FOOD & BEVERAGE FILTERS

These filter cartridges have been designed to comply with all FDA requirements for the food and beverage industry.

Nominal Depth Media Prefilters

These cartridges have been rinsed with 18 megohm-cm water to ensure that no manufacturing debris remains downstream to contaminate your product. This washing also ensures that all extractables which may affect the taste of the product or other performance characteristics such as foaming and brightness are removed.

- FGD- Fiber Glass Depth Media (PDF*)
- FPD - Polypropylene Depth Media (PDF*)

The FGD & FPD are capable of removing particulates below the rated pore size of the filter. Good filter for applications where chill haze is an issue and where "beverage brightness" is important.

Membrane Filters for Sterile Applications

- VPS & FPS Polyethersulfone Membrane Media (PDF*)

Polyethersulfone is low protein binding and therefore a good choice for fermented beverage filtrations.

- FNM- Nylon Membrane Media (PDF*)

Nylon is particularly suited for water filtration.

CRITICAL PROCESS FILTRATION, INC.

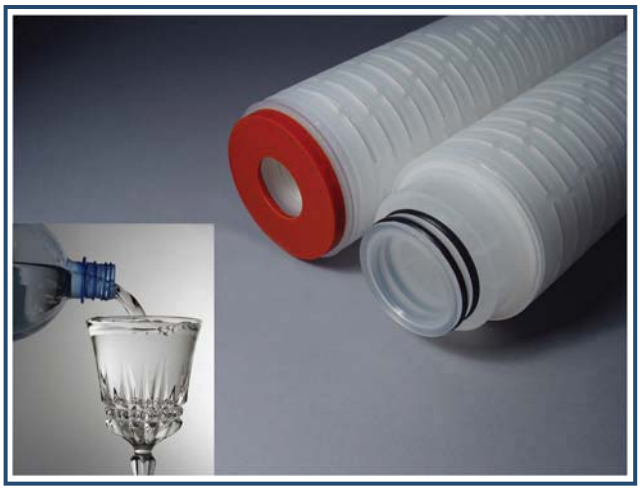
FGD grade

Fiber Glass Depth Media Filter Cartridges

Developed for the special needs of the food and beverage industry

Distributed by: John Mulhern Company info@jmulhern.com
PO Box 6604, Santa Rosa, Ca 95406
800 761-9201 707 578-5105 fx 707 578-8692

FGD cartridges have been designed to comply with all FDA requirements for the food industry. These cartridges have been rinsed with 17+ megohm-cm water to ensure that no manufacturing debris remains downstream to contaminate your product. This washing also ensures that all extractables which may effect the taste of the product or other performance characteristics such as foaming or brightness are removed . Cartridges are designed to give maximum throughput because of gradient density construction. This design facilitates cartridge cleaning. Each cartridge module is tested for integrity and is 99% efficient at the rated pore size.



Construction Materials [1]

Filtration Media: ..... Fiber Glass
Filtration Media Support: ..... Polypropylene
End Caps: ..... Polypropylene
Center Core: ..... Polypropylene
Outer support Cage: ..... Polypropylene
Sealing Method: ..... Thermal Bonding
O-rings: ..... Buna, Viton, EP, Silicone, Teflon®

[1]All materials of construction are FDA accepted. Final assemblies have been validated to pass USP class 6 Toxicology extractable tests, oxidizable substances for plastics, endotoxin level and other quality tests.

Maximum Operating Parameters

Forward Differential Pressure: ... 50 psi (3.4 bar) at 20°C.
Reverse Differential Pressure: ..... 40 psi (2.7 bar) at 20°C.
Operating Temperature:..... 180°F (82°C) at 10 psid (0.69 bar) in water.
Recommended Change Out Pressure: ... 35 psid (2.4 bar)

Dimensions

Length: ..... 5 to 40 inches (12.7 to 101.6 cm) nominal
Outside Diameter: ..... 2.75 inches (7.0 cm) nominal
Filtration Area: ..... Up to 6.8 ft² (0.63 m²) Per 10" length

Applications

Filtration of:

- Wine Clarification
- Beverage Clarification
- Process Water
- Air
- Soft Drinks
- Bottled Water
- Syrups

Sanitization / Sterilization

Filtered Hot Water: ..... 194°F (90°C)
Autoclave: ..... 260°F (127°C), 30 min, multiple cycles
In-line Steam: ..... 275°F (135°C), 30 min, multiple cycles

Chemical Sanitization : ..... Industry standard concentrations of hydrogen peroxide, paracetic acid, sodium hypochlorite and other selected chemicals. Sanitization protocols designed to extend the useful life of FGD cartridges are available from Critical Process Filtration, Inc.®.

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 10 inch cartridge element. The test fluid is water at ambient temperature. Extrapolation for housings with multiple elements and higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Pore	0.22 µm	0.30 µm	0.45 µm	0.65 µm	1.0 µm	2.0 µm	3.0 µm	5.0 µm	10 µm	20 µm	30 µm
GPM	2.6	3.0	5.0	6.0	8.0	10	12	14	› 15	›15	›15
LPM	9.84	11.35	18.92	22.71	30.28	37.85	45.42	52.99	›56.78	›56.78	›56.78

Integrity Test Information

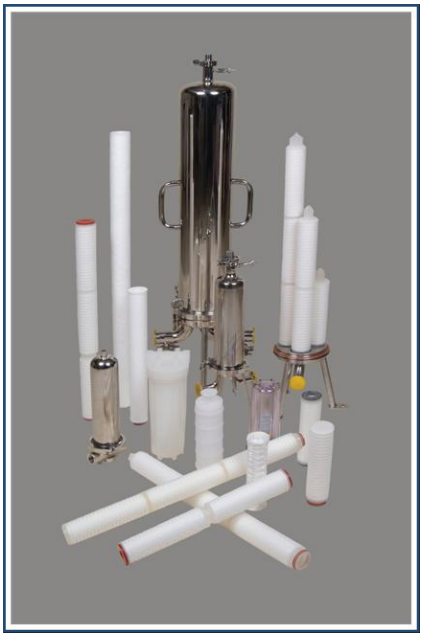
Cartridges are factory tested for integrity before shipment. Field Duplication of these tests is not practical because of the complexity of the testing process and absence of commercial portable testing equipment.

Quality Standards

Our goal is to ensure our customers the greatest possible value for their filtration dollar. We achieve both low cost manufacture and high quality by employing state of the art manufacturing equipment. This computer controlled equipment is highly automated, reducing hand operations that compromise quality. Each operation including assembly, testing, cleaning, drying and packaging is done in appropriately rated clean rooms. Critical Process Filtration manages an ISO 9000 facility that produces validated products to rigorous standards. Manufacturing is controlled using sophisticated MRP software that is networked to work stations in manufacturing centers and inspection points. During the manufacturing and inspection processes, data is collected "real time" from machinery and measuring instruments. This allows variable and attribute data to be quickly and easily analyzed to facilitate constant improvements in both quality and cost.

Total Performance

Critical Process Filtration, Inc.® is a vertically integrated supplier of filtration products and services to industries in which filtration is considered to be a critical part of the manufacturing process. We manufacture a complete line of products to help you achieve all your filtration requirements from a single source.



Ordering Information

The cartridge catalog number is made up of several variable characters i.e. pore size, length, O-ring material, and end cap code. For example: a 1.0 µm , 20 inch (50.8 cm) long cartridge with 2-222, Teflon® Encapsulated Viton O-rings, no spear (flat top) and no 316 SS Ring would be designated as: FGD1*0N00002T5.

FGD [ ] [ ] 000 [ ] [ ] [ ]

Pore size code

- ***20** = 0.22 µm
- ***30** = 0.30 µm
- ***40** = 0.45 µm
- ***60** = 0.65 µm
- **1*0** = 1.0 µm
- **2*0** = 2.0 µm
- **3*0** = 3.0 µm
- **5*0** = 5.0 µm
- **10*** = 10.0 µm
- **20*** = 20.0 µm
- **30*** = 30.0 µm

316 SS Ring

- **S** = Ring
- **N** = No Ring

Cartridge Length

- **05** - 4.875 inches (12.4 cm)
- **97** - 9.75 inches (24.6 cm)
- **01** - 10 inches (25.4 cm)
- **19** - 19.5 inches (49.5 cm)
- **02** - 20 inches (50.8 cm)
- **29** - 29.25 inches (74.3 cm)
- **03** - 30 inches (76.2 cm)
- **04** - 40 inches (101.6 cm)

O-ring code

- **S** - Silicone
- **B** - Buna
- **V** - Viton
- **T** - Teflon® Encapsulated Viton
- **E** - EP
- **R** - Teflon® Encapsulated Silicone

End cap code

- **0** - Flat Gasket, DOE
- **1** - Flat Gasket / Plug
- **2** - 2-222 O-Ring / Plug
- **3** - 213/119 Internal O-Ring DOE
- **4** - 213/119 Internal O-Ring / Plug
- **5** - 2-222 O-Ring / Flat
- **6** - 2-226 O-Ring / Flat
- **7** - 020 O-ring / Plug
- **8** - 2-222 O-ring / Spear
- **9** - 2-226 O-ring / Spear
- **21** - 2-223 O-Ring / Flat
- **22** - 2-223 O-ring / Spear
- **23** - 2-222 O-ring 3 Tab / Flat
- **24** - 2-222 O-ring 3 Tab / Spear

CRITICAL PROCESS FILTRATION, INC.

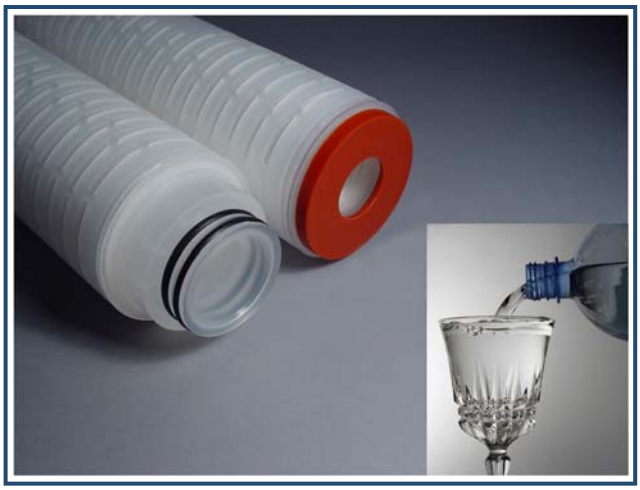
FPD grade

Polypropylene Depth Media Filter Cartridges

Developed for the special needs of the food and beverage industry

Critical Process Filtration, Inc.® • One Chestnut Street • Nashua, NH • 03060
Telephone: 603-880-4420 Fax: 603-880-4536

FPD cartridges have been designed to comply with all FDA requirements for the food industry. These cartridges have been rinsed with 18 megohm-cm water to ensure that no manufacturing debris remains downstream to contaminate your product. This washing also ensures that all extractables which may effect the taste of the product or other performance characteristics such as foaming or brightness are removed . FPD cartridges are rated at 99.9% efficiencies at the rated pore size and are designed to give maximum throughput because of gradient density construction. This design facilitates cartridge cleaning.



Construction Materials [1]

Filtration Media: ..... Polypropylene
Filtration Media Support: ..... Polypropylene
End Caps: ..... Polypropylene
Center Core: ..... Polypropylene
Outer support Cage: ..... Polypropylene
Sealing Method: ..... Thermal Bonding
O-rings: ..... Buna, Viton, EP, Silicone, Teflon® Encapsulated Silicone, Teflon® Encapsulated Viton

[1]All materials of construction are FDA accepted. Final assemblies have been validated to pass USP class 6 Toxicology extractable tests, oxidizable substances for plastics, endotoxin level and other quality tests.

Maximum Operating Parameters

Forward Differential Pressure: ... 50 psi (3.4 bar) at 20°C.
Reverse Differential Pressure: ..... 40 psi (2.7 bar) at 20°C.
Operating Temperature:..... 180°F (82°C) at 10 psid (0.69 bar) in water.
Recommended Change Out Pressure: ... 35 psid (2.4 bar)

Dimensions

Length: ..... 5 to 40 inches (12.7 to 101.6 cm) nominal
Outside Diameter: ..... 2.75 inches (7.0 cm) nominal
Filtration Area: ..... Up to 7.2 ft² (0.67 m²) Per 10" length

Applications

Filtration of:

- Wine Clarification
- Beverage Clarification
- Cosmetics
- Chemicals
- Soft Drinks
- Bottled Water
- Process Water
- Air & Gases

Sanitization / Sterilization

Filtered Hot Water: ..... 194^{0}F (90^{0}C)
Autoclave: ..... 260^{0}F (127^{0}C), 30 min, multiple cycles
In-line Steam: ..... 275^{0}F (135^{0}C), 30 min, multiple cycles

Chemical Sanitization : ..... Industry standard concentrations of hydrogen peroxide, paracetic acid, sodium hypochlorite and other selected chemicals. Sanitization protocols designed to extend the useful life of FPD cartridges are available from Critical Process Filtration, Inc.®.

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 10 inch cartridge element. The test fluid is water at ambient temperature. Extrapolation for housings with multiple elements and higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Pore	0.10	0.22	0.45	0.65	1.0 µm	3.0 µm	5.0 µm	10 µm	20 µm	30 µm	40 µm	60 µm	100 µm
GPM	1.0	3.0	5.0	6.0	8.0	12	16	18	›20	›20	› 20	›20	›20
LPM	3.79	11.35	18.92	22.71	30.28	45.42	60.56	68.13	›75.70	›75.70	›75.70	›75.70	›75.70

Integrity Test Information

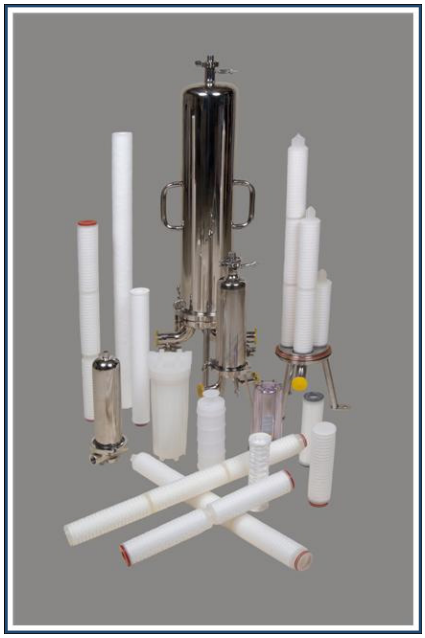
Cartridges are factory tested for integrity before shipment. Field Duplication of these tests is not practical because of the complexity of the testing process and absence of commercial portable testing equipment.

Quality Standards

Our goal is to ensure our customers the greatest possible value for their filtration dollar. We achieve both low cost manufacture and high quality by employing state of the art manufacturing equipment. This computer controlled equipment is highly automated, reducing hand operations that compromise quality. Each operation including assembly, testing, cleaning, drying and packaging is done in appropriately rated clean rooms. Critical Process Filtration manages an ISO 9000 facility that produces validated products to rigorous standards. Manufacturing is controlled using sophisticated MRP software that is networked to work stations in manufacturing centers and inspection points. During the manufacturing and inspection processes, data is collected "real time" from machinery and measuring instruments. This allows variable and attribute data to be quickly and easily analyzed to facilitate constant improvements in both quality and cost.

Total Performance

Critical Process Filtration, Inc.® is a vertically integrated supplier of filtration products and services to industries in which filtration is considered to be a critical part of the manufacturing process. We manufacture a complete line of products to help you achieve all your filtration requirements from a single source.



Ordering Information

The cartridge catalog number is made up of several variable characters i.e. pore size, length, O-ring material, and end cap code. For example: a 0.10 µm , 20 inch (50.8 cm) long cartridge with 2-222, Teflon® Encapsulated Viton O-rings, no spear (flat top) and no 316 SS Ring would be designated as: FPD*10N00002T5.

FPD □□□ □ 000 □ □ □

Pore size code

- ***10** = 0.10 µm
- ***20** = 0.22 µm
- ***40** = 0.45 µm
- ***60** = 0.65 µm
- **1*0** = 1.0 µm
- **3*0** = 3.0 µm
- **5*0** = 5.0 µm
- **10*** = 10.0 µm
- **20*** = 20.0 µm
- **30*** = 30.0 µm
- **40*** = 40.0 µm
- **60*** = 60.0 µm
- **999** = 100.0 µm

316 SS Ring

- **S** = Ring
- **N** = No Ring

Cartridge Length

- **05** = 4.875 inches (12.4 cm)
- **97** = 9.75 inches (24.6 cm)
- **01** = 10 inches (25.4 cm)
- **19** = 19.5 inches (49.5 cm)
- **02** = 20 inches (50.8 cm)
- **29** = 29.25 inches (74.3 cm)
- **03** = 30 inches (76.2 cm)
- **04** = 40 inches (101.6 cm)

O-ring code

- **S** = Silicone
- **B** = Buna
- **V** = Viton
- **T** = Teflon® Encapsulated Viton
- **E** = EP
- **R** = Teflon® Encapsulated Silicone

End cap code

- **0** = Flat Gasket, DOE
- **1** = Flat Gasket / Plug
- **2** = 2-222 O-Ring / Plug
- **3** = 213/119 Internal O-Ring DOE
- **4** = 213/119 Internal O-Ring / Plug
- **5** = 2-222 O-Ring / Flat
- **6** = 2-226 O-Ring / Flat
- **7** = 020 O-ring / Plug
- **8** = 2-222 O-ring / Spear
- **9** = 2-226 O-ring / Spear
- **21** = 2-223 O-Ring / Flat
- **22** = 2-223 O-ring / Spear
- **23** = 2-222 O-ring 3 Tab / Flat
- **24** = 2-222 O-ring 3 Tab / Spear

CRITICAL PROCESS FILTRATION, INC.

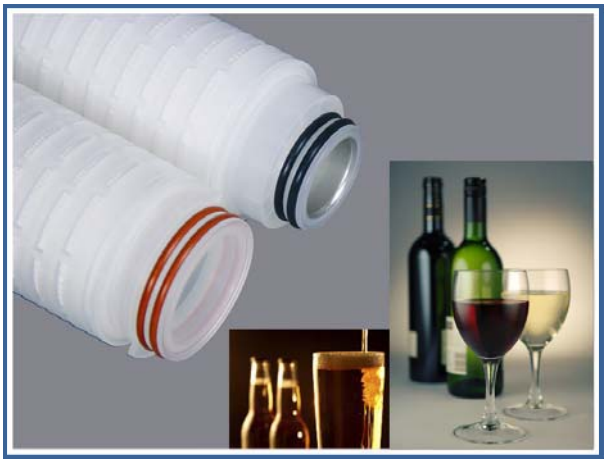
CRITICAL PROCESS FILTRATION, INC.

VPS grade

Dual Layered Polyethersulfone Membrane Media Filter Cartridges Developed for the Special Needs of the Wine and Beverage Industry

Distributed by: John Mulhern Company
PO Box 6604
Santa Rosa, Ca 95406
800 761-9201 707 578-5105
info@jmulhern.com

VPS wine and beverage grade cartridges have been designed to comply with all FDA requirements for the food and beverage industry. Polyethersulfone is low protein binding and therefore a good choice for fermented beverage filtrations. VPS cartridges are flushed with 17+ megohm-cm water to ensure that no manufacturing debris remains downstream to contaminate your product. This washing also ensures that all extractables which may affect the taste of the product are removed. Cartridges are custom configured to increase the surface area and give maximum throughputs. Each VPS is designed to handle cleaning and sanitization protocols well. Each cartridge module is individually tested to ensure integrity and is absolute at the rated pore size.



Construction Materials [1]

Filtration Media: ..... Polyethersulfone
Prefiltration Media: ..... Polyethersulfone
Filtration Media Support: ..... Polypropylene
End Caps: ..... Polypropylene
Center Core: ..... Polypropylene
Outer Support Cage: ..... Polypropylene
Sealing Method: ..... Thermal Bonding
O-rings: ..... Buna, Viton®, EP, Silicone, Teflon® Encapsulated Silicone, Teflon® Encapsulated Viton®

[1]All materials of construction are FDA accepted. Final assemblies have been validated to pass USP class 6 Toxicology extractable tests, oxidizable substances for plastics, endotoxin level and other quality tests.

Maximum Operating Parameters

Forward Differential Pressure: ..... 50 psi (3.4 bar) at 20°C.
Reverse Differential Pressure: ..... 40 psi (2.7 bar) at 20°C.
Operating Temperature: ..... 180°F (82°C) at 10 psid (0.69 bar) in water.
Recommended Change Out Pressure: ..... 35 psid (2.4 bar)

Dimensions

Length: ..... 5 to 40 inches (12.7 to 101.6 cm) nominal
Outside Diameter: ..... 2.75 inches (7.0 cm) nominal
Filtration Area: ..... 9.1 ft² (0.85 m²) Per 10" length

Validation

VPS grade cartridges are validated using modified HIMA protocols at a challenge level of 10^6 organisms per cm² of filter media. (0.22 µm challenged with Brevundimonas diminuta) (0.45 µm challenged with Serratia marcescens) (0.65 µm challenged with Saccharomyces cerevisiae).

Applications

Final Filtration of:

- Wine
- Beer
- Juices
- Vinegar
- Soft Drinks
- Bottled Water
- Process Water
- Aseptic Packaged Liquids

Sanitization / Sterilization

Filtered Hot Water: ..... 194°F (90°C)
Autoclave: ..... 260°F (127°C), 30 min, multiple cycles
In-line Steam: ..... 275°F (135°C), 30 min, multiple cycles
Chemical Sanitization: ..... Industry standard concentrations of hydrogen peroxide, paracetic acid, sodium hypochlorite and other selected chemicals. Sanitization protocols designed to extend the useful life of VPS cartridges are available from Critical Process Filtration, Inc.

Integrity Test Specifications

(per 10-inch length) (water wetted membrane)

Pore Size	Air Diffusion Rate
0.22 µm	≤ 37 cc/min at 35 psi (2412 mbar)
0.45 µm	≤ 37 cc/min at 20 psi (1378 mbar)
0.65 µm	≤ 37 cc/min at 15 psi (1044 mbar)
0.80 µm	≤ 37 cc/min at 12 psi (827 mbar)
1.0 µm	≤ 37 cc/min at 8 psi (552 mbar)
1.2 µm	≤ 37cc/min at 7 psi (483 mbar)

Flow Rate

The following table represents typical water flow at a one psi (69 m bar) pressure differential across a single 10-inch cartridge element. The test fluid is water at ambient temperature. Extrapolation for housings with multiple elements and higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Pore Size	0.22 µm	0.45 µm	0.65 µm	0.80 µm	1.0 µm	1.2 µm
GPM	4.5	7.0	8.3 9.0		9.5	9.8
LPM	17.03	26.49	31.41 34.06		35.96	37.09

Quality Standards

Our goal is to ensure our customers the greatest possible value for their filtration dollar. We achieve both low cost manufacture and high quality by employing state of the art manufacturing equipment. This computer-controlled equipment is highly automated, reducing hand operations that compromise quality. Each operation, including assembly, testing, cleaning, drying and packaging, is done in appropriately rated clean rooms. Critical Process Filtration manages an ISO 9000 facility that produces validated products to rigorous standards. Manufacturing is controlled using sophisticated MRP software that is networked to work stations in manufacturing centers and inspection points. During the manufacturing and inspection processes, data is collected "real time" from machinery and measuring instruments. This allows variable and attribute data to be quickly and easily analyzed to facilitate constant improvements in both quality and cost.

Total Performance

Critical Process Filtration, Inc. is a vertically integrated supplier of filtration products and services to industries in which filtration is considered to be a critical part of the manufacturing process. We manufacture a complete line of products to help you achieve all your filtration requirements from a single

Ordering Information

The cartridge catalog number is made up of several variable characters i.e. pore size, length, O-ring material, and end cap code. For example: a 0.45 µm, 20 inch (50.8 cm) long cartridge with 2-222, Silicone O-rings, no spear (flat top) and no 316 SS Ring would be designated as: VPS*40N00002S5.

VPS [ ] [ ] **000** [ ] [ ] [ ]

Pore size code
***20** = 0.22 µm
***40** = 0.45 µm
***60** = 0.65 µm
***80** = 0.80 µm
1*0 = 1.0 µm
1*2 = 1.2 µm

316 SS Ring
S = Ring
N = No Ring

Cartridge Length
05 = 4.875 inches (12.4 cm)
97 = 9.75 inches (24.6 cm)
01 = 10 inches (25.4 cm)
19 = 19.5 inches (49.5 cm)
02 = 20 inches (50.8 cm)
29 = 29.25 inches (74.3 cm)
03 = 30 inches (76.2 cm)
04 = 40 inches (101.6 cm)

O-ring code
S = Silicone
B = Buna
V = Viton®
T = Teflon® Encapsulated Viton®
E = EP
R = Teflon® Encapsulated Silicone

End cap code
0 = Flat Gasket, DOE
1 = Flat Gasket / Plug
2 = 2-222 O-ring / Plug
3 = 213/119 Internal O-ring DOE
4 = 213/119 Internal O-ring / Plug
5 = 2-222 O-ring / Flat
6 = 2-226 O-ring / Flat
7 = 020 O-ring / Plug
8 = 2-222 O-ring / Spear
9 = 2-226 O-ring / Spear
21 = 2-223 O-ring / Flat
22 = 2-223 O-ring / Spear
23 = 2-222 O-ring 3 Tab / Flat
24 = 2-222 O-ring 3 Tab / Spear

CRITICAL PROCESS FILTRATION, INC.

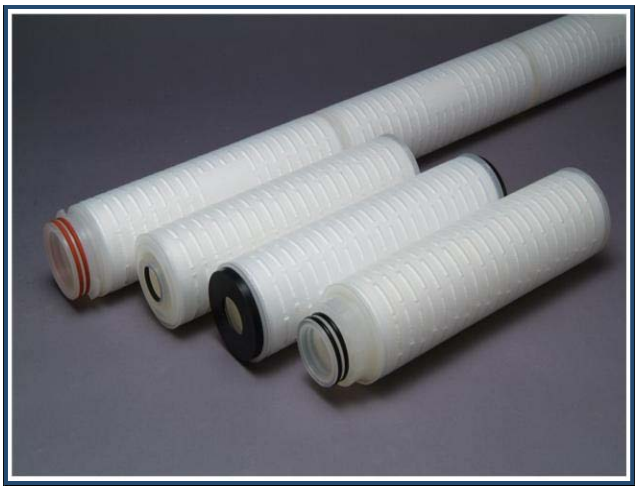
CRITICAL PROCESS FILTRATION, INC.

FPS grade

Polyethersulfone Membrane Media Filter Cartridges developed for the special needs of the food and beverage industry

Distributed by: John Mulhern Company www.jmulhern.com
Santa Rosa, CA e-mail: info@jmulhern.com
(800) 761-9201 (707) 578-5105 Fax: (707) 578-8692

FPS food and beverage grade cartridges have been designed to comply with all FDA requirements for the food industry. Polyethersulfone is low protein binding and therefore a good choice for fermented beverage filtrations. FPS cartridges are flushed with 17+ megohm-cm water to ensure that no manufacturing debris remains downstream to contaminate your product. This washing also ensures that all extractables which may effect the taste of the product are removed. Cartridges are designed to give maximum throughput and handle cleaning and sanitization protocols well. Each cartridge module is individually tested to ensure integrity and is absolute at the rated pore size.



Construction Materials [1]

Filtration Media: ..... Polyethersulfone
Filtration Media Support: ..... Polypropylene
End Caps: ..... Polypropylene
Center Core: ..... Polypropylene
Outer support Cage: ..... Polypropylene
Sealing Method: ..... Thermal Bonding
O-rings: ..... Buna, Viton, EP, Silicone, Teflon® Encapsulated Silicone, Teflon® Encapsulated Viton

[1]All materials of construction are FDA accepted. Final assemblies have been validated to pass USP class 6 Toxicology extractable tests, oxidizable substances for plastics, endotoxin level and other quality tests.

Maximum Operating Parameters

Forward Differential Pressure: ... 50 psi (3.4 bar) at 20°C.
Reverse Differential Pressure: ..... 40 psi (2.7 bar) at 20°C.
Operating Temperature:..... 180°F (82°C) at 10 psid (0.69 bar) in water.
Recommended Change Out Pressure: ... 35 psid (2.4 bar)

Dimensions

Length: ..... 5 to 40 inches (12.7 to 101.6 cm) nominal
Outside Diameter: ..... 2.75 inches (7.0 cm) nominal
Filtration Area: ..... 7.0 ft ² (0.65 m²) Per 10" length

Validation

FPS grade cartridges are validated using modified HIMA protocols at a challenge level of 10^6 organisms per cm² of filter media. (0.22 µm challenged with Brevundimonas diminutal) (0.45 µm challenged with Serratia marscecens) (0.65 µm challenged with Saccharomyces cerevisiae).

Applications

Final Filtration of:

- Wine
- Beer
- Juices
- Vinegar
- Soft Drinks
- Bottled Water
- Process Water
- Aseptic Packaged liquids

Sanitization / Sterilization

Filtered Hot Water: ..... 194°F (90°C)
Autoclave: ..... 260°F (127°C), 30 min, multiple cycles
In-line Steam: ..... 275°F (135°C), 30 min, multiple cycles

Chemical Sanitization : .....Industry standard concentrations of hydrogen peroxide, paracetic acid, sodium hypochlorite and other selected chemicals. Sanitization protocols designed to extend the useful life of FPS cartridges are available from Critical Process Filtration, Inc.®.

Integrity Test Specifications (per 10 inch length) (water wetted membrane)

Pore Size	Air Diffusion Rate
0.03 µm	< 30 cc/min at 60 psi (4137 mbar)
0.1 µm	< 30 cc/min at 48 psi (3307 mbar)
0.22 µm	< 30 cc/min at 35 psi (2412 mbar)
0.45 µm	< 30 cc/min at 20 psi (1378 mbar)
0.65 µm	< 30 cc/min at 15 psi (1044 mbar)
0.8 µm	< 30 cc/min at 12 psi (827 mbar)
1.0 µm	< 30 cc/min at 8 psi (552 mbar)
1.2 µm	< 30 cc/min at 7 psi (483 mbar)

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 10 inch cartridge element. The test fluid is water at ambient temperature. Extrapolation for housings with multiple elements and higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

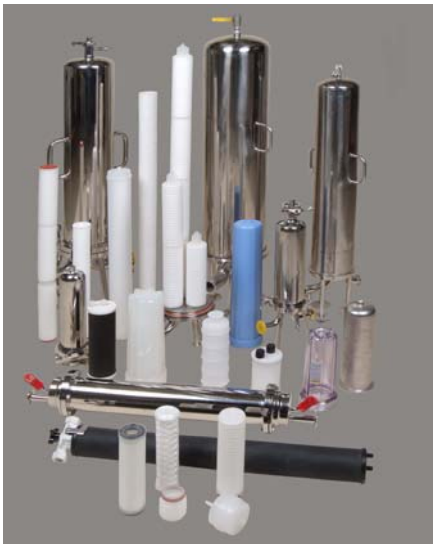
Pore Size	0.03 µm	0.10 µm	0.22 µm	0.45 µm	0.65 µm	0.80 µm	1.0 µm	1.2 µm
GPM	1.5	2.5	4.5	7.0	8.3	9.0	9.5	9.8
LPM	5.67	9.46	17.03	26.49	31.41	34.06	35.96	37.09

Quality Standards

Our goal is to ensure our customers the greatest possible value for their filtration dollar. We achieve both low cost manufacture and high quality by employing state of the art manufacturing equipment. This computer controlled equipment is highly automated, reducing hand operations that compromise quality. Each operation including assembly, testing, cleaning, drying and packaging is done in appropriately rated clean rooms. Critical Process Filtration manages an ISO 9000 facility that produces validated products to rigorous standards. Manufacturing is controlled using sophisticated MRP software that is networked to work stations in manufacturing centers and inspection points. During the manufacturing and inspection processes, data is collected "real time" from machinery and measuring instruments. This allows variable and attribute data to be quickly and easily analyzed to facilitate constant improvements in both quality and cost.

Total Performance

Critical Process Filtration, Inc.® is a vertically integrated supplier of filtration products and services to industries in which filtration is considered to be a critical part of the manufacturing process. We manufacture a complete line of products to help you achieve all your filtration requirements from a single source.



Ordering Information

The cartridge catalog number is made up of several variable characters i.e. pore size, length, O-ring material, and end cap code. For example: a 0.45 µm , 20 inch (50.8 cm) long cartridge with 2-222, Silicone O-rings, no spear (flat top) and no 316 SS Ring would be designated as: FPS*40N00002S5.

FPS □□□ □ 0000 □ □ □

Pore size code

- ***03** - 0.03 µm
- ***10** - 0.10 µm
- ***20** - 0.22 µm
- ***40** - 0.45 µm
- ***60** - 0.65 µm
- ***80** - 0.80 µm
- **1*0** - 1.0 µm
- **1*2** - 1.2 µm

316 SS Ring

- **S** - SS Ring
- **N** - No Ring

Cartridge Length

- **5** - 5 inches (12.7 cm)
- **1** - 10 inches (25.4 cm)
- **2** - 20 inches (50.8 cm)
- **3** - 30 inches (76.2 cm)
- **4** - 40 inches (101.6 cm)

O-ring code

- **S** - Silicone
- **B** - Buna
- **V** - Viton
- **T** - Teflon® Encapsulated Viton
- **E** - EP
- **R** - Teflon® Encapsulated Silicone

End cap code

- **0** - Flat Gasket, double open end
- **1** - Flat Gasket w/Plug
- **2** - 2-222 w/ Plug
- **3** - 213/119 Both Ends
- **4** - 213/119 w/ Plug
- **5** - 2-222 O-Ring / Flat
- **6** - 2-226 O-Ring / Flat
- **7** - 020 O-ring
- **8** - 2-222 O-ring with Spear
- **9** - 2-226 O-ring with Spear

Note: For additional cap codes, see selection guide data sheet. CCDS0107

CRITICAL PROCESS FILTRATION, INC.

Web Site: www.criticalprocess.com

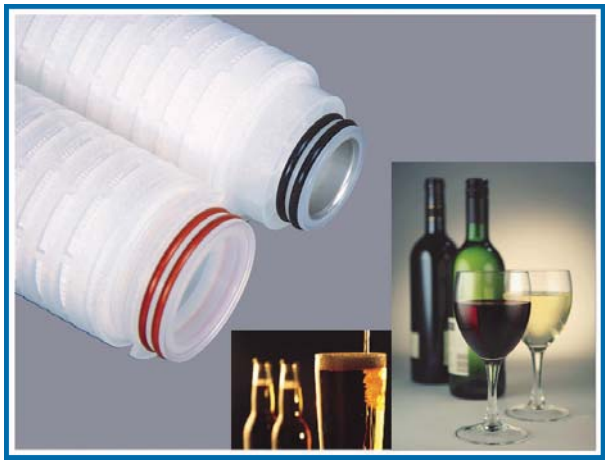
CRITICAL PROCESS FILTRATION, INC.

FNM grade

Nylon Membrane Media Filter Cartridges Developed for the Special Needs of the Food and Beverage Industry

Distributed by: John Mulhern Company
PO Box 6604, Santa Rosa, CA 95406
(800)761-9210 (707)578-5105 info@jmulhern.com

FNM cartridges have been designed to comply with all FDA requirements for the food industry. Nylon is particularly suited for water and syrup filtration. Fermented beverages and high protein liquids are better filtered with other polymers. Contact Critical Process Filtration to discuss the potential to use this cartridge as a low cost alternative in compressed gas filtration. These cartridges have been rinsed with 17+ megohm-cm water to ensure that no manufacturing debris remains downstream to contaminate your product. This washing also ensures that extractables which may effect the taste of the product are removed.



Construction Materials [1]

Filtration Media: ..... Nylon
Filtration Media Support: ..... Polypropylene
End Caps: ..... Polypropylene
Center Core: ..... Polypropylene
Outer Support Cage: ..... Polypropylene
Sealing Method: ..... Thermal Bonding
O rings: ..... Buna, Viton®, EP, Silicone, Teflon® Encapsulated Silicone, Teflon® Encapsulated Viton®

[1]All materials of construction are FDA accepted. Final assemblies have been validated to pass USP class 6 Toxicology extractable tests, oxidizable substances for plastics, endotoxin level and other quality tests.

Maximum Operating Parameters

Forward Differential Pressure: ..... 50 psi (3.4 bar) at 20°C.
Reverse Differential Pressure: ..... 40 psi (2.7 bar) at 20°C.
Operating Temperature: ..... 180°F (82°C) at 10 psid (0.69 bar) in water.
Recommended Change Out Pressure: ..... 35 psid (2.4 bar)

Dimensions

Length: ..... 5 to 40 inches (12.7 to 101.6 cm) nominal
Outside Diameter: ..... 2.75 inches (7.0 cm) nominal
Filtration Area: ..... 7.0 ft² (0.65 m²) Per 10" length

Validation

FNM grade cartridges are validated using modified HIMA protocols at a challenge level of 10^6 organisms per cm² of filter media. (0.22 µm challenged with Brevundimonas diminutal) (0.45 µm challenged with Serratia marscecens) (0.65 µm challenged with Saccharomyces cerevisiae).

Applications

Final Filtration of:

- Syrup
- Bottled Water
- Soft Drinks
- Process Wate

Sanitization / Sterilization

Filtered Hot Water: ..... 194°F (90°C)
Autoclave: ..... 260°F (127°C), 30 min, multiple cycles
In line Steam: ..... 275°F (135°C), 30 min, multiple cycles
Chemical Sanitization: ..... Nylon does not tolerate heavy concentrations of common sanitization agents. Consult Critical Process filtration to determine if your chemical sanitization protocol can be used with these cartridges. Or for a protocol that meets your needs and is compatible with these cartridges.

Integrity Test Specifications

(per 10-inch length) (water wetted membrane)

Pore Size	Air Diffusion Rate
0.03 µm	≤ 30 cc/min at 60 psi (4137 mbar)
0.10 µm	≤ 30 cc/min at 48 psi (3307 mbar)
0.22 µm	≤ 30 cc/min at 35 psi (2412 mbar)
0.45 µm	≤ 30 cc/min at 20 psi (1378 mbar)
0.65 µm	≤ 30 cc/min at 15 psi (1034 mbar)

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 10 inch cartridge element. The test fluid is water at ambient temperature. Extrapolation for housings with multiple elements and higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Pore	0.03 µm	0.10 µm	0.22 µm	0.45 µm	0.65 µm
GPM	0.75	1.0	1.25	3.0	5.5
LPM	2.84	3.79	4.73	11.36	20.82

Total Performance

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Quality Standards

Our goal is to ensure our customers the greatest possible value for their filtration dollar. We achieve both low cost manufacture and high quality by employing state of the art manufacturing equipment. This computer controlled equipment is highly automated, reducing hand operations that compromise quality. Each operation including assembly, testing, cleaning, drying and packaging is done in appropriately rated clean rooms. Critical Process Filtration manages an ISO 9000 facility that produces validated products to rigorous standards. Manufacturing is controlled using sophisticated MRP software that is networked to work stations in manufacturing centers and inspection points. During the manufacturing and inspection processes, data is collected "real time" from machinery and measuring instruments. This allows variable and attribute data to be quickly and easily analyzed to facilitate constant improvements in both quality and cost.

Ordering Information

The cartridge catalog number is made up of several variable characters i.e. pore size, length, O-ring material, and end cap code. For example: a 0.45 µm , 20 inch (50.8 cm) long cartridge with 2-222, Silicone O-rings, no spear (flat top) and no 316 SS Ring would be designated as: FNM*40N00002S5.

FNM [ ] [ ] **000** [ ] [ ] [ ]

Pore size code
- ***03** = 0.03 µm
- ***10** = 0.10 µm
- ***20** = 0.22 µm
- ***40** = 0.45 µm
- ***60** = 0.65 µm

316 SS Ring
- **S** = Ring
- **N** = No Ring

Cartridge Length
- **05** = 4.875 inches (12.4 cm)
- **97** = 9.75 inches (24.6 cm)
- **01** = 10 inches (25.4 cm)
- **19** = 19.5 inches (49.5 cm)
- **02** = 20 inches (50.8 cm)
- **29** = 29.25 inches (74.3 cm)
- **03** = 30 inches (76.2 cm)
- **04** = 40 inches (101.6 cm)

O ring code
- **S** = Silicone
- **B** = Buna
- **V** = Viton®
- **T** = Teflon® Encapsulated Viton®
- **E** = EP
- **R** = Teflon® Encapsulated Silicone

End cap code
- **0** = Flat Gasket, DOE
- **1** = Flat Gasket / Plug
- **2** = 2-222 O-ring / Plug
- **3** = 213/119 Internal O-ring DOE
- **4** = 213/119 Internal O-ring / Plug
- **5** = 2-222 O-ring / Flat
- **6** = 2-226 O-ring / Flat
- **7** = 020 O-ring / Plug
- **8** = 2-222 O-ring / Spear
- **9** = 2-226 O-ring / Spear
- **21** = 2-223 O-ring / Flat
- **22** = 2-223 O-ring / Spear
- **23** = 2-222 O-ring 3 Tab / Flat
- **24** = 2-222 O-ring 3 Tab / Spear

CRITICAL PROCESS FILTRATION, INC.