



0.2µm *AseptiCap*[®] KSO

Sterilizing 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.

Process managers are continuously looking for microfiltration solutions for upstream, downstream, intermediate processes and final biological preparations. Since biopharma 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 over all 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 absolute retention, very high protein recoveries, extremely low extractables, high throughputs, wide compatibility and other important characteristics.

With the added advantages of pre-filtration layer built into the device for higher throughputs, wide pH compatibility (1-14), 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**[®] KSO filters are a universal solution for process filtration.

PES Membrane Devices for Biopharmaceuticals

AseptiCap® KSO 0.2 micron capsule filters incorporate **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® KSO are manufactured in class 10,000 clean rooms and ISO 9001 certified facilities.

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

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

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 by 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.

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 KSO* 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 KSO 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 KSO 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, add on and may impact the impurity profile of the desired product.

Asepticap KSO filters are validated to exhibit low extractables under harsh extraction conditions.

Alkali Resistance

Tests were performed to establish that *Asepticap*® KSO PES membrane capsule filters maintain integrity (with water) and flow rate after a minimum 96-hour soak in 4N NaOH at room temperature.

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 as per USP <85>.

Total Traceability

Asepticap KSO 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 are also printed on the labels of the box in which individual filter is packed.

Packaging Integrity

Asepticap KSO 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

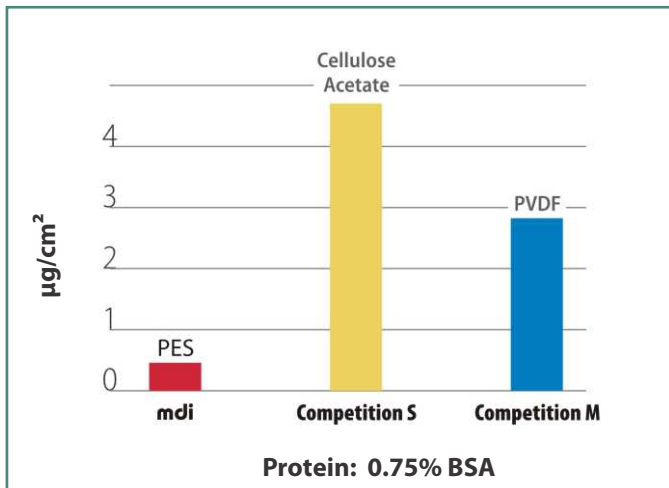
- Complies with USFDA 21 CFR 210.3(b)(6) for fiber release
- Complies with USFDA 21 CFR 177.1520 for fractional dissolution
- Materials of construction tested for toxicity as per Biological Reactivity Tests, In-vivo, USP <88> for class VI Plastics

Low Protein Binding

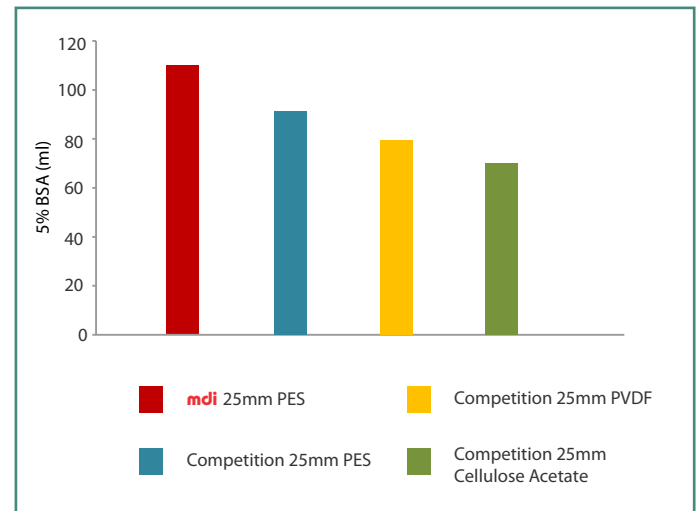
A comparative study on **mdi** 0.2µm PES membrane exhibits much lower protein adsorption than other competing membranes of Cellulose Acetate and PVDF.

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

Protein Binding (µg/cm²)



High Throughputs



mdi 0.2µm 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 improved economy of operations.

Very Low Hold-Up Volumes

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

0.2 µm AseptiCap® KSO Filters, EFA*	Protein Binding
25 mm, 5 cm ²	1.45 µg
50 mm, 20 cm ²	6.3 µg
1", 250 cm ²	80.5 µg
2", 500 cm ²	175 µg
10", 6000 cm ²	1925 µg

*EFA: Effective Filtration Area

Filter Devices	EFA* (Nominal)	Hold up Volume
AseptiCap® KSO 25mm	5cm ²	< 50µl
AseptiCap® KSO 50mm	20cm ²	< 200µl
AseptiCap® KSO 1"	250cm ²	< 5ml
AseptiCap® KSO 2"	500cm ²	< 25ml
AseptiCap® KSO 5"	1000cm ²	< 45ml
AseptiCap® KSO 8"	2000cm ²	< 60ml

*EFA: Effective Filtration Area

Extractables

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

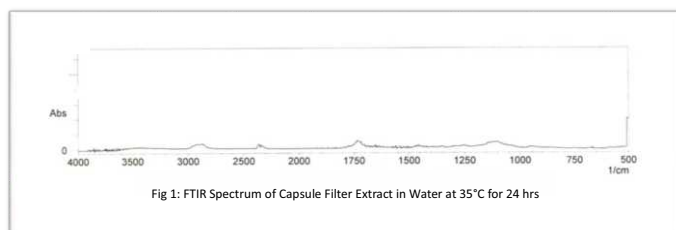
Low extractables mean less addition to impurity profile of the biological product from the filters.

Extraction Time: 24 hours

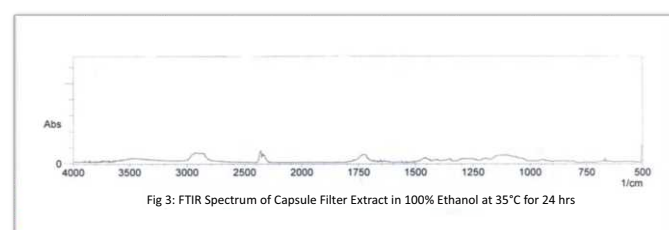
Model Solvent	Non Volatile Residue	
	<i>AseptiCap</i> [®] KSO 1" (250 cm ²)	<i>AseptiCap</i> [®] KSO 10" (6000 cm ²)
Water @ 35 °C	1.6 mg	38.26 mg
Water @ 80 °C	1.8 mg	43.04 mg

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

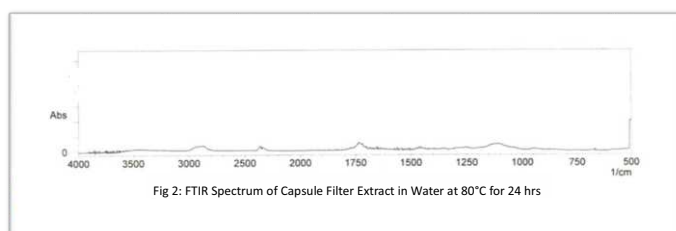
FTIR Analysis of Extractables From *AseptiCap*[®] KSO 1" Capsule Filter with Water @ 35 °C



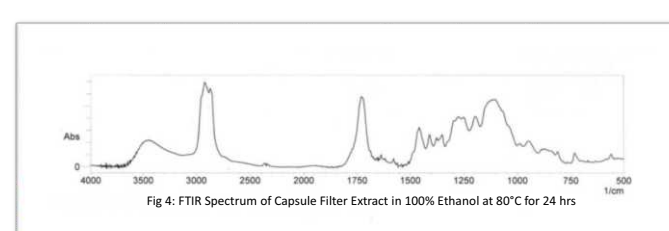
FTIR Analysis of Extractables From *AseptiCap*[®] KSO 1" Capsule Filter with 100% Ethanol @ 35 °C



FTIR Analysis of Extractables From *AseptiCap*[®] KSO 1" Capsule Filter with Water @ 80 °C



FTIR Analysis of Extractables From *AseptiCap*[®] KSO 1" Capsule Filter with 100% Ethanol @ 80 °C



The spectrum of extracts from *AseptiCap*[®] KSO capsule filters with 100% ethanol under extreme extraction conditions show presence of various components used in the manufacture of **mdi** PES membrane capsule filters.

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® KSO 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® KSO**

Customized Connectivity

mdi AseptiCap® KSO 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. 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" Hose Barb



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



AseptiCap® KSO with HighSecurity Single step 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® KSO* 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 cm² to 18000 cm² hence process scaling can be facilitated without triggering additional validation studies for given process conditions. **mdi** provides complete documentation for each of the *AseptiCap® KSO* filters thereby reducing the additional validation cost and time.



AseptiCap® KSO
25mm, 5cm²



AseptiCap® KSO
50mm, 20cm²



AseptiCap® KSO
1", 250cm²



AseptiCap® KSO
2", 500cm²



AseptiCap® KSO
5", 1000cm²



AseptiCap® KSO
8", 2000cm²

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



AseptiCap® KSO
10", 6000cm²

*EFA: Effective Filtration Area

0.2 µm AseptiCap® KSO (25 mm and 50 mm)

Construction		
Membrane	0.2 µm Hydrophilic PES	
Upstream Membrane	0.8 µm or 0.45 µm Hydrophilic PES	
Plastic parts	Polypropylene	
Integrity Testing/ Retention		
Bubble Point	≥ 50 psi (3.52 Kg/cm ²) with Water	
Microbial Retention	LRV >7 for <i>Brevundimonas diminuta</i> (ATCC 19146) per cm ²	
Size		
Size	25mm	50mm
Effective Filtration Area (Nominal)	5 cm ²	20 cm ²
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 ²) @ 25 °C	42 psi (3 Kg/cm ²) @ 30 °C
Sterilization	By Gas	Sterilizable by Ethylene Oxide
	By Autoclave	Autoclavable at 125 °C for 30 minutes, 25 Cycles. Cannot 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, as per USP <87> for Cytotoxicity	
Bacterial Retention	LRV > 7 for <i>B. diminuta</i> (ATCC 19146) per cm ² 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 500 ml flush	
pH Compatibility	Compatible with pH range of 1 - 14	
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[®] KSO

Construction

Membrane	0.2 μm Hydrophilic PES
Upstream Membrane	0.8 μm or 0.45 μm Hydrophilic PES
Support Layers	Polypropylene
Plastic parts	Polypropylene

Integrity Testing/ Retention

Bubble Point	$\geq 50\text{psi}$ (3.52Kg/cm ²) with Water
Microbial Retention	LRV > 7 for <i>Brevundimonas diminuta</i> (ATCC 19146) per cm ²

Size

Size	1"	2"	5"	8"
Effective Filtration Area (Nominal)	250cm ²	500cm ²	1000cm ²	2000 cm ²
Operational Radius (with Vent/ Drain)	40 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 ²)	
Max. Differential Pressure	60 psi (4 Kg/cm ²) @ 30 °C	
Sterilization	By Gas	Sterilizable by Ethylene Oxide
	By Autoclave	Autoclavable at 125 °C for 30minutes, 25 Cycles. Cannot 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, as per USP <87> for Cytotoxicity
Bacterial Retention	LRV > 7 for <i>B. diminuta</i> (ATCC 19148) per cm ² 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 - 14
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[®] KSO

Construction

Membrane	0.2 μm Hydrophilic PES
Upstream Membrane	0.8 μm or 0.45 μm Hydrophilic PES
Support Layers	Polypropylene
Plastic parts	Polypropylene

Integrity Testing/ Retention

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

Size

Size	5"	10"	20"	30"
Effective Filtration Area (Nominal)	3000cm ²	6000cm ²	12000cm ²	18000cm ²
Operational Radius (with Vent/ Drain)	80 mm	80 mm	80 mm	80 mm
Vent and Drain	1/4" Hose Barb with Silicone "O" rings			

Operational

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

Assurance

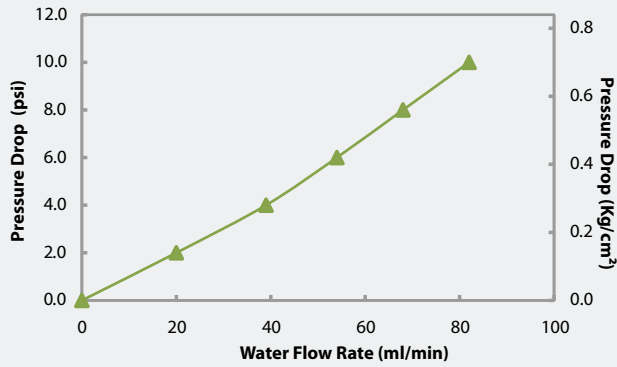
Toxicity	Passes Biological Reactivity Tests, In vivo, as per USP <88> for Class VI plastics
Cytotoxicity	Passes Biological Reactivity Tests, In vitro, as per USP <87> for Cytotoxicity
Bacterial Retention	LRV > 7 for <i>B. diminuta</i> (ATCC 19146) per cm ² of filter area as per ASTM F 838-05
Bacterial 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 10 liter flush for 5" capsule filters and 20 liter flush for 10" capsule filters
pH Compatibility	Compatible with pH range of 1 - 14
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

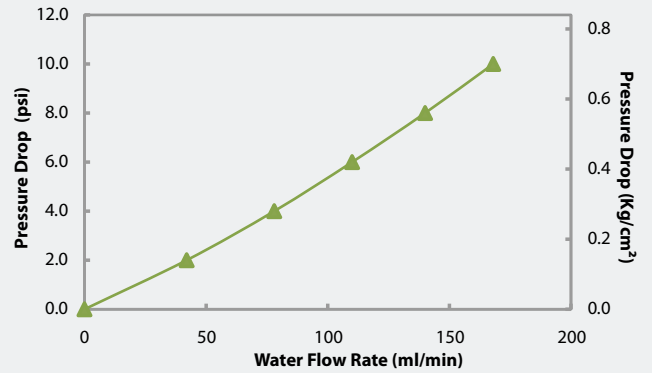
0.2 μm AseptiCap[®] KSO (with Prefilter)

25mm Capsule Filters



End Connections: MN

50mm Capsule Filters



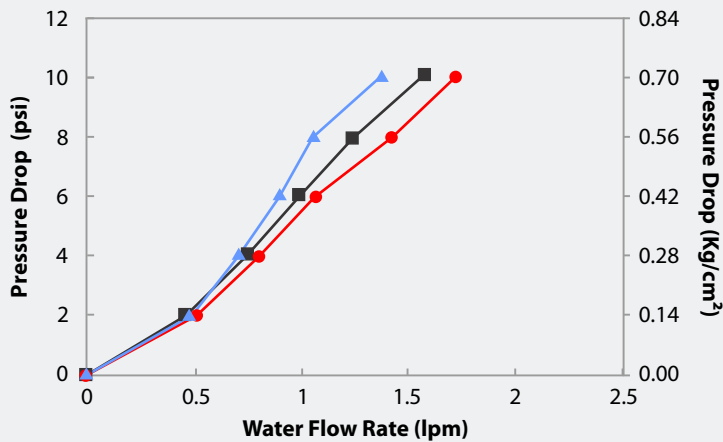
End Connections: BB

End Connection Type:

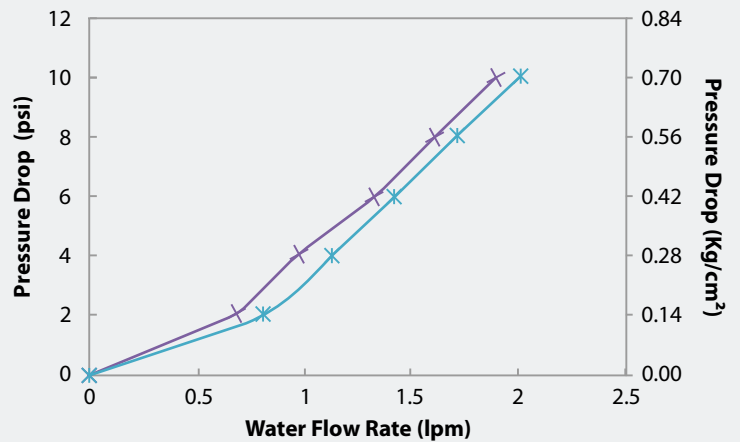
B: 1/4" Stepped Hose Barb (for 50mm only)

MN: End Connections: Female Luer Lock Inlet/Male Luer Slip Out let

1" Capsule Filters



End Connections: AA JJ UU



End Connections: EE SS

End Connection Type:

A: 1/4" Stepped Hose Barb

E: 1/2" Sanitary Flange

J: Quick Connector

S: 3/4" Sanitary Flange

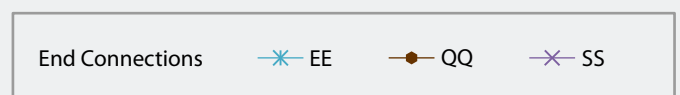
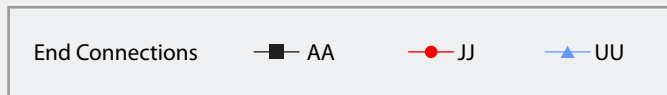
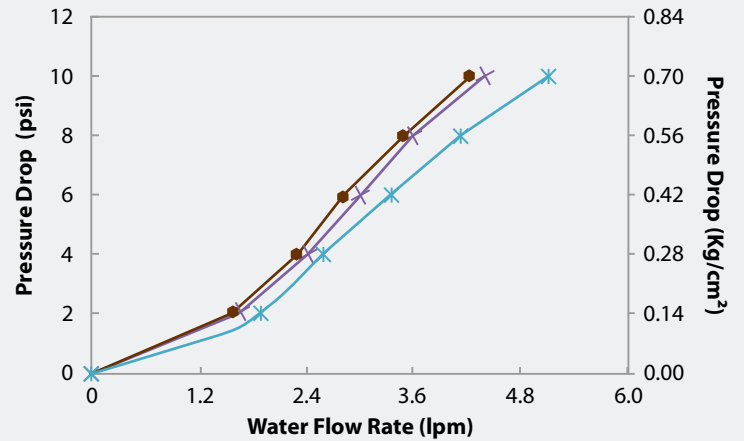
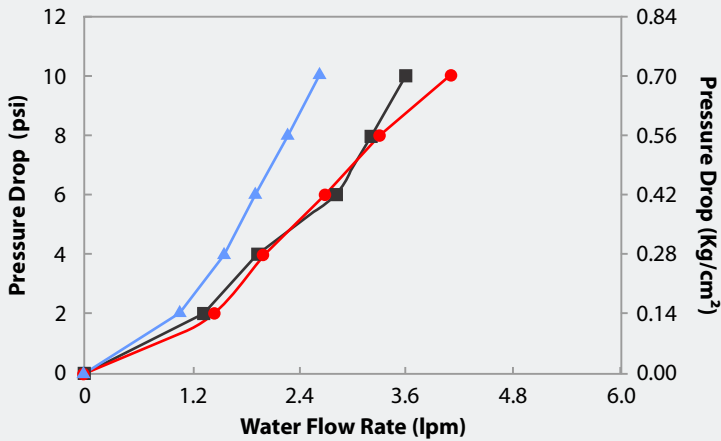
U: Female Luer Lock

Water Flow Rates

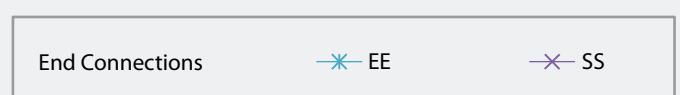
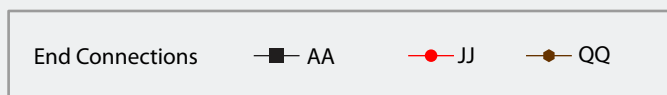
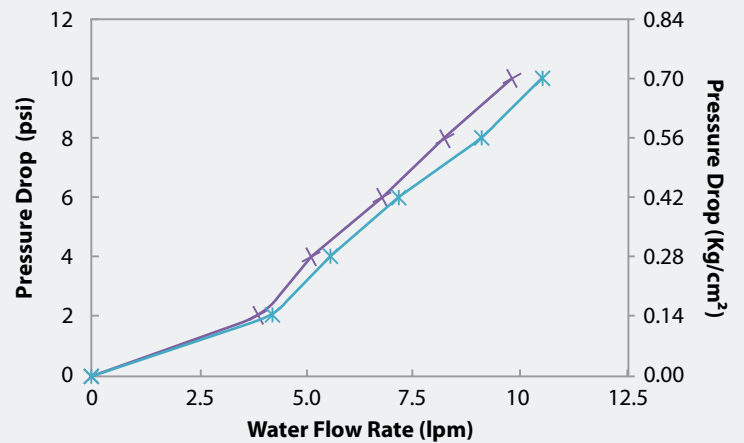
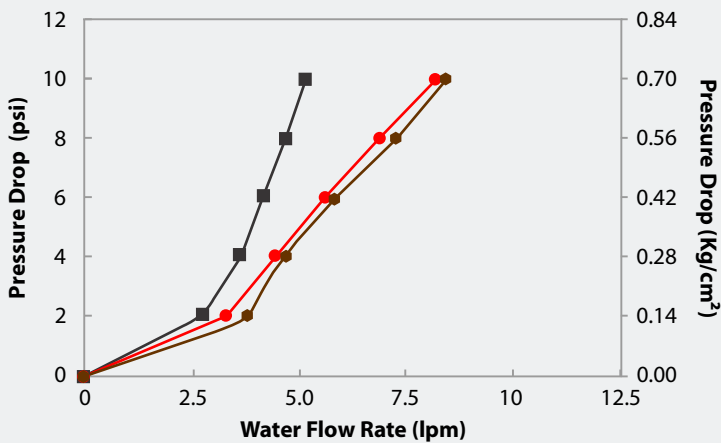
Datasheet

0.2 μm AseptiCap[®] KSO (with Prefilter)

2" Capsule Filters



5" Capsule Filters



End Connection Type:

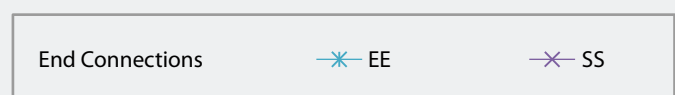
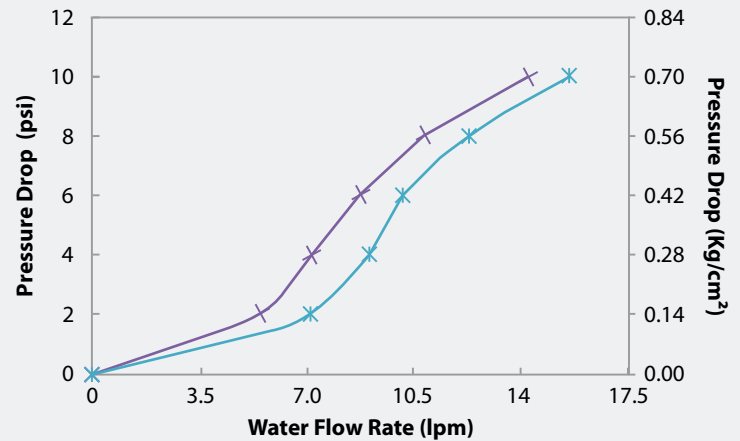
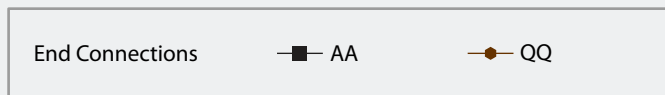
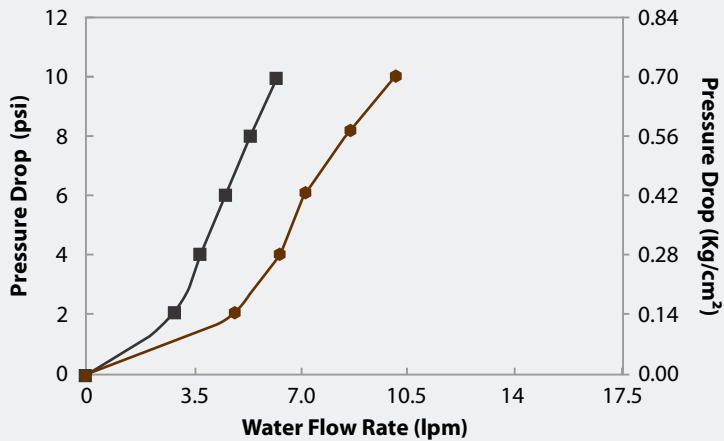
- A: 1/4" Stepped Hose Barb Q: 1/2" Single Step Hose Barb E: 1 1/2" Sanitary Flange J: Quick Connector S: 3/4" Sanitary Flange
 U: Female Luer Lock

Water Flow Rates

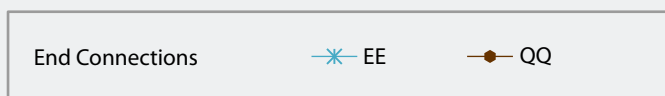
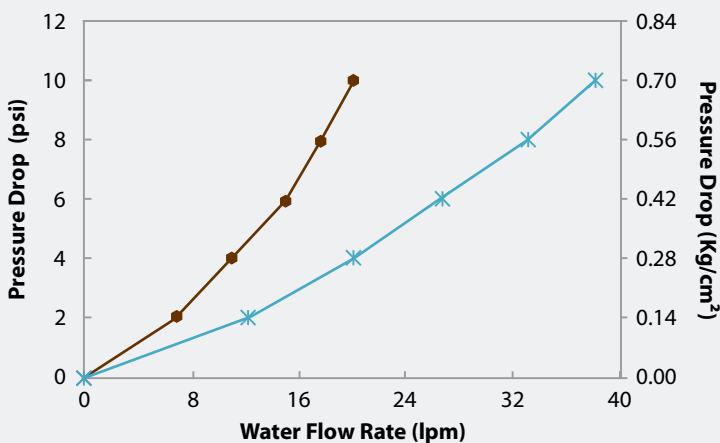
Datasheet

0.2 μm AseptiCap[®] KSO (with Prefilter)

8" Capsule Filters



10" 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® KSO 25mm PES Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		X	X	Sterility		Pack Size		
	Code		Code		Code		Code				Code		Code	
IKSO (0.45 µm Upstream)	IKOX	25mm	06	0.2µm	01	Female Luer Lock	M	↓	↓	Non Sterile	1	↓	100	04
IKSO (0.8 µm Upstream)	IKO5					Male Luer Slip	N							
						1/8" Hose Barb	H							
						Male Luer Lock	L							
						1/4" Hose Barb	B							
Example:														
IKOX		06		01		MN		X	X	1		04		

0.2 µm AseptiCap® KSO 50mm PES Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		X	X	Sterility		Pack Size		
	Code		Code		Code		Code				Code		Code	
IKSO (without Vent) (0.45 µm Upstream)	IKOX	50mm	10	0.2µm	01	1/4" SHB	B	↓	↓	Non Sterile	1	↓	10	02
IKSO (without Vent) (0.8 µm Upstream)	IKO5					3/4" Sanitary Flange	S							
VKSO (with Vent) (0.45 µm Upstream)	VKOX					Female Luer Lock	M							
VKSO (with Vent) (0.8 µm Upstream)	VKO5									EO Sterile	2			
Example:														
VKOX		10		01		BB		X	X	1		02		

Inlet/Outlet Connections Available

Inlet/Outlet	25mm	50mm	
		with Vent	without Vent
1/4" - 3/4" Stepped Hose Barb	X	√	X
3/4" Sanitary Flange	X	√	X
Female Luer Lock	Inlet Only	X	√
Male Luer Slip	Outlet Only	X	X
1/8" Hose Barb	√	X	X
Male Luer Lock	Outlet Only	X	X
1/4" Hose Barb	√	X	X

Dimension (Length) (in mm)

Inlet/ Outlet	25mm	50mm
1/4" - 3/8" Stepped Hose Barb I/O	-	79
1/4" Single Step Hose Barb I/O	38	-
3/4" Sanitary Flange I/O	-	51
Female Luer Lock Inlet/ Male Luer Slip Outlet	23	-
1/8" Hose Barb I/O	36	-
Operational Radius	15	28

0.2 µm AseptiCap® KSO PES Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		X	Bell		Sterility		Pack Size	
			Code		Code					Code		Code		Code
AseptiCap® KSO (0.45µm Upstream)	DKOX	1"	51	0.2µm	01	¼" SHB				B	Non Sterile	1	1	01
AseptiCap® KSO (0.8µm Upstream)	DKOS	2"	52			¼" MNPT (18 TPI)				X	EO Sterile	2		
		5"	53			¼" BSP (19 TPI)								
		8"	57			¼" BSP (19 TPI) with O-ring				C				
						¼" BSP								
						½" MNPT								
						½" Hose Barb								
						1½" Sanitary Flange								
						¾" Sanitary Flange								
						Quick Connector								
						½" Single Step Hose Barb								
						Female Luer Lock								
						Male Luer Slip								
						3/16" Hose Barb								
						3/8" Hose Barb								

Example:

DKOX	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			
	1"	2"	5"	8"
¼" Stepped Hose Barb	√	√	√	√
½" Single Step Hose Barb	X	√	√	√
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
⅜" Hose Barb	√	√	Outlet Only	X
⅜" Hose Barb	X	√	√	√

Bell at outlet Available with (Size/outlet)
1" / ¼" SHB
1", 2", 5", 8" / ½" HB

Dimensions (in mm)	Small Capsule Filters			
End Connections	1"	2"	5"	8"
¼" SHB I/O	94	122	172	223
¾" Sanitary Flange Inlet I/O	85	104	155	206
Quick Connector	100	113	164	218
1½" Sanitary Flange I/O	92	112	164	216
½" Hose Barb I/O	90	112	162	214
½" Single Step Hose Barb I/O	-	115	165	218
1½" Sanitary Flange Inlet ½" Single Step Hose Barb Outlet	-	112	165	216
3/8" Hose Barb I/O	-	115	167	217
Operational Radius	40	65	65	65

0.2 µm AseptiCap® KSO 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		
AseptiCap® KSO (0.45 µm Upstream)	LKOX	5"	53	0.2µm	01	½" Single Step Hose Barb	Q	X	Inline	X	Non Sterile	1	1	01		
		10"	54			1½" Sanitary Flange	E		T-Line*	T	EO Sterile	2				
AseptiCap® KSO (0.8 µm Upstream)	LK05	20"	55			¾" Sanitary Flange	S									
		30"	56			3/8" Hose Barb	I									
						1" Hose Barb	Z									

Example:

LKOX	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 Connections Only

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

Inlet/Outlet	Inline				T-Line			Dimensions (in mm)	Inline Capsule Filters				T-line Capsule Filters		
	5"	10"	20"	30"	10"	20"	30"	End Connections	5"	10"	20"	30"	10"	20"	30"
½" Single Step Hose Barb	√	√	√	√	X	X	X	1½" Sanitary Flange I/O	205	330	600	855	340	580	840
1½" Sanitary Flange	√	√	√	√	√	√	√	¾" Sanitary Flange I/O	214	335	x	x	x	x	x
¾" Sanitary Flange	√	√	X	X	X	X	X	½" Single Step Hose Barb I/O	218	336	630	890	x	x	x
¾" Hose Barb	√	√	√	√	X	X	X	1½" Sanitary Flange Inlet ½" Hose Barb Outlet	212	334	620	870	x	x	x
1" Hose Barb	X	√	√	√	X	X	X	¾" Hose Barb I/O	211	332	634	885	x	x	x
								1" Hose Barb I/O	x	405	635	895	x	x	x
								Operational Radius	80	80	80	80	80	80	80

Advanced Microdevices Pvt. Ltd.

20-21, Industrial Area, Ambala Cantt-133 006, INDIA

Tel : +91-171-2699290, 2699471

E-mail : info@mdimembrane.com

Website : www.mdimembrane.com