



## 0.2µm *AseptiCap* KL/KS

### **Sterilization Grade Hydrophilic Polyethersulfone (PES) Membrane Devices for Liquid Streams in Biopharmaceuticals**

### Data Sheet

Biopharmaceutical processing requires sterilizing grade microfiltration at multiple stages to meet specific process requirements.

Processes managers are continuously looking for microfiltration solutions to upstream, downstream, intermediate processes and final biological preparations. Since bio manufacturing is a multi stage process and bio molecules by nature are extremely sensitive, they are looking for:

- Minimizing protein losses due to adsorption to improve overall product yields
- Minimizing filter extracts which add up due to multiple points of use in a process
- High throughputs to achieve process economy
- Choice of filter end connections for easy and reliable quick connections
- Absolute retentions for higher sterility assurance

**mdi** produces a wide range of Sterilizing grade PES membrane devices to meet filtration requirements of biopharmaceutical processing. These filter devices are validated to meet compendia and regulatory requirements and are well characterized. They meet key process requirements such as high retention efficiency, very high protein recoveries, extremely low extractables, high throughputs, wide chemical compatibility and other important characteristics.

With the advantages of pre filtration layer built into the device for higher throughputs, linear scalability of filter area for smooth transitions from lab scale to pilot to process scale and widest range of end connections for quick and reliable connections to the existing fittings, **mdi** *AseptiCap* KL/KS filters are a universal solution for process filtration.

## PES Membrane Devices for Biopharmaceuticals

*AseptiCap KL/KS* 0.2 micron capsule filters use **mdi** PES membrane in Polypropylene housing. No adhesives or glue are used in the manufacturing process and all bonding is done by heat welding.

The products are deeply validated for use in Biopharmaceutical applications and specially recommended for single use systems. *AseptiCap KL/KS* are manufactured in class 10,000 clean rooms and ISO 9001 certified facilities.

### Types Available

- AseptiCap KS: Double Layer (with Prefilter)
- AseptiCap KL: Single Layer (without Prefilter)

### Applications

#### Sterile Filtration of

- Cell culture media
- Cell culture media containing serum
- Media additives
- pH adjusters
- Final product concentrates

#### Bioburden Reduction/ Particulate Removal

- Buffers
- Centrifuge supernatants
- Clarified cell lysates

### Key Features

- Absolute retention
- 100% integrity tested
- Low protein binding
- Very low hold up volume in filters
- High flow rates
- Serial construction with prefilter for higher throughput with fouling streams
- Bioburden maintained below 1000 cfu/device
- Endotoxin level certified to be <0.25 EU/ml
- Widest range of end connections
- Products available for total scalability from a few ml to thousands of liters
- Total traceability through unique serial number for each filter
- Individual certificate of quality for each device
- Sterilizable by EO gas or autoclaving

### Validation Services

The regulatory requirements emphasize on the need to validate the efficacy of the 'Sterilizing Filter' with drug product under simulated worst-case conditions of use.

**mdi** provides validation services supported by customized validation protocols and world class test facilities to assist you in filter validations with your specific drug product.

## Quality Assurance

**mdi's** quality management system emphasizes on quality by design rather than end product testing. Robust processes are developed for product manufacturing and are continuously monitored to ensure that the products meet their predetermined specifications and lot to lot reproducibility is ensured.

### Certificate of Quality

Each capsule filter is accompanied by individual certificate of quality to ensure traceable documentation at user's end.

It certifies the product compliance to various regulatory as well as user requirements.

### Validated for Microbial Retention

Integrity test data have been correlated to actual microbial retention with *B. diminuta* (ATCC 19146) as per ASTM F838-05 to establish acceptable integrity test values.

Samples from each lot are subjected to microbial challenge test before final lot release.

### 100% Integrity Tested

Each *AseptiCap KL/KS* is tested for integrity to comply with validated acceptable Integrity Test Specifications.

### Flow Rate

Each lot is tested for clean water flow rates to ensure that flow rates are within the specifications.

### Adsorption

*AseptiCap KL/KS* filters are validated for low protein binding to ensure minimal active ingredient losses when used for filtration of high value proteins.

### Pressure, Temperature Endurance

*AseptiCap KL/KS* filters are validated to endure high operating pressure and temperature conditions which may be encountered during use.

These filters are also validated for high burst pressure to ensure user safety in case of inadvertent pressure build-up.

### Extractables

Extractables/leachables from sterilizing filters, used at various stages of a biopharmaceutical manufacturing process, will add on and may impact the impurity profile of the desired product.

*AseptiCap KL/KS* filters are validated to exhibit low extractables under harsh extraction conditions.

### Bioburden Testing

Device bioburden is tested as per ISO 11737-1 and assured to be <1000 cfu/device.

### Endotoxin Testing

Aqueous extracts exhibit <0.25 EU/ml as established by *Lumulus Amebocyte Lysate* (LAL) test.

### Total Traceability

*AseptiCap KL/KS* filters come with completely traceable lot numbers and unique identification number to facilitate easy and fast retrieval of manufacturing and quality control data.

These unique lot and identification numbers are laser etched on each filter device and also printed on the labels of the box in which individual filter is packed.

### Packaging Integrity

*AseptiCap KL/KS* filters are fitted with vent caps and are packed in bags to ensure package integrity during transit as well as to prevent particulate contamination while transferring to clean room assembly or process areas.

### Other Regulatory Compliance

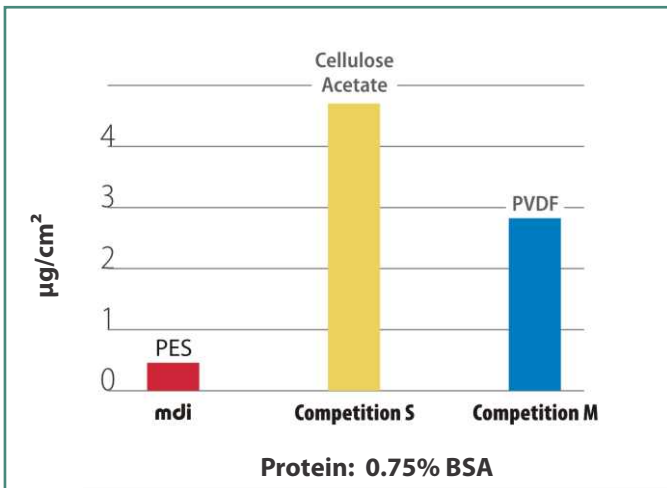
- Complies with USFDA 21 CFR 210.3(b)(6) for fiber release
- Complies with USFDA 21 CFR 177.1520 for fractional dissolution
- Materials of construction tested for toxicity as per Biological Reactivity Tests, In-vivo, USP <88> for class VI Plastics
- Complete filter devices tested for cytotoxicity as per Biological Reactivity Tests, In-vitro, USP <87>

## Low Protein Binding

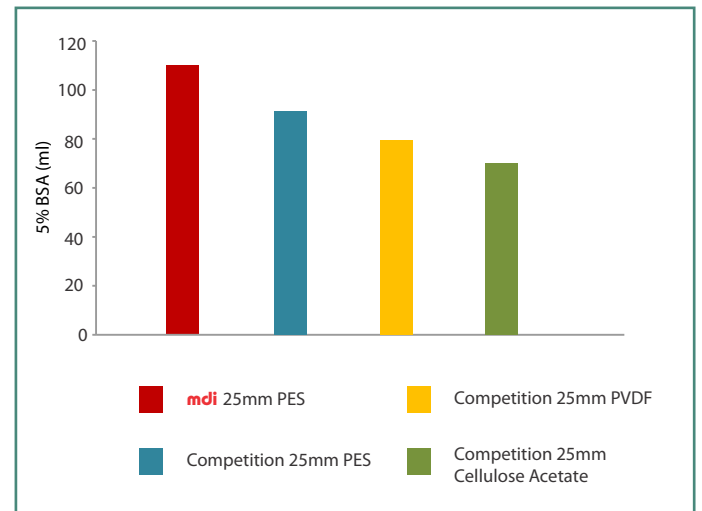
A comparative study on **mdi** PES membrane exhibits much lower protein adsorption than other competing membranes of Cellulose Acetate and PVDF.

The low protein binding results in increased overall product yield and higher throughputs with biological streams.

## Protein Binding ( $\mu\text{g}/\text{cm}^2$ )



## High Throughputs



**mdi** PES membrane exhibits higher throughput than either Cellulose Acetate or PVDF membranes.

The high throughput translates to lower filtration costs, less number of filter changes and overall economy of operations.

## Very Low Hold-Up Volumes

**mdi** PES membrane capsule filters are designed to offer very low hold-up volumes to minimize filtration losses and maximize product recovery.

0.2 $\mu\text{m}$ AseptiCap Filters	Protein Binding
25 mm, 5 $\text{cm}^2$	1.45 $\mu\text{g}$
50 mm, 20 $\text{cm}^2$	6.3 $\mu\text{g}$
1", 250 $\text{cm}^2$	80.5 $\mu\text{g}$
2", 500 $\text{cm}^2$	175 $\mu\text{g}$
10", 6000 $\text{cm}^2$	1925 $\mu\text{g}$

Filter Devices	EFA* (Nominal)	Hold up Volume
AseptiCap KL/KS 25mm	5 $\text{cm}^2$	< 50 $\mu\text{l}$
AseptiCap KL/KS 50mm	20 $\text{cm}^2$	< 200 $\mu\text{l}$
AseptiCap KL/KS 1"	250 $\text{cm}^2$	< 5ml
AseptiCap KL/KS 2"	500 $\text{cm}^2$	< 25ml
AseptiCap KL/KS 5"	1000 $\text{cm}^2$	< 45ml
AseptiCap KL/KS 8"	2000 $\text{cm}^2$	< 60ml

\*EFA: Effective Filtration Area

## Extractables

It is useful to evaluate extractables that may be leached out of the filter and enter the process stream. **mdi** filters give low extractables under harsh preconditioning and extraction conditions.

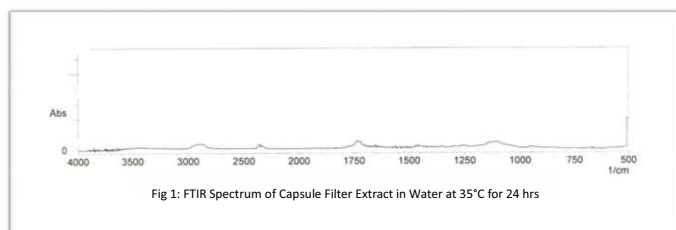
**Low extractables mean less addition to impurity profile of the biological product from the filters.**

**Extraction Time:** 24 hours

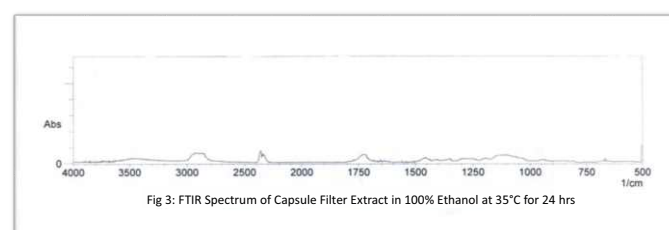
Model Solvent	Non Volatile Residue	
	<i>AseptiCap KS 1"</i> (250 cm <sup>2</sup> )	<i>AseptiCap KS 10"</i> (6000 cm <sup>2</sup> )
Water @ 35 °C	1.6 mg	38.26 mg
Water @ 80 °C	1.8 mg	43.04 mg

Model Solvent	Non Volatile Residue	
	<i>AseptiCap KS 1"</i> (250 cm <sup>2</sup> )	<i>AseptiCap KS 10"</i> (6000 cm <sup>2</sup> )
100% Ethanol @ 35 °C	13.4 mg	320.43 mg

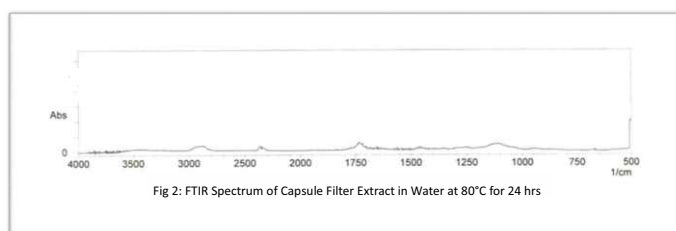
### FTIR Analysis of Extractables From *AseptiCap KS 1"* Capsule Filter with Water @ 35 °C



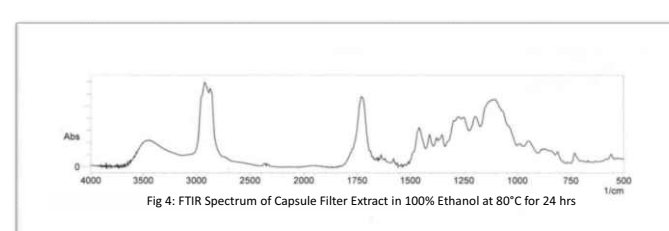
### FTIR Analysis of Extractables From *AseptiCap KS 1"* Capsule Filter with 100% Ethanol @ 35 °C



### FTIR Analysis of Extractables From *AseptiCap KS 1"* Capsule Filter with Water @ 80 °C



### FTIR Analysis of Extractables From *AseptiCap KS 1"* Capsule Filter with 100% Ethanol @ 80 °C



The Spectrum of extracts from *AseptiCap KL/KS* capsule filters with 100% ethanol under extreme extraction conditions show presence of various components used in the manufacture of **mdi** PES membrane capsule filters.

## Easy Connect

### Widest Range of End Connections

Biopharmaceutical processes involve transfer of high value fluids through multiple process steps. Making high quality, reliable, flexible and functionally convenient connectivity with filters is of utmost value to the bio-processors.

**mdi** AseptiCap KL/KS filters offer a wide range of reliable end connections for functional convenience and customized connectivity.

### Validated for Performance

These end connections are manufactured with tight dimension tolerance and are validated for strength and connection integrity under extreme use conditions as well as for their ability to withstand prevalent sterilization methods including EO sterilization and autoclaving.



**3/4" Sanitary Flange**



**1 1/2" Sanitary Flange**



**1/2" HB**



**1/2" Single Stepped HB**



**1/4" SHB**



**Quick Connector**

Some end connections available with AseptiCap

### Customized Connectivity

**mdi** AseptiCap KL/KS filters are available in a wide range of end connections and are also customized to offer different inlet-outlet combinations to meet the unique connectivity needs in biopharmaceutical process assemblies where, for example, stainless steel components with sanitary flange connections are sometimes required to be connected to single use disposable systems through quick-connectors or hose barb connections.



**1 1/2" Sanitary Flange to 1/2" Barb Hose**



**1 1/2" Sanitary Flange to 3/4" Sanitary Flange**



**AseptiCap with HighSecurity 1/2" hose barb connection**

# Linear Upscaling from R&D to Production Process

## Datasheet

Scientists are concerned about filter fluid interaction impacting the stability, purity, strength etc. of the drug product, and they take a keen interest in filter selection at the formulation development stage itself. Although preliminary compatibility data support initial filter selection, for stability studies detailed filter validations are required to provide enough documented evidence to justify specific filter use.

A critical requirement that needs to be addressed at this stage is of scalability from R&D to pilot scale to full scale production processes.

**mdi** offers a wide range of *AseptiCap KL/KS* filters to provide linear scale up from lab scale to production process. While scaling up the process, the appropriate size filter can be selected by increasing the effective filtration area of filter proportionate to the process fluid volumes.

All Materials of construction as well as manufacturing process are identical for all filter devices starting from 5 cm<sup>2</sup> to 18000cm<sup>2</sup> hence process scaling can be facilitated without triggering additional validation studies for given process conditions. **mdi** provides complete documentation for each of the *AseptiCap KL/KS* filters there by reducing the additional validation cost and time.



**AseptiCap KL/KS**  
25mm, 5cm<sup>2</sup>



**AseptiCap KL/KS**  
50mm, 20cm<sup>2</sup>



**AseptiCap KL/KS**  
1", 250cm<sup>2</sup>



**AseptiCap KL/KS**  
2", 500cm<sup>2</sup>



**AseptiCap KL/KS**  
5", 1000cm<sup>2</sup>



**AseptiCap KL/KS**  
8", 2000cm<sup>2</sup>

Filter Devices	EFA* (Nominal)	Hold up Volume
<i>AseptiCap KL/KS</i> 25 mm	5cm <sup>2</sup>	< 50µl
<i>AseptiCap KL/KS</i> 50 mm	20cm <sup>2</sup>	< 200µl
<i>AseptiCap KL/KS</i> 1"	250cm <sup>2</sup>	< 5ml
<i>AseptiCap KL/KS</i> 2"	500cm <sup>2</sup>	< 25ml
<i>AseptiCap KL/KS</i> 5"	1000cm <sup>2</sup>	< 45ml
<i>AseptiCap KL/KS</i> 8"	2000cm <sup>2</sup>	< 60ml
<i>AseptiCap KL/KS</i> 10"	6000cm <sup>2</sup>	–
<i>AseptiCap KL/KS</i> 20"	12000cm <sup>2</sup>	–
<i>AseptiCap KS</i> 30"	18000cm <sup>2</sup>	–



**AseptiCap KS**  
10", 6000cm<sup>2</sup>

## 0.2 µm AseptiCap KL/KS

### Construction

Membrane	0.2 µm Hydrophilic PES
Upstream Membrane (in case of AseptiCap KS)	0.8 µm, 0.65 µm or 0.45 µm Hydrophilic PES
Plastic parts	Polypropylene

### Integrity Testing/ Retention

Bubble Point	≥ 50 psi (3.52 Kg/cm <sup>2</sup> ) with Water
Microbial Retention	LRV >7 for <i>Brevundimonas diminuta</i> (ATCC 19146) per cm <sup>2</sup>

### Size

Size	25mm	50mm	
Effective Filtration Area (Nominal)	5 cm <sup>2</sup>	20 cm <sup>2</sup>	
Dimensions (End to End)	¼" SHB I/O	–	79 mm
	¾" Sanitary Flange Inlet I/O	–	51 mm
	Female Luer Lock Inlet/ Male Luer Slip Out let	23 mm	–
Operational Radius (with Vent/ Drain)	15 mm	28 mm	

### Operational

Max. Operating Temperature	55 °C	60 °C
Max. Differential Pressure	75 psi (5 Kg/cm <sup>2</sup> ) @ 25 °C	42 psi (3 Kg/cm <sup>2</sup> ) @ 30 °C
Sterilization	By Gas	Sterilizable by Ethylene Oxide
	By Autoclave	Autoclavable at 125 °C for 30minutes, 25 Cycles. Can not be in-line steam sterilized
Shelf Life	3 years after EO sterilization	

### Assurance

Toxicity	Passes Biological Reactivity Tests, In vivo, as per USP <88> for Class VI plastics
Cytotoxicity	Passes Biological Reactivity Tests, In vitro, USP <87> for cytotoxicity
Bacterial Retention	LRV > 7 for <i>B. diminuta</i> (ATCC 19146) per cm <sup>2</sup> of filter area as per ASTM F 838-05
Bacterial Endotoxin	Aqueous extracts exhibit < 0.25 EU/ml as established by Limulus Amebocyte Lysate (LAL) Test as per USP <85>
Non Fiber Releasing	Passes test as per USP and comply with USFDA 21 CFR Part 210.3(b)(6) for fiber release
TOC and Conductivity	Meets the WFI requirements of USP for TOC <643> and Conductivity <645> after a specified minimal flush
pH Compatibility	Compatible with pH range of 1 - 10
Extractables with WFI	Passes NVR test as per USP <661>
Indirect Food Additives	Comply with USFDA 21 CFR Part 177.1520
Oxidizable Substances	Within limits as specified in USP <1231>
Quality Management System	ISO-9001 Certified
USFDA	DMF No. 015554



## 0.2 µm AseptiCap KL/KS

Construction					
Membrane	0.2 µm Hydrophilic PES				
Upstream Membrane (in case of AseptiCap KS)	0.8 µm, 0.65µm or 0.45 µm Hydrophilic PES				
Support Layers	Polyester				
Plastic parts	Polypropylene				
Integrity Testing/ Retention					
Bubble Point	≥ 50psi (3.52Kg/cm <sup>2</sup> ) with Water				
Microbial Retention	LRV > 7 for <i>Brevundimonas diminuta</i> (ATCC 19146) per cm <sup>2</sup>				
Size					
Size	1"	2"	5"	8"	
Effective Filtration Area (Nominal)	250cm <sup>2</sup>	500cm <sup>2</sup>	1000cm <sup>2</sup>	2000 cm <sup>2</sup>	
Dimensions (End to End)	1½" Sanitary Flange I/O	91 mm	110 mm	161 mm	211 mm
	½" Hose Barb I/O	90 mm	112 mm	164 mm	215 mm
	1½" Sanitary Flange Inlet ½" Single Step Hose Barb Outlet	-	111 mm	162 mm	212 mm
	¾" Sanitary Flange I/O	91 mm	103 mm	155 mm	205 mm
Operational Radius (with Vent/ Drain)	30 mm	65 mm	65 mm	65 mm	
Vent and Drain	-	1/4" Hose Barb with Silicone "O" rings			
Operational					
Max. Operating Temperature	80 °C @ < 30 psi (2 Kg/cm <sup>2</sup> )				
Max. Differential Pressure	60 psi (4 Kg/cm <sup>2</sup> ) @ 30 °C				
Sterilization	By Gas	Sterilizable by Ethylene Oxide			
	By Autoclave	Autoclavable at 125 °C for 30minutes, 25 Cycles. Can not be in-line steam sterilized			
Shelf Life	3 Years after EO Sterilization				
Assurance					
Toxicity	Passes Biological Reactivity Tests, In vivo, as per USP <88> for Class VI plastics				
Cytotoxicity	Passes Biological Reactivity Tests, In vitro, USP <87> for cytotoxicity				
Bacterial Retention	LRV > 7 for <i>B. diminuta</i> (ATCC 19148) per cm <sup>2</sup> of filter area as per ASTM F 838-05				
Bacterial Endotoxin	Aqueous extracts exhibit < 0.25 EU/ml as established by Limulus Amebocyte Lysate (LAL) Test as per USP <85>				
Non Fiber Releasing	Passes test as per USP and comply with USFDA 21 CFR Part 210.3(b)(6) for fiber release				
TOC and Conductivity	Meets the WFI requirements of USP for TOC <643> and Conductivity <645> after a 3 liter flush				
pH Compatibility	Compatible with pH range of 1 - 10				
Extractables with WFI	Passes NVR test as per USP <661>				
Indirect Food Additives	Comply with USFDA 21 CFR Part 177.1520				
Oxidizable Substances	Within limits as specified in USP <1231>				
Quality Management System	ISO-9001 Certified				
USFDA	DMF No. 015554				

# Specifications

## 0.2 $\mu\text{m}$ AseptiCap KS

# Datasheet

### Construction

Membrane	0.2 $\mu\text{m}$ Hydrophilic PES
Upstream Membrane	0.8 $\mu\text{m}$ , 0.65 $\mu\text{m}$ or 0.45 $\mu\text{m}$ Hydrophilic PES
Support Layers	Polyester
Plastic parts	Polypropylene

### Integrity Testing/ Retention

Bubble Point	$\geq 50\text{psi}$ (3.52Kg/cm <sup>2</sup> ) with Water
Max. Air Diffusion Flows Per 10" Capsule Filter	$\leq 30\text{ml/min}$ @ 37psi (2.6Kg/cm <sup>2</sup> ) with water
Microbial Retention	LRV >7 for <i>Brevundimonas diminuta</i> (ATCC 19146) per cm <sup>2</sup>

### Size

Size	5"	10"	20"	30"	
Effective Filtration Area (Nominal)	3000cm <sup>2</sup>	6000cm <sup>2</sup>	12000cm <sup>2</sup>	18000cm <sup>2</sup>	
Dimensions (End to End) Inline Capsule Filters	1/2" Single Step Hose Barb I/O	217 mm	332 mm	607 mm	882 mm
	1 1/2" Sanitary Flange Inlet 1/2" Single Step Hose Barb Outlet	203 mm	332 mm	607 mm	882 mm
	1 1/2" Sanitary Flange I/O	207 mm	326 mm	601 mm	876 mm
Operational Radius (with Vent/ Drain)	78 mm	78 mm	78 mm	78 mm	
Vent and Drain	1/4" Hose Barb with Silicone "O" rings				

### Operational

Max. Operating Temperature	80 °C @ < 30 psi (2 Kg/cm <sup>2</sup> )	
Max. Differential Pressure	60 psi (4 Kg/cm <sup>2</sup> ) @ 30 °C	
Sterilization	By Gas	Sterilizable by Ethylene Oxide
	By Autoclave	Autoclavable at 125 °C for 30minutes, 25 Cycles. Can not be in-line steam sterilized
Shelf Life	3 Years after EO Sterilization	

### Assurance

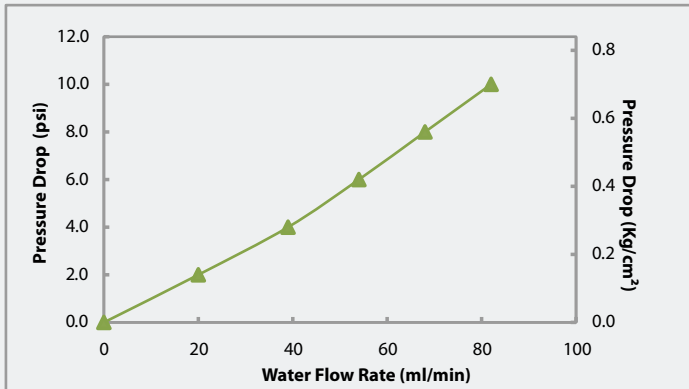
Toxicity	Passes Biological Reactivity Tests, In vivo, as per USP <88> for Class VI plastics
Cytotoxicity	Passes Biological Reactivity Tests, In vitro, USP <87> for cytotoxicity
Bacterial Retention	LRV > 7 for <i>B. diminuta</i> (ATCC 19146) per cm <sup>2</sup> of filter area as per ASTM F 838-05
Bacterial Endotoxin	Aqueous extracts exhibit < 0.25 EU/ml as established by Limulus Amebocyte Lysate (LAL) Test as per USP <85>
Non Fiber Releasing	Passes test as per USP and comply with USFDA 21 CFR Part 210.3(b)(6) for fiber release
TOC and Conductivity	Meets the WFI requirements of USP for TOC <643> and Conductivity <645> after a 3 liter flush
pH Compatibility	Compatible with pH range of 1 - 10
Extractables with WFI	Passes NVR test as per USP <661>
Indirect Food Additives	Comply with USFDA 21 CFR Part 177.1520
Oxidizable Substances	Within limits as specified in USP <1231>
Quality Management System	ISO-9001 Certified
USFDA	DMF No. 015554

# Typical Water Flow Rates

# Datasheet

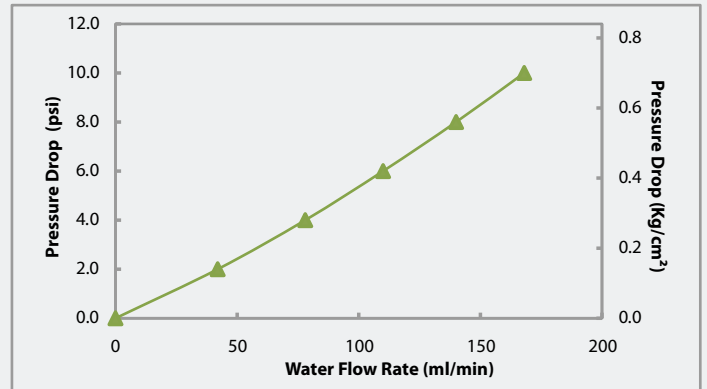
## 0.2 $\mu\text{m}$ AseptiCap KL/KS (with Prefilter)

### 25mm Capsule Filters



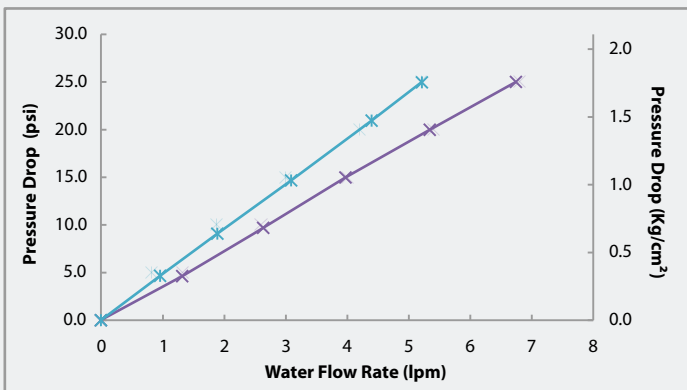
—▲— End Connections: MN

### 50mm Capsule Filters

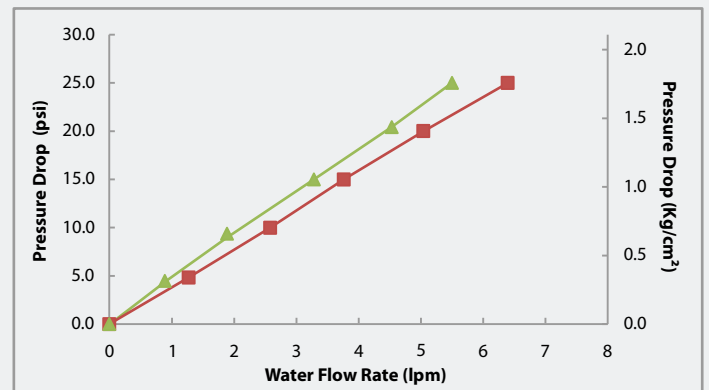


—▲— End Connections: BB

### 1" Capsule Filters



—x— End Connections: AA    —\*— End Connections: EE



—■— End Connections: SS    —▲— End Connections: JJ

### End Connection Type:

A: 1/4" Stepped Hose Barb    E: 1 1/2" Sanitary Flange    J: Quick Connector    S: 3/4" Sanitary Flange

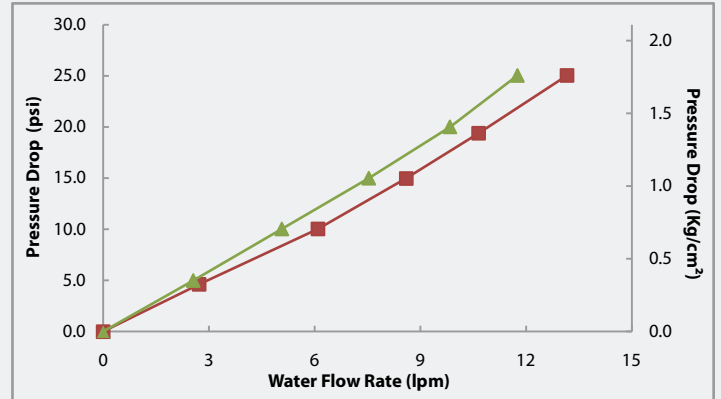
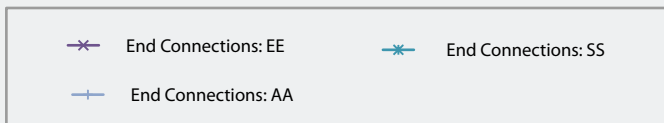
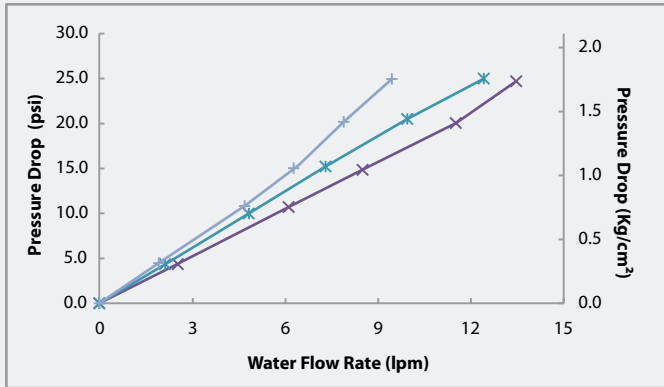
B: 1/4" Stepped Hose Barb (for 50mm only)    MN: End Connections: Female Luer Lock Inlet/Male Luer Slip Out let

# Water Flow Rates

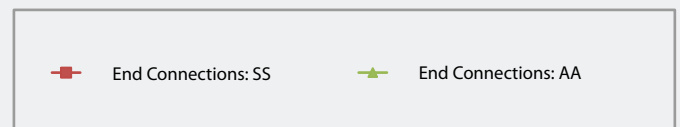
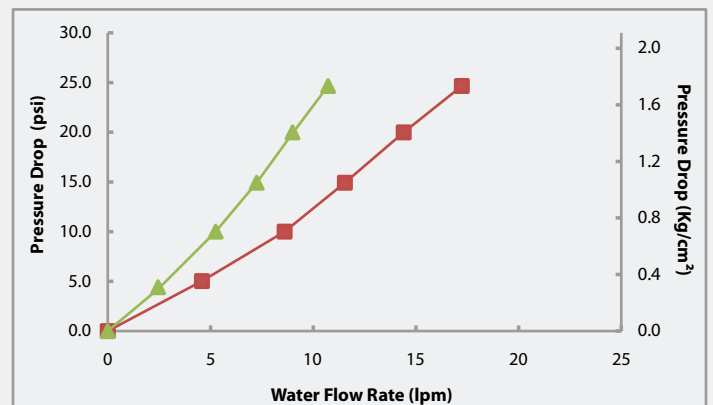
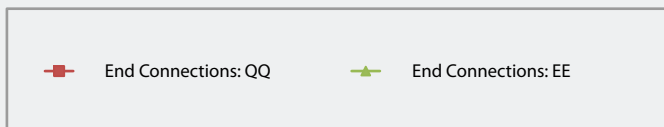
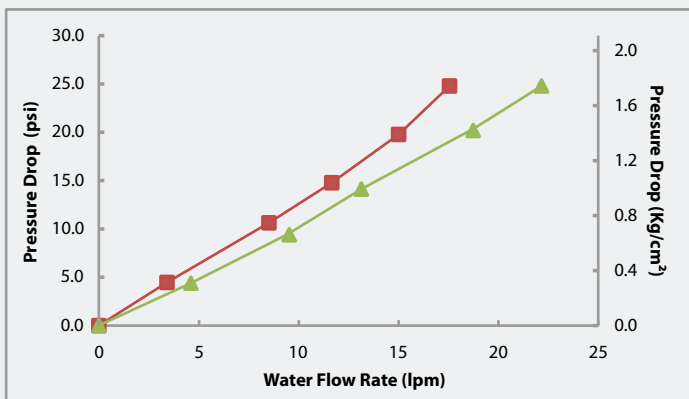
# Datasheet

## 0.2 $\mu\text{m}$ AseptiCap KL/KS (with Prefilter)

### 2" Capsule Filters



### 5" Capsule Filters



### End Connection Type:

A: 1/4" Stepped Hose Barb

Q: 1/2" Single Step Hose Barb

E: 1 1/2" Sanitary Flange

J: Quick Connector

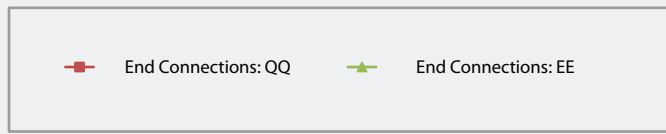
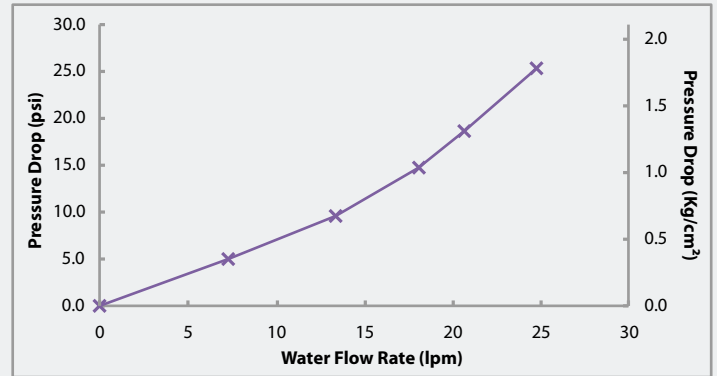
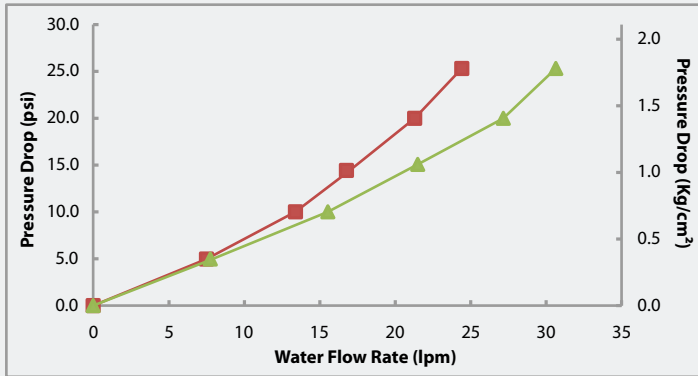
S: 3/4" Sanitary Flange

# Water Flow Rates

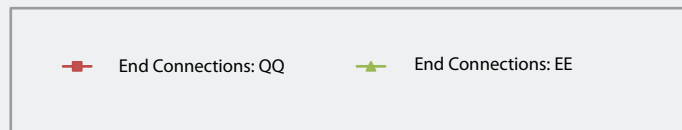
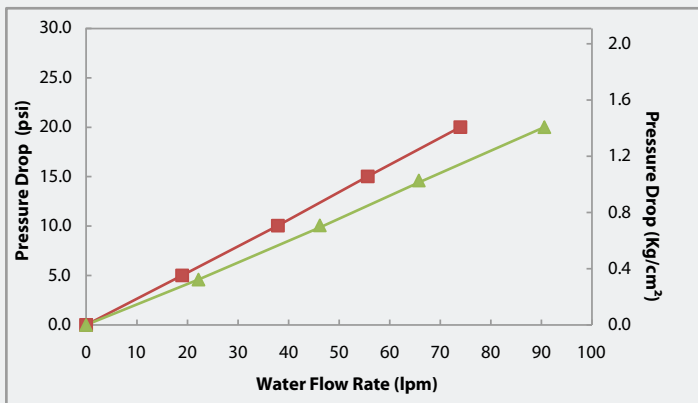
# Datasheet

## 0.2 $\mu\text{m}$ AseptiCap KL/KS (with Prefilter)

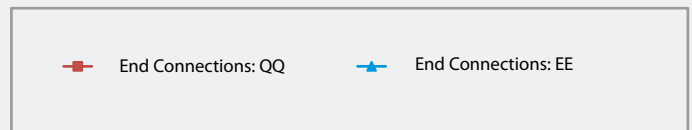
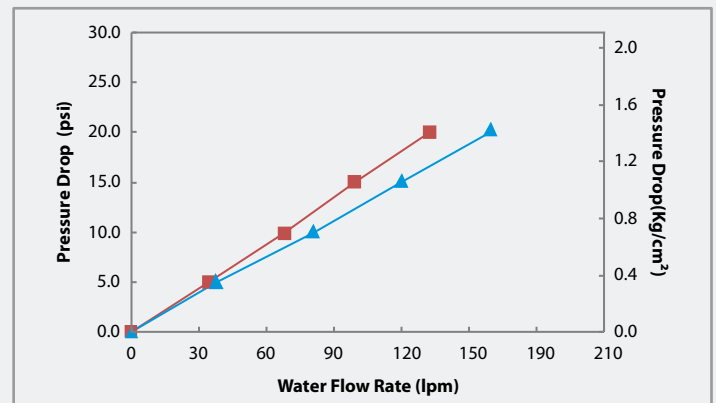
### 8" Capsule Filters



### 10" Capsule Filters



### 20" Capsule Filters



### End Connection Type:

A: 1/4" Stepped Hose Barb    Q: 1/2" Single Step Hose Barb    E: 1 1/2" Sanitary Flange    J: Quick Connector    S: 3/4" Sanitary Flange

## 0.2 µm AseptiCap KL/KS 25mm PES Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		X	X	Sterility		Pack Size			
	Code		Code		Code		Code				Code		Code		
IKL (Single Layer)	IKLX	25mm	06	0.2µm	01	Female Luer Lock	M	↓	↓	Non Sterile	1	↓	100	04	
IKS (0.8 µm Upstream)	IKS5					Male Luer Slip	N								
IKS (0.65 µm Upstream)	IKS3					1/8" Hose Barb	H								
IKS (0.45 µm Upstream)	IKSX					1/4" Hose Barb	B								
<b>Example:</b>															
	IKSX		06		01		MN		X		X		1		04

## 0.2 µm AseptiCap KL/KS 50mm PES Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		X	X	Sterility		Pack Size			
	Code		Code		Code		Code				Code		Code		
VKL (Single Layer)	VKLX	50mm	10	0.2µm	01	1/4" SHB	B	↓	↓	Non Sterile	1	↓	12	08	
VKS (0.8 µm Upstream)	VKS5					3/4" Sanitary Flange	S								
VKS (0.65 µm Upstream)	VKS3														
VKS (0.45 µm Upstream)	VKSX									EO Sterile	2				
<b>Example:</b>															
	VKSX		10		01		BB		X		X		1		08

**Note: Inlet/Outlet Connections and Pack Sizes available with different diameter filters as follows:**

Connections Available		
Inlet/Outlet	25mm	50mm
1/4" - 3/4" Stepped Hose Barb	X	√
3/4" Sanitary Flange	X	√
Female Luer Lock	Inlet Only	X
Male Luer Slip	Outlet Only	X
1/8" Hose Barb	√	X
Male Luer Lock	Outlet Only	X
1/4" Hose Barb	√	X

Pack Size Available		
Pack Size	25mm	50mm
12/Pack	X	√
100/Pack	√	X

## 0.2 µm AseptiCap KL/KS PES Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		X	Bell		Sterility		Pack Size					
	Code		Code		Code		Code			Code		Code		Code				
DKL (Single Layer)	DKLX	1"	51	0.2µm	01	¼" SHB	A		Yes*	B	Non Sterile	1	1	01				
		2"	52			¼" MNPT (18 TPI)	B		No Bell	X					EO Sterile	2		
DKS (0.8 µm Upstream)	DKS5	5"	53			¼" BSP (19 TPI)	M		*Bell is available with - ½" Hose Barb outlet connections in 1", 2", 5" and 8" capsule filters - ¼" SHB outlet connection in 1" capsule filters only	Bell with cover	C							
		8"	57			¼" BSP (19 TPI) with O-ring	P											
DKS (0.65 µm Upstream)	DKS3					¼" BSP	F											
						½" MNPT	C											
DKS (0.45 µm Upstream)	DKSX					½" Hose Barb	D											
						1½" Sanitary Flange	E											
						¾" Sanitary Flange	S											
						Quick Connector	J											
						½" Single Step Hose Barb	Q											
						Female Luer Lock	U											
				Male Luer Slip	W													
				3/16" Hose Barb	N													
				3/8" Hose Barb	I													

### Example:

DKSX	57	01	DD	X	X	1	01
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### Note: Inlet/Outlet Connections available with different Sizes/Length as follows:

Inlet/Outlet	Size/Length				Bell at Outlet Available with (Size/Outlet)
	1"	2"	5"	8"	
¼" Stepped Hose Barb	√	√	√	√	1" / ¼" SHB
½" Single Step Hose Barb	X	√	√	√	1", 2", 5", 8" / ½" HB
½" Hose Barb	√	√	√	√	
1½" Sanitary Flange	√	√	√	√	
¾" Sanitary Flange	√	√	√	√	
Quick Connector	√	√	√	√	
½" MNPT	X	√	√	√	
¼" MNPT (18TPI)	√	√	√	√	
¼" BSP (19 TPI)	Inlet Only	X	X	X	
¼" BSP (19 TPI) with O-ring	Inlet Only	X	X	X	
¼" BSP	Inlet Only	√	√	√	
Female Luer Lock	√	√	√	√	
Male Luer Slip	Outlet Only	X	X	X	
3/16" Hose Barb	√	√	√	√	
3/8" Hose Barb	X	√	√	√	

## 0.2 µm AseptiCap KS PES Membrane Large Capsule filter

Type		Size		Pore Size		Inlet/Outlet		X	Inline/T-Line		Sterility		Pack Size	
	Code		Code		Code		Code			Code		Code		Code
LKS (0.8 µm Upstream)	LKS5	5"	53	0.2µm	01	½" Single Step Hose Barb	Q		Inline	X	Non Sterile	1	1	01
		10"	54			1½" Sanitary Flange	E		*T-Line	T	EO Sterile	2		
		20"	55			3/8" Hose Barb	I							
LKS (0.65 µm Upstream)	LKS3	30"	56			1" Hose Barb	Z							
LKS (0.45 µm Upstream)	LKSX													

Example:

LKSX	54	01	EE	X	T	1	01
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\*T-line is not available in 5" Capsule filter

\*T-line Capsule filter are available with 1½" Sanitary Flange I/O Connection only

Note: Inlet/Outlet Connections available with different Sizes/Length as follows:

Inlet/Outlet	Inline				T-Line		
	5"	10"	20"	30"	10"	20"	30"
½" Single Step Hose Barb	√	√	√	√	X	X	X
1½" Sanitary Flange	√	√	√	√	√	√	√
3/8" Hose Barb	√	√	√	√	X	X	X
1" Hose Barb	X	√	√	√	X	X	X



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