deliverables subjected to: (i) improper installation or storage; (ii) accident, damage, abuse or misuse; (iii) abnormal operating conditions or applications; (iv) operating conditions or applications above the rated capacity of the Deliverables; (v) repairs or modifications made to all or part of the Deliverables without the prior written consent of Seller; or (vi) a use or application other than or varying in any degree from the specifications and Seller’s instructions.
15. **PATENTS.** Provided Buyer has made all payments due Seller, Seller shall defend any suit brought against Buyer based upon a claim that the Deliverables infringe any United States patent issued as of the date of Seller’s quotation and shall pay any damages and costs finally awarded therein against Buyer, provided that Seller is notified promptly in writing of such suit and is given full authority, information and assistance by Buyer to defend or settle the suit. Notwithstanding anything to the contrary, Seller will have no liability to the extent that the suit is based upon: (i) modifications to any item made by or on behalf of the Buyer in a manner that causes the infringement; (ii) use of any item in combination with the Deliverables that causes the infringement; (iii) the failure of the Buyer to use corrections or enhancements to the Deliverables that are made available by Seller; (iv) Buyer’s Specifications; (v) Buyer’s distribution, marketing or use for the benefit of third parties of the Deliverables; or (vi) use not authorized under these Terms. If the Deliverables or any part thereof are deemed to infringe any such patent, Seller shall, at its expense and sole option either: (a) procure for Buyer the right to continue using said Deliverables or part; (b) replace them with non-infringing Deliverables or parts; (c) modify them so they become non-infringing; or (d) remove them and refund the purchase price for them depreciated over no more than 3 years.
16. **TOOLING.** In no event shall Buyer have any interest in any tools, jigs, dies, patterns, etc. (collectively, “Tooling”) which is made or obtained for the production of the Deliverables. Such Tooling shall remain the property of Seller.
17. **CONFIDENTIALITY.** All non-public or proprietary information of Seller, including all IP, quotations and pricing information, is confidential, solely for the use in performing hereunder and may not be disclosed, used or copied unless authorized by Seller in writing.
18. **INTELLECTUAL PROPERTY.** All drawings, know-how, designs, specifications, inventions, devices, developments, processes, copyrights, trademarks, patents and applications therefor, and other information or intellectual property disclosed or otherwise provided to Buyer by Seller and all rights therein (collectively, “IP”) are and will remain the property of Seller. Buyer shall have no claim to, nor ownership interest in, any IP and such information, in whatever form and any copies thereof, shall be promptly returned to Seller upon written request from Seller. Buyer acknowledges that no license or rights of any sort are granted

to Buyer hereunder in respect of any IP, other than the limited right to use the Deliverables purchased from Seller.

19. **EXPORT COMPLIANCE.** Any items provided by Seller are controlled by the United States Government and authorized for export only to the country of ultimate destination for use by the ultimate consignee or end-user(s) herein identified. They may not be resold, transferred, or otherwise disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining approval from the United States Government or as otherwise authorized by U.S. Law and regulation.
20. **FORCE MAJEURE.** Seller shall not be liable for any delay in or failure to perform due to any event or contingency beyond its reasonable control (an event of “Force Majeure”), including acts of God, epidemics, acts of war whether declared or undeclared, blockades, labor disputes (whether of Seller’s employees or the employees of others), raw material shortages and material increases in costs of raw materials, including those material increases in costs resulting from the imposition of tariffs. In the event of Force Majeure, the time for performance will extend for such time as reasonably necessary to enable Seller to perform. Seller may, during any period of shortage due to any of the above circumstances, allocate its available supply of Deliverables among itself and its purchasers in such manner as Seller, in its sole judgement, deems fair and equitable.
21. **TERMINATION.** Seller shall have the right to cease work or terminate these Terms or any purchase order, in whole or in part, at any time, without liability, if: (i) Buyer breaches or defaults under these Terms or any other agreement it has with Seller; (ii) a petition under any applicable law relating to bankruptcy, insolvency, or reorganization is filed by or against Buyer; (iii) Buyer executes an assignment for benefit or creditors; (iv) a receiver is appointed for Buyer or any substantial part of its assets; or (v) Seller shall have any reasonable ground for insecurity with respect to Buyer’s ability to perform and Buyer is unable to provide Seller with adequate assurance within 10 days after written request therefor by Seller. In all cases, Seller’s rights are cumulative, are not exclusive and in addition to all other rights and remedies it may have at law or in equity. No termination shall affect any accrued rights or obligations of either party as of the effective date of such termination.
22. **WAIVER.** All waivers by Seller shall be in writing. Failure of Seller at any time to require Buyer’s performance of any obligation hereunder shall not affect Seller’s right to require performance of that obligation. No delay or omission in the exercise of any right, power, or remedy hereunder shall impair such right, power, or remedy or be considered to be a waiver of any default or acquiescence therein.
23. **GOVERNING LAW.** Any dispute arising out of or related to these Terms will be governed by and construed in accordance with the laws of the State of Illinois without regard to any rules on conflicts of laws and exclusively litigated in either (i) a state or federal court located in Cook County, Illinois, or (ii) a state or federal court located in the state of Seller’s principal place of business, at Seller’s sole discretion.
24. **SEVERABILITY.** The unenforceability or invalidity of any clause in these Terms shall not have an impact on the enforceability or validity any other clause in these Terms. Any unenforceable or invalid clause shall be regarded as removed from these Terms to the extent of its unenforceability and invalidity.
25. **MISCELLANEOUS.** Buyer shall not assign any of its rights or obligations under these Terms or any purchase order without Seller’s prior written consent. Buyer shall comply with all applicable laws. There are no third-party beneficiaries. Provisions which by their nature should survive will remain in force after any termination or expiration of any sale of Deliverables. The section headings are included solely for the convenience of the parties.



SUPERIOR PRODUCTS & GLOBAL REACH

Whether your business is around the corner or around the world, Graver Technologies can support you with superior products and services. Our ion exchange, adsorbent, filtration, and membrane products deliver exceptional performance in some of the harshest process environments in North America, Europe, Asia, the Pacific Rim, South America, and Africa.

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FOR MORE INFORMATION

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3-20



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