

## Data Sheet

# Millipore Express® HPF Hydrophilic Filters

## High-capacity bioburden reduction filters

Millipore Express® HPF hydrophilic filters significantly reduce the level of bioburden and particulates across a wide range of aqueous filtration applications, including: cell culture media, media additives, buffers, process intermediates and protein-containing solutions.

Millipore Express® HPF filters are constructed with hydrophilic polyethersulfone (PES) membranes which reduce process variability and extend the filtration capacity of downstream filters by retaining large and fine particles while maintaining high flow rates. The robust design of Millipore Express® HPF filters offers broad chemical compatibility, high thermal stability, gamma stability, low extractables and exceptionally high capacity in fouling fluids for increased productivity, shortened cycle time and reduced costs.



### Membrane

- Millipore Express® HPF hydrophilic polyethersulfone (PES) membranes
- Nominal pore size: 0.5 µm/0.3 µm

### Filter Formats

- OptiScale® 25 small-scale, disposable capsule filters
- Opticap® XL 150, 300, and 600 small-scale, disposable capsule filters - sterile and gamma compatible
- Opticap® XL 3, 5 and 10 disposable capsule filters—gamma compatible or presterilized
- Opticap® XLT 10, 20 and 30 disposable capsule filters—gamma compatible or presterilized
- Cartridge filters in 5, 10, 20, and 30 inch.

### Benefits

- High-capacity, high-flux hydrophilic PES membranes
- Superior throughput in high-fouling streams, including media and protein-containing solutions
- Combines the dirt-holding capacity of a depth filter with the retention efficiency and cleanliness of a membrane prefilter
- Provides superior protection of downstream filters for improved process efficiency and economy
- Broad chemical and caustic compatibility across a wide pH range
- Robust devices – resistant to thermal and hydraulic stress
- Available in scalable autoclavable, gamma sterilizable or presterilized disposable capsules

# Applications

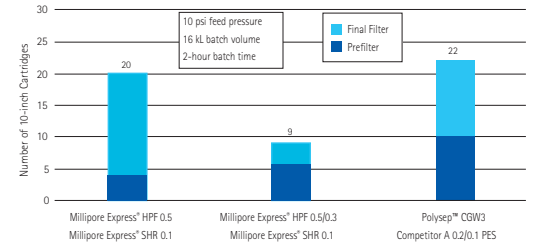
## Cell Culture Media

Millipore Express® HPF filters extend the service life of downstream sterilizing-grade filters by removing colloidal and particulate contaminants, including lipids, without binding or obstructing the flow of vital media constituents. Millipore Express® HPF filters have a robust device construction which will withstand high operating pressures, high flow rates and multiple steam-in-place cycles of up to 135 °C (cartridges only). Millipore Express® HPF high-capacity filters absorb process variability and protect downstream filters from premature plugging.

## Buffer Preparation/Column Protection/Process Intermediates

Millipore Express® HPF filters reduce particulate and bioburden before sterilizing filtration and provide excellent protection of sterilizing-grade filters in applications requiring prefiltration.

### Serum-free CHO Perfusion Media



### Serum-free CHO Media

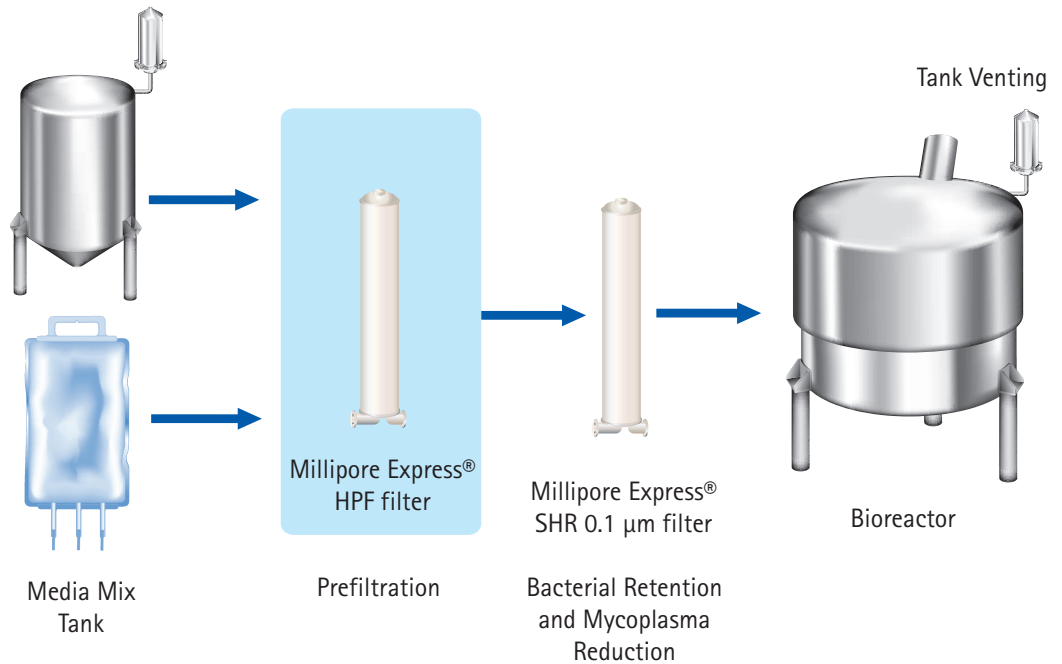
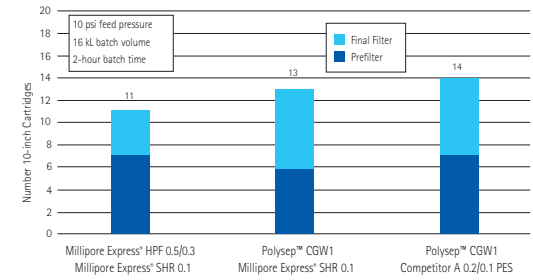
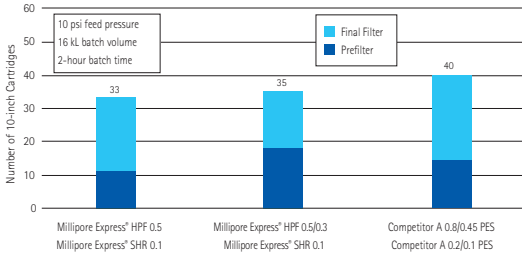
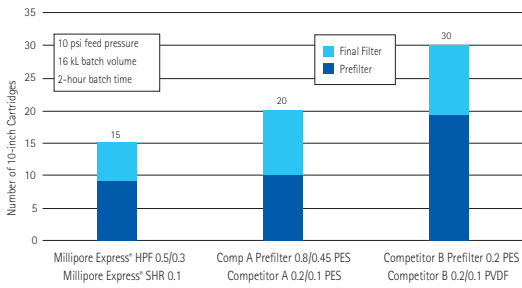


Figure 1. Cell Culture Media Process

### Moderately Fouling Soy Peptone



### Serum-free CHO Batch Media



## Increased Throughput for Lower Filtration Costs

High-capacity polyethersulfone membranes extend filter capacity and reduce filtration surface area requirements. This benefit can deliver up to a 50 percent savings in filtration costs, improving your process economics.

## Fewer Filter Change-outs and Extended Capacity

Millipore Express® HPF filters are designed to maximize the efficiency of constrained filtration systems. Its superior dirt-holding capacity and protection of downstream filtration, can increase output while reducing capital and operating expenses.

## Reliable Performance

With the Millipore Express® HPF filter, you will benefit from:

- Higher throughput
- Consistent high capacity
- Low extractables
- High flow rates
- Multiple steam-in-place or autoclave sterilization cycles
- Gamma stable and gamma pre-sterilized devices
- Broad chemical compatibility
- Reliable performance
- High resistance to thermal and hydraulic stresses
- Superior efficiency and process economy



OptiScale® 25 disposable capsule

## OptiScale® Process Development Screening Tool

OptiScale® 25 disposable capsule filters provide a convenient small volume option for process screening and scaling. These "drop in" filters are faster and easier to set up than conventional 25 mm and 47 mm discs, and completely disposable. OptiScale® 25 capsule filters offer speed-to-market strategies for efficiently developing compounds and biotherapeutics.



Small-scale Opticap® XL 150, 300, and 600 capsules and Opticap® XL 3, 5, and 10 capsules

## Opticap® XL and XLT Disposable Capsule Filters

### Convenient and Easy to Use

Opticap® XL and XLT's capsule design allows unparalleled hydraulic stress resistance in a disposable filter and eliminates the time and expense associated with 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 a ribbed housing for easy gripping, even with gloved hands.

### Opticap® XL Capsule Filters

Opticap® XL disposable capsule filters have a unique capsule design that minimizes hold-up volume and reduces production losses. Opticap® XL 150, 300, 600, 3, 5 and 10 capsules are available with Millipore Express® HPF membranes in sterile and gamma compatible formats.

### Opticap® XLT Capsule Filters

Opticap® XLT disposable T-line capsule filters with Millipore Express® HPF membrane 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 10, 20 and 30 capsules are available with Millipore Express® HPF membranes in sterile and gamma compatible formats.



Opticap® XLT filters

## Cartridge Filters

Millipore Express® HPF 5, 10, 20 and 30-inch cartridge" filters provide high flow rates and extended throughput and are 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® XLT capsule stand



Millipore Express® HPF cartridge filters

# Specifications

## OptiScale® Disposable Capsules

### OptiScale® 25 Capsules

<b>Nominal Dimensions</b>	
Diameter	31 mm (1.21 in.)
Length	39 mm (1.52 in.)
<b>Filtration Area</b>	3.5 cm <sup>2</sup>
<b>Materials of Construction</b>	
Filter membrane	Hydrophilic polyethersulfone
Structural components	Polypropylene
Vent cap	Polypropylene
<b>Housing Vent</b>	Capped vent with female Luer connections on inlet side of device.
<b>Maximum Inlet Pressure</b>	60 psi (4.1 bar) at 25°C
<b>Maximum Differential Pressure</b>	
Forward	60 psi (4.1 bar) at 25°C
Reverse	0 psi (0 bar)
<b>Bacterial Endotoxin</b>	Aqueous extraction contains <0.25 EU/mL as determined by Limulus Amebocyte Lysate (LAL)
<b>TOC/Conductivity at 25 °C</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.
<b>Sterilization</b>	May be autoclaved for 1 cycle at 123 °C for 60 min.
<b>Particle Shedding</b>	Passes USP test for particulates in injectables.
<b>Non-fiber Releasing</b>	Millipore Express® HPF membranes 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® HPF 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

## Small-scale Opticap® XL Capsules

	Opticap® XL 150 Capsules	Opticap® XL 300 Capsules	Opticap® XL 600 Capsules
<b>Nominal Dimensions</b>			
Maximum length	3.8 in (9.7 cm)	4.7 in (11.9 cm)	6.5 in (16.5 cm)
Body diameter	2.2 in (5.6 cm)	2.2 in (5.6 cm)	2.2 in (5.6 cm)
<b>Filtration Area</b>	0.019 m <sup>2</sup> (0.206 ft <sup>2</sup> )	0.039 m <sup>2</sup> (0.418 ft <sup>2</sup> )	0.078 m <sup>2</sup> (0.843 ft <sup>2</sup> )
<b>Materials of Construction</b>			
Filter membrane	Hydrophilic polyethersulfone	Hydrophilic polyethersulfone	Hydrophilic polyethersulfone
Film edge	—	—	—
Supports	Polyethylene	Polyethylene	Polyethylene
Structural components <sup>1</sup>	Gamma Stable Polypropylene	Gamma Stable Polypropylene	Gamma Stable Polypropylene
Core	Polysulfone	Polysulfone	Polysulfone
Vent O-rings <sup>2</sup>	Silicone	Silicone	Silicone
<b>Vent/Drain</b>	¼ in. hose barb with double O-ring seal		
<b>Maximum Inlet Pressure</b>	100 psid (6.9 bar) intermittent at 23 °C 80 psi (5.5 bar) at 23 °C 40 psi (2.8 bar) at 60 °C 15 psi (1.0 bar) at 80 °C		
<b>Maximum Differential Pressure</b>			
Forward	100 psid (6.9 bar) intermittent at 25 °C 80 psi (5.5 bar) at 25 °C 40 psi (2.8 bar) at 60 °C 15 psid (1.0 bar) at 80 °C		
Reverse	20 psid (1.4 bar) intermittent at 25 °C		
<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 at 25 °C</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:		
	1 L	2 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		
<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® HPF membranes 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. Toxicity Millipore Express® HPF 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

## Specifications

### Opticap® XL Capsules

	Opticap® XL3 Capsules	Opticap® XL5 Capsules	Opticap® XL10 Capsules
<b>Nominal Dimensions</b>			
Maximum length	6.8 in (17.3 cm)	8.5 in (21.6 cm)	13.2 in (33.5 cm)
Body diameter	4.2 in (10.7 cm)	4.2 in (10.7 cm)	4.2 in (10.7 cm)
<b>Filtration Area</b>	0.13 m <sup>2</sup> (1.4 ft <sup>2</sup> )	0.23 m <sup>2</sup> (2.5 ft <sup>2</sup> )	0.49 m <sup>2</sup> (5.3 ft <sup>2</sup> )
<b>Materials of Construction</b>			
Filter membrane	Hydrophilic polyethersulfone		
Film edge	Polyethylene		
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>	100 psid (6.9 bar) intermittent at 25 °C 80 psid (5.5 bar) at 25 °C 40 psid (2.8 bar) at 60 °C 15 psid (1.0 bar) at 80 °C		
<b>Maximum Differential Pressure</b>			
Forward	100 psid (6.9 bar) intermittent at 25 °C 80 psid (5.5 bar) at 25 °C 40 psid (2.8 bar) at 60 °C 15 psid (1.0 bar) at 80 °C		
Reverse	30 psid (2.1 bar) intermittent at 25 °C		
<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 at 25 °C</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:		
	4 L	7 L	15 L
<b>Oxidizable Substances</b>	Meets the USP Oxidizable Substances Test requirements for sterile purified water after a water flush of: ≤ 2000 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® HPF membranes 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® HPF 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

# Specifications

## Opticap® XLT Capsules

	Opticap® XLT 10 Capsules	Opticap® XLT 20 Capsules	Opticap® XLT 30 Capsules
<b>Nominal Dimensions</b>			
Maximum length	14.8 in (37.7 cm)	24.6 in (62.5 cm)	34.3 in (87.2 cm)
Body diameter	4.2 (10.7 cm)	4.2 in (10.7 cm)	4.2 in (10.7 cm)
<b>Fitting to Fitting</b>			
Sanitary flange to Sanitary flange:	6.0 in (15.2 cm)	6.0 in (15.2 cm)	6.0 in (15.2 cm)
Sanitary flange to hose barb:	6.9 in (17.5 cm)	6.9 in (17.5 cm)	6.9 in (17.5 cm)
Hose barb to hose barb:	7.8 in (19.4 cm)	7.8 in (19.4 cm)	7.8 in (19.4 cm)
<b>Filtration Area</b>	0.49 m <sup>2</sup> (5.3 ft <sup>2</sup> )	0.98 m <sup>2</sup> (10.5 ft <sup>2</sup> )	1.47 m <sup>2</sup> (15.8 ft <sup>2</sup> )
<b>Materials of Construction</b>			
Filter membrane	Hydrophilic polyethersulfone		
Film edge	Polyethylene		
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>	100 psid (6.9 bar) intermittent at 23 °C 80 psid (5.5 bar) at 23 °C 40 psid (2.8 bar) at 60 °C 15 psid (1.0 bar) at 80 °C		
<b>Maximum Differential Pressure</b>			
Forward	100 psid (6.9 bar) intermittent at 25 °C 80 psid (5.5 bar) at 25 °C 15 psid (1.0 bar) at 80 °C		
Reverse	30 psid (2.1 bar) intermittent at 25 °C		
<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 at 25 °C</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:		
	15 L	30 L	45 L
<b>Oxidizable Substances</b>	Meets the USP Oxidizable Substances Test requirements for sterile purified water after a water flush of:		
	≤ 2000 mL	≤ 4000 mL	≤ 6000 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® HPF membranes 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. Toxicity Millipore Express® HPF 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



## Specifications

### Cartridge Filters

	5-inch Cartridges	Cartridges (per 10-inch element)
<b>Nominal Dimensions</b>		
Maximum length	5 in (12.7 cm)	10 in (25.4 cm)
Body diameter	2.7 in (6.9 cm)	2.7 in (6.9 cm)
<b>Filtration Area</b>	0.23 m <sup>2</sup> (2.5 ft <sup>2</sup> )	0.49 m <sup>2</sup> (5.3 ft <sup>2</sup> )
<b>Materials of Construction</b>		
Filter membrane	Hydrophilic polyethersulfone	
Supports	Polypropylene non-woven spun bound	
Structural components <sup>1</sup>	Polypropylene	
Core	Polysulfone	
Vent O-rings <sup>2</sup>	Silicone	
<b>Maximum Differential Pressure</b>		
Forward	100 psid (6.9 bar) intermittent at 4-25 °C 25 psid (1.7 bar) at 80 °C 5 psid (0.3 bar) at 135 °C	
Reverse	30 psid (2.1 bar) at 4-25 °C 1 psid (0.1 bar) at 135 °C	
<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 at 25 °C</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: 4.7 L <span style="float: right;">10 L</span>	
<b>Sterilization</b>		
Autoclave	25 cycles of 60 minutes at ≤126 °C.	
In-line steam*	25 forward cycles of 30 minutes at ≤135 °C or 22 forward cycles of 30 minutes at ≤135 °C and 3 reverse cycles of 30 minutes at 135 °C	
<b>USP Toxicity</b>	Non-toxic per MEM elution ISO 10993-5	
<b>Non-fiber Releasing</b>	Millipore Express® HPF membranes 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. Toxicity Millipore Express® HPF 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.	

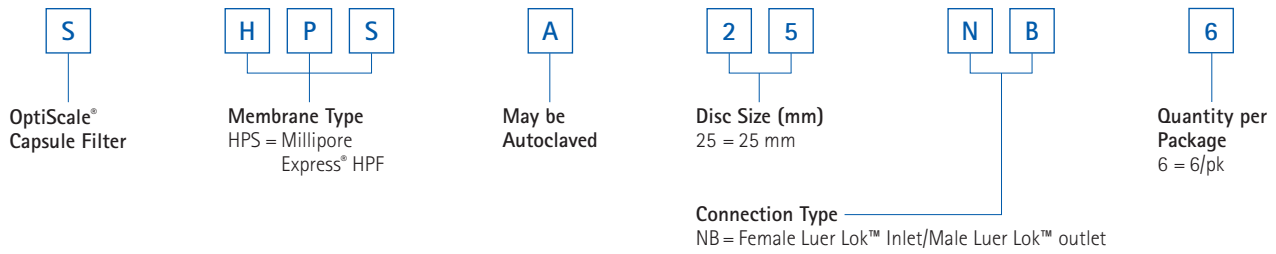
<sup>1</sup> Cage, end caps and capsule housing

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

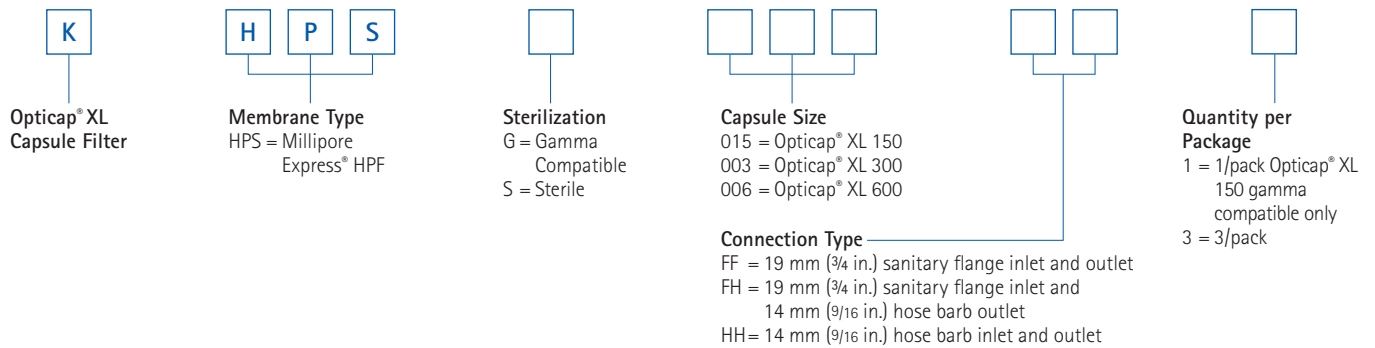
<sup>3</sup> 30 inch cartridge requires 20 L flush

## Ordering Information

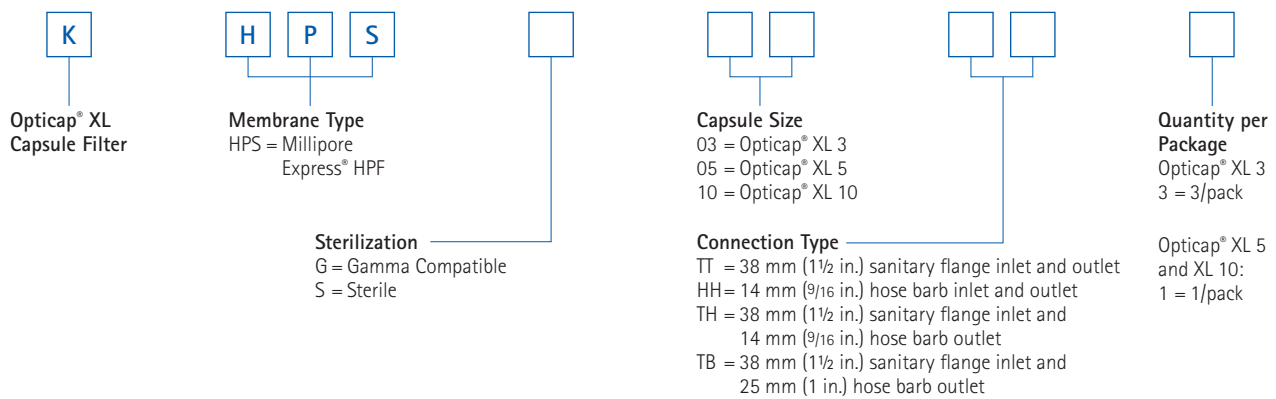
### OptiScale® Capsule Filters



### Small-scale Opticap® XL 150/300/600 Capsule Filters

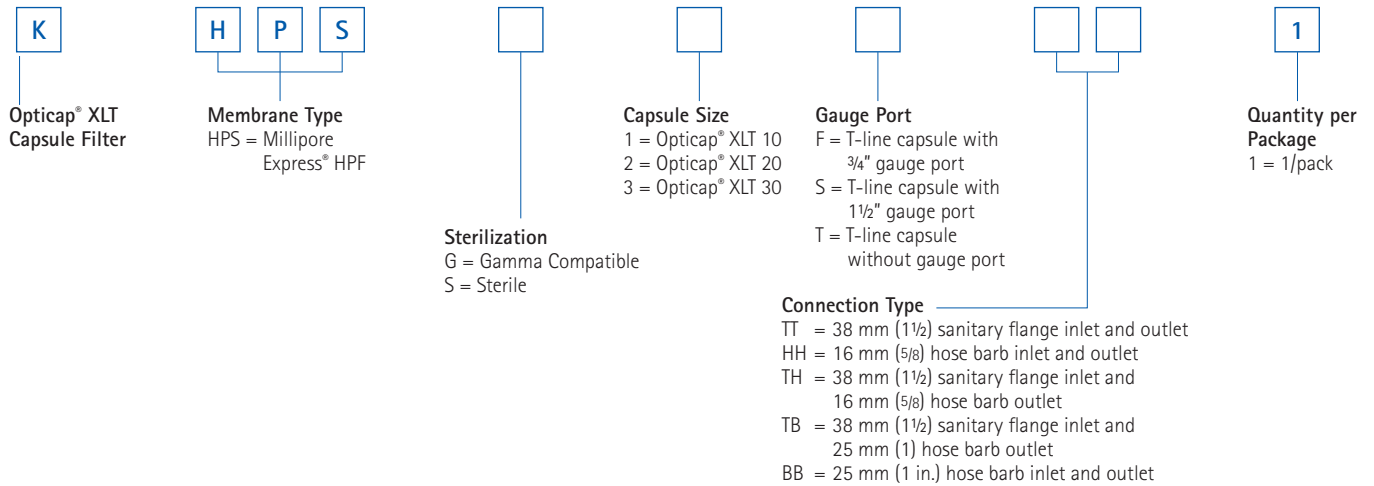


### Opticap® XL Capsule Filters



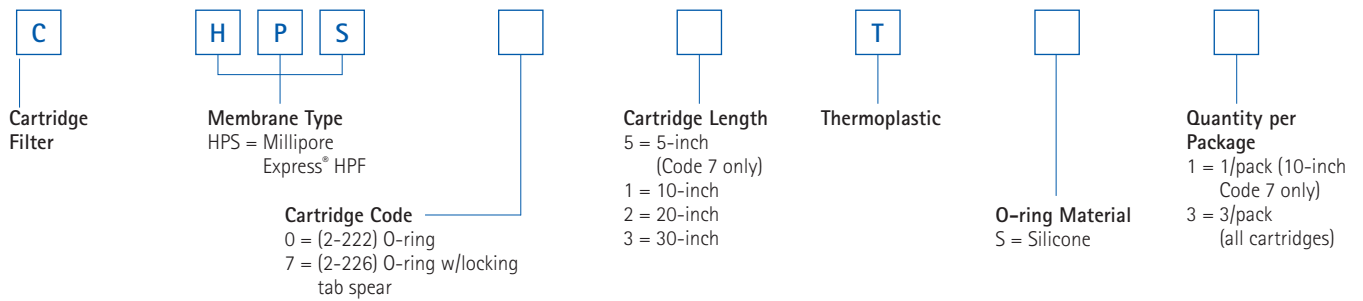
## Ordering Information

### Opticap® XLT Capsule Filters



Description	Qty/pk	Catalogue Number
Standard Opticap® XLT Capsule Filter Stand	1	XLTSTAND1

### Cartridge Filters





## To Place an Order or Receive Technical Assistance

In the U.S. and Canada, call toll-free 1-800-645-5476

For other countries across Europe and the world,  
please visit: [www.emdmillipore.com/offices](http://www.emdmillipore.com/offices)

For Technical Service, please visit:  
[www.emdmillipore.com/techservice](http://www.emdmillipore.com/techservice)



[www.emdmillipore.com/offices](http://www.emdmillipore.com/offices)