



## 0.2 $\mu$ m *AseptiCap WL/WS- $\gamma$* Gamma Irradiatable Sterilization Grade Hydrophilic PVDF Membrane Capsule Filters 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 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** *AseptiCap WL/WS- $\gamma$*  are low protein binding hydrophilic PVDF gamma sterilizable membrane capsule filters. *AseptiCap WS- $\gamma$*  offers serial filtration incorporating a larger pore size upstream membrane to protect the downstream membrane for enhanced throughput. 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 *AseptiCap WS- $\gamma$*  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 WL/WS- $\gamma$*  filters are a universal solution for process filtration.

# AseptiCap WL/WS- $\gamma$

## Gamma Sterilizable PVDF Membrane Devices for Biopharmaceuticals

# Datasheet

*AseptiCap WL/WS- $\gamma$*  0.2 $\mu$ m capsule filters use **mdi** hydrophilic PVDF membrane in gamma stable 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 WL/WS- $\gamma$*  are manufactured in class 10,000 clean rooms and ISO 9001:2015 certified facilities.

Packaging is done in double polybags for direct irradiation by gamma or for convenience of taking *AseptiCap* in clean areas for making disposable assemblies for subsequent sterilization.

### Types Available

- *AseptiCap WS- $\gamma$* : Double Layer (with Prefilter)
- *AseptiCap WL- $\gamma$* : Single Layer (without Prefilter)

### Applications

#### Sterile Filtration of

- Antibodies
- Protein Solutions
- Buffers
- Vaccine concentrates
- Small Volume Parenterals

### 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
- Wide 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 Gamma irradiation

### 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.

**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 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 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 WL/WS-γ* 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 WL/WS-γ* 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 WL/WS-γ* 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 WL/WS-γ* 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 Limulus Amebocyte Lysate (LAL) Test as per USP <85>.

## Total Traceability

*AseptiCap WL/WS-γ* filters come with completely traceable lot numbers and unique identification number to facilitate easy and fast retrieval of manufacturing and quality control data associated with each filter.

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 WL/WS-γ* filters are fitted with vent caps and are packed in double polybags 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 indirect food additives
- 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>

## Very Low Hold-Up Volumes

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

Filter Devices	EFA (Nominal)	Hold up Volume
<i>AseptiCap WL/WS-γ</i> , 25 mm	5cm <sup>2</sup>	< 50μl
<i>AseptiCap WL/WS-γ</i> , 50 mm	20cm <sup>2</sup>	< 200μl
<i>AseptiCap WL/WS-γ</i> , 1"	250cm <sup>2</sup>	< 5ml
<i>AseptiCap WL/WS-γ</i> , 2"	500cm <sup>2</sup>	< 25ml
<i>AseptiCap WL/WS-γ</i> , 5"	1000cm <sup>2</sup>	< 45ml
<i>AseptiCap WL/WS-γ</i> , 8"	2000cm <sup>2</sup>	< 60ml
<i>AseptiCap WL/WS-γ</i> , 5"	3000cm <sup>2</sup>	< 80ml
<i>AseptiCap WL/WS-γ</i> , 10"	6000cm <sup>2</sup>	< 150ml
<i>AseptiCap WL/WS-γ</i> , 20"	12000cm <sup>2</sup>	< 250ml
<i>AseptiCap WL/WS-γ</i> , 30"	18000cm <sup>2</sup>	< 350ml

## Extractables

**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.**

Solvent	Non Volatile Residue
	mg/10" Capsule Filters
Water	60.8 mg
	64.8 mg
	57.6 mg
Ethanol	237.6 mg
	317.7 mg
	244.8 mg

**mdi** 0.2 μm *AseptiCap WL/WS-γ* hydrophilic PVDF membrane capsule filters exhibit very low non volatile residue (NVR) with Water and Ethanol.

## 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 WL/WS- $\gamma$  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 gamma irradiation.



1/2" HB



1/2" Single Stepped  
Hose Barb



1/4" MNPT



1/4" SHB



Quick Connector



Male Luer Slip



3/8" Hose Barb



Female Luer Lock



1 1/2" Sanitary Flange



3/4" Sanitary Flange



1/2" MNPT



1" Hose Barb

Variety of end connections

### Customized Connectivity

**mdi** AseptiCap WL/WS- $\gamma$  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 WL/WS-γ* 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 WL/WS-γ* filters there by reducing the additional validation cost and time.



*AseptiCap WL/WS-γ*  
25mm, 5cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
50mm, 20cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
1", 250cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
2", 500cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
5", 1000cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
8", 2000cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
5", 3000cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
10", 6000cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
20", 12000cm<sup>2</sup>



*AseptiCap WL/WS-γ*  
30", 18000cm<sup>2</sup>

## 0.2 µm AseptiCap WL/WS-γ

Construction				
Membrane	0.2 µm Hydrophilic PVDF			
Pre-filter Membrane	0.8 µm or 0.45 µm Hydrophilic PVDF			
Support Layers	Polyester (Small and Large Capsule Filters only)			
Plastic Parts	Gamma Stable Polypropylene			
Vent and Drain	¼" Hose Barb with Silicone "O" ring			
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>			
Max. Air Diffusion Flows per 10" Capsule Filter	≤ 30 ml/min @ 37 psi (2.6 Kg/cm <sup>2</sup> ) with water			
Operational				
Size	25 mm Inline Capsule Filters	50 mm Inline Capsule Filters	1", 2", 5", 8" Small Capsule Filters	5", 10", 20", 30 Large Capsule Filters
Max. Operating Temperature	55 °C	60 °C	80 °C @ < 30 psi (2 Kg/cm <sup>2</sup> )	
Max. Differential Pressure	75 psi (5 Kg/cm <sup>2</sup> ) @ 25 °C	42 psi (3 Kg/cm <sup>2</sup> ) @ 30 °C	60 psi (4 Kg/cm <sup>2</sup> ) @ 30 °C	
Sterilization	<b>By Irradiation:</b> Gamma Irradiatable up to 50 kGy. These filters must not be autoclaved or in-line steam sterilized.			
Shelf Life	2 years after Gamma Sterilization			
Assurance				
Toxicity	Passes Bioreactivity test, In Vivo, as per USP <88> for Class VI plastics			
Cytotoxicity	Passes Biological Reactivity Tests, In vitro, USP <87> for Cytotoxicity			
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 500ml flush for inline filters, 3 liter flush for small capsule filters ,10 liter flush for 5" capsule filters and 20 liter flush for 10" capsule filters			
Extractables with WFI	Passes NVR test as per USP <661>			
Indirect Food Additives	All Polypropylene components meet the FDA Indirect Food Additive requirements cited in 21 CFR Part 177.1520			
Oxidizable Substances	Passes test as per USP <1231>			
Quality Management System	ISO-9001:2015 Certified			
USFDA	DMF No. 015554			



## 0.2 $\mu\text{m}$ AseptiCap WL/WS- $\gamma$

### Inline Capsule Filters

Typical Dimension (in mm)	Inline Capsule Filters	
	25mm	50mm
Inlet/ Outlet		
¼" - ¾" Stepped Hose Barb I/O	-	79
¼" Single Step Hose Barb I/O	38	-
¾" Sanitary Flange I/O	-	51
Female Luer Lock Inlet/ Male Luer Slip Outlet	23	-
⅜" Hose Barb I/O	36	-
Operational Radius	15	28
Effective Filtration Area (EFA) (cm <sup>2</sup> )	5 cm <sup>2</sup>	20 cm <sup>2</sup>

### Small Capsule Filters

Typical Dimensions (in mm)	Small Capsule Filters			
	1"	2"	5"	8"
End Connections				
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
Effective Filtration Area (EFA) (cm <sup>2</sup> )	100	500	1000	2000
	250			

### Large Capsule Filters

Typical Dimensions (in mm)	Inline Capsule Filters				T-line Capsule Filters		
	5"	10"	20"	30"	10"	20"	30"
End Connections							
1½" Sanitary Flange I/O	205	330	600	855	340	580	840
¾" Sanitary Flange I/O	214	335	x	x	x	x	x
½" Single Step Hose Barb I/O	218	336	630	890	x	x	x
1½" Sanitary Flange Inlet ½" Hose Barb Outlet	212	334	620	870	x	x	x
⅜" Hose Barb I/O	211	332	634	878	x	x	x
1" Hose Barb I/O	x	405	635	895	x	x	x
Operational Radius	80	80	80	80	80	80	80
Effective Filtration Area (EFA) (cm <sup>2</sup> )	3000	6000	12000	18000	6000	12000	18000

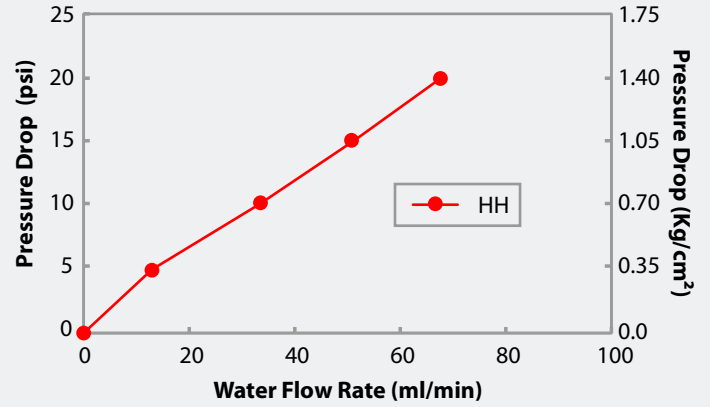
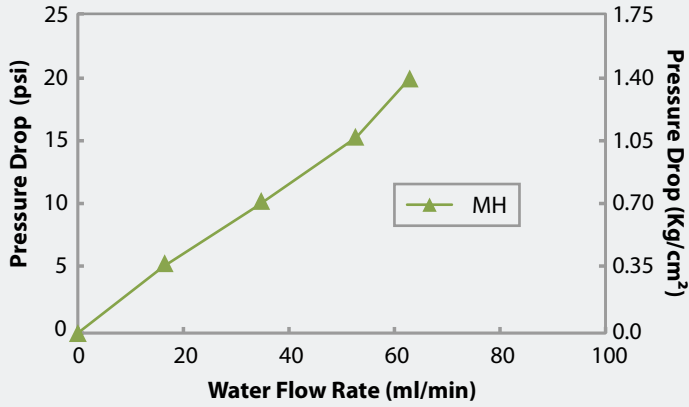


# Typical Water Flow Rates

## 0.2 $\mu\text{m}$ AseptiCap WL/WS- $\gamma$

# Datasheet

### 25mm Inline Capsule Filters

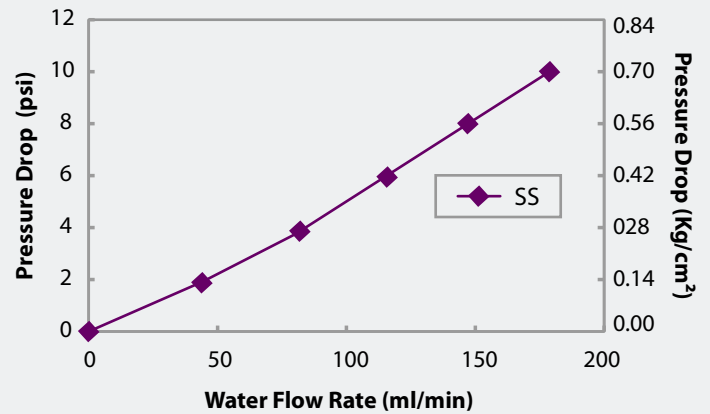
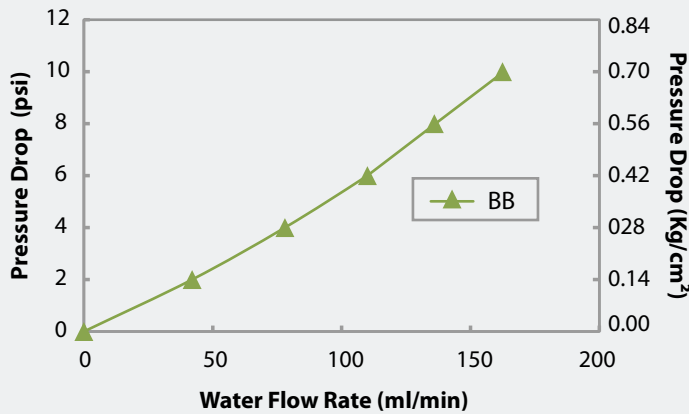


**End Connection Type:**

M: Female Luer Lock

H: 1/8" Hose Barb

### 50mm Inline Capsule Filters



**End Connection Type:**

B: 1/4" - 3/8" Stepped Hose Barb

S: 3/4" Sanitary Flange

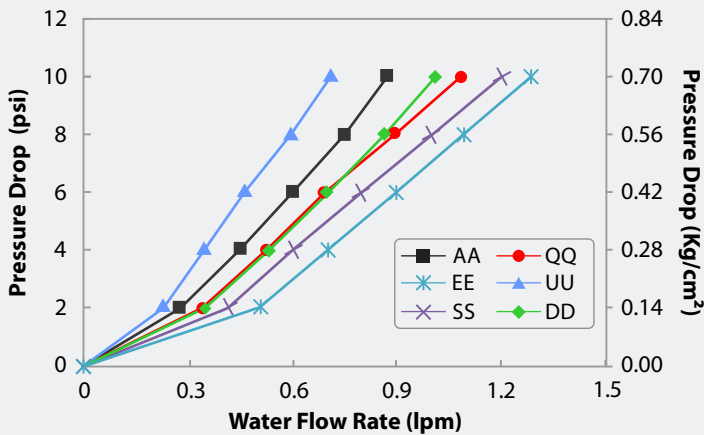
# Typical Water Flow Rates

## 0.2 $\mu\text{m}$ AseptiCap WL/WS- $\gamma$

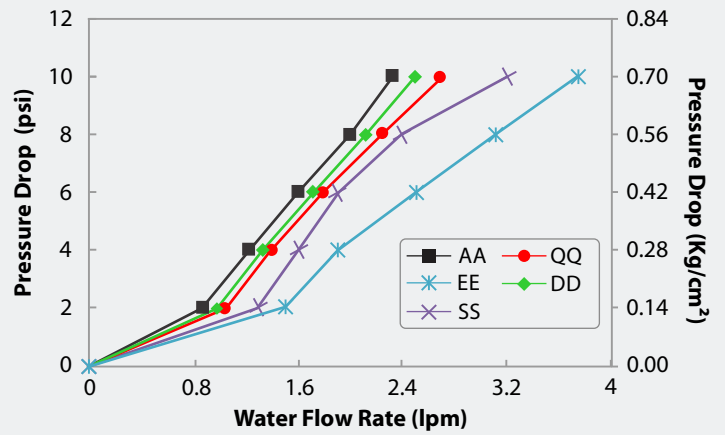
# Datasheet

### Small Capsule Filters

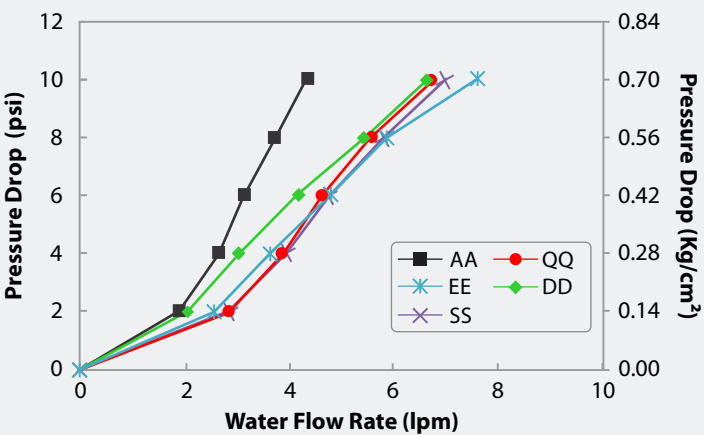
0.2 $\mu\text{m}$  AseptiCap WS- $\gamma$ , 1" Capsule Filter



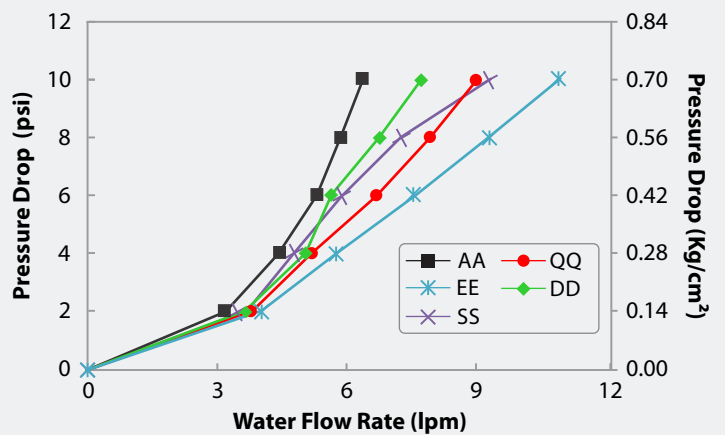
0.2 $\mu\text{m}$  AseptiCap WS- $\gamma$ , 2" Capsule Filter



0.2 $\mu\text{m}$  AseptiCap WS- $\gamma$ , 5" Capsule Filter



0.2 $\mu\text{m}$  AseptiCap WS- $\gamma$ , 8" Capsule Filter



### End Connection Type:

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

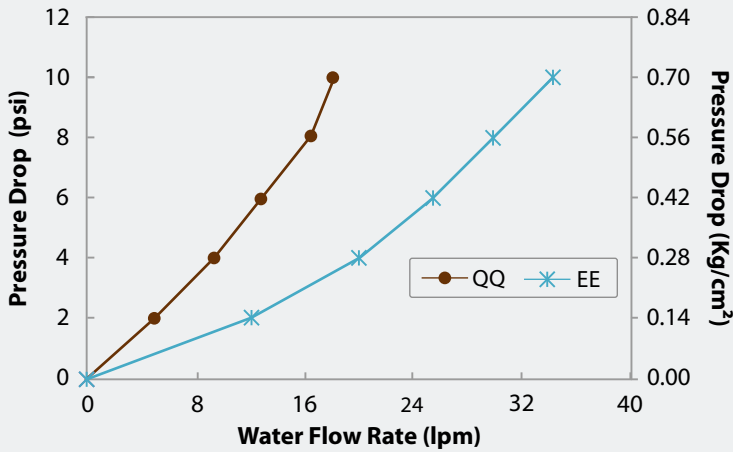
# Typical Water Flow Rates

## 0.2 $\mu\text{m}$ AseptiCap WL/WS- $\gamma$

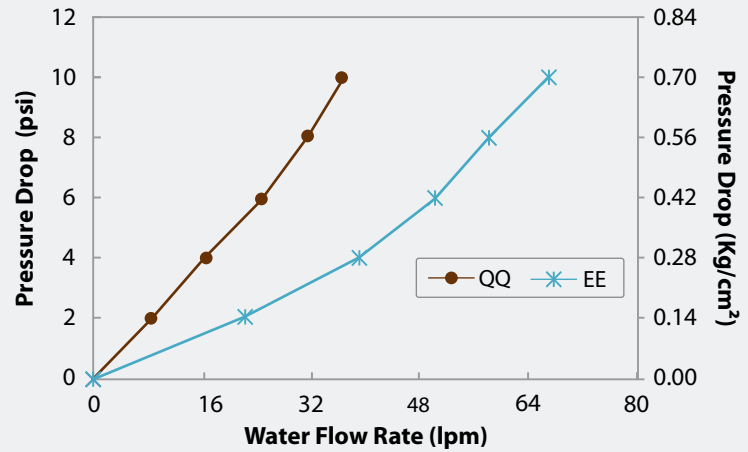
# Datasheet

### Large Capsule Filters

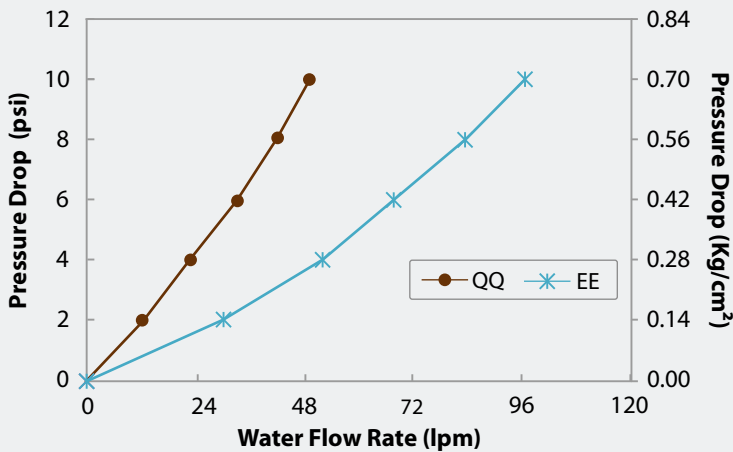
0.2 $\mu\text{m}$  AseptiCap WS- $\gamma$ , 10" Capsule Filter



0.2 $\mu\text{m}$  AseptiCap WS- $\gamma$ , 20" Capsule Filter



0.2 $\mu\text{m}$  AseptiCap WS- $\gamma$ , 30" Capsule Filter



#### End Connection Type:

E: 1½" Sanitary Flange

Q: ½" Single Step Hose Barb

# Ordering Information

## 0.2 µm AseptiCap WL/WS-γ 25mm Hydrophilic PVDF Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		Radiation Sterilizable		X	Sterility		Pack Size	
	Code		Code		Code		Code		Code			Code		Code
IWL (Single Layer)	IWLX	25mm	06	0.2µm	01	Female Luer Lock	M	Yes	R		Non Sterile	1	100	04
IWS (0.8 µm Upstream)	IWS5					Male Luer Slip	N	No*	X		Gamma Sterile	3		
IWS (0.45 µm Upstream)	IWSX					1/8" Hose Barb	H							
						1/4" Hose Barb	B							

**Example:**

IWSX	06	01	MN	R	X	1	04
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\*Gamma irradiated filters can not be gamma sterilized again

Example for Non Sterile: IWLX0601MNRX104

Example for gamma Sterile: IWLX0601MNXX304

## 0.2 µm AseptiCap WL/WS-γ 50mm Hydrophilic PVDF Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		Radiation Sterilizable		X	Sterility		Pack Size	
	Code		Code		Code		Code		Code			Code		Code
VWL (Single Layer)	VWLX	50mm	10	0.2µm	01	1/4" - 3/8" Stepped Hose Barb	B	Yes	R		Non Sterile	1	10	02
VWS (0.8 µm Upstream)	VWS5					3/4" Sanitary Flange	S	No*	X		Gamma Sterile	3		
VWS (0.45 µm Upstream)	VWSX													

**Example:**

VWSX	10	01	BB	R	X	1	02
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\*Gamma irradiated filters can not be gamma sterilized again

Example for Non Sterile: VWSX1001BBRX102

Example for gamma Sterile: VWSX1001BBXX302

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

Connections Available		
Inlet/Outlet	25mm	50mm
1/4" - 3/8" 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

# Ordering Information

# Datasheet

## 0.2 µm AseptiCap WL/WS-γ Hydrophilic PVDF Membrane Capsule filter

Type		Size		Pore Size		Inlet/Outlet		Radiation Sterilizable		Bell		Sterility		Pack Size	
	Code		Code		Code		Code		Code		Code		Code		Code
DWL (Single Layer)	DWLX	1"	31	0.2µm	01	¼" SHB	A	Yes	R	Yes**	B	Non Sterile	1	1	01
			51			¼" MNPT (18 TPI)	B	No*	X	No Bell	X	Gamma Sterile	3		
DWS (0.8 µm Upstream)	DWS5	2"	52			¼" BSP (19 TPI)	M				Bell with cover				
			53			¼" BSP (19 TPI) with O-ring	P								
DWS (0.45 µm Upstream)	DWSX	8"	57			¼" BSP	F								
						½" MNPT	C								
						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								
						⅜" Hose Barb	N								
						⅝" Hose Barb	I								

**Example:** ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

DWSX	57	01	DD	R	X	1	01
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\* Gamma irradiated filters can not be gamma sterilized again

Example for Non Sterile: DWLX5201QQRX101

Example for gamma Sterile: DWLX5201QQXX301

\*\* 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

**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	
⅜" Hose Barb	√	√	Outlet Only	X	
⅝" Hose Barb	X	√	√	√	

# Ordering Information

# Datasheet

## 0.2 µm AseptiCap WS-γ Hydrophilic PVDF Membrane Large Capsule filter

Type		Size		Pore Size		Inlet/Outlet		Radiation Sterilizable		Inline/T-Line		Sterility		Pack Size			
	Code		Code		Code		Code		Code		Code		Code		Code		
LWL (Single Layer)	LWLX	5"	53	0.2µm	01	½" Single Step Hose Barb	Q	Yes	R	Inline	X	Non Sterile	1	1	01		
		10"	54			1½" Sanitary Flange	E	No*	X	T-Line**	T	Gamma Sterile	3				
LWS (0.8 µm Upstream)	LWSS	20"	55			¾" Sanitary Flange	S										
		30"	56			⅝" Hose Barb	I										
LWS (0.45 µm Upstream)	LWSX					1" Hose Barb	Z										

Example:

LWSX	54	01	EE	R	T	1	01
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\* Gamma irradiated filters can not be gamma sterilized again

Example for Non Sterile: LWS55301QQRX101

Example for gamma Sterile: LWS55301QQXX301

\*\*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		
	5"	10"	20"	30"	10"	20"	30"
½" Single Step Hose Barb	√	√	√	√	X	X	X
1½" Sanitary Flange	√	√	√	√	√	√	√
¾" Sanitary Flange	√	√	X	X	X	X	X
⅝" Hose Barb	√	√	√	√	X	X	X
1" Hose Barb	X	√	√	√	X	X	X

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