CRITICAL PROCESS FILTRATION, INC.

CP capsules

Complete Range of Disposable Media Filter Capsules engineered and manufactured for cost effective filtration

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CP capsules are designed and manufactured by Critical Process for small flow and encapsulated disposable cartridge requirements. CP capsules are offered in a wide range of pleated and depth medias and offered in four grades; general, food / beverage, electronic and pharmaceutical. Each Capsule has been designed to hold the maximum amount of filter media that can be completely and effectively utilized in a capsule. CP capsules lower the cost of filtration and reduce the need for high cost metallic housings. They are well suited for liquids and gas applications with the same attention to quality, traceability, validation and testing.

General Specifications

Construction Materials [1]

Housing: ..... Polypropylene
Filtration Media:

Membranes
Polyethersulfone - PS
Nylon - NM
Polypropylene - PM
PTFE - TM

Depth Pleated
Polypropylene - PD
Fiberglass - GD

Depth
Polypropylene 85% - MB
Polypropylene 95% - BD
Polypropylene 99% - NS

Filtration Media Support: ..... Polypropylene
Support Components: ..... Polypropylene
Sealing Method: ..... Heat - Fused

[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

Liquid Operational Pressure: ..... 80 psi (5.5 bar) at 20°C.
Gases Operational Pressure: ..... 60 psi (4.1 bar) at 20°C.
Forward Differential Pressure: ... 50 psi (3.4 bar) at 20°C.
Reverse Differential Pressure: ..... 40 psi (2.7 bar) at 20°C.
Operating Temperature:..... 170°F (76°C) at 20 psid (1.3 bar) in water.
Recommended Change Out Pressure: ... 20 psid (2.4 bar)

Pore Size

Removal Ratings: ..... 0.03 to 100 microns
(continue to the media specifications for the specific pore size available)

Sanitization / Sterilization

Filtered Hot Water: ..... 194^0F (90^0C)
Autoclave: ..... 260^0F (127^0C), 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 CP capsules are available from Critical Process Filtration, Inc.®.

Pre Sterilized: ... CP capsules are offered in both a non and pre sterilized grade.

Inlet & Outlet Options

1/4" Female NPT
1/4" Male NPT
3/8" Female NPT
1/2" Female NPT
1/2" Male NPT
Sanitary
Hose Barb

Vent & Drain

Standard with Luer-Lok® ports and caps

Dimensions

Nominal Length: (length based on capsules with hose barb connections)

Capsule	2"	5"	10"	20"	30"
Inches	5"	8 5/8"	13 3/8"	22 7/8"	32 7/16"
cm	12.7	22.0	33.9	58.2	82.4

Outside Diameter: ..... 3.50 inches (8.9 cm) nominal

Membranes

Polyethersulfone Membrane - PS

PS Capsules are hydrophilic and manufactured with the highest quality asymmetric polyethersulfone membrane. Polyethersulfone membrane exhibits excellent flow rates with precise retention ratings. PS capsules are used for the most critical applications including beverage, electronic and pharmaceutical. PS capsules can handle a wide range of pH and chemical compatibility. Many applications include high purity water, process water, wine, inks, dyes, acids, bases and oxidants. Used for solvents, cosmetics, alcohols and many others. Our double layered pharmaceutical PS capsules see broad service in sterile fill applications in SVPs and biological products. Polyethersulfone is particularly suited for the filtration of products whose constituents, such as preservatives, can adsorb to the media. The lower binding characteristics of Polyethersulfone make it a good choice for filtration of valuable protein solutions such as vaccines and other biologicals. PPS .22 micron membrane is sterilizing grade LAL tested, non-reactive. 100% integrity tested.

Integrity Test Specifications (per 1.0 ft ² (930 cm²)

(water wetted membrane)

Air Diffusion Rate			
Pore Size	**G - Grade**	**F & E - Grade**	**P - Grade**
0.03 µm	≤ 11 cc/min at 60 psi (4137 mbar)	≤ 6 cc/min at 60 psi (4137 mbar)	≤ 3 cc/min at 60 psi (4137 mbar)
0.1 µm	≤ 11 cc/min at 48 psi (3307 mbar)	≤ 6 cc/min at 48 psi (3307 mbar)	≤ 3 cc/min at 48 psi (3307 mbar)
0.22 µm	≤ 11 cc/min at 35 psi (2412 mbar)	≤ 6 cc/min at 35 psi (2412 mbar)	≤ 3 cc/min at 35 psi (2412 mbar)
0.45 µm	≤ 11 cc/min at 20 psi (1378 mbar	≤ 6 cc/min at 20 psi (1378 mbar	≤ 3 cc/min at 20 psi (1378 mbar
0.65 µm	≤ 11 cc/min at 15 psi (1044 mbar)	≤ 6 cc/min at 15 psi (1044 mbar)	≤ 3 cc/min at 15 psi (1044 mbar)
0.8 µm	≤ 11 cc/min at 12 psi (827 mbar)	≤ 6 cc/min at 12 psi (827 mbar)	≤ 3 cc/min at 12 psi (827 mbar)
1.0 µm	≤ 11 cc/min at 8 psi (552 mbar)	≤ 6 cc/min at 8 psi (552 mbar)	≤ 3 cc/min at 8 psi (552 mbar)
1.2 µm	≤ 11 cc/min at 7 psi (483 mbar)	≤ 6 cc/min at 7 psi (483 mbar)	≤ 3 cc/min at 7 psi (483 mbar)

Flow Rate / Filtration Area

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule 1.0 ft ² (930 cm²) of media with 1/2" FNPT ports. The test fluid is water at ambient temperature. 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	.20	.34	.64	1.0	1.4	1.5	1.6	1.65
LPM	0.76	1.29	2.42	3.79	5.30	5.68	6.06	6.25

Filtration Area		
2" Capsule	**5" Capsule**	**10" Capsule**
1.0 ft ² (930 cm²)	3.0 ft ² (2788 cm²)	6.8 ft ² (6318 cm²)

Nylon Membrane - NM

NM Capsules are hydrophilic Nylon membrane, able to remove particles below the rated pore size of the membrane. These capsules exhibit superior retention, used across the beverage, electronic and pharmaceutical industries. Applications include high purity water, esters, solvents, cosmetics, alcohols, ketones, glycols and many others. PNM grade Nylon capsules are designed to be used as sterilizing grade capsules for the pharmaceutical industry. Nylon capsules see broad service in sterile fill applications in SVPs and as bio burden management filters in LVPs. Media and service liquid filtration are other common applications for this capsule. Nylon is particularly suited for the filtration of solvents because of it's broad compatibility and low level of extractables. 100% integrity tested.

Integrity Test Specifications (per 1.0 ft ² (930 cm²)

(water wetted membrane)

Air Diffusion Rate			
Pore Size	**G - Grade**	**F & E - Grade**	**P - Grade**
0.03 µm	≤ 11 cc/min at 60 psi (4137 mbar)	≤ 6 cc/min at 60 psi (4137 mbar)	≤ 3 cc/min at 60 psi (4137 mbar)
0.1 µm	≤ 11 cc/min at 48 psi (3307 mbar)	≤ 6 cc/min at 48 psi (3307 mbar)	≤ 3 cc/min at 48 psi (3307 mbar)
0.22 µm	≤ 11 cc/min at 35 psi (2412 mbar)	≤ 6 cc/min at 35 psi (2412 mbar)	≤ 3 cc/min at 35 psi (2412 mbar)
0.45 µm	≤ 11 cc/min at 20 psi (1378 mbar	≤ 6 cc/min at 20 psi (1378 mbar	≤ 3 cc/min at 20 psi (1378 mbar
0.65 µm	≤ 11 cc/min at 15 psi (1044 mbar)	≤ 6 cc/min at 15 psi (1044 mbar)	≤ 3 cc/min at 15 psi (1044 mbar)

Flow Rate / Filtration Area

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule 1.0 ft ² (930 cm²) of media with 1/2" FNPT ports. The test fluid is water at ambient temperature. 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
GPM	.15	.20	.25	.60	1.1
LPM	0.57	0.76	0.95	2.27	4.16

Filtration Area		
2" Capsule	**5" Capsule**	**10" Capsule**
1.0 ft ² (930 cm²)	3.0 ft ² (2788 cm²)	6.8 ft ² (6318 cm²)

Polypropylene Membrane - PM

PM Capsules are hydrophobic polypropylene membrane. They have excellent chemical compatibility and very low extractables. Widely used across the beverage, electronic and pharmaceutical industries. Applications include acids, bases, esters, solvents, alcohols, ketones, etchants and many others. Used in the filtration of compressed gas, fermentors and vent filters. Each cartridge module is individually diffusion tested using 60/40 IPA and water before it is released from manufacture. 100% integrity tested.

Integrity Test Specifications (per 1.0 ft² (930 cm²) (60/40, IPA/water wetted membrane)

Air Diffusion Rate			
Pore Size	**G - Grade**	**F & E - Grade**	**P - Grade**
0.1 µm	‹ 10 cc/min at 40 psi (2756 mbar)	‹ 6 cc/min at 40 psi (2756 mbar)	‹ 6 cc/min at 40 psi (2756 mbar)
0.22 µm	‹ 10 cc/min at 35 psi (2412 mbar)	‹ 6 cc/min at 35 psi (2412 mbar)	‹ 6 cc/min at 35 psi (2412 mbar)

Flow Rate / Filtration Area

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule 1.0 ft² (930 cm²) of media with 1/2" FNPT ports. The test fluid is water at ambient temperature. Higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Liquid Retention	0.10 µm	0.22 µm
GPM	.15	.55
LPM	0.57	2.08
Gas Retention	0.01 µm	0.02 µm
SCFM	2	4.5

Filtration Area		
2" Capsule	**5" Capsule**	**10" Capsule**
1.0 ft² (930 cm²)	3.0 ft² (2788 cm²)	6.8 ft² (6318 cm²)

PTFE Membrane - TM

TM Capsules are hydrophobic PTFE membrane. They have excellent chemical compatibility with superior flow rates in air and gases with very low extractables. Widely used across the beverage, electronic and pharmaceutical industries. Applications include acids, bases, esters, solvents, alcohols, ketones, etchants and many others. Used in the filtration of compressed gas, fermentors and sterile vent filters. Each cartridge module is individually diffusion tested using 60/40 IPA and water before it is released from manufacture. 100% integrity tested.

Integrity Test Specifications (per 1.0 ft² (930 cm²) (60/40, IPA/water wetted membrane)

Bubble Point	
Pore Size	**All Grades**
0.1 µm	18 PSIG
0.22 µm	14 PSIG
0.45 µm	8 PSIG
1.0 µm	6 PSIG
3.0 µm	3 PSIG

Flow Rate / Filtration Area

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule 1.0 ft² (930 cm²) of media with 1/2" FNPT ports. The test fluid is water at ambient temperature. Higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Liquid Retention	0.10 µm	0.22 µm	0.45 µm	1.0 µm	3.0 µm
GPM	.25	.55	1.5	2.0	2.8
LPM	0.95	2.08	5.68	7.57	10.60
Gas Retention	0.01 µm	0.02 µm	0.05 µm	0.10 µm	0.30 µm
SCFM	4	7	10	›15	›15

Filtration Area		
2" Capsule	**5" Capsule**	**10" Capsule**
1.0 ft² (930 cm²)	3.0 ft² (2788 cm²)	6.8 ft² (6318 cm²)

Validation (Membrane capsules only)

P - grade capsules are validated using modified HIMA protocols at a challenge level of 10^7 organisms per cm² of filter media.

F & E - grade capsules are validated using modified HIMA protocols at a challenge level of 10^6 organisms per cm² of filter media.

G - grade capsules are validated using modified HIMA protocols at a challenge level of 10^4 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).

USP-Biosafety

The materials used to construct the membrane capsule filters are non-toxic and meet the requirements for the MEM Elution Cytotoxicity Test and USP24 Plastic Class V1 121°C Test.

Depth Pleated

Polypropylene - PD

PD 100% pleated depth polypropylene capsules are designed for general purpose use wherever a cost effective pleated depth filter is required. Rated at 99.9% efficiencies at the rated pore size offered in a complete range of microns to serve the needs of the beverage, electronic and pharmaceutical industries. Used for wine and beverage clarification, chemicals, process water, air and gases. **PPD** grade capsules are designed to be used as pre-filters and non-sterilization grade Filters in the pharmaceutical industry. Special attention was give in the design of these cartridges to ensure long life as well as superior retention. Each module is flushed and tested.

Filtration Area

Filtration Area		
2" Capsule	5" Capsule	10" Capsule
1.0 ft ² (930 cm²)	2.8 ft ² (2601 cm²)	5.8 ft ² (5388 cm²)

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule 1.0 ft ² (930 cm²) of media with 1/2" FNPT ports. The test fluid is water at ambient temperature. Higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Pore Size	0.10 µm	0.22 µm	0.45 µm	0.65 µm	1.0 µm	3.0 µm	5.0 µm	10 µm	20 µm	30 µm	40 µm	60 µm	100 µm
GPM	.20	.60	1.0	1.2	1.6	2.4	3.2	3.6	4.0	›4.0	›4.0	›4.0	›4.0
LPM	0.76	2.27	3.78	4.54	6.05	9.08	12.11	13.62	15.14	›15.14	›15.14	›15.14	›15.14

Fiberglass - GD

GD Pleated fiber glass depth capsules are designed for general purpose use wherever a long life pleated depth filter is required. Rated at 99% efficiencies at the rated pore size offered in a complete range of microns to serve the needs of the beverage, electronic and pharmaceutical industries. Used for wine and beverage clarification, chemicals, process water and many others. **PGD** grade capsules are designed to be used as pre-filters and non-sterilization grade Filters in the pharmaceutical industry. Special attention was give in the design of these cartridges to ensure long life as well as superior retention. Each module is flushed and tested.

Filtration Area

Filtration Area		
2" Capsule	5" Capsule	10" Capsule
1.0 ft ² (930 cm²)	2.8 ft ² (2601 cm²)	5.8 ft ² (5388 cm²)

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule 1.0 ft ² (930 cm²) of media with 1/2" FNPT ports. The test fluid is water at ambient temperature. Higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Pore Size	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	.50	.60	1.0	1.2	1.6	2.0	2.4	3.2	3.6	4.0	›4.0
LPM	1.89	2.27	3.78	4.54	6.05	7.57	9.08	12.11	13.62	›15.14	›15.14

Grade Definitions

(All pleated capsules)

G - Grade: Designed for general purpose use at an effective cost. Each module is rinsed with 17+ megohm-cm water to remove potential extraneous manufacturing debris. Each cartridge module is individually tested for integrity.

F - Grade: Food and beverage grade capsules have been designed to comply with all FDA requirements for the food industry. Each module is 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. F grade capsules are designed to give maximum throughput and handle cleaning and sanitization protocols well. Each cartridge module is individually tested for integrity.

E - Grade: Designed to meet the special needs of the electronics and high purity chemical industries. To minimize extractables, each cartridge module is pulse, power flushed until the rinse effluent reaches 17+ megohm-cm and less than 3 ppb TOC. Each cartridge module is also individually tested.

P - Grade: The media utilized in these capsules is optimized for retention and durability to meet the extra security needs of the pharmaceutical industry. Each module is rinsed with 17+ megohm-cm water to remove potential extraneous manufacturing debris. Each cartridge module is individually tested for integrity. Further, representative cartridge modules have been validated to show equivalent retention characteristics per the deigned protocol.

(Certificate of quality Assurance is provided with every Food, Electronic and Pharmaceutical Capsule)

Depth

Polypropylene - MB

GDMB Melt blown capsules are manufactured by a continuous spun bonding technology that assures a consistent product. 100% all polypropylene construction gives wide chemical compatibility and extremely low extractables. These capsules offer exceptional value in both removal efficiency and dirt holding capacity where protection of more expensive membrane filters is important.

Cartridge Length

Cartridge Size		
2" Capsule	5" Capsule	10" Capsule
2" Wafer (5.08 cm)	5" Wafer (12.7 cm)	10" Wafer (25.4 cm)

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule, with 2 inch (5.08 cm) length wafer and 1/2 inch FNPT ports. The test fluid is water at ambient temperature. Higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent.

Pore Size	1 µm	3 µm	5 µm	10 µm	20 µm	30 µm	50 µm	75 µm	100 µm
GPM	.60	1.0	1.2	1.5	2.0	2.4	›3.0	›3.0	›3.0
LPM	2.27	3.78	4.54	5.67	7.57	9.08	›11.35	›11.35	›11.35

Bio-Component - BD

XSPD Bicomponent Media filter cartridges have been designed to hold large amounts of contaminant and still provide 95% retention efficiencies at the rated pore size. These cartridges can be used wherever a high contamination load application requires retention efficiencies above nominal. XSPD is an excellent choice where protection of more expensive membrane filters is required.

Cartridge Length

Cartridge Size		
2" Capsule	5" Capsule	10" Capsule
2" Wafer (5.08 cm)	5" Wafer (12.7 cm)	10" Wafer (25.4 cm)

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule, with 2 inch (5.08 cm) length wafer and 1/2 inch FNPT ports. The test fluid is water at ambient temperature. Higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent

Pore Size	0.3 µm	0.5 µm	1.0 µm	3.0 µm	5.0 µm	7.0 µm	10 µm	20 µm	30 µm	40 µm	50 µm
GPM	.60	.80	1.2	1.4	1.6	1.8	1.9	2.0	2.5	›3.0	›3.0
LPM	2.27	3.02	4.54	5.29	6.05	6.81	7.19	7.57	9.46	›11.35	›11.35

Nano-Spun - NS

NS Media filter cartridges have been designed to hold large amounts of contaminant and still provide 99% retention efficiencies at the rated pore size. Made of 100% polypropylene these cartridges can be used wherever a high contamination load application requires retention efficiencies above nominal. NS is an excellent choice where protection of more expensive membrane filters is required or a high efficiency depth filter is all that is required.

Cartridge Length

Cartridge Size		
2" Capsule	5" Capsule	10" Capsule
2" Wafer (5.08 cm)	5" Wafer (12.7 cm)	10" Wafer (25.4 cm)

Flow Rate

The following table represents typical water flow at a one psi (69 mbar) pressure differential across a single 2 inch capsule, with 2 inch (5.08 cm) length wafer and 1/2 inch FNPT ports. The test fluid is water at ambient temperature. Higher pressure drops is acceptable, but as flows increase the pressure drop of the housing becomes more apparent

Pore Size	0.3 µm	0.5 µm	1.0 µm	3.0 µm	5.0 µm	7.0 µm	10 µm	20 µm	30 µm	40 µm	50 µm
GPM	.05	.07	.20	.30	.45	.55	.65	.80	1.2	1.60	1.80
LPM	0.189	0.264	0.757	1.135	1.703	2.081	2.460	3.028	4.542	6.056	6.813

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.

Inlet & Outlet Options

1/4" Female NPT

1/4" Male NPT

3/8" Female NPT

Hose Barb

1/2" Female NPT

1/2" Male NPT

Sanitary

Ordering Information

The capsule catalog number is made up of several variable characters i.e. pore size, length, filter media, and inlet / outlet configuration. For example: a general grade polyethersulfone membrane, 0.10 µm , 5 inch length capsule non sterilized with sanitary connections would be designated as: CPGPS*10N000BFF.

CP [ ] [ ] [ ] [ ] [ ] [ ] [ ] 000 [ ] [ ] [ ]

Grade

G - General
F - Food & Beverage
E - Electronic
P - Pharmaceutical

Filter Media/Membrane

PD - Polypropylene Depth Pleated
GD - Fiberglass Depth Pleated
MB - Polypropylene GDMB
BD - Bio-component Depth XSPD
NS - Nano Spun
NM - Nylon Membrane
PM - Polypropylene Membrane
PS - Polyethersulfone Membrane
TM - Teflon Membrane

Micron Rating

***03** - .03
***10** - .10
***20** - .22
***40** - .45
***60** - .65
***80** - .80
1*0 - 1.0
1*2 - 1.2
3*0 - 3.0
5*0 - 5.0
10* - 10.0
25* - 25.0
30* - 30.0
40* - 40.0
50* - 50.0
60* - 60.0
75* - 75.0
999 - 100

Pre Sterilized or Not

S - Pre- Sterilized
N - Not Sterilized

Length

A - 2"
B - 5"
1 - 10"
2 - 20"
3 - 30"

Inlet/Outlet

A - 1/4" Female NPT
B - 1/4" Male NPT
C - 3/8" Female NPT
D - 1/2" Female NPT
E - 1/2" Male NPT
F - Sanitary
G - Hose Barb

CRITICAL PROCESS FILTRATION, INC.

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