

Data Sheet

Millistak+[®] Pod disposable depth filter system

Innovative, High-Performance Pod Filters are Ideal for Primary and Secondary Clarification in Lab, Pilot and Process-Scale Applications.

Millistak+[®] depth filter media is offered in a scalable, disposable format, the Pod Filter System. Accommodating applications from lab to pilot to process scale, the Pod format offers greater flexibility because of its unique modular and 100% disposable design.

The Millistak+[®] Pod system is ideal for a wide variety of primary and secondary clarification applications, including cell cultures, yeast and *E. coli* lysates post centrifuge, *E. coli* refolds, media, vaccines, plasma proteins and sera.

Millistak+[®] Pod filters are available in three distinct series of media grades in order to meet your specific application needs. Millistak+[®] DE, CE and HC media deliver optimal performance through a gradient density matrix as well as positive surface charge properties.



Benefits

- Low hold-up volume for greater product yield
- Broad range of media types offered in single and multilayer products
- Millistak+[®] HC dual-action media improves prefiltration and compresses clarification
- Flexible, modular format offers scalability from 5 to 12,000 liters or more
- Patented disposable design eliminates need for housing, CIP or cleaning validation
- Self-contained Pod filters protect operators from exposure to biohazards
- Robust construction is easy to use and set up
- Smaller footprint facilitates use in tight spaces

Linear Scalability

The innovative Pod filter system consists of eight filter sizes and two expandable holders. No matter what size Pod filter you choose, the same flow path and configuration ensures a linearly scalable solution from bench to process scale.

Easy to Use

With the compact, modular design of Millipore's new Pod system, you can increase productivity and shorten cycle times.

Installation and set-up of the Pod system is simple and straightforward. The unique design of the disposable adapters and disposable manifolds makes it easy to connect the Pod filters to the rest of the unit operations in the process. The self-contained and disposable nature of the system protects operators from exposure to biohazards and eliminates maintenance as well as cleaning validation requirements.

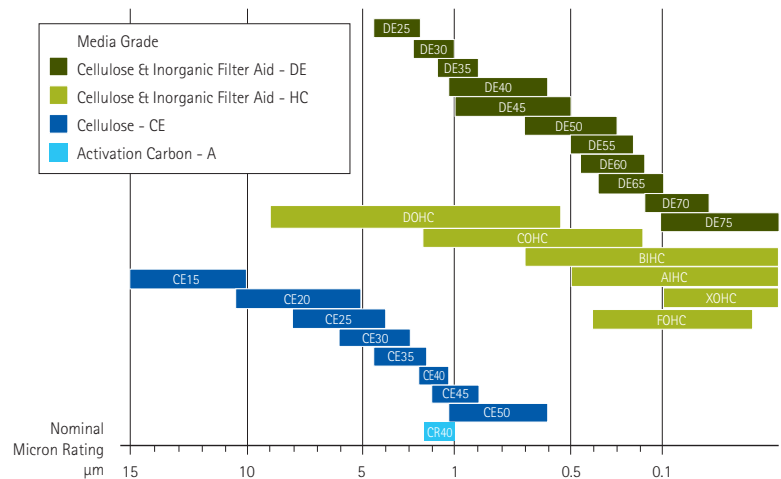
Configurations

- μ Pod™ filter -23 cm²
- Lab scale Pod filter- 0.027 m², 0.054 m²
- Millistak+® DE and CE media – 0.11 m², 0.77 m², or 1.4 m² filtration area.
- Millistak+® HC media– 0.11 m², 0.55 m², or 1.1 m² filtration area.
- Process scale holder – accepts from five to ten Pod filters per rack. Up to three racks can be stacked for process flexibility.
- Pilot scale holder – accommodates up to two full size Pod filters for configurations from 0.11 m² to 2.8 m² depending on media type. An optional accessory kit expands capacity to 5 full scale Pod filters.
- Disposable adapters – connect Pod filters to process piping, creating disposable flow path.
- Disposable diverter plates – enable more than one media grade on a single rack

Millistak+® Depth Filter Media

Available in three media series, the proven filtration performance of Millistak+® filter media in the popular Pod format provides greater flexibility and reduced cycle times. Millistak+® Pod filters incorporate multiple graded-density layers and adsorptive, positively-charged filter media. Composed of select grade cellulose fiber and diatomaceous earth, the Millistak+® DE series not only improves the manufacturing process but also increases contaminant holding. In addition, the Millistak+® CE series consists of single layer media with cellulose fibers that are suitable for coarse filtration applications.

The Millistak+® HC series is dedicated to improving productivity by combining two distinct technologies that enhance filter capacity and retention. Multiple filtration stages downstream of the bioreactor are compressed into one efficient step.

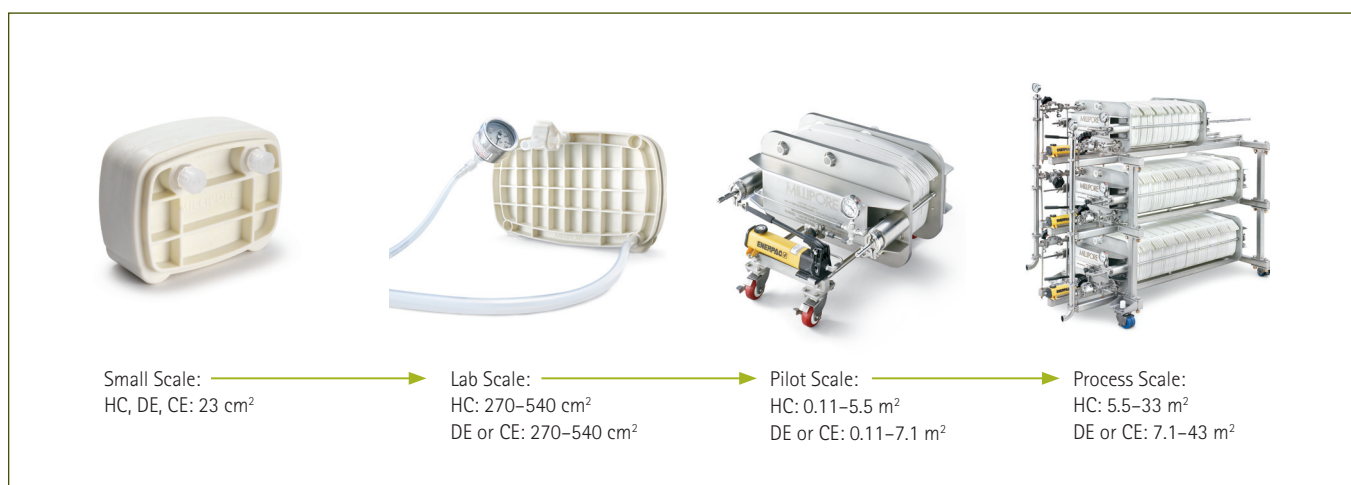


Typical Extractables

	Single Layer CE & DE Media	HC Media (non X0HC)	X0HC/F0HC Media
Conductivity	1.52 - 1.94 $\mu\text{S}/\text{cm}$ post autoclave (1 cycle of 60 minutes at 123°C) and pure water flush of 5L/ft ² (50L/m ²) of media surface area	3.64-10.5 $\mu\text{S}/\text{cm}$ post autoclave (1 cycle of 60 minutes at 123°C) and pure water flush of 10L/ft ² (100L/m ²) of media surface area	19.34-53.2 $\mu\text{S}/\text{cm}$ (X0HC) and 21.4-42.7 $\mu\text{S}/\text{cm}$ (F0HC) post autoclave (1 cycle of 60 minutes at 123°C) and pure water flush of 10L/ft ² (100L/m ²) of media surface area
NVR Gravimetric Extractables	Not Tested	420-750 mg/f ² (process scale) and 630-1251 mg/m ² (lab-scale) per 24 hour static soak in pure water (type 1 DI water) post autoclave (1 cycle of 60 minutes at 123°C) and pure water flush of 10L/ft ² (100L/m ²) of media surface area	Not Tested
TOC	910-1800 ppb post autoclave (1 cycle of 60 minutes at 123°C) and pure water flush of 5L/ft ² (50L/m ²) of media surface area	720-4600 ppb post autoclave (1 cycle of 60 minutes at 123°C) and pure water flush of 10L/ft ² (100L/m ²) of media surface area	1200-2800 ppb (X0HC) and 460-3200 ppb (F0HC) post autoclave (1 cycle of 60 minutes at 123°C) and pure water flush of 10L/ft ² (100L/m ²) of media surface area

Metals (mg/ft ² Media)	DE Series	CE Series	A1HC Series	X0HC Series	F0HC Series
Sodium	≤ 11.5	≤ 9.91	≤ 38.2	≤ 14.02	≤ 17.313
Calcium	≤ 0.050	≤ 1.46	≤ 7.30	≤ 9.60	≤ 5.170
Potassium	≤ 0.351	≤ 0.042	≤ 1.18	≤ 0.82	≤ 0.439
Magnesium	≤ 0.129	≤ 0.662	≤ 2.31	≤ 3.905	≤ 1.464
Iron	≤ 0.042	≤ 0.042	≤ 0.090	< 0.001*	< 0.041
Lead	≤ 0.0004	≤ 0.0004	< 0.001	< 0.001*	< 0.001
Aluminum	≤ 0.025	≤ 0.059	≤ 0.141	≤ 0.084	≤ 0.021
Titanium	< 0.001*	< 0.001*	≤ 0.019	≤ 0.04	< 0.001
Chromium	≤ 0.001	0.0003	≤ 0.003	≤ 0.001	< 0.001
Manganese	≤ 0.001	≤ 0.001	≤ 0.487	≤ 0.425	≤ 0.370
Cobalt	≤ 0.0002	0.0002	≤ 0.002	≤ 0.001	≤ 0.002
Nickel	≤ 0.001	≤ 0.0004	≤ 0.013	≤ 0.013	≤ 0.022
Copper	≤ 0.003	≤ 0.0004	≤ 0.167	≤ 0.009	≤ 0.019
Zinc	≤ 0.002	≤ 0.003	≤ 0.112	≤ 0.046	≤ 0.052
Mercury	≤ 0.0004	≤ 0.0004	< 0.001*	< 0.001*	< 0.001
Arsenic	≤ 0.003	≤ 0.002	≤ 0.011	≤ 0.009	≤ 0.004

*Pilot and process scale only



Millistak+® Process Scale Pod Filter Specifications

Surface Area	23 cm ² (HC, CE, DE, and CR media)	1.2 ft ² (0.11 m ²) (HC, CE, DE, and CR media)	5.9 ft ² (0.55 m ²) (HC and CR media)	8.3 ft ² (0.77 m ²) (CE and DE media)	11.8 ft ² (1.1 m ²) (HC and CR media)
Materials of Construction					
Filter Media:	Cellulose fibers with inorganic filter aid (CE Media contains cellulose only)				
Filter Membrane:	Mixed esters of cellulose (grades A1HC and B1HC only)				
Pod Housings:	Glass Filled Polypropylene				
Adapters:	Glass Filled Polypropylene*				
Gaskets and Plugs:	Thermo Plastic Elastomer (TPE)*				
Inlet, Vent and Outlet Connections	Female Luer	Flat seal			
Pod Dimensions					
Length:	3.5 in. (8.9 cm)	24.2 in. (62 cm)	24.2 in. (62 cm)	24.2 in. (62 cm)	24.2 in. (62 cm)
Height:	2.6 in. (6.6 cm)	12.5 in. (32 cm)	12.5 in. (32 cm)	12.5 in. (32 cm)	12.5 in. (32 cm)
Thickness:	1.6 in. (4.1 cm)	1.2 in. (3 cm)	2.8 in. (7.1 cm)	3.1 in. (7.9 cm)	4.8 in. (12.2 cm)
Maximum Operating Pressure	50 psig (3.5 bar) at ≤40° C 50 psig (3.5 bar) at 25 °C; 15 psig (1.0 bar) at 80° C				
Maximum Differential Pressure					
Forward:	30 psid (2.1 bar) at 40 °C 30 psid (2.1 bar) at 25° C; 15 psid (1.0 bar) at 80° C				
Reverse:	15 psid (1.0 bar) at 40 °C 30 psid (2.1 bar) at 25° C				
Sterilization	2 cycles of 60 minutes at 123° C		1 cycle of 60 minutes at 123° C		
Indirect Food Additive	All components meet the FDA indirect food requirements cited in 21 CFR 177-182.				
Toxicity	All component materials meet the requirements of the current USP <88> biological reactivity test for class VI plastics.				
Bacterial Endotoxin	< 0.25 EU/mL as determined by the Limulus Amebocyte Lysate (LAL) test.				
CE Pressure	This filter has been designed and manufactured according to the essential requirements of the Pressure.				
Equipment Directive	Equipment Directive 97/23/EC. Only 0.77 m ² , 1.1 m ² and 1.4 m ² filters carry the CE mark.*				

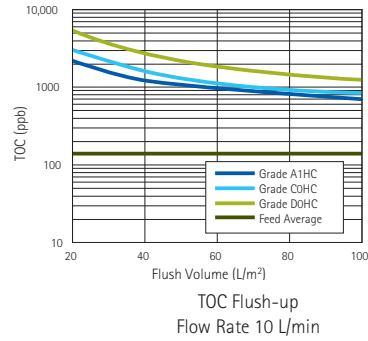
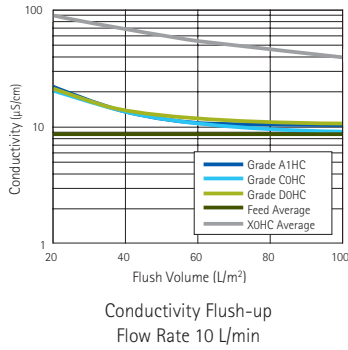
* Pilot and process scale only.

Millistak+® Single Layer and Lab Scale Pod Filter Specifications

Surface Area	15.4 ft ² (1.4 m ²) (CE and DE media)	0.29 ft ² (0.027 m ²)	0.58 ft ² (0.054 m ²)
Materials of Construction			
Filter Media:	Cellulose fibers with inorganic filter aid (CE Media contains cellulose only)		
Filter Membrane:	Mixed esters of cellulose (grades A1HC and B1HC only)		
Pod Housings:	Glass Filled Polypropylene		
Adapters:	Glass Filled Polypropylene*		
Gaskets and Plugs:	Thermo Plastic Elastomer (TPE)*		
Pod Dimensions			
Length:	24.2 in. (62 cm)	8.5 in. (22 cm)	8.5 in. (22 cm)
Height:	12.5 in. (32 cm)	5.3 in. (14 cm)	5.3 in. (14 cm)
Thickness:	5.0 in. (12.7 cm)	2.9 in. (7.9 cm)	3.7 in. (9.4 cm)
Maximum Operating Pressure	50 psig (3.5 bar) at 25 °C; 15 psig (1.0 bar) at 80 °C		30 psig (3.5 bar) at 37 °C
Maximum Differential Pressure			
Forward:	30 psid (2.1 bar) at 25 °C; 15 psid (1.0 bar) at 80 °C		30 psid (2.1 bar) at 4-37 °C
Reverse:	30 psid (2.1 bar) at 25 °C		30 psid (2.1 bar) at 37 °C
Sterilization	May be autoclaved for 1 cycle of 60 minutes at 123 °C		2 cycles of 60 minutes at 123 °C
Indirect Food Additive	All components meet the FDA indirect food requirements cited in 21 CFR 177-182.		
Toxicity	All component materials meet the requirements of the current USP <88> biological reactivity test for class VI plastics.		
Bacterial Endotoxin	< 0.25 EU/mL as determined by the Limulus Amebocyte Lysate (LAL) test.		
CE Pressure	This filter has been designed and manufactured according to the essential requirements of the Pressure		
Equipment Directive	Equipment Directive 97/23/EC. Only 0.77 m ² , 1.1 m ² and 1.4 m ² filters carry the CE mark.		

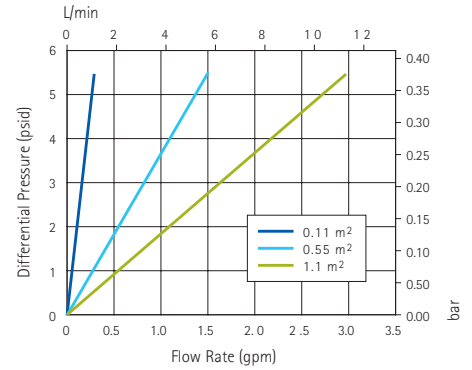
* Pilot and process scale only.

Conductivity / TOC



Water Permeability

Grade A1HC Pod Filters Example Graph



Media Type/Grade	Water Flow Rate (L/min m ² at 10 psid, 23° C)**
CE15	3060-5620
CE20	2115-3775
CE25	1440-2585
CE30	990-1775
CE35	675-1215
CE40	450-835
CE45	305-560
CE50	210-380

Media Type/Grade	Water Flow Rate (L/min m ² at 10 psid, 23° C)**
DE25	1443-2593
DE30	1001-1782
DE35	677-1218
DE40	451-834
DE45	307-564
DE50	212-379
DE55	144-259
DE60	99.2-178
DE65	67.7-122
DE70	45.1-83.4
DE75	30.7-56.4
IM75	39.1-54.6
IM83	21.2-27.7

** Typical values for media

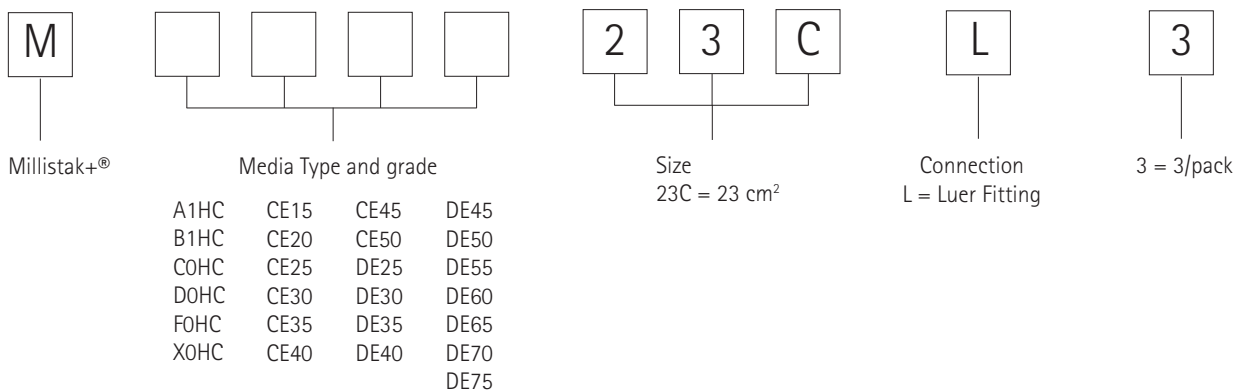
Choose the Right Media

Media Grade	Application	Characteristics	Media Construction
Single-layer CE*		Cellulose	CE15 to 50
Single-layer DE*		Cellulose + inorganic filter aid	DE 25 to 75
Triple-layer A1HC	Post-TFF (Prostak™) clarification fluids	Tightest media combination with an additional membrane layer to protect downstream membrane filters	60DE + 75DE + RW01
Triple-layer B1HC	Post-centrifuge or settled permeate containing cellular particulate	A more open first layer with an additional membrane layer to protect downstream membrane filters	50DE + 75DE + RW01
Double-layer COHC	Perfusion bioreactor fluid	Two layers of a more open DE media	30DE + 60DE
Double-layer DOHC	Primary clarification directly out of the bioreactor	A more open CE layer and DE media combination	25CE + 40DE
Double-layer X0HC	Secondary clarification of bioreactor harvests, primarily for cell cultures	Two DE Layers. Provides sterile filter protection without an RW01 membrane	75IM + 83IM
Double-layer F0HC	Secondary clarification of pretreated harvest by acid precipitation or flocculation, <i>E. coli</i> and yeast	Two DE Layers. Provides sterile filter protection without an RW01 membrane	60DE + 75IM

*For clarification of serum, plasma, vaccines, cell culture or other fluids, choice of media grade should be based on small-scale trials.

Ordering Information

µPod™ Filter

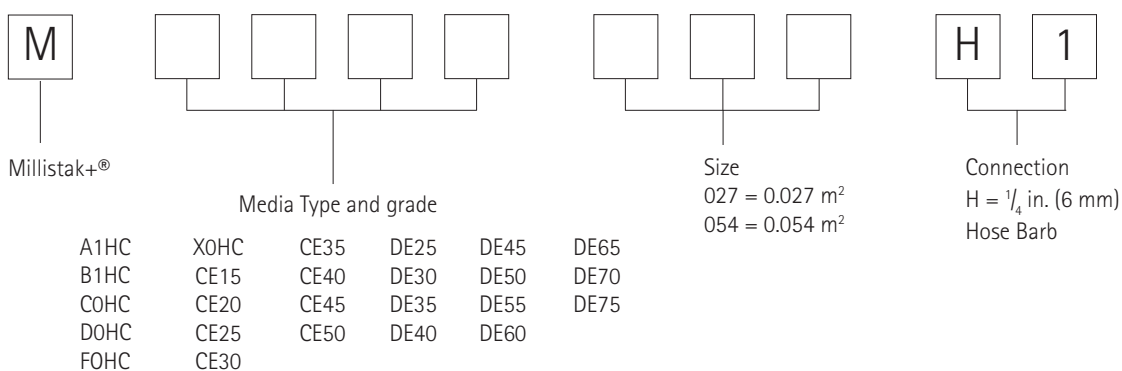


µPod™ Filter Accessories

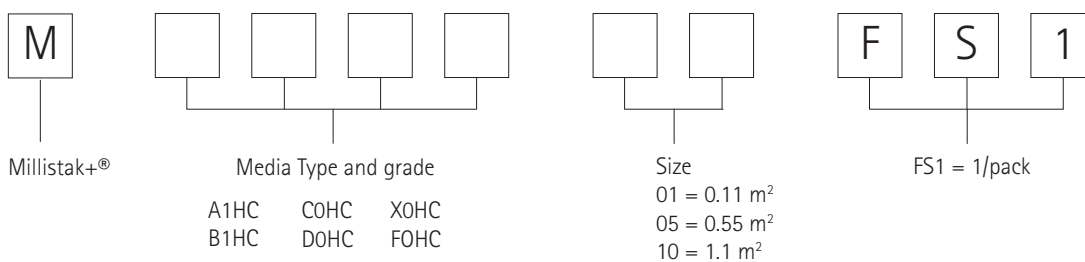
µPod™ Tubing Kit Catalogue No. MTUBEKITL1

Gauge 0-60 psi and Connection Fittings Catalogue No. XXPXLGAGE

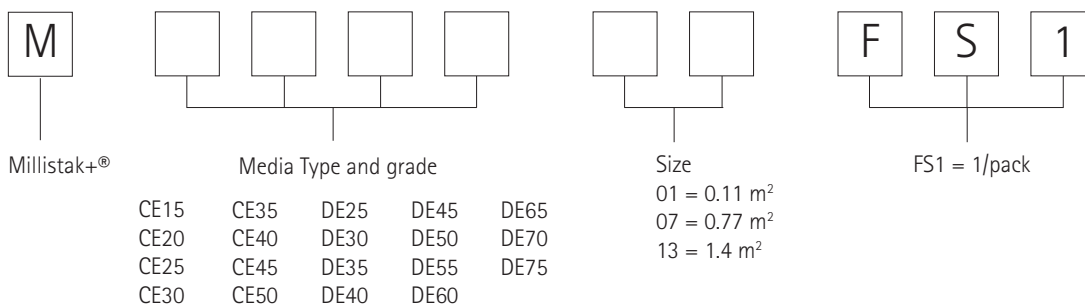
Lab Scale Pod Filter



Multilayer Pod Filter



Single Layer Pod Filter





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