

## Data Sheet

# Millipore Express® SHF Hydrophilic Filters

**Sterilizing-Grade PES membrane for fast,  
efficient, economical buffer filtration**



- High-flux hydrophilic PES sterilizing-grade membrane
- Faster flow, up to 2.5 times faster than most other sterilizing grade membranes
- Increased output without increasing filtration area
- Lower cost from improved process economics
- Optimized for buffer filtration which requires sterility assurance and high flow rates
- Broad chemical compatibility across a wide pH range—NaOH compatible

Millipore Express SHF (Sterile High-Flux) devices are the choice for optimal buffer filtration. A sterilizing grade, 0.2 µm hydrophilic polyethersulfone (PES) membrane, Millipore Express SHF filters provide sterility assurance, broad chemical compatibility, and exceptionally high flow rates for buffers at the high and low range of pH, 1–14.

The high flow rate of the Millipore Express SHF membrane cuts your filtration time in half, dramatically improving filtration economics and extending production capacity. The membrane is caustic compatible and offers high-flux performance with a full range of buffer chemistries. Its low extractables and non-fiber releasing properties contribute to clean processes. With Millipore Express SHF filters, you increase productivity, shorten cycle-time and reduce costs.

## Superior Performance, Speed and Value

For biotech and pharmaceutical customers seeking fast, efficient and economical sterile buffer filtration, no PES membrane delivers more than Millipore Express SHF.

- Fast filtration with sterility assurance
- Broad chemical compatibility — even at high pH
- Low filtration costs — reduced up-front filter and overall filtration costs.

Membrane Types	Filter Formats
<ul style="list-style-type: none"> <li>○ Millipore Express SHF PES membranes</li> </ul>	OptiScale® small-scale disposable capsule filters  Opticap® XL and XLT disposable capsule filters – autoclavable, sterile and gamma compatible  Cartridge filters

## Developed to Enhance Buffer Filtration

Millipore Express SHF filters use a fast flowing process membrane specifically developed for the filtration of buffers, pH adjusters and other aqueous intermediate pharmaceutical and biotech process solutions. Designed to offer high-flux performance and improved economics, Millipore Express SHF membrane is compatible with a wide range of buffer chemistries, including acids and sodium hydroxide.

## More than Twice as Fast

Millipore Express SHF filters have flow rates that are up to two to two-and-a-half times faster than other sterilizing grade membranes for lower filtration costs and increased production capacity. You get fast flowing filters with broad chemical compatibility, especially at the high pH of caustic and buffer solutions.

## Reduced Surface Area and Lower Costs

Because Millipore Express SHF filters feature flow rates faster than most other membranes, you can maintain batch volume while reducing filtration surface area. This high-flux benefit has been shown to deliver greater than 50 percent savings in filtration costs, improving your process economics.

## Reduced Process Time and Extended Capacity

Millipore Express SHF filters are ideal for maximizing the capacity of constrained buffer filtration systems. With its superior flux, you can reduce processing time by half, doubling your output without significant capital expense.

## Reliable Performance

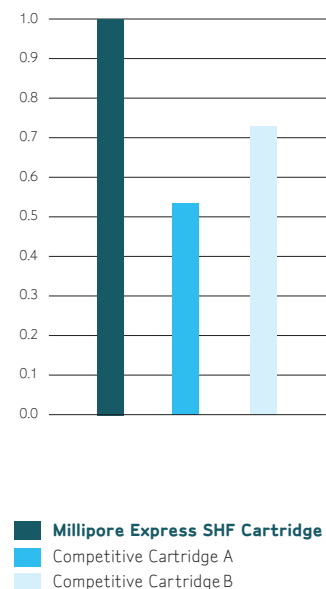
Millipore Express SHF membrane delivers all the benefits you'd expect from a quality Millipore membrane. Reliable sterilizing performance. Multiple steam-in-place or autoclave sterilization cycles. Broad chemical compatibility. Easy integrity testing. And fast flow to help you fill your buffer filtration tank quickly—now with the added benefits of improving efficiency and economics.

## Regulatory Compliance

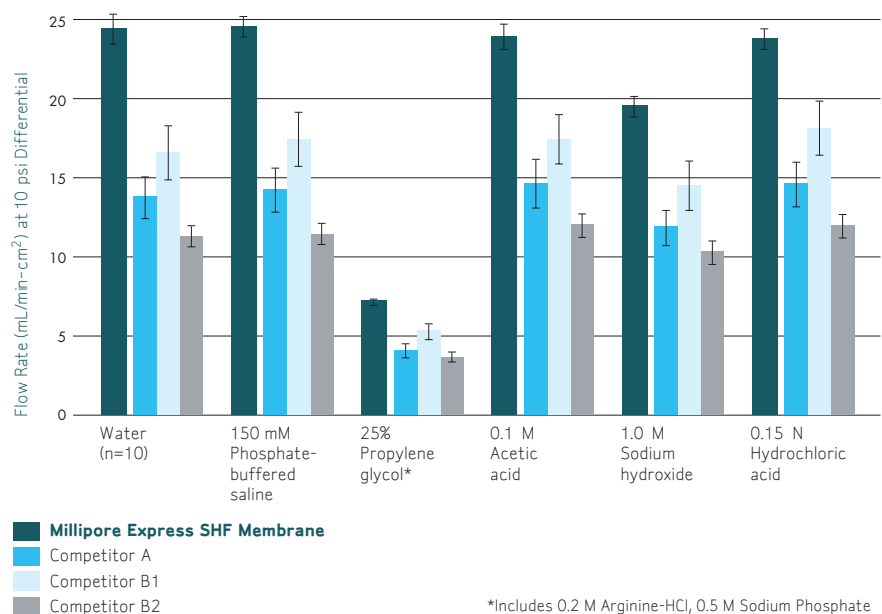
Millipore Express SHF filters are designed, developed and manufactured in accordance with a Quality Management System approved by an accredited registering body of an ISO® 9000 Quality Systems Standard. Each device is shipped with a Certificate of Quality. All cartridge filters are 100% integrity tested during manufacture and supported by a Validation Guide for compliance with regulatory requirements. For traceability and easy identification, each filter is identified with product name and other characteristics.

# SUPERIOR FLUX

Relative Water Permeability of 10-inch Cartridges

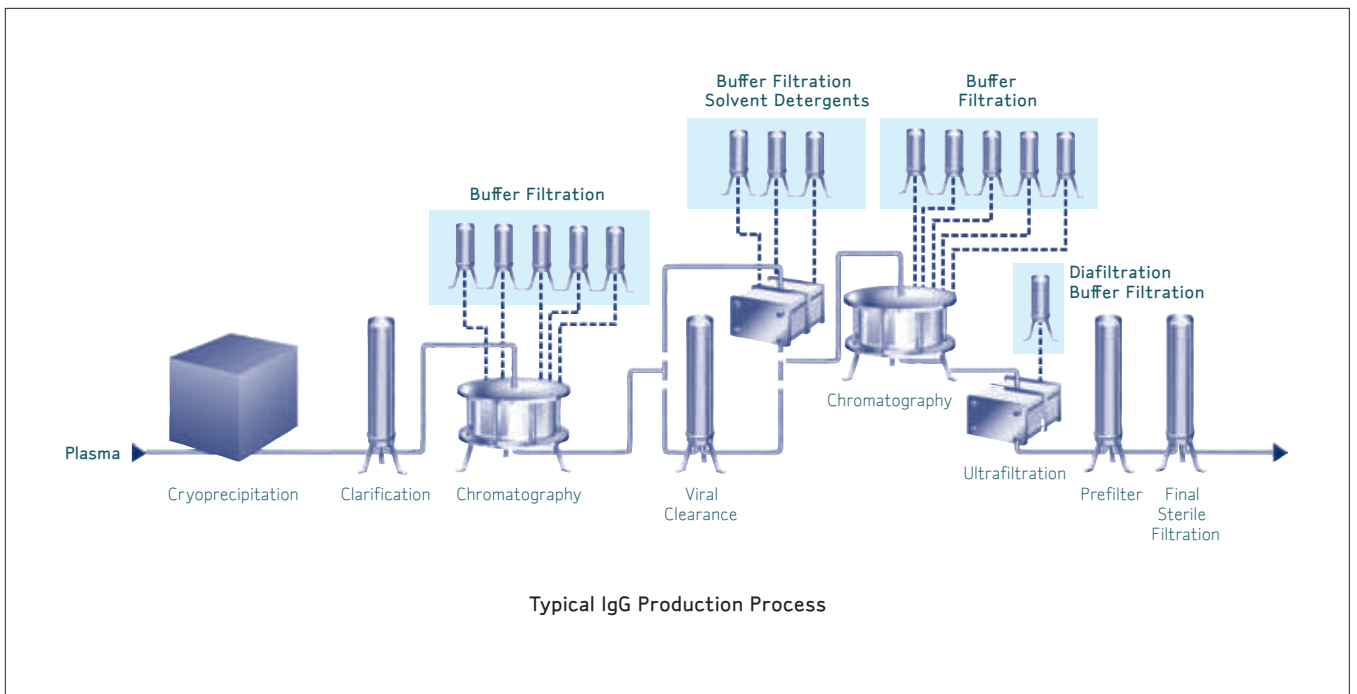
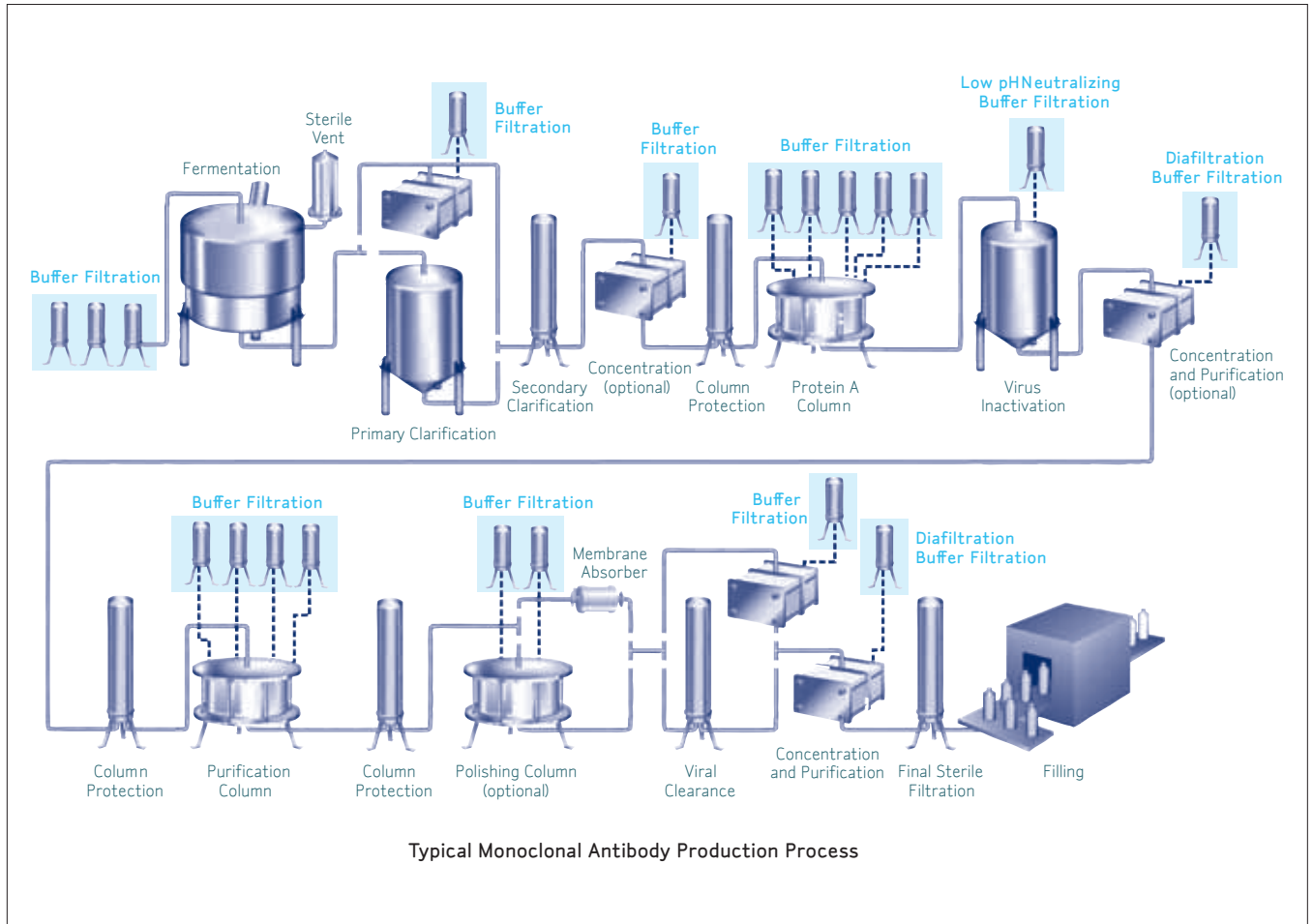


Millipore Express SHF Membrane Flux Relative to Competitors (n=2)



\*Includes 0.2 M Arginine-HCl, 0.5 M Sodium Phosphate

# Millipore Express SHF Filters for All Your Buffer Filtration Needs



**From process development to full-scale production, Millipore has the right solution for all of your process needs.**



OptiScale Filters

### **OptiScale Process Development Screening Tool**

OptiScale disposable capsule filters provide a convenient small-volume option for process screening and scaling. These “drop in” filters are ideal for evaluating biopharmaceuticals. OptiScale capsule filters offer speed-to-market strategies for efficiently developing compounds and biotherapeutics.

The OptiScale capsule is ideally suited for process development and screening. OptiScale capsules are faster and easier to set-up than conventional 25 mm and 47 mm discs, and completely disposable.



Cartridge Filters

### **Cartridge Filters**

Millipore Express SHF 5-, 10-, 20-, and 30-inch cartridge filters provide very high flow rates. Cartridges are robust, strong, resilient and designed to withstand multiple steam-in-place cycles. Each cartridge is integrity tested during manufacturing.

Code 0 and code 7 O-ring adaptors are available to suit your application and housing needs.

## Opticap XL and XLT Disposable Capsule Filters



Opticap XL Filters

### Convenient and Easy to Use

Opticap XL and XLT capsule filters eliminate the time and expense



associated with assembling, cleaning, and validating stainless steel housings.

Adjustable, easy-to-turn, upstream vents and drain valves with O-ring seals and hose barb connections allow for easy process control. Other ease-of-use features include flow direction arrows and ribbed housing for easy gripping even with gloved hands.



Opticap XLT Filters

### The Right Size

Opticap XLT 10, 20 and 30 capsules are available to fit all of your application needs and to allow easy scale-up of your small volume filtration steps to larger, full-scale filtration processes.

### The Right Connections

Designed to optimize your filtration process, Opticap XL and XLT disposable capsule filters are available with a choice of inlet and outlet connections, including sanitary flanges, fractional sanitary flanges as well as hose barbs.

### Proven Integrity

Each capsule is integrity tested during the manufacturing process to ensure reliable performance in your process.

### Robust Construction

Opticap XL and XLT capsules' design allows unparalleled hydraulic stress resistance in a disposable filter.

### Opticap XL Capsule Filters

Opticap XL disposable capsule filters have a unique design to minimize hold-up volume and reduce production losses.

### Opticap XLT 10, 20 and 30 Capsule Filters

Opticap XLT disposable T-line capsule filters are available with or without a pressure gauge port for ease in monitoring process conditions. The T-line design accommodates series or parallel filtration to match your application needs, and a specially-designed stand enables quick and easy integration into your existing process.



Opticap XLT Capsule Stand

# SPECIFICATIONS

## Cartridge Filters and OptiScale Disposable Capsules

		Optiscale 25 Capsules	Optiscale 47 Capsules	5-inch Cartridge	Per 10-inch Cartridge
Nominal Dimensions	Diameter:	31 mm (1.21 in.)	69 mm (2.75 in.)	6.9 cm (2.7 in.)	6.9 cm (2.7 in.)
	Length:	39 mm (1.52 in.)	82 mm (3.24 in.) w/flange inlet/hose barb outlet 74 mm (2.91 in.) w/flange inlet/flange outlet 94 mm (3.70 in.) w/hose barb inlet/hose barb outlet	12.5 cm (5 in.)	25.4 cm (10 in.)
	Weight	5.5 g (0.19 oz)	67 g (2.3 oz)	—	—
<b>Filtration Area</b>		3.5 cm <sup>2</sup>	17.7 cm <sup>2</sup>	0.29 m <sup>2</sup> (2.5 ft <sup>2</sup> )	0.54 m <sup>2</sup> (5.3 ft <sup>2</sup> )
Materials of Construction	Filter membrane:	Hydrophilic polyethersulfone	Hydrophilic polyethersulfone	Hydrophilic polyethersulfone	
	Film edge:	—	—	Polypropylene	
	Supports:	—	Polypropylene	Polypropylene	
	Cage and end caps:	—	Polycarbonate	Polypropylene	
	Core:	—	Polycarbonate	Polysulfone	
	Structural components:	Polypropylene	Polycarbonate	—	
	Vent cap:	Polypropylene	Polyvinylidene fluoride (PVDF)	—	
	O-rings:	Fluorocarbon rubber	Fluorocarbon rubber	Silicone, EPDM or fluorocarbon rubber	
<b>Housing Vent</b>		Capped vent with female Luer connections on inlet side of device.	Adjustable vent with male Luer and female Luer-Lok® connections on inlet side of the device	—	
<b>Maximum Inlet Pressure</b>		4136 mbar (60 psi) at 25 °C	5516 mbar (80 psi) at 25 °C	—	
Maximum Differential Pressure	Forward:	4136 mbar (60 psi) at 25°C	5516 mbar (80 psi) at 25 °C	6895 mbar (100 psi) at 25 °C 1700 mbar (25 psi) at 80 °C 340 mbar (5 psi) at 135 °C	
	Reverse:	0 mbar (0 psi)	700 mbar (10 psi) at 25 °C	2068 mbar (30 psi) at 25 °C 69 mbar (1 psi) at 135 °C	
<b>Bubble Point at 23 °C</b>		—	—	≥ 4000 mbar (58 psi) air with water	
<b>Air Diffusion at 23 °C</b>		—	—	Through a water wet membrane at 2758 mbar (40 psi): ≤ 16.4 cc/min.      ≤ 30 cc/min.	
<b>Bacterial Retention</b>		—	—	Quantitative retention of 10 <sup>7</sup> CFU/cm <sup>2</sup> <i>Brevundimonas diminuta</i> ATCC® 19146 per ASTM® methodology	
<b>Bacterial Endotoxin</b>		Aqueous extraction contains < 0.25 EU/mL as determined by Limulus Amebocyte Lysate (LAL) Test	—	Aqueous extraction contains <0.25 EU/mL as determined using the Limulus Amebocyte Lysate (LAL) test.	
<b>TOC/Conductivity</b>		This product exhibited less than 500 ppb TOC per USP <643> and less than 1.3 µm per USP<645> after autoclave and WFI water flush of 15 mL.	—	Autoclaved cartridges meet the WFI of USP <643> for Total Organic Carbon and USP <645> for Water Conductivity after a WFI water flush of: 5.5 L at 25 °C      10 L at 25 °C	
<b>Oxidizable Substances</b>		—	Effluent meets the USP Oxidizable Substance Test requirements for sterile purified water after a water flush of ≤100 mL.	Effluent meets the USP Oxidizable Substance Test requirements for sterilepurified water after a water flush of: 1000 mL.	
<b>Sterilization</b>		May be autoclaved for 1 cycle at 123 °C for 60 min.	May be autoclaved for 3 cycles of 60 min at 126 °C.	Autoclave: May be autoclaved 25x, 60 min cycles at 126 °C In-line Steam: 25x (forward), 30 min cycles at 135 °C, or 22x (forward) and 3x (reverse), 30 min cycles at 135 °C	
<b>USP Toxicity</b>		—	—	Non-toxic per MEM elution ISO® 10993-5.	
<b>Particle Shedding</b>		Passes USP test for particulates in injectables.	—	Passes USP test for particulates in injectables.	
<b>Non-fiber Releasing</b>		Millipore Express SHF membrane meet the criteria for a "non-fiber releasing" filter as defined in 21 CFR 210.3(b)(6).			
<b>Component Material Toxicity</b>		Component materials were tested and meet the criteria of the USP <88> Reactivity Test for Class VI plastics. Millipore Express SHF filters meet the requirements of the USP <88> Safety Test, utilizing a 0.9% sodium chloride extraction.			
<b>Indirect Food Additive</b>		All component materials meet the FDA Indirect Food Additive requirements cited in 21 CFR 177–182.			
<b>Good Manufacturing Practices</b>		These products are manufactured in a facility which adheres to FDA Good Manufacturing Practices.			

# SPECIFICATIONS

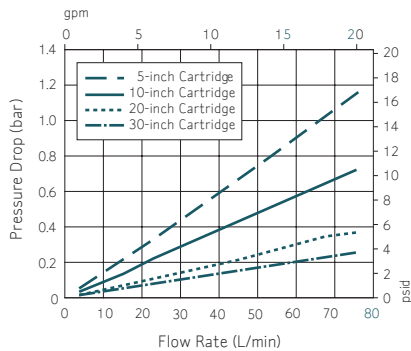
## Opticap XL and XLT Disposable Capsules (Autoclavable)

	Opticap XL 3	Opticap XL 5	Opticap XL 10	Opticap XLT 10	Opticap XLT 20	Opticap XLT 30
<b>Nominal Dimensions</b>						
Maximum length:	17.3 cm (6.8 in.)	21.6 cm (8.5 in.)	33.5 cm (13.2 in.)	37.6 cm (14.8 in.)	62.5 cm (24.6 in.)	87.1 cm (34.3 in.)
Body diameter:	10.7 cm (4.2 in.)	10.7 cm (4.2 in.)	10.7 cm (4.2 in.)	—	—	—
<b>Fitting to Fitting</b>						
Sanitary flange to sanitary flange:	—			15.2 cm (6.0 in.)	15.2 cm (6.0 in.)	15.2 cm (6.0 in.)
Sanitary flange to hose barb:	—			17.5 cm (6.9 in.)	17.5 cm (6.9 in.)	17.5 cm (6.9 in.)
Hose barb to hose barb:	—			19.8 cm (7.8 in.)	19.8 cm (7.8 in.)	19.8 cm (7.8 in.)
<b>Filtration Area</b>	0.16 m <sup>2</sup> (1.7 ft <sup>2</sup> )	0.29 m <sup>2</sup> (3.1 ft <sup>2</sup> )	0.54 m <sup>2</sup> (5.8 ft <sup>2</sup> )	0.54 m <sup>2</sup> (5.8 ft <sup>2</sup> )	1.08 m <sup>2</sup> (11.6 ft <sup>2</sup> )	1.62 m <sup>2</sup> (17.4 ft <sup>2</sup> )
<b>Materials of Construction</b>	Hydrophilic polyethersulfone					
Filter membrane:	Hydrophilic polyethersulfone					
Film edge:	Polypropylene					
Supports:	Polypropylene					
Structural components <sup>1</sup> :	Polypropylene					
Core:	Polysulfone					
Vent O-rings	Silicone					
<b>Vent/Drain</b>	¼ in. hose barb with double O-ring seal					
<b>Maximum Differential Pressure</b>						
Forward:	5516 mbar (80 psi) at 25 °C 6895 mbar (100 psi) intermittent at 25 °C 1034 mbar (15 psi) at 80 °C					
Reverse:	2068 mbar (30 psi) intermittent at 25 °C					
<b>Bubble Point at 23 °C</b>	≥4000 mbar (58 psi) air with water					
<b>Air Diffusion at 23 °C</b>	Through a water wet membrane at 2758 mbar (40 psi): ≤9.1 cc/min.   ≤16.4 cc/min.   ≤30 cc/min.   ≤30 cc/min.   ≤60 cc/min.   ≤90 cc/min.					
<b>Bacterial Retention</b>	Quantitative retention of 10 <sup>7</sup> CFU/cm <sup>2</sup> <i>Brevundimonas diminuta</i> ATCC® 19146 per ASTM® methodology					
<b>Bacterial Endotoxin</b>	Aqueous extraction contains <0.25 EU/mL as determined by the Limulus Amebocyte Lysate (LAL) Test (per 10-inch filter).					
<b>TOC/Conductivity</b>	Autoclaved filter meets the WFI requirements of USP <643> for Total Organic Carbon and USP <645> for Water Conductivity after a WFI water flush of 10L at 25 °C (per 10-inch filter)					
<b>Oxidizable Substances</b>	Meets the USP Oxidizable Substances Test requirements for sterile purified water after a water flush of: ≤1000 mL   ≤1000 mL   ≤1000 mL   ≤1000 mL   ≤2000 mL   ≤3000 mL					
<b>Sterilization</b>	May be autoclaved for 3 cycles of 60 minutes at 126 °C. (Cannot be steam sterilized in-line).					
<b>Non-Fiber Releasing</b>	Component materials meet criteria for a "non fiber releasing" filter as defined in 21 CFR 210.3 (b)(6).					
<b>Component Material</b>	Component materials were tested and meet the criteria of the USP <88> Reactivity Test for Class VI plastics.					
<b>Toxicity</b>	Millipore Express SHF filters meet the requirements of the USP <88> Safety Test, utilizing a 0.9% sodium chloride extraction.					
<b>USP Toxicity</b>	Non-toxic per MEM Elution ISO 10993-5					
<b>Good Manufacturing Practices</b>	These products are manufactured in a facility which adheres to FDA Good Manufacturing Practices.					
<b>Indirect Food Additive</b>	All component materials meet the FDA Indirect Food Additive requirements cited in 21 CFR 177–182.					

<sup>1</sup> Cage, end caps and capsule housing

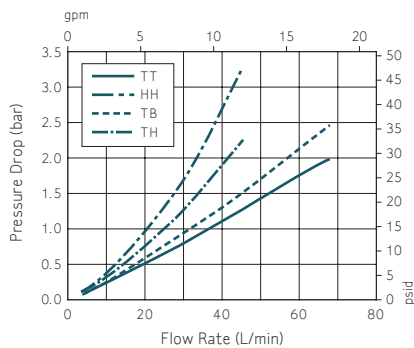
# TYPICAL CLEAN WATER FLOW RATES

## Cartridge Filters with Millipore Express SHF Hydrophilic Membrane

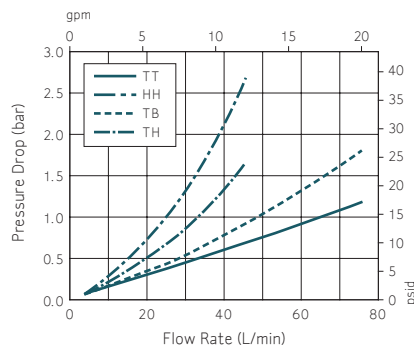


## Opticap XL and XLT Disposable Capsules (Autoclavable)

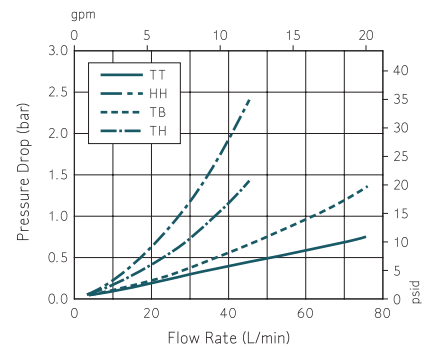
Opticap XL 3 Capsule Filters with 0.2  $\mu\text{m}$  Millipore Express SHF Membrane



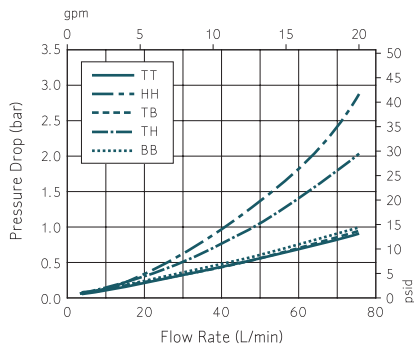
Opticap XL 5 Capsule Filters with 0.2  $\mu\text{m}$  Millipore Express SHF Membrane



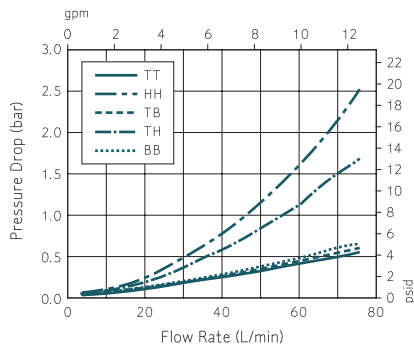
Opticap XL 10 Capsule Filters with 0.2  $\mu\text{m}$  Millipore Express SHF Membrane



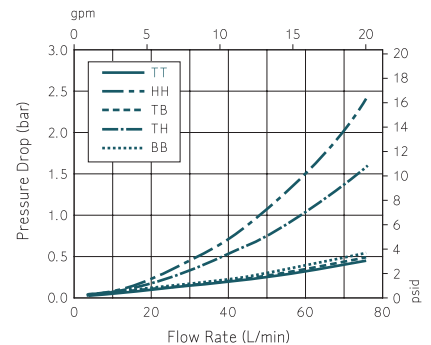
Opticap XLT 10 Capsule Filters with 0.2  $\mu\text{m}$  Millipore Express SHF Membrane



Opticap XLT 20 Capsule Filters with 0.2  $\mu\text{m}$  Millipore Express SHF Membrane



Opticap XLT 30 Capsule Filters with 0.2  $\mu\text{m}$  Millipore Express SHF Membrane



### Opticap XL Capsule Legends Refer to Connection Type

- TT = 38 mm (1 1/2 in.) Sanitary Flange Inlet and Outlet
- HH = 14 mm (9/16 in.) Hose Barb Inlet and Outlet
- TH = 38 mm (1 1/2 in.) Sanitary Flange Inlet and 14 mm (9/16 in.) Hose Barb Outlet
- TB = 38 mm (1 1/2 in.) Sanitary Flange Inlet and 25 mm (1 in.) Hose Barb Outlet

### Opticap XLT Capsule Legends Refer to Connection Type

- TT = 38 mm (1 1/2 in.) Sanitary Flange Inlet and Outlet
- TH = 38 mm (1 1/2 in.) Sanitary Flange Inlet and 16 mm (5/8 in.) Hose Barb Outlet
- HH = 16 mm (5/8 in.) Hose Barb Inlet and Outlet
- BB = 25 mm (1 in.) Hose Barb Inlet and Outlet
- TB = 38 mm (1 1/2 in.) Sanitary Flange Inlet and 25 mm (1 in.) Hose Barb Outlet



## SPECIFICATIONS

### Opticap XL 150, 300 and 600 Disposable Capsules (Sterile and Gamma Compatible)

	Opticap XL 150	Opticap XL 300	Opticap XL 600
<b>Nominal Dimensions</b>			
Maximum length:	9.7 cm (3.8 in.)	11.9 cm (4.7 in.)	16.5 cm (6.5 in.)
Body diameter:	5.6 cm (2.2 in.)	5.6 cm (2.2 in.)	5.6 cm (2.2 in.)
<b>Fitting to Fitting</b>			
Sanitary flange to Sanitary flange:	—	—	—
Sanitary flange to hose barb:	—	—	—
Hose barb to hose barb:	—	—	—
<b>Filtration Area</b>	0.022 m <sup>2</sup> (0.240 ft <sup>2</sup> )	0.048 m <sup>2</sup> (0.514 ft <sup>2</sup> )	0.097 m <sup>2</sup> (1.046 ft <sup>2</sup> )
<b>Materials of Construction</b>	Hydrophilic polyethersulfone		
Filter membrane:	—		
Film edge:	—		
Supports:	Polyethylene		
Structural components <sup>1</sup> :	Gamma stable polypropylene		
Core:	Polysulfone		
Vent O-rings <sup>2</sup> :	Silicone		
<b>Vent/Drain</b>	¼ in. hose barb with double O-ring seal		
<b>Maximum Inlet Pressure</b>	6895 mbar (100 psi) intermittent at 23 °C 5515 mbar (80 psi) at 23 °C 2758 mbar (40 psi) at 60 °C 1035 mbar (15 psi) at 80 °C		
<b>Maximum Differential Pressure</b>			
Forward:	6895 mbar (100 psi) intermittent at 25 °C 5515 mbar (80 psi) at 25 °C 1035 mbar (15 psi) at 80 °C		
Reverse:	2068 mbar (30 psi) intermittent at 25 °C		
<b>Bubble Point at 23 °C</b>	≥ 4000 mbar (58 psi) air with water		
<b>Air Diffusion at 23 °C</b>	Through a water wet membrane at 2758 mbar (40 psi): ≤ 1.4 cc/min.   ≤ 2.8 cc/min.   ≤ 5.8 cc/min.		
<b>Bacterial Retention</b>	Quantitative retention of 10 <sup>7</sup> CFU/cm <sup>2</sup> <i>Brevundimonas diminuta</i> ATCC® 19146 per ASTM® methodology		
<b>Bacterial Endotoxin</b>	Aqueous extraction contains < 0.25 EU/mL as determined by the Limulus Amebocyte Lysate (LAL) Test		
<b>TOC/Conductivity at 25 °C</b>	Gamma Sterilized filter meets the WFI requirements of USP <643> for Total Organic Carbon and USP <645> for Water Conductivity after a WFI water flush of: 2 L   2.5 L   3 L		
<b>Oxidizable Substances</b>	Meets the USP Oxidizable Substances Test requirements for sterile purified water after a water flush of: ≤ 1000 mL   ≤ 1000 mL   ≤ 1000 mL		
<b>Sterilization</b>			
Gamma compatible:	Gamma compatible to 45 kGy. May be autoclaved for 3 cycles of 60 minutes at 123 °C. (Cannot be steam sterilized in-line.)		
Sterile capsules:	May be autoclaved for 3 cycles of 60 minutes at 123 °C. (Cannot be steam sterilized in-line.)		
<b>Sterility</b>			
Sterile capsules:	Meets current USP and AAMI guidelines for sterility utilizing a validated sterilization cycle.		
<b>USP Toxicity</b>	Non-toxic per MEM elution ISO 10993-5.		
<b>Particle Shedding</b>	Passes USP test for particulates in injectables.		
<b>Non-Fiber Releasing</b>	Millipore Express SHF membrane meets the criteria for a "non-fiber releasing" filter as defined in 21 CFR 210.3(b)(6).		
<b>Component Material Toxicity</b>	Component materials were tested and meet the criteria of the USP <88> Reactivity Test for Class VI plastics. Millipore Express SHF filters meet the requirements of the USP <88> Safety Test, utilizing a 0.9% sodium chloride extraction.		
<b>Indirect Food Additive</b>	All component materials meet the FDA Indirect Food Additive requirements cited in 21 CFR 177–182.		
<b>Good Manufacturing Practices</b>	These products are manufactured in a facility which adheres to FDA Good Manufacturing Practices.		

<sup>1</sup> Cage, end caps and capsule housing

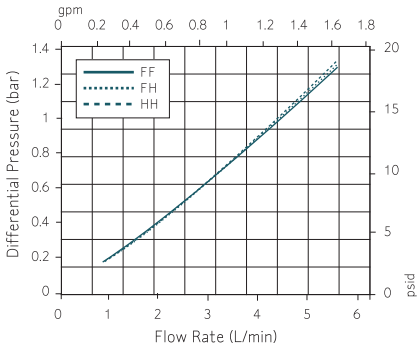
<sup>2</sup> EPDM and fluorocarbon O-rings available by custom order

Filters were tested post gamma radiation at 25-65 kGy

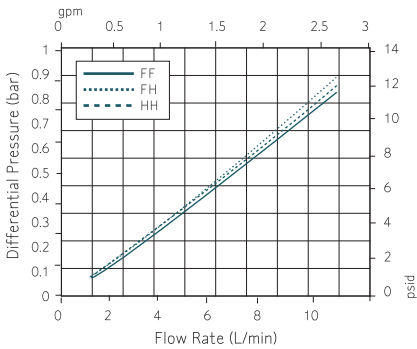
# TYPICAL CLEAN WATER FLOW RATES

## Opticap XL and XLT Disposable Capsules (Sterile and Gamma Compatible\*)

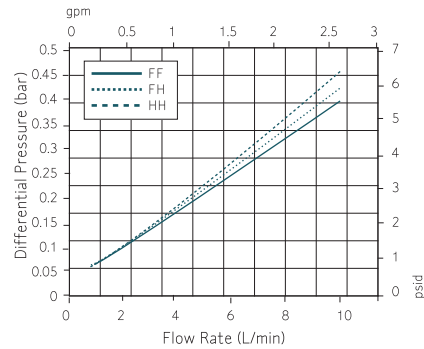
### Opticap XL 150 with 0.2 µm Millipore Express SHF Membrane



### Opticap XL 300 with 0.2 µm Millipore Express SHF Membrane



### Opticap XL 600 with 0.2 µm Millipore Express SHF Membrane



### Opticap XL 150, 300 & 600 Capsule Connection Type

FF = 19 mm ( $3/4$  in.) sanitary flange inlet and outlet

FH = 19 mm ( $3/4$  in.) hose barb inlet and and 14 mm ( $9/16$  in.) hose barb outlet

HH = 14 mm ( $9/16$  in.) hose barb inlet and outlet

\*Filters were tested post gamma radiation at 45-65kGy and autoclave at 123 °C for 60 minutes.

# SPECIFICATIONS

## Opticap XL and XLT Disposable Capsules (Sterile and Gamma Compatible)

	Opticap XL 3	Opticap XL 5	Opticap XL 10	Opticap XLT 10	Opticap XLT 20	Opticap XLT 30
<b>Nominal Dimensions</b>						
Maximum length:	17.3 cm (6.8 in.)	21.6 cm (8.5 in.)	33.5 cm (13.2 in.)	37.6 cm (14.8 in.)	62.5 cm (24.6 in.)	87.1 cm (34.3 in.)
Body diameter:	10.7 cm (4.2 in.)	10.7 cm (4.2 in.)	10.7 cm (4.2 in.)	—	—	—
<b>Fitting to Fitting</b>						
Sanitary flange to sanitary flange:	—			15.2 cm (6.0 in.)	15.2 cm (6.0 in.)	15.2 cm (6.0 in.)
Sanitary flange to hose barb:	—			17.5 cm (6.9 in.)	17.5 cm (6.9 in.)	17.5 cm (6.9 in.)
Hose barb to hose barb:	—			19.8 cm (7.8 in.)	19.8 cm (7.8 in.)	19.8 cm (7.8 in.)
<b>Filtration Area</b>	0.17 m <sup>2</sup> (1.8 ft <sup>2</sup> )	0.31 m <sup>2</sup> (3.3 ft <sup>2</sup> )	0.57 m <sup>2</sup> (6.1 ft <sup>2</sup> )	0.57 m <sup>2</sup> (6.1 ft <sup>2</sup> )	1.14 m <sup>2</sup> (12.3 ft <sup>2</sup> )	1.71 m <sup>2</sup> (18.4 ft <sup>2</sup> )
<b>Materials of Construction</b>	Filter membrane: Hydrophilic polyethersulfone Film edge: Polyethylene Supports: Polyester Structural components <sup>1</sup> : Gamma stable polypropylene Core: Polysulfone Vent O-rings: Silicone					
<b>Vent/Drain</b>	¼ in. hose barb with double O-ring seal					
<b>Maximum Differential Pressure</b>	Forward: 5.5 bar (80 psi) at 25 °C 6.9 bar (100 psi) intermittent at 25 °C 1.0 bar (15 psi) at 80 °C Reverse: 2.1 bar (30 psi) intermittent at 25 °C					
<b>Bubble Point at 23 °C</b>	≥ 4000 mbar (58 psi) air with water					
<b>Air Diffusion at 23 °C</b>	Through a water wet membrane at 2758 mbar (40 psi): ≤ 9.5 cc/min.    ≤ 17.4 cc/min.    ≤ 32.7 cc/min.    ≤ 32.7 cc/min.    ≤ 65.5 cc/min.    ≤ 98.2 cc/min.					
<b>Bacterial Retention</b>	Quantitative retention of 10 <sup>7</sup> CFU/cm <sup>2</sup> <i>Brevundimonas diminuta</i> ATCC® 19146 per ASTM® methodology					
<b>Bacterial Endotoxin</b>	Aqueous extraction contains <0.25 EU/mL as determined by the Limulus Amebocyte Lysate (LAL) Test.					
<b>TOC/Conductivity</b>	Autoclaved filter meets the WFI requirements of USP <643> for Total Organic Carbon and USP <645> for Water Conductivity after a WFI water flush of 11 L at 25 °C (per 10-inch filter).					
<b>Oxidizable Substances</b>	Meets the USP Oxidizable Substances Test requirements for sterile purified water after a water flush of: > 1000 mL    > 1000 mL    ≤ 1500 mL    ≤ 1500 mL    ≤ 3000 mL    ≤ 4500 mL					
<b>Sterilization</b>	Gamma compatible: Gamma compatible to 45 kGy. May be autoclaved for 3 cycles of 60 minutes at 123 °C. (Cannot be steam sterilized in-line.) Sterile capsules: May be autoclaved for 3 cycles of 60 minutes at 123 °C. (Cannot be steam sterilized in-line.)					
<b>Sterility</b>	Sterile capsules: Meets current USP and AAMI guidelines for sterility utilizing a validated sterilization cycle.					
<b>Non-Fiber Releasing</b>	Component materials meet criteria for a "non fiber releasing" filter as defined in 21 CFR 210.3 (b)(6).					
<b>Component Material Toxicity</b>	Component materials were tested and meet the criteria of the USP <88> Reactivity Test for Class VI plastics. Millipore Express SHF filters meet the requirements of the USP <88> Safety Test, utilizing a 0.9% sodium chloride extraction.					
<b>USP Toxicity</b>	Non-toxic per MEM Elution ISO 10993-5					
<b>Good Manufacturing Practices</b>	These products are manufactured in a facility which adheres to FDA Good Manufacturing Practices.					
<b>Indirect Food Additive</b>	All component materials meet the FDA Indirect Food Additive requirements cited in 21 CFR 177-182.					

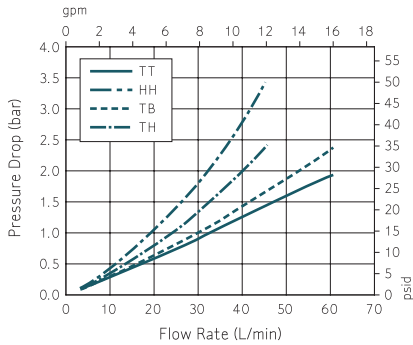
<sup>1</sup> Cage, end caps and capsule housing

Filters were tested post gamma radiation at 25-45 kGy

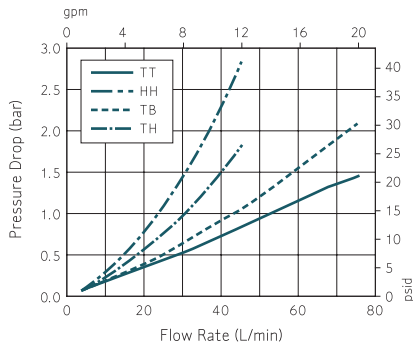
# TYPICAL CLEAN WATER FLOW RATES

## Opticap XL and XLT Disposable Capsules (Sterile and Gamma Compatible)

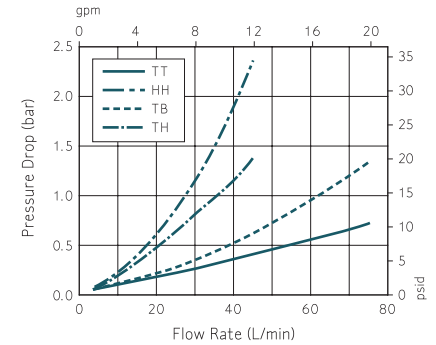
Opticap XL 3 Capsule Filters with 0.2 µm Millipore Express SHF Membrane



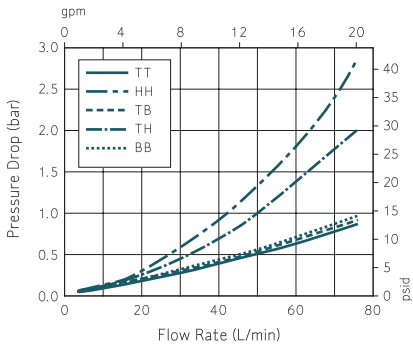
Opticap XL 5 Capsule Filters with 0.2 µm Millipore Express SHF Membrane



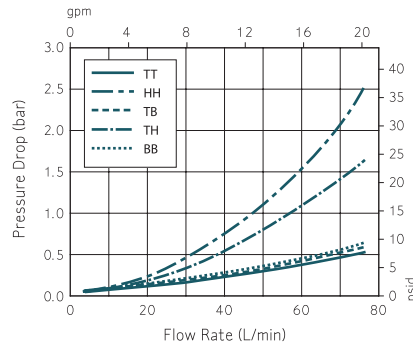
Opticap XL 10 Capsule Filters with 0.2 µm Millipore Express SHF Membrane



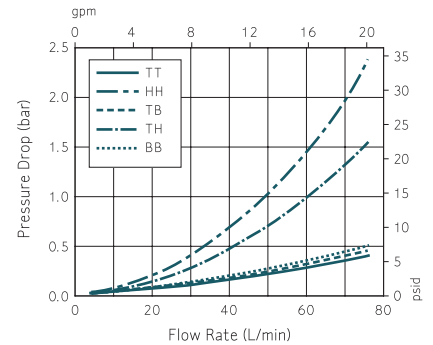
Opticap XLT 10 Capsule Filters with 0.2 µm Millipore Express SHF Membrane



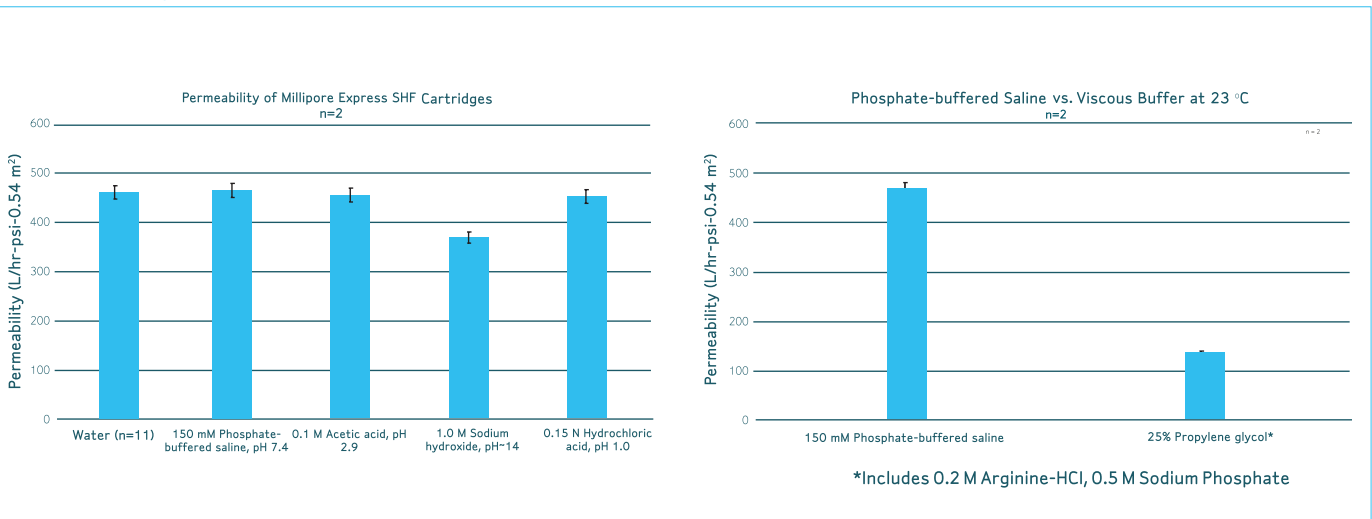
Opticap XLT 20 Capsule Filters with 0.2 µm Millipore Express SHF Membrane



Opticap XLT 30 Capsule Filters with 0.2 µm Millipore Express SHF Membrane

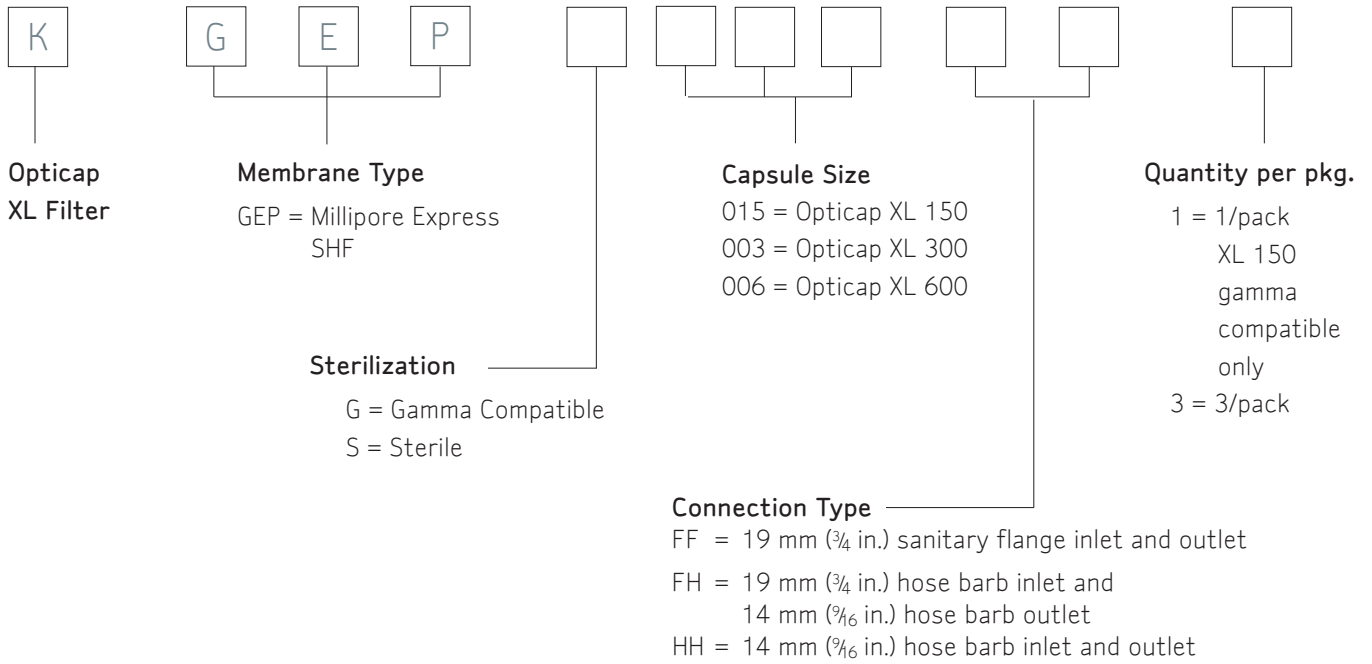


## Filter Sizing



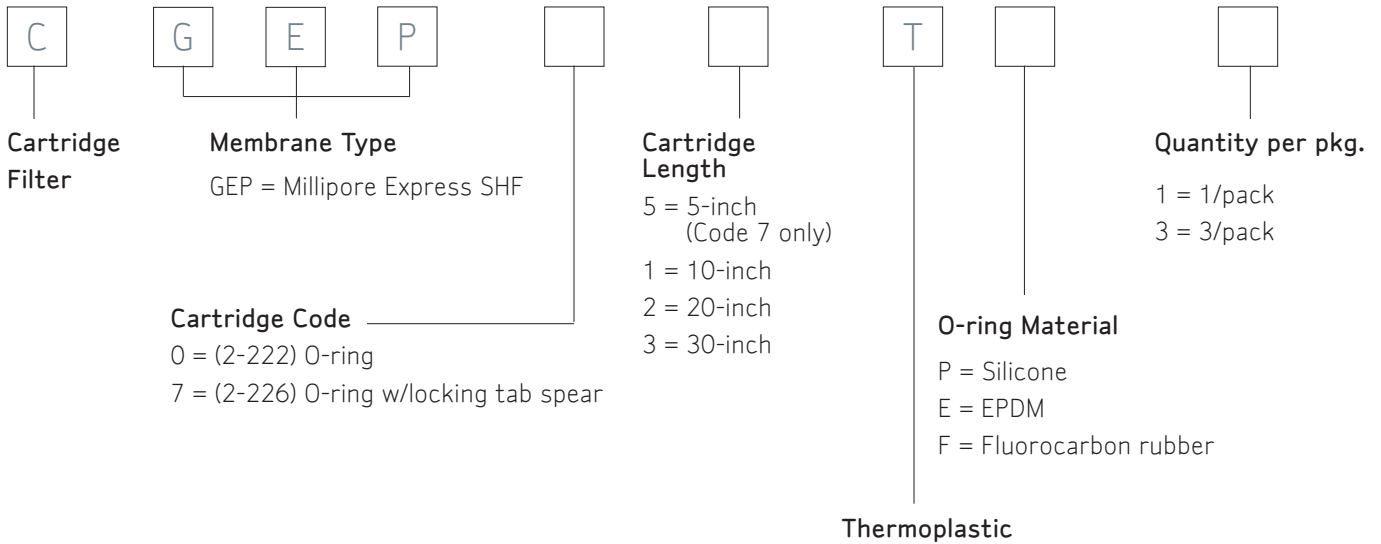
Testing with the Millipore Express SHF filters across a range of commonly used buffers and cleaning solutions (pH = 1 - 14) showed an average permeability of 450 liters per hour per psi per 10-inch cartridge.

## Opticap XL 150/300/600 Filters

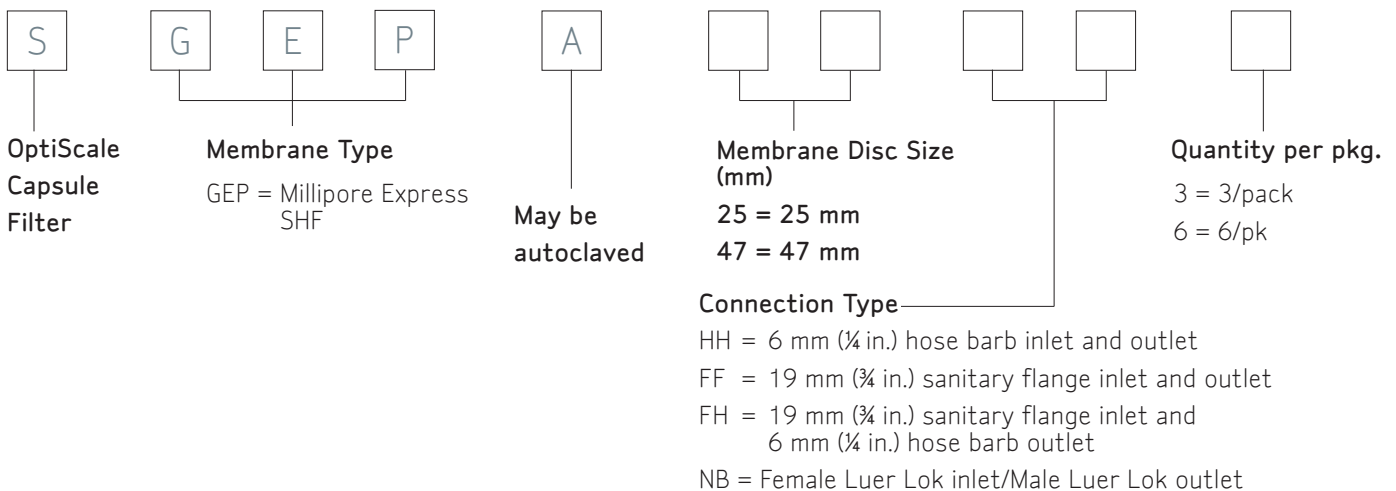


# ORDERING INFORMATION

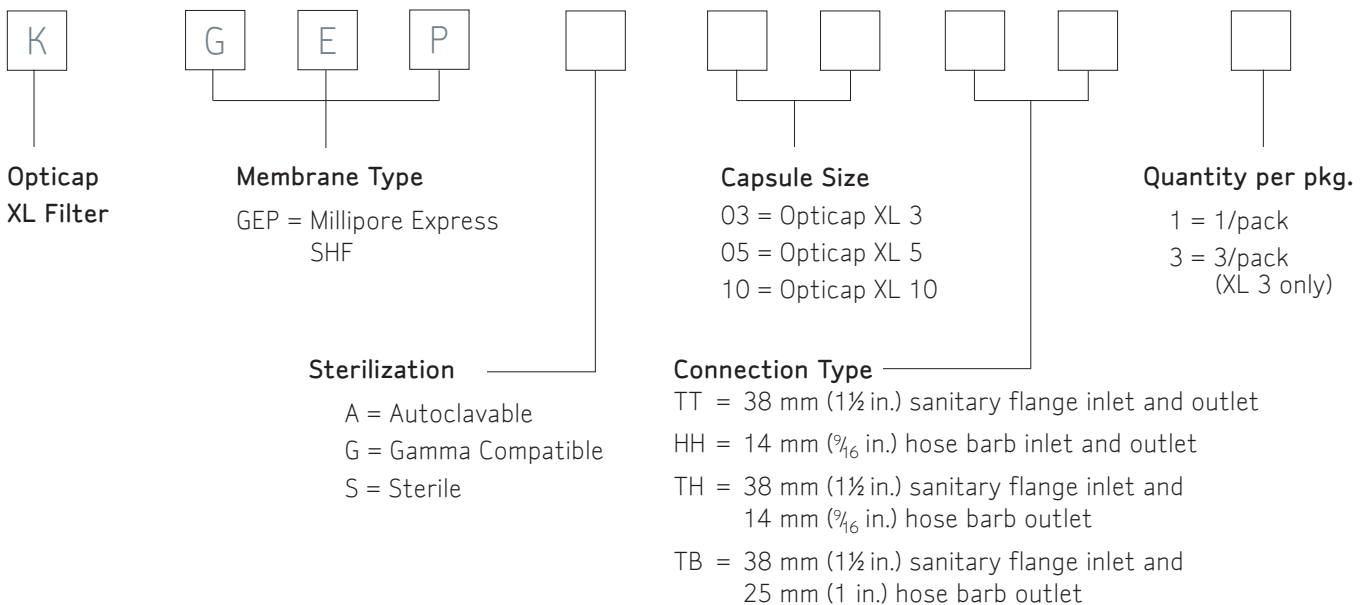
## Cartridge Filters



## OptiScale Filters

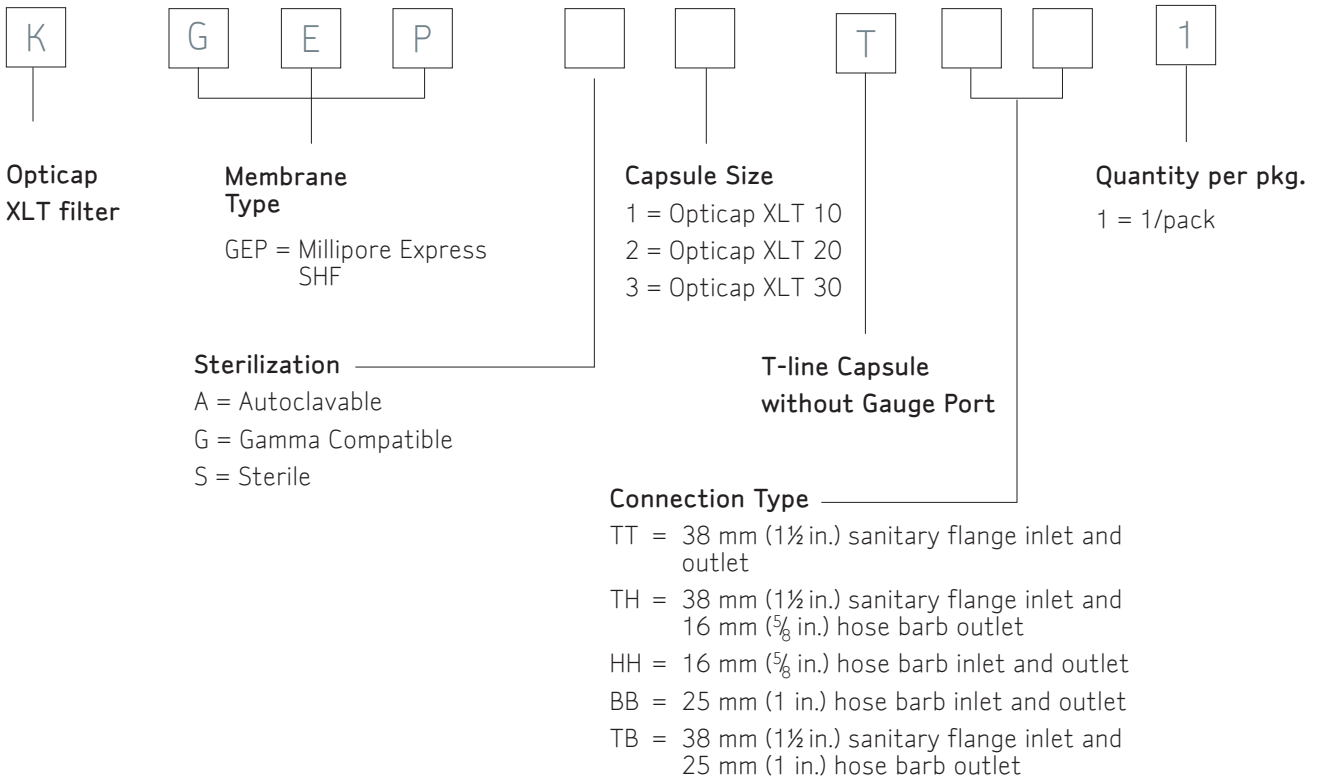


## Opticap XL Filters



# ORDERING INFORMATION

## Opticap XLT Filters





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Millipore Express SHF hydrophilic filters are part of the Mobius integrated, disposable bioprocess solution. No matter what your application step or scale, Mobius can help you achieve greater process efficiency and productivity with the right combination of single-use products, application solutions, and expert validation support. From disposable process containers to Millipore patented capsule filters and connectors, to validated, gamma-compatible turnkey assemblies, Mobius solutions provide faster turnaround time and reliable performance, right out of the box.



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## Millipore-Express-SHF-Hydrophilic-Filters

KGEPG015FF1	CGEP01TP1	SGEPA25HH3	KGEPA05TT1	KGEPA1TTT1
KGEPG015FH1	CGEP01TE1	SGEPA25FF3	KGEPA05HH1	KGEPA1TTH1
KGEPG015HH1	CGEP01TF1	SGEPA25FH3	KGEPA05TH1	KGEPA1THH1
KGEPG003FF1	CGEP02TP1	SGEPA25NB3	KGEPA05TB1	KGEPA1TBB1
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KGEPG003HH1	CGEP02TF1	SGEPA47FF3	KGEPA10HH1	KGEPA2TTT1
KGEPG006FF1	CGEP03TP1	SGEPA47FH3	KGEPA10TH1	KGEPA2TTH1
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