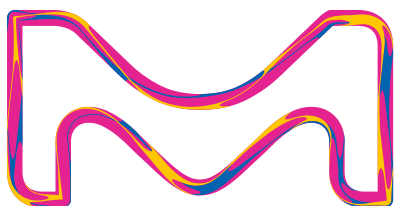


Clarification Portfolio Guide

Single and multi-use products
for the successful development
and implementation of robust
clarification processes



The Life Science business
of Merck operates as
MilliporeSigma in the
U.S. and Canada.

Millipore®

Expert Pharm/BioPharm
Products & CTDMO Services

Single-use

Millistak+® and Millistak+® HC Pro Depth Filters

Available in a wide range of media grades and device formats in both single and multi-layer configurations for primary and secondary clarification applications, including mammalian cell culture, yeast, inclusion body refolds, vaccines and plasma proteins.



Clarisolve® Depth Filters

Available in a variety of media grades and device formats. Developed to address the needs of challenging high cell density mammalian feed streams where pretreatment, including pDADMAC polymer flocculation, is implemented.



Polygard® and Clarigard® Capsule Filters

Available in a variety of media grades and device formats. Designed for clarification and pre-filtration of liquids and gases in pharmaceutical, biological, fine chemical and industrial applications.



Polysep™ II Pre-filters*

Combining the dirt-holding capacity of a depth filter with the retention efficiency of a membrane filter, Polysep™ II filters provide multiple filtration stages in a single, compact configuration for critical prefiltration applications.



Multi-use

Prostak™ Open-channel Modules*

Tangential flow stacked plate membrane devices with open feed channels for convenient and economical clarification and concentration applications.



Pellicon® 2 Cassettes*

High-performance tangential flow filters for biopharmaceutical process development, scale-up/ scale-down and concentration, purification, cell harvesting applications.



* For information on Polysep™ II pre-filters, Prostak™ modules, or Pellicon® cassettes, please reference the data sheet available at SigmaAldrich.com or contact your local sales representative.

Millistak+® and Clarisolve® Depth Filters

Depth filters are proven technology that can be used in a broad range of applications at many different process steps. These depth filters remove particles, protect downstream unit operations and can improve capacity of sterilizing-grade filters.

Millistak+® HC Pro Series (Synthetic High Capacity)

A family of synthetic depth filters in modular Pod format that provides a cleaner and more consistent depth filtration media over current diatomaceous earth (DE) and cellulose (CE) based filter media. Multiple media grades are available for primary and secondary clarification, as well as for applications further downstream.



Millistak+® DE Series (Diatomaceous Earth)

Composed of select grade cellulose fiber and DE, which increases contaminant retention. Available in grades ranging from DE 25–75 in 12 in. and 16 in. lenticular disc and modular Pod formats. This media series is suitable for primary or secondary clarification.

Millistak+® CE Series (Cellulose)

Composed of a single-layer media with cellulose fibers that are suitable for coarse filtration applications such as primary clarification. Available in grades ranging from CE 15–50 in both 12 in. and 16 in. lenticular disc and modular Pod formats.



Millistak+® HC Series (High Capacity)

Two layers of diatomaceous earth or cellulose media enable improved productivity with enhanced filter capacity. These filters are ideal for primary clarification of cell culture harvest as multiple filtration stages are compressed into one efficient step. Several grades are available for a variety of applications in both 12 in. and 16 in. lenticular disc and modular Pod format.

Millistak+® CR40 Filters

Formulated with activated carbon retained in a rigid structure by a cellulose matrix, creating a tortuous flow path that maximizes impurity contact with the surface and pores of the activated carbon for optimum impurity adsorption. These modular Pod format filters are utilized for the removal of color and trace contaminants, and to reduce HCP and other impurities in Protein A elution pools.

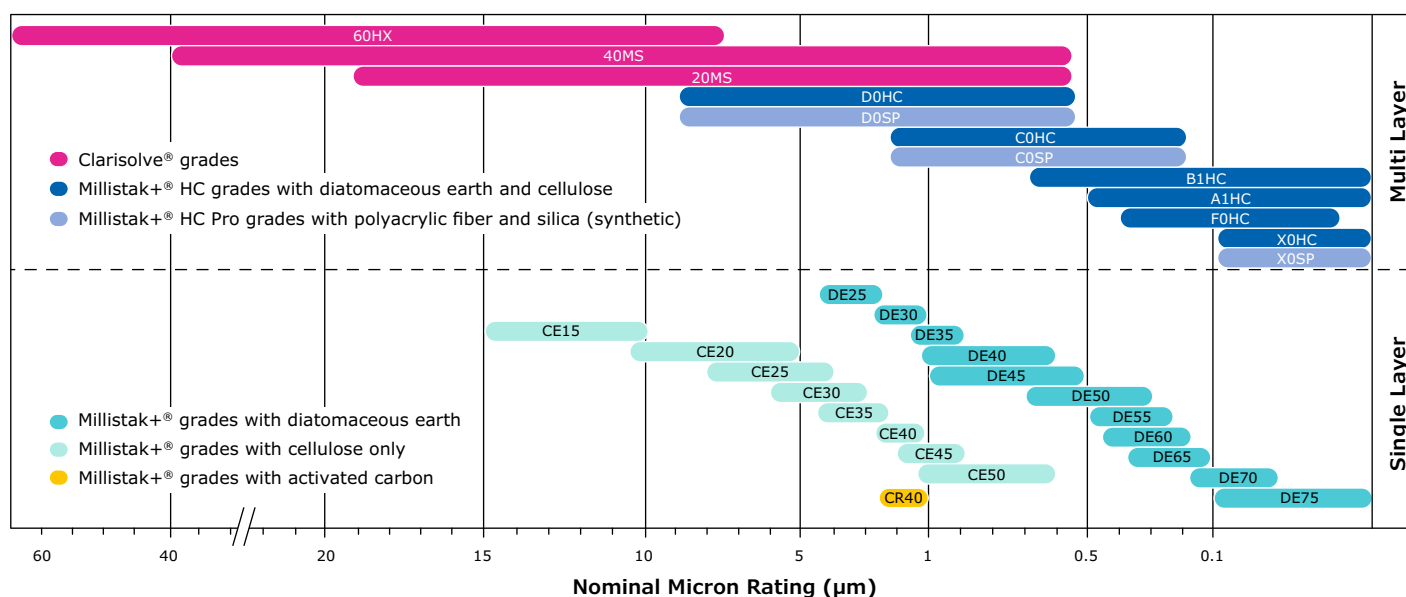


Clarisolve® Depth Filters

Developed to address the needs of challenging high cell density feed streams where pretreatment is being implemented. These modular Pod format filters are available in three distinct grades designed for different pretreatment methodologies including polymer flocculation and acid precipitation.



Media Grades



Target Step		Media Grade
Clarisolve® Pre-treated Feed – High Cell Density	Single stage clarification of mAb pre-treated feed streams with particle size distribution of 60 µm. Utility in some bacterial, viral and polysaccharide vaccine applications.	● 60HX
	Single stage clarification of mAb pre-treated feed streams with particle size distribution of 40 µm (as produced by cationic polymers such as pDADMAC). Utility in some bacterial and viral vaccine applications.	● 40MS
	Single stage clarification of mAb pre-treated feed streams with particle size distribution of 20 µm (as produced by acid precipitation). Utility in some bacterial and viral vaccine applications.	● 20MS
Millistak+®, Millistak+® HC, Millistak+® HC Pro	Primary clarification. In some cases, can be used as a single stage clarification step going directly onto a membrane filter.	● C0HC ● C0SP (synthetic)
	Primary (coarse) clarification for products that bind to silica or strong positive charges.	● CE
	Primary clarification.	● D0HC ● D0SP (synthetic)
	Primary or secondary clarification.	● DE
	Secondary clarification post depth filtration or centrifugation. Can also be utilized in downstream processing steps to protect chromatography columns.	● X0HC ● X0SP (synthetic)
DSP	CR40 for removal of small molecular weight impurities and phenolic/aromatic chemicals. X0SP for effective removal of aggregates post viral inactivation or before virus filtration.	● Carbon (AC) CR40 ● X0SP (synthetic)

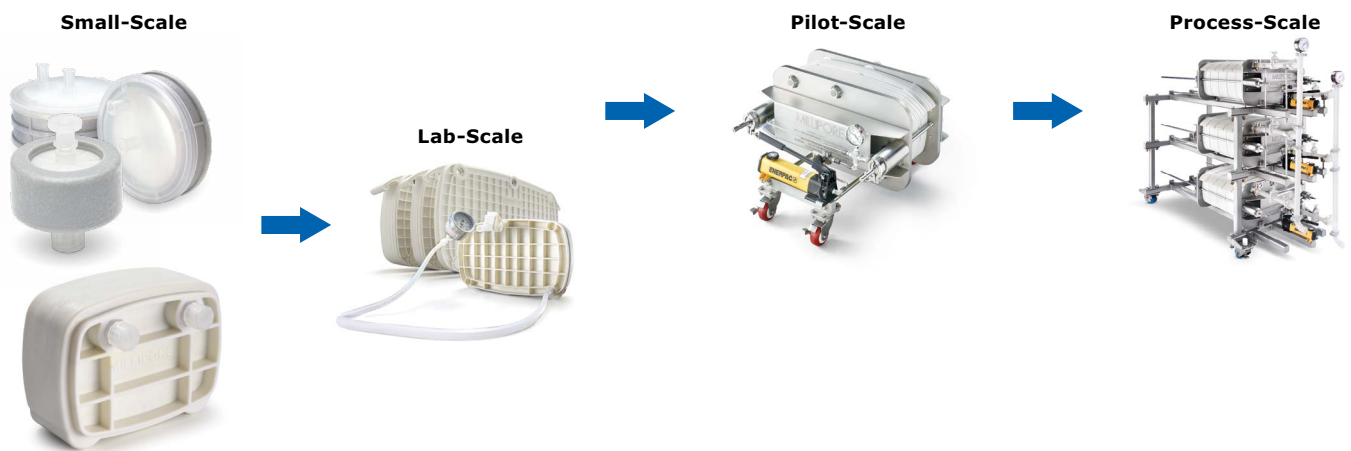
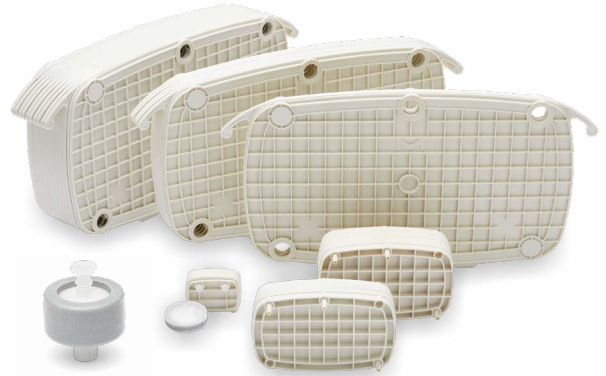
Device Formats

Pod Filter Systems

(Millistak+®, Millistak+® HC, Millistak+® HC Pro and Clarisolve®)

The pod filter system is a single-use, modular format designed for linear scalability from laboratory to process scale. The system's holder design makes it easy to configure for a specific application and quickly reconfigure to scale up or down as capacity requirements change. This flexible format offers scalability to 12,000 L process volume.

- Patented, single use design provides flexibility and eliminates the need for CIP or cleaning validation.
- Enables use of multiple grades in a single holder.
- Smaller footprint.



Lenticular Discs (Millistak+® media only)

The Millistak+® 16 in. lenticular format is available in multiple stacked-cell configurations for installation into steel housings.

- Full range of Millistak+® and Millistak+® HC media available.
- Capable of sterile operations via steam-in-place.

The Millistak+® 316L stainless steel filter housings are designed for high-capacity liquid clarification. The housings' versatile design and a wide offering of accessories allow users to operate the system with as few as one or as many as eight stacked cartridges installed. These options make it easy to configure for a specific application and conveniently reconfigure it as process capacity requirements scale-up or down.



Polygard® and Clarigard® Filter Media

Polygard® and Clarigard® filter media are available in a broad range of micron ratings to match an array of particle removal applications. These versatile, multi-use filters can be utilized in pharmaceutical, biological, fine chemical and industrial applications.

Polygard® CR Series

Nominally rated filters designed for particle removal applications in liquids and gases. The graded-density depth structure of Polygard® CR filter media provides maximum filtration capacity, and the all-polypropylene construction offers low extractable levels and broad chemical compatibility. Available in pore sizes ranging from 0.1 μm to 100.0 μm .



Polygard® CN Series

Nominally rated filters designed for particle removal applications in liquids and gases. The pleated structure of Polygard® CN filter media minimizes pressure differentials during the filtration process, and the all-polypropylene construction offers low extractable levels and broad chemical compatibility. Downstream filter performance is enhanced due to efficient particle and microorganism reduction. Available in pore sizes ranging from 0.3 μm to 30.0 μm .



Polysep™ II

Composed of a glass fiber (Lifegard®) primary layer over a cellulose acetate (Milligard®) surface membrane. Designed for plugging, viscous or challenging feedstreams, particularly those heavy in colloids like certain vaccines. Available in pore sizes ranging from 0.1 μm to 2 μm .



Clarigard® Series

Composed of graded-density polypropylene for clarification and pre-filtration of process fluids. The 99.99% retention characteristic makes them ideal for the protection of critical downstream process steps such as membrane filters or chromatography columns. The graded-density depth structure provides maximum filtration capacity, and the polypropylene construction offers low extractable levels and broad chemical compatibility. Available in pore sizes ranging from 0.2 μm to 3.0 μm .



Device Formats

A wide range of filter formats and sizes are available to fit all your application needs for easy scale-up of your small-volume filtration steps to larger, process-scale filtration processes.

OptiScale® Capsule Filters

A convenient, small-volume, “drop in” filters for process development and screening. These devices support speed-to-market strategies for efficiently developing compounds and biotherapeutics. OptiScale® capsules are faster and easier to set up than conventional 47 mm discs.



Small-Scale Capsule Filters

Available as a selection tool when evaluating several media configurations to clarify process fluids. These devices have been developed to minimize hold-up volume when screening these multiple media configurations.



Cartridge Filters

Robust, strong, resilient cartridge filters designed to withstand multiple steam-in-place cycles. A full range of filter sizes are available to suit your application requirements. A variety of connection options are offered for easy adaptation to existing housings.



Opticap® XL Capsule Filters

Available in multiple filtration sizes, providing an optimal choice for every application. The patented Opticap® XL capsule design allows unparalleled thermal and hydraulic stress resistance in an autoclavable disposable filter, resulting in reliability and high confidence in the sterility process, as well as improved cleanliness. The unique capsule design also minimizes hold-up volume and reduces production losses.



	OptiScale® Capsule Filters	Small-Scale Capsule Filters	Cartridge Filters	Opticap® XL Capsule Filters
Polygard® CR filter media		●	●	●
Polygard® CN filter media	●		●	●
PolySep™ II filter media	●		●	●
Clarigard® filter media		●	●	●

Clarification Selection Guide for Monoclonal Antibodies, Recombinant Proteins, and Fc-fusion Proteins

The following decision trees are focused on batch and fed-batch feeding strategies for mammalian cell bioreactors. The selection matrices are created for reference only, based on historical experience and process development data.

The decision trees cover direct harvest, pretreatment, and centrifugation at various scales. The following information should be considered as general guidance and it is highly recommended that performance should be confirmed by experimental studies before implementation.

- Primary direct harvest: Bioreactor volume <2,000 L.
- Centrifugation: Bioreactor volume >2,000 L.
- Pretreatment: Appropriate for high cell density material ($>10^7$ cells/mL) or for cell lines that are challenging to clarify like CHO DG44. Requires a specialized Clarisolve® filter post-pretreatment.




Direct Harvest and Clarification of Cell Culture Media




Monoclonal antibodies, recombinant proteins, and Fc-fusion proteins behave similarly with respect to capacity. If product yield is an issue, reach out to your local Account Manager or Process Development Specialist.

For mAb, recombinant and fusion proteins, there is a clear recommendation for direct harvest.

Most high producing feeds will rapidly foul any depth filter capable of generating a filtrate suitable for membrane filtration. Consequently, two stage depth filtration using a coarse, followed by a fine, depth filter is recommended.

* Process Cost and Facility Considerations in the Selection of Primary Cell Culture Clarification Technology, Felo et al., Biotechnol. Prog., 2013, Vol. 29, No. 5.

Cell Density	Low ($\leq 10^7$ cells/mL)			
	↓		↓	
Cell Viability	Low Viability		High Viability	
	↓		↓	
Depth Filter Train	Two-stage		Two-stage	
Millistak+® Media Grade	HC Pro D0SP/X0SP†	D0HC/X0HC	HC Pro D0SP/X0SP†	D0HC/X0HC
Approx. Expected Filter Loading Capacity	D0SP: 240 L/m² X0SP: 120 L/m²	D0HC: 120 L/m² X0HC: 120 L/m²	D0SP: 120 L/m² X0SP: 250 L/m²	D0HC: 120 L/m² X0HC: 250 L/m²
Scale* 1 L			NanoPod NP6, Micro-20 and µPod® device format	
10 L			Lab-scale Pod (LSP) device format	
100 L 1,000 L 2,000 L			Process-scale Pod (PSP) device format	
2,000 L+	See centrifuge			

Cell Density	High ($>10^7$ cells/mL)			
	↓		↓	
Cell Viability	Low Viability		High Viability	
	↓		↓	
Depth Filter Train	Two-stage		Two-stage	
Millistak+® Media Grade	HC Pro D0SP/X0SP†	C0HC/X0HC	HC Pro D0SP/X0SP†	D0HC/X0HC
Approx. Expected Filter Loading Capacity	C0SP: 100 L/m² X0SP: 120 L/m²	C0HC: 50 L/m² X0HC: 120 L/m²	D0SP: 140 L/m² X0SP: 150 L/m²	D0HC: 70 L/m² X0HC: 150 L/m²
Scale* 1 L			NanoPod NP6, Micro-20 and µPod® device format	
10 L			Lab-scale Pod (LSP) device format	
100 L 1,000 L 2,000 L			Process-scale Pod (PSP) device format	
2,000 L+	See centrifuge			

Recovery should be considered during the small-scale tests. Low-titer feeds historically have slightly lower recovery values. This could be due to low levels of binding, hold-up volume losses during recovery (blow-down or buffer flush), and/or dilution from pre-use flushing and post-use recovery.

Filter choices marked in blue are the primary recommendations for this application.

Cell density is a critical parameter in the consideration for filter selection and capacity. High-cell-density cultures contain a high level of cells and with that cell debris, both soluble and insoluble. When the viability is high, most of the cells are intact and the particle size distribution shifts towards larger particles. When the viability is low, the particle size shifts towards the smaller particles and insoluble (unmeasured) particles.

Process scales are typically 1 L–20,000 L bioreactor volume. Direct harvest is economically practical and feasible for manufacturing, depending on the cell density, up to approximately 2,000 L. Centrifuge is recommended at scales $\geq 2,000$ L for direct harvest.

[†] As a general guideline, the filter loadings for Millistak+® HC Pro Media grades (D0SP and C0SP only) are at least double (2X) the equivalent Millistak+® HC D0HC and C0HC grades. The X0 grades for both have similar filter loadings.

High Cell Density



High cell density mammalian cell culture harvests can result in low capacity and high levels of breakthrough using standard clarification approaches. By pretreating high density cell harvest material with novel chemical flocculants or acid, the efficiency of clarification over Clarisolve® depth filters can be markedly improved. Pretreatment, via flocculation or precipitation, is recommended at cell densities greater than or equal to 10^7 cells/mL. However, flocculation can be implemented at any cell density if the process requires such a step. The type of pretreatment and dosing requirements (e.g., pH adjustment, polymer addition) depends on the cell culture and product characteristics. The Clarisolve® family of filters can effectively separate impurities from high-cell-density pretreated feed streams; filter grade selection will be determined by the type of pretreatment and particle size distribution of the feed stream. pDADMAC residual quantitation services (VSPDADMAC) are available to support process validation.

Cell Density	10^7 cells/mL (volumes $\leq 2,000$ L)	
	↓ Acid treatment	↓ pDADMAC cationic polymer
Clarisolve® 20MS* filter	1st choice	2nd choice
Clarisolve® 40MS* filter	2nd choice	1st choice
Clarisolve® 60HX* filter	—	3rd choice

* If the filtrate turbidity is greater than 15–20 NTU or sterile filter filtration area does not meet your target directly after the primary depth filter, consider additional polishing via Millistak+® HC Pro XOSP media.

Centrifugation for Large Volume Processing

Centrate quality may differ depending on the cell density/viability and the centrifuge optimization/operation. Centrate turbidity is a good indicator as to which depth filter will have the highest capacity and best membrane filter protection. Pretreatment with polymer flocculation greatly improves centrifuge capacity.

Cell Density	<10 ⁷ cells/mL (low) untreated		or	>10 ⁷ cells/mL (high) pretreated	
					
<2,000 L bioreactor volume					
Recommend two stage depth filtration					
>2,000 L					
	High centrate turbidity (>100 NTU)	Low centrate turbidity (<100 NTU)		High centrate turbidity (>100 NTU)	Low centrate turbidity (<100 NTU)
Millistak+® HC Pro XOSP filter	Approx. filter loading capacity 100 L/m ²	Approx. filter loading capacity 300 L/m ²		Approx. filter loading capacity 100 – 200 L/m ²	Approx. filter loading capacity 300 – 500 L/m ²

Clarification Selection Guide for Non mAb Expression Systems

The following recommendations are focused on non mAb expression systems. These typically require more process development due to processing differences as particle size distribution can vary greatly between molecules/processes – loading capacities stated in the table below should be taken with that in mind. The recommendations are based on historical experience and data. If filtrate turbidity is greater than 15–20 NTU or membrane filtration area does not meet your target directly after the primary depth filter, consider additional polishing via Millistak+® HC Pro X0SP.

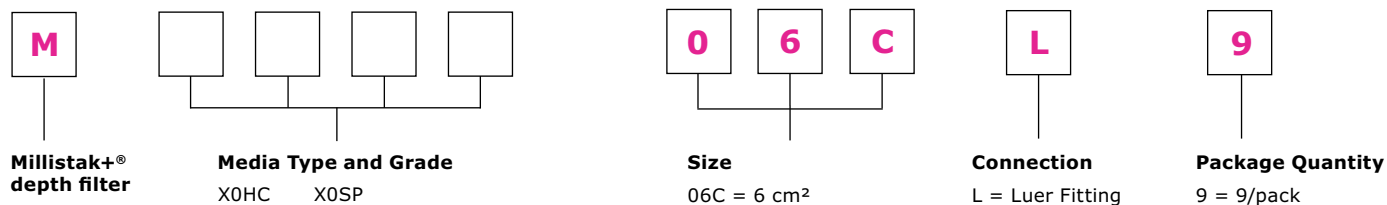
Expression System	Molecule Type	Application	Batch Type	Pretreatment Options/ Method of Cell Lysis	Primary Clarification	Secondary Clarification
Mammalian	Enzyme (binds to DE)	Harvest	Perfusion	NONE	Millistak+® CE50	Polysep™ II 1.0/0.5 µm
					Polygard® CR 0.5 µm	Polysep™ II 1.0/0.5 µm
	Enzyme (does not bind to DE)	Harvest	Perfusion	NONE	Millistak+® C0SP	Millistak+® X0SP
					Millistak+® F0HC	—
Microbial: Bacterial	Secreted Protein	Harvest	Batch	NONE	Millistak+® C0SP	Millistak+® X0SP
					Prostak™ 0.22 µm or 0.1 µm	—
	Intracellular – Soluble	Lysate Clarification	Batch	Mechanical	Pellicon® 2 1000 kD Biomax® V-screen	—
					Clarisolve® 20MS	Millistak+® C0SP
				Chemical or Enzymatic	Call Technical Service	
	Intracellular – Inclusion Body	Lysate Clarification/ IB Wash	Batch	Mechanical	Prostak™ MF 0.1 µm	—
					Pellicon® 2 1000 kD Biomax® V-screen	—
				Chemical or Enzymatic	Call Technical Service	
		Lysate Clarification/ Refold Pool	Batch	NONE	Clarisolve® 20MS	(Millistak+® X0SP – if needed)*
					Clarisolve® 60HX	(Millistak+® X0SP – if needed)*
Microbial: Yeast	Intracellular – Inclusion Body	Lysate Clarification	Batch	Mechanical	Clarisolve® 60HX	Millistak+® C0SP
					Pellicon® 2 1000 kD Biomax® V-screen	—
Vaccines	Egg-based Influenza	Centrate Clarification	Batch	NONE	Polygard® CN 5.0 µm	—
					Polygard® CR 5.0 µm	—
	Cell-based Influenza	Centrate Clarification	Batch	NONE	Clarisolve® 20MS	—
					Polygard® CR 5.0 or 3.0 µm	Clarigard® 1.0 or 0.5 µm
	AAV/AV viral vector	Lysate clarification	Batch	Chemical	Millistak+® D0SP/ C0SP	Millistak+® X0SP (if required)
	LV viral vector	Harvest	Batch	NONE	Millistak+® 60HX (if required)	Millistak+® CE35
	pDNA	Harvest Clarification	Batch	NONE	Pellicon® 2 0.1 µm Durapore® V-screen	—
					Pellicon® 2 1000 kD Biomax® V-screen	—
		Precipitate Clarification	Batch	NONE	Clarisolve® 60HX	—
	Virus-like Particle	Lysate Clarification	Batch	Mechanical	Prostak™ 0.65 µm Durapore®	—
					Clarisolve® 20MS	—
					Polygard® CN 5.0 µm	—
	Conjugated Polysaccharide	—	Batch	NONE	Prostak™ 0.1 µm Durapore®	—

Ordering Information

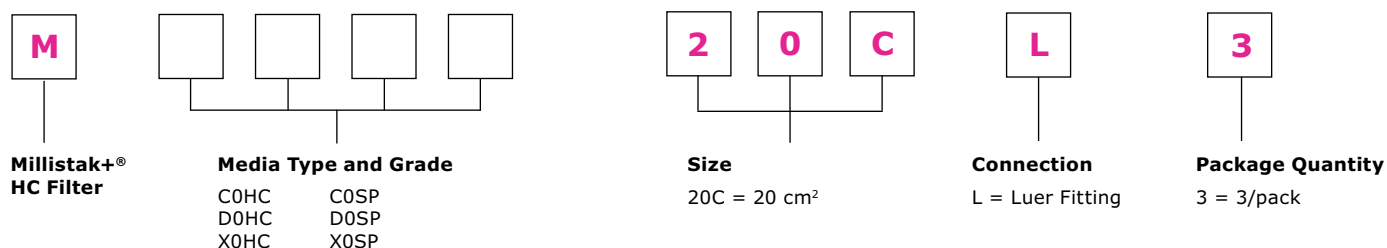
Millistak+® HC and HC Pro Pod Depth Filters

Screening and Scaling Devices

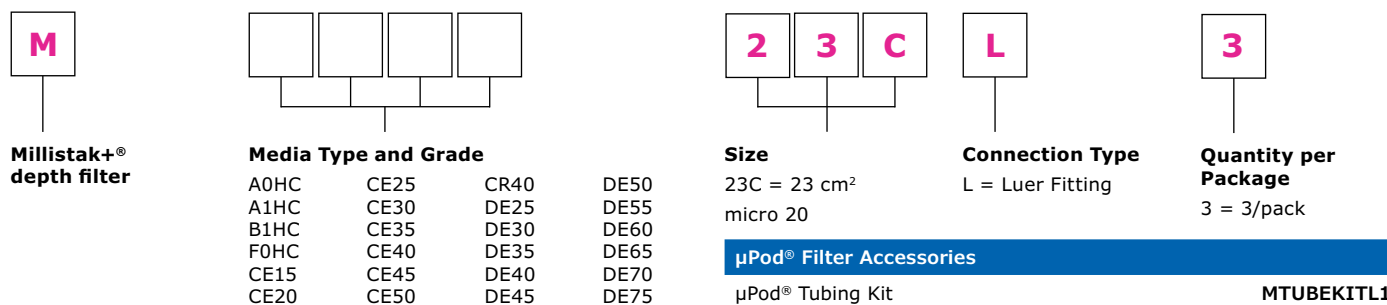
NanoPod NP6



Micro 20



µPod® Filter

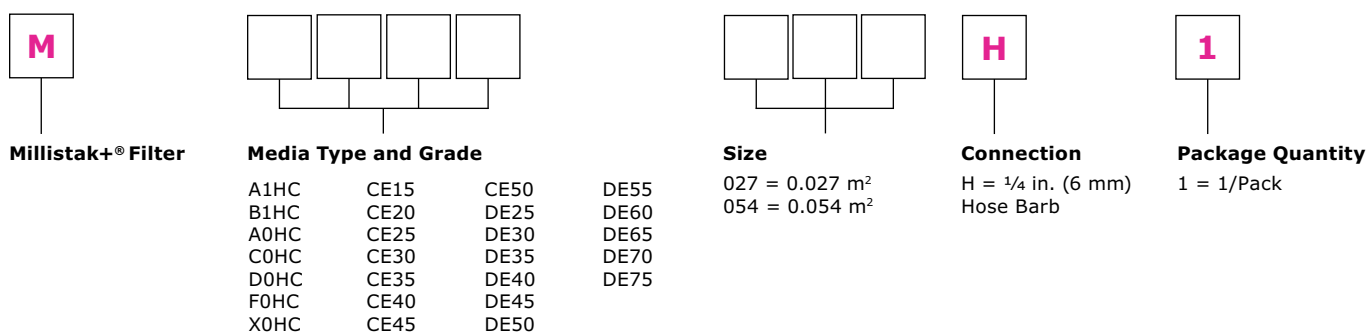


µPod® Filter Accessories

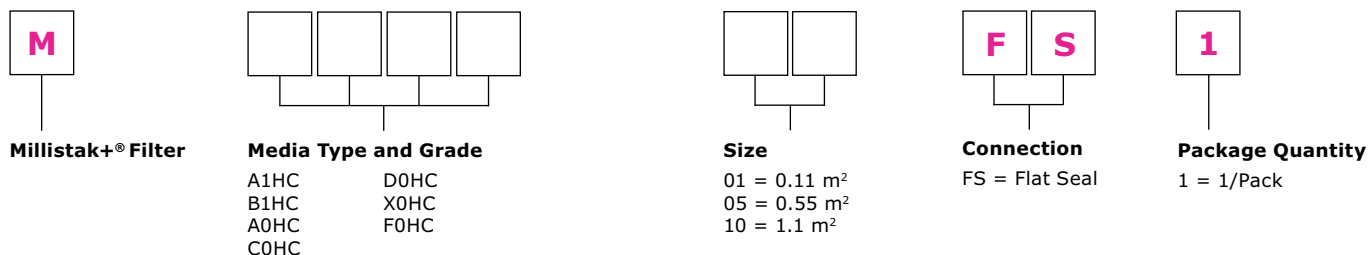
µPod® Tubing Kit	MTUBEKITL1
Gauge 0–60 psi and Connection Fittings	XXPXLGAGE

Millistak+® HC Pod Depth Filters

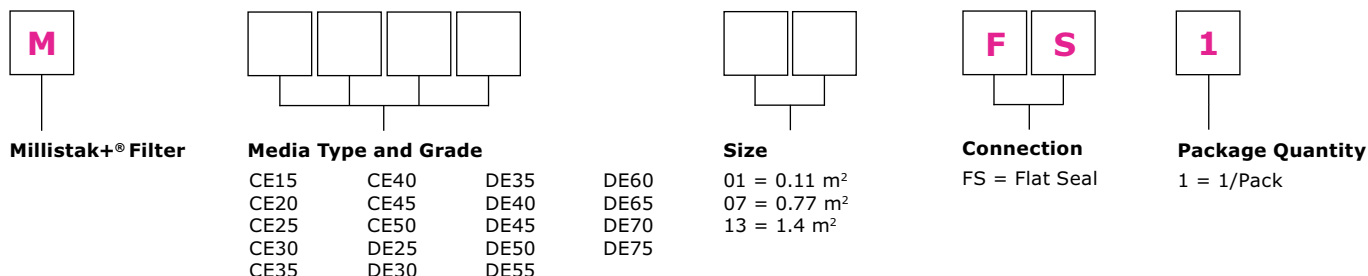
Lab-Scale Pod Filters



Multi-layer Pilot and Process-scale Pod Filters

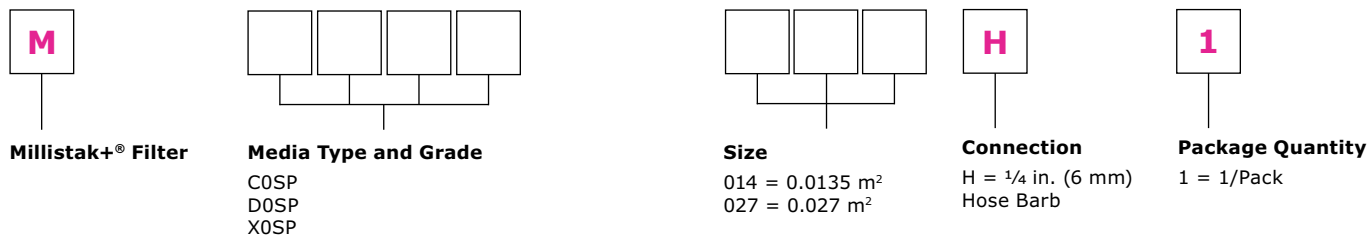


Single-layer Pilot and Process-scale Pod Filters

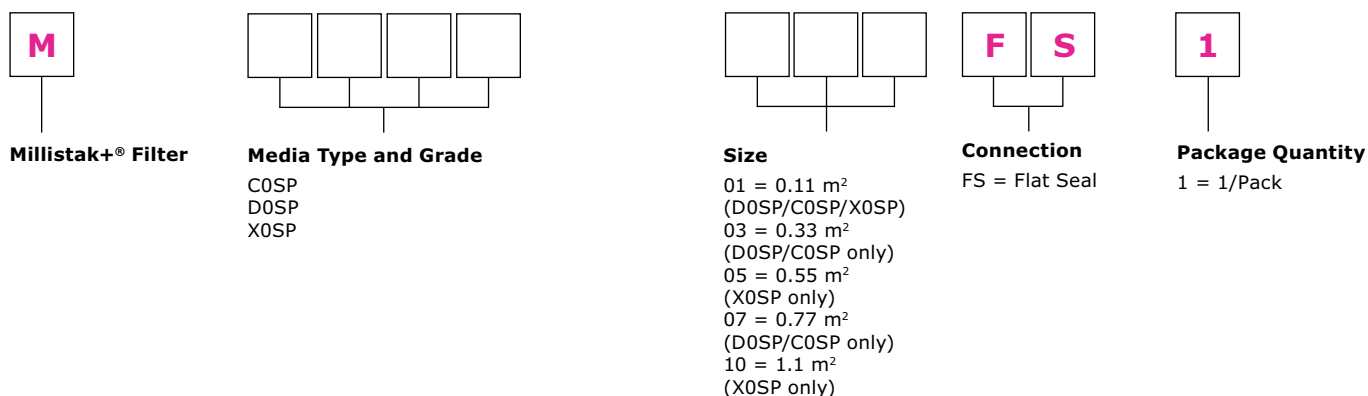


Millistak+® HC Pro Pod Depth Filters

Lab-Scale Pod Filters



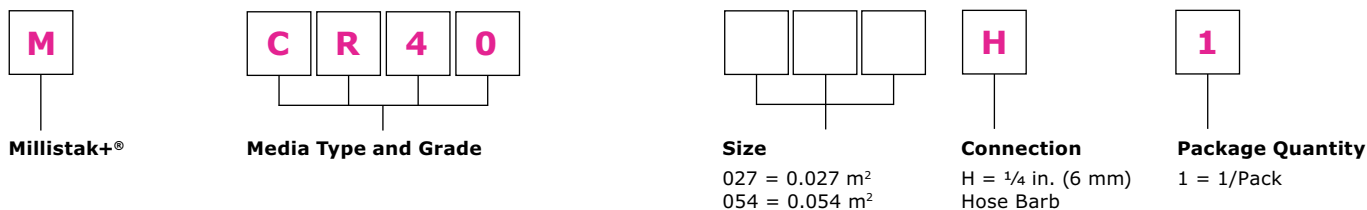
Multi-Layer Process-Scale Pod Filters*



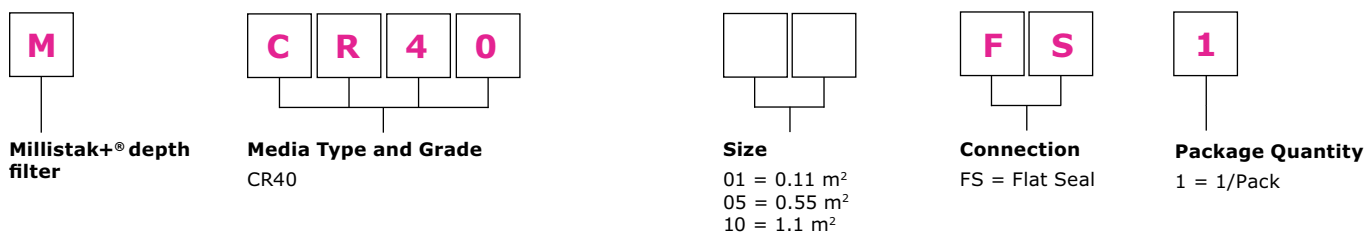
* Note: Pod filters require the use of flow adaptors, which are sold separately (MP0DADAPT or MP0DADPTF). See the Millistak+® Pod disposable depth filter hardware Data Sheet (DS3388EN00) for information on Pod filter holders.

Millistak+® Carbon Pod Depth Filters

Lab-Scale Pod Filters

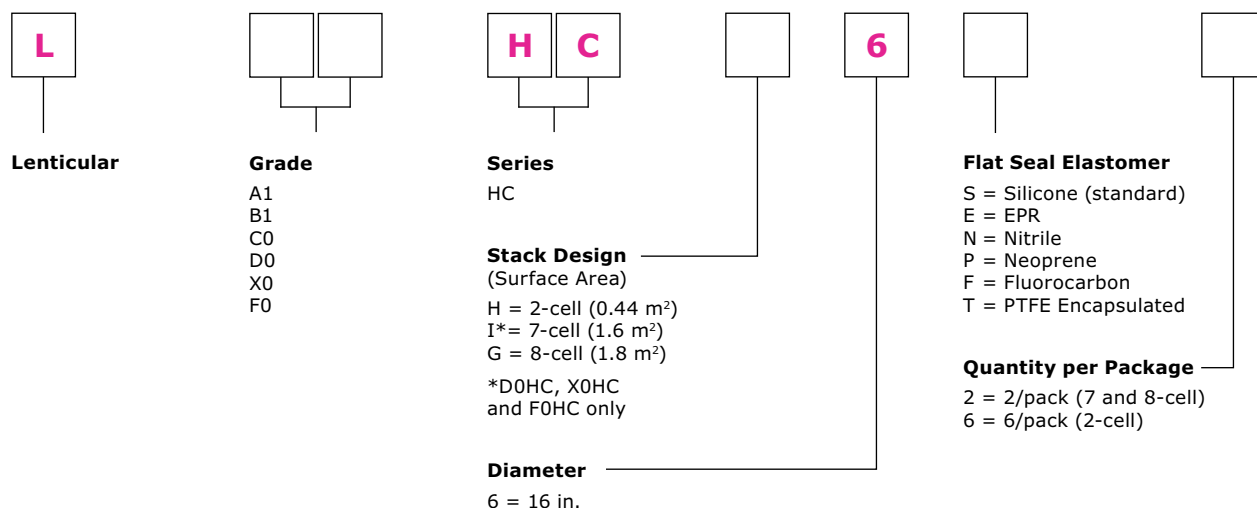


Pilot- and Process-Scale*

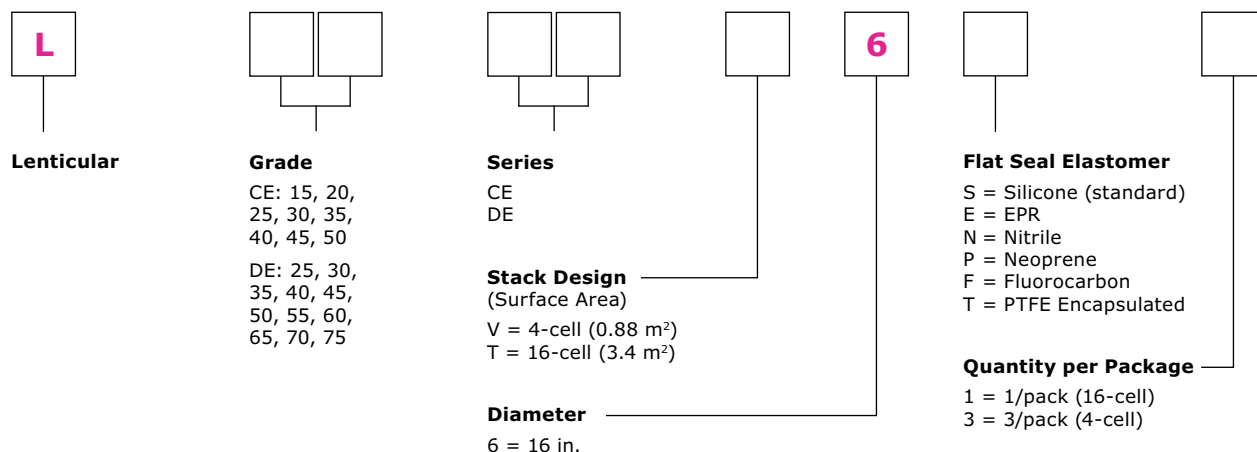


Millistak+® Lenticular Disc Filters

Multi-layer*



Single-layer



* Note: Pod filters require the use of flow adaptors, which are sold separately (MP0DADAPT or MP0DADPTF). See the Millistak+® Pod disposable depth filter hardware Data Sheet (DS3388EN00) for information on Pod filter holders.

Millistak+® Lenticular Housings

Number of Cartridges*	Inlet/Outlet Connections	Cat. No.
CE Marked		
Millistak+® Housings†		
For 12 in. Diameter Millistak+® (DE, CE, A) Cartridges		
1 × 12 in. 13- or 16-cell/6- or 9-cell	1 in. TC, ISO DN32	WM21 SET ET
2 × 12 in. 13- or 16-cell/6- or 9-cell	1 in. TC, ISO DN32	WM22 SET ET
3 × 12 in. 13- or 16-cell (4 × 12 in. 6- or 9-cell)	1 in. TC, ISO DN32	WM23 SET ET
4 × 12 in. 13- or 16-cell (5 × 12 in. 6- or 9-cell)	1 in. TC, ISO DN32	WM24 SET ET
For 16 in. Diameter Millistak+® (DE, CE, A) Cartridges		
1 × 16 in. 16-cell	2 in. TC, ISO DN40	WM61 SFT FT
2 × 16 in. 16-cell (3 × HC 16 in. 8-cell)	2 in. TC, ISO DN40	WM62 SFT FT
3 × 16 in. 16-cell (4 × HC 16 in. 8-cell)	2 in. TC, ISO DN40	WM63 SFT FT
4 × 16 in. 16-cell (6 × HC 16 in. 8-cell)	2 in. TC, ISO DN40	WM64 SFT FT
Millistak+® HC Housings†		
For 16 in. Diameter Millistak+® HC Cartridges		
2 × 16 in. 8-cell (1 × DE, CE, A 16 in. 16-cell)	2 in. TC, ISO DN40	HC62 SFT FT
4 × 16 in. 8-cell (2 × DE, CE, A 16 in. 16-cell)	2 in. TC, ISO DN40	HC64 SFT FT
6 × 16 in. 8-cell (3 × DE, CE, A 16 in. 16-cell)	2 in. TC, ISO DN40	HC66 SFT FT
8 × 16 in. 8-cell (5 × DE, CE, A 16 in. 16-cell)	2 in. TC, ISO DN40	HC68 SFT FT
ASME® Stamped		
Millistak+® Housings†		
For 12 in. Diameter Millistak+® (DE, CE, A) Cartridges		
1 × 12 in. 13- or 16-cell/6- or 9-cell	1 in. TC	UM21 SET ET
2 × 12 in. 13- or 16-cell/6- or 9-cell	1 in. TC	UM22 SET ET
3 × 12 in. 13- or 16-cell/4 × 12 in. 6- or 9-cell	1 in. TC	UM23 SET ET
4 × 12 in. 13- or 16-cell/5 × 12 in. 6- or 9-cell	1 in. TC	UM24 SET ET
For 16 in. Diameter Millistak+® (DE, CE, A) Cartridges		
1 × 16 in. 16-cell	2 in. TC	UM61 SFT FT
2 × 16 in. 16-cell (3 × HC 16 in. 8-cell)	2 in. TC	UM62 SFT FT
3 × 16 in. 16-cell (4 × HC 16 in. 8-cell)	2 in. TC	UM63 SFT FT
4 × 16 in. 16-cell (6 × HC 16 in. 8-cell)	2 in. TC	UM64 SFT FT
Millistak+® HC Housings†		
For 16 in. Diameter Millistak+® HC Cartridges		
2 × 16 in. 8-cell (1 × DE, CE, A 16 in. 16-cell)	2 in. TC	UC62 SFT FT
4 × 16 in. 8-cell (2 × DE, CE, A 16 in. 16-cell)	2 in. TC	UC64 SFT FT
6 × 16 in. 8-cell (3 × DE, CE, A 16 in. 16-cell)	2 in. TC	UC66 SFT FT
8 × 16 in. 8-cell (5 × DE, CE, A 16 in. 16-cell)	2 in. TC	UC68 SFT FT

* Millistak+® Housings are also compatible with many other commercially available lenticular cartridges.

† The compression tool must be ordered separately (Compression kit assembly, Catalogue No.: 1 WM00 CAK 01).

Clarisolve® Depth Filters

<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 10px;">C</div> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 10px;">S</div> <p>Clarisolve® depth filters</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 40px; margin-bottom: 5px;"></div> <p>Feed Particle Size (Nominal) 20 = 20 µm 40 = 40 µm 60 = 60 µm</p> <p>Media Combination M = Mixed H = Homogenous (60 µm only)</p> <p>Media Extractables S = Standard X = Low (60 µm grade only)</p>	<div style="border: 1px solid black; width: 40px; height: 40px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; width: 40px; height: 40px; margin-bottom: 5px;"></div> <p>Filter Surface Area Clarisolve® depth filters in µPod® format 01 = 23 cm² (0.025 ft²)</p> <p>Clarisolve® depth filters in Lab-Scale Pod format 01 = 0.014 m² (0.15 ft²) 02 = 0.027 m² (0.29 ft²)</p> <p>Clarisolve® depth filters in Process-Scale Pod format 01 = 0.11 m² (1.18 ft²) 03 = 0.33 m² (3.55 ft²) 05 = 0.55 m² (5.92 ft²)</p> <p>Connection Clarisolve® depth filters in µPod® format L = Luer Fitting</p> <p>Clarisolve® depth filters in Lab-Scale Pod format H = ¼ in. (6 mm) Hose Barb</p> <p>Clarisolve® depth filters in Process-Scale Pod format F = Flat Seal</p> <p>Quantity per Package Clarisolve® depth filters in µPod® format 3 = 3/pack</p> <p>Clarisolve® depth filters in Lab-Scale Pod format 1 = 1/pack</p> <p>Clarisolve® depth filters in Process-Scale Pod format 1 = 1/pack</p> <p>-X (For process-scale only)</p>
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Flocculation Agents

pDADMAC solution 10% flocculation reagent	100 mL	1.37069.0100
	1 L	1.37069.1000
	10 L	1.37069.9010

Millipore® Validation Services

Quantitation of residual pDADMAC	VSPDADMAC
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Millistak+® and Clarisolve® Pod Holders

Description		Qty/Pk	
Pilot-Scale Holder	For Pod configurations from 1 to 2 filters	1	MP0DPILOT
	For Pod configurations up to 5 filters	1	MP0DPILOTX
Process-Scale Holder	1-rack holder; Gemu® valves	1	MP0DSYS1A
	1-rack holder; ITT valves	1	MP0DSYS1B
	1-rack holder; no valves	1	MP0DSYS1N
	1-rack expansion kit; no valves or casters	1	MP0DSYS1X
	2-rack holder; Gemu® valves	1	MP0DSYS2A
	2-rack holder; ITT valves	1	MP0DSYS2B
	2-rack holder; no valves	1	MP0DSYS2N
	3-rack holder; Gemu® valves	1	MP0DSYS3A
	3-rack holder; ITT valves	1	MP0DSYS3B
	3-rack holder; no valves	1	MP0DSYS3N



Nanopod NP6 filter:

HC – HC Pro (X0):
6 cm²



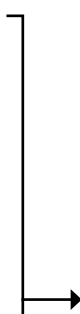
Micro 20:

HC – HC Pro (C0/D0/X0):
20 cm²



µPod® filter:

HC (AD/A1/B1/F0), DE, CE,
Clarisolve®: 23 cm²



Lab-Scale:

HC, CE, DE: 0.027 – 0.054 m²
HC Pro: 0.014 – 0.027 m²
Clarisolve®: 0.014 – 0.027 m²



Pilot-Scale:

HC/X0SP: 0.11 – 0.55 m²
HC Pro C0SP/D0SP: 0.11 – 2.75 m²
Clarisolve®: 0.11 – 1.76 m²
DE or CE: 0.11 – 7 m²



Process-Scale:

HC/X0SP: 5.5 – 33 m²
HC Pro C0SP/D0SP: 5.72 – 17.16 m²
Clarisolve®: 1.76 – 17.16 m²
DE or CE: 7 – 42 m²

The PODs provided in bulk packaging will all be from one catalog item, all from one lot.

Millistak+® improved bulk packaging configuration was tested per the ISTA 3E and Real time ship testing. Devices were then visually inspected, and integrity tested according to the purchase specification. Testing was successful.

Disposable Adapter Kit¹

3 through adapters, 3 blind adapters	MP0DADAPT
6 through adapters, required if using Disposable Diverter Plate (MP0DDIVERTR)	MP0DADPTF

¹ Note: Pod filters require the use of flow adaptors, which are sold separately (MP0DADAPT or MP0DADPTF). See the Millistak+® Pod disposable depth filter hardware data sheet (DS3388EN00) available at sigmaaldrich.com for information on Pod filter holders.

A retrofit kit may be required in order to accommodate the new Clarisolve® depth filters in the Pod pilot- and process-scale holders. Please contact your local sales representative for details.

Optimized Packaging

To improve sustainability of the packaging and shipping of filter products, bulk pack solutions for several grades of Millistak® and Clarisolve® Process Scale Pod filters have been developed to optimize transport and receiving processes as well as to reduce waste.

Bulk packaging configurations include different quantities of pod filters distributed in 3 boxes on one regional standardized pallet size.

The key benefits are:

- 42% average reduction in corrugated packaging material per product.
- 29% decrease in the number of pallets further reducing energy use and emissions.
- 75% reduction in operator time to open and manage the product and packaging.



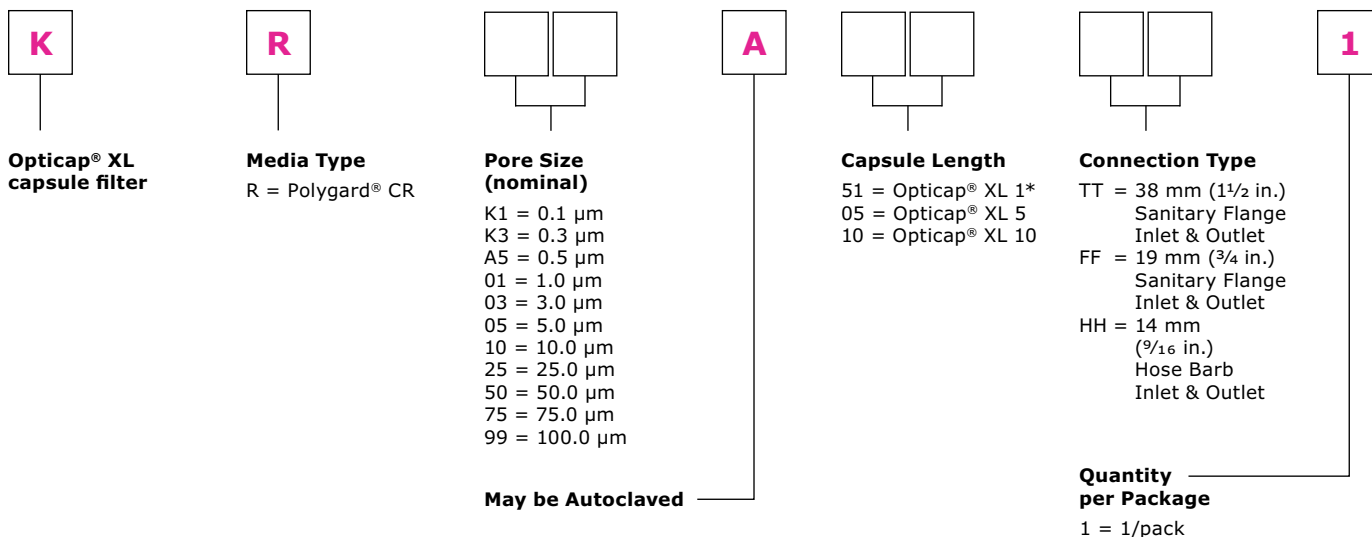
Millistak® and Clarisolve® Bulk Packaging

Description	Item Description	Qty/Pk	
US Pallet format HDPE black Pallet 40" x 48" x 5.9"	Millistak®+ Pod A0HC 1.1 m ²	30	MA0HC10FS30
	Millistak®+ Pod A1HC 1.1 m ²	30	MA1HC10FS30
	Millistak®+ Pod B1HC 1.1 m ²	30	MB1HC10FS30
	Millistak®+ Pod C0HC 1.1 m ²	30	MC0HC10FS30
	Millistak®+ Pod D0HC 1.1 m ²	30	MD0HC10FS30
	Millistak®+ Pod F0HC 1.1 m ²	30	MF0HC10FS30
	Millistak®+ Pod X0HC 1.1 m ²	30	MX0HC10FS30
	Millistak®+ HC Pro Pod C0SP 0.77 m ²	24	MC0SP07FS24
	Millistak®+ HC Pro Pod D0SP 0.77 m ²	24	MD0SP07FS24
	Millistak®+ HC Pro Pod X0SP 1.1 m ²	36	MX0SP10FS36
	Millistak®+ Carbon Pod CR40 1.1 m ²	30	MCR4010FS30
	Clarisolve® Process-Scale Pod 20MS Media 0.55 m ²	24	CS20MS05FS24
	Clarisolve® Process-Scale Pod 40MS Media 0.55 m ²	24	CS40MS05FS24
	Clarisolve® Process-Scale Pod 60HX Media 0.55 m ²	24	CS60HX05FS24
Euro Pallet format EU Modified Heat treated (EU) Wooden CP2 1,200 x 800 mm	Millistak®+ Pod A0HC 1.1 m ²	27	MA0HC10FS27EU
	Millistak®+ Pod A1HC 1.1 m ²	27	MA1HC10FS27EU
	Millistak®+ Pod B1HC 1.1 m ²	27	MB1HC10FS27EU
	Millistak®+ Pod C0HC 1.1 m ²	27	MC0HC10FS27EU
	Millistak®+ Pod D0HC 1.1 m ²	27	MD0HC10FS27EU
	Millistak®+ Pod F0HC 1.1 m ²	27	MF0HC10FS27EU
	Millistak®+ Pod X0HC 1.1 m ²	27	MX0HC10FS27EU
	Millistak®+ Carbon Pod CR40 1.1 m ²	27	MCR4010FS27EU
Asian Pallet format HDPE Pallet 1,100 x 1,100 mm	Millistak®+ HC Pod A1HC 1.1 m ²	36	MA1HC10FS36AS
	Millistak®+ HC Pod B1HC 1.1 m ²	36	MB1HC10FS36AS
	Millistak®+ HC Pod C0HC 1.1 m ²	36	MC0HC10FS36AS
	Millistak®+ HC Pod D0HC 1.1 m ²	36	MD0HC10FS36AS
	Millistak®+ HC Pod F0HC 1.1 m ²	36	MF0HC10FS36AS
	Millistak®+ HC Pod X0HC 1.1 m ²	36	MX0HC10FS36AS
	Millistak®+ HC Pro Pod C0SP 0.77 m ²	24	MC0SP07FS24AS
	Millistak®+ HC Pro Pod D0SP 0.77 m ²	24	MD0SP07FS24AS
	Millistak®+ HC Pro Pod X0SP 1.1 m ²	36	MX0SP10FS36AS
	MMillistak®+ Carbon Pod CR40 1.1 m ²	36	MCR4010FS36AS
	Clarisolve® Process-Scale Pod 20MS Media 0.55 m ²	24	CS20MS05FS24AS
	Clarisolve® Process-Scale Pod 40MS Media 0.55 m ²	24	CS40MS05FS24AS
	Clarisolve® Process-Scale Pod 60HX Media 0.55 m ²	24	CS60HX05FS24AS

The PODs provided in bulk packaging will all be from one catalog item, all from one lot.
All pods are single labelled (inner and outer polybag). Optimized Packaging design has been tested following ISTA 3E standards.

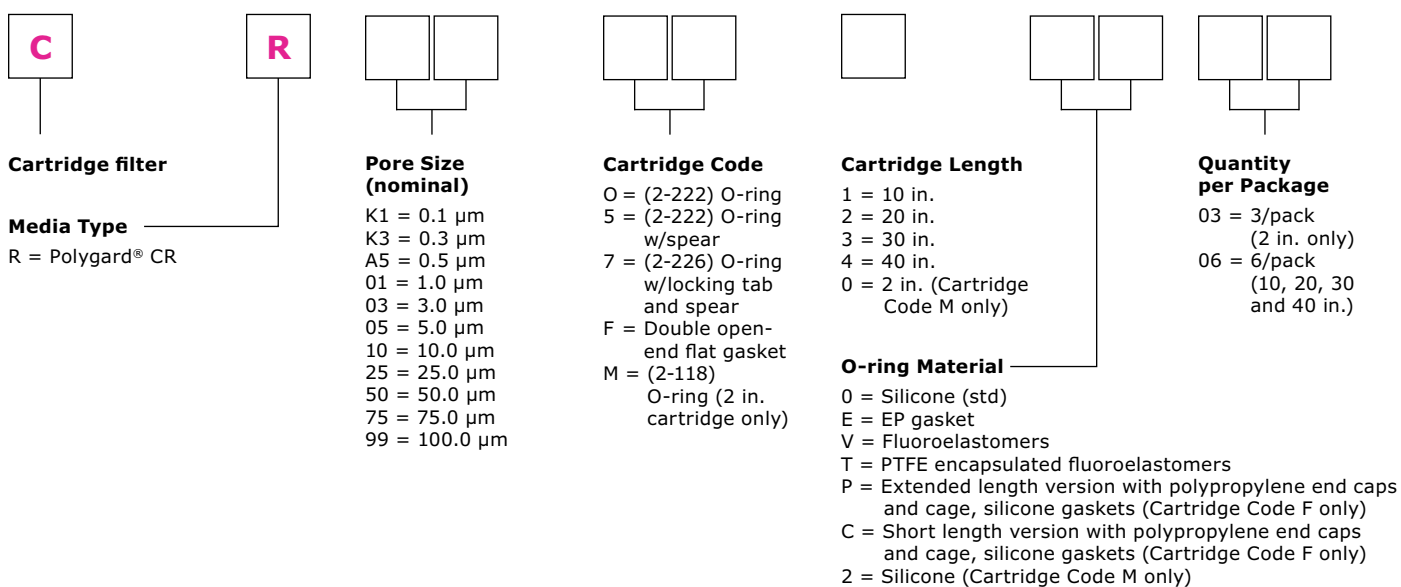
Polygard® CR Filters

Opticap® XL Capsule Filters



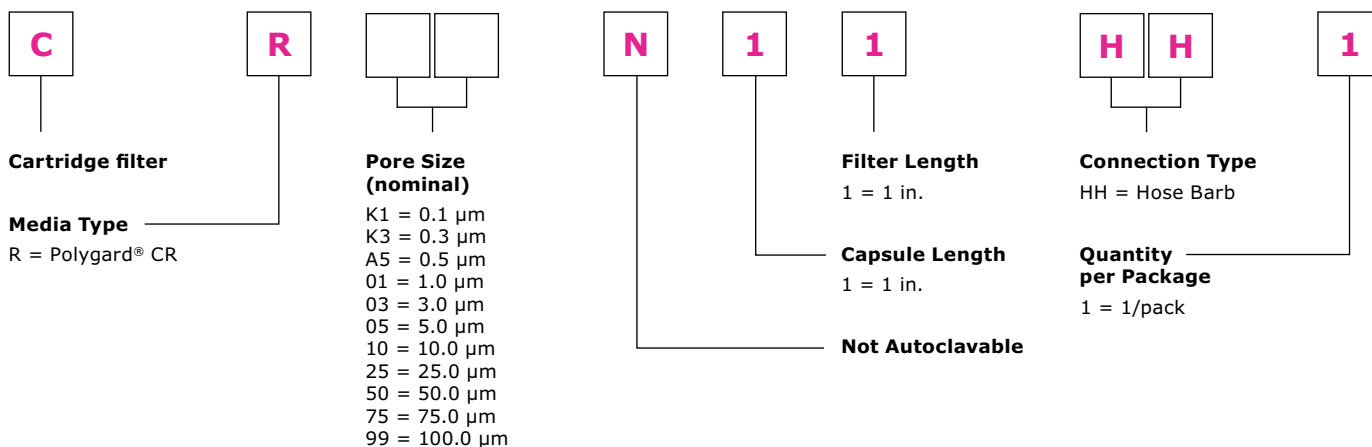
* 1 in. filter element in a 5 in. capsule housing.

Cartridge Filters*



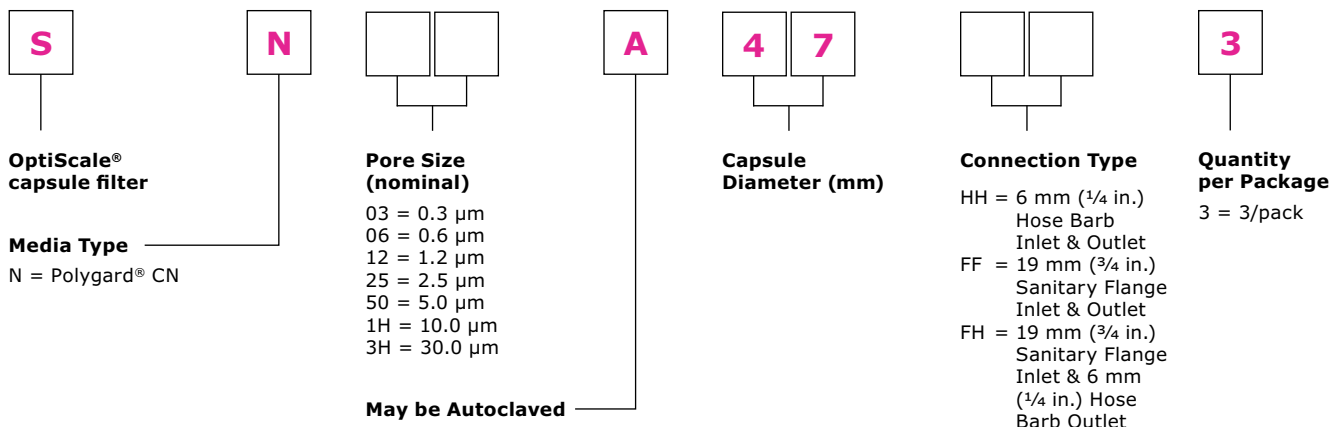
* Not all configurations are available.

Small-scale Capsule Filters

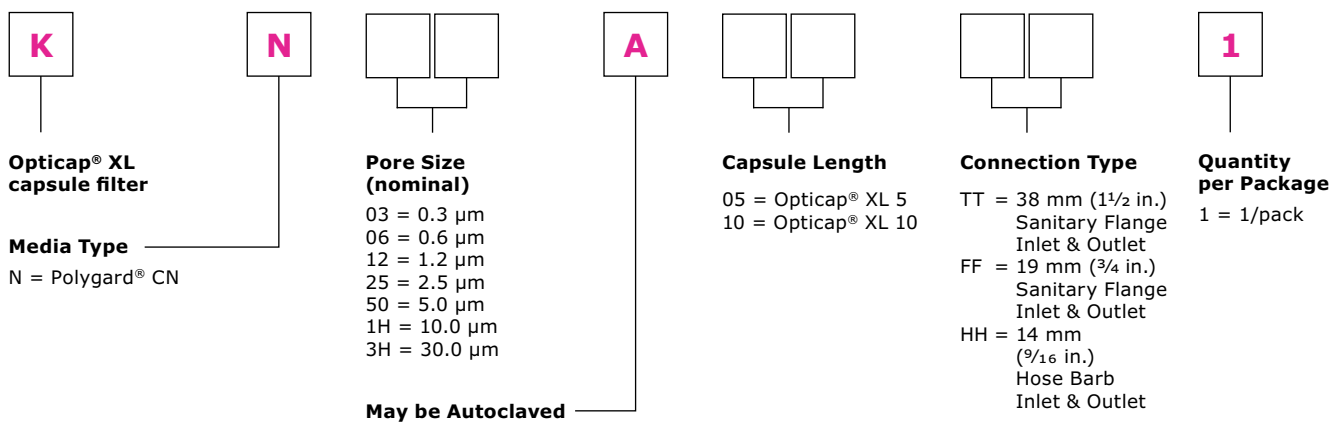


Polygard® CN Filters

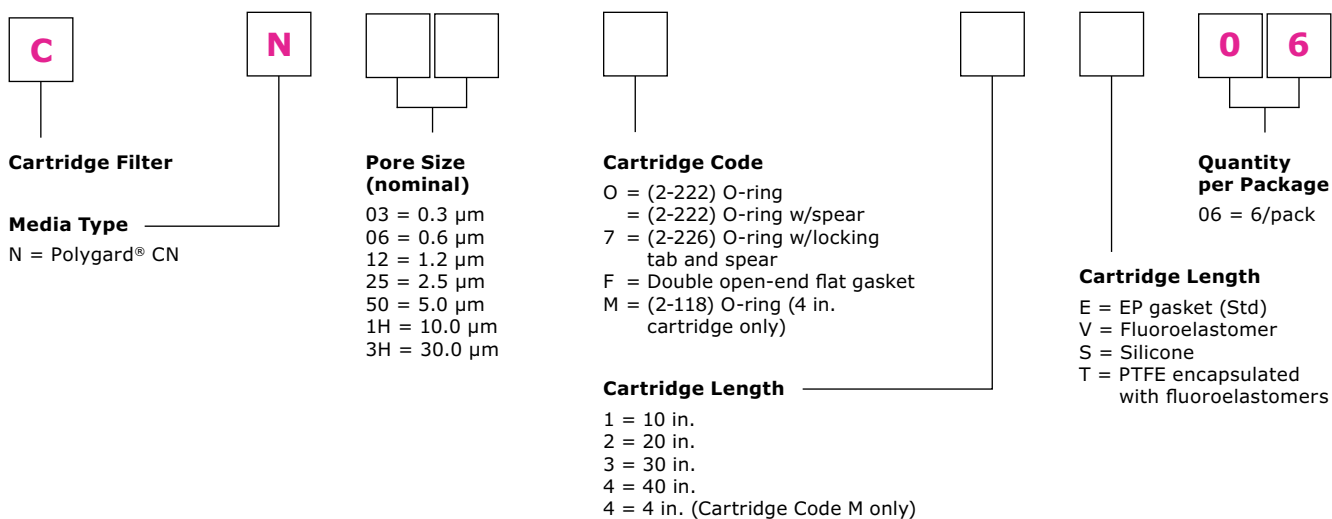
OptiScale® Capsule Filters



Opticap® XL Capsule Filters



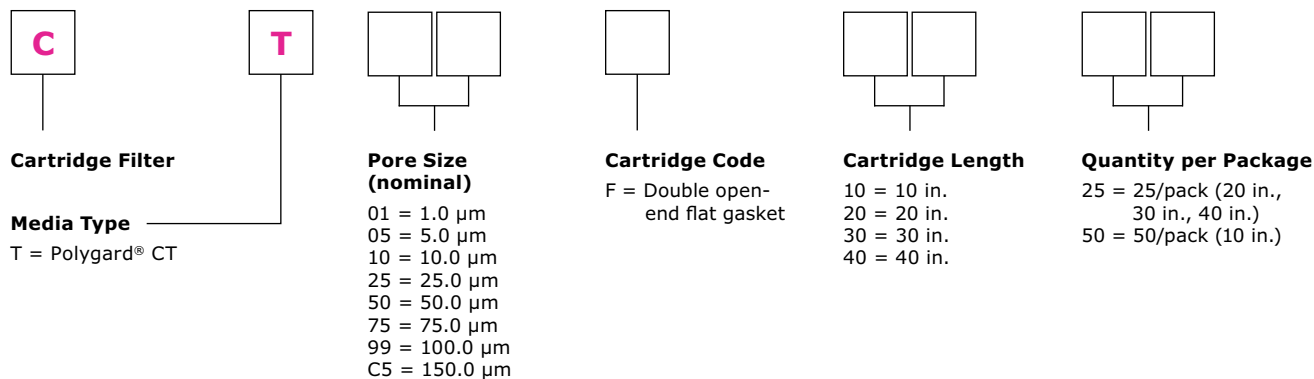
Cartridge Filters*



* Not all configurations are available.

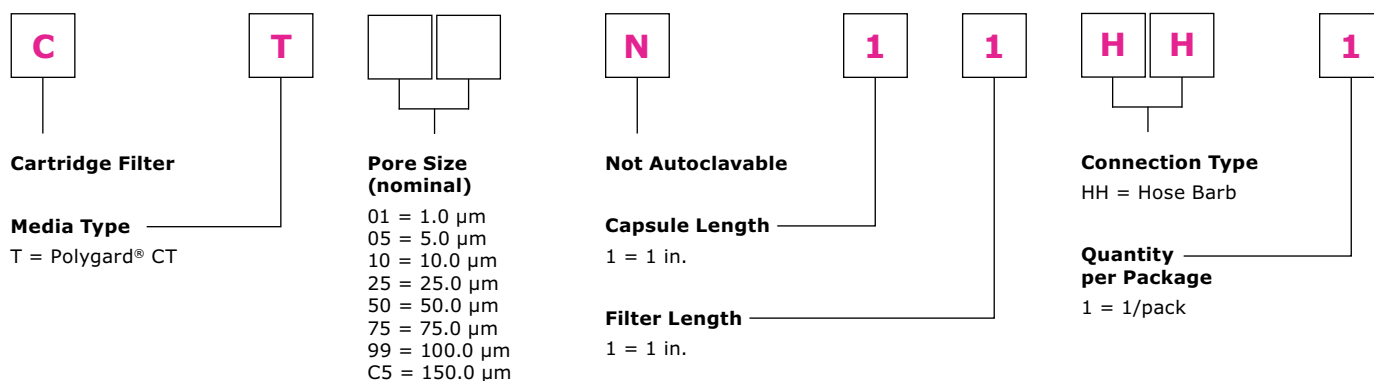
Polygard® CT Filters

Cartridge filters*



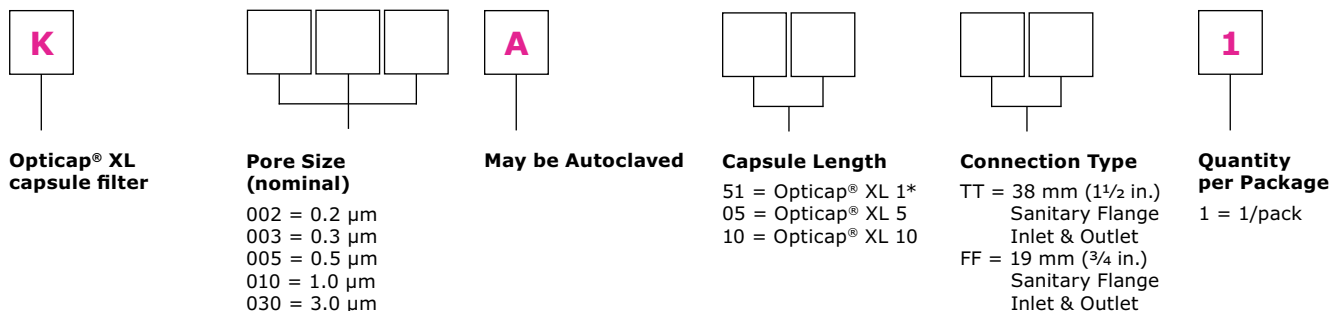
* Not all configurations are available.

Small-scale Capsule Filters



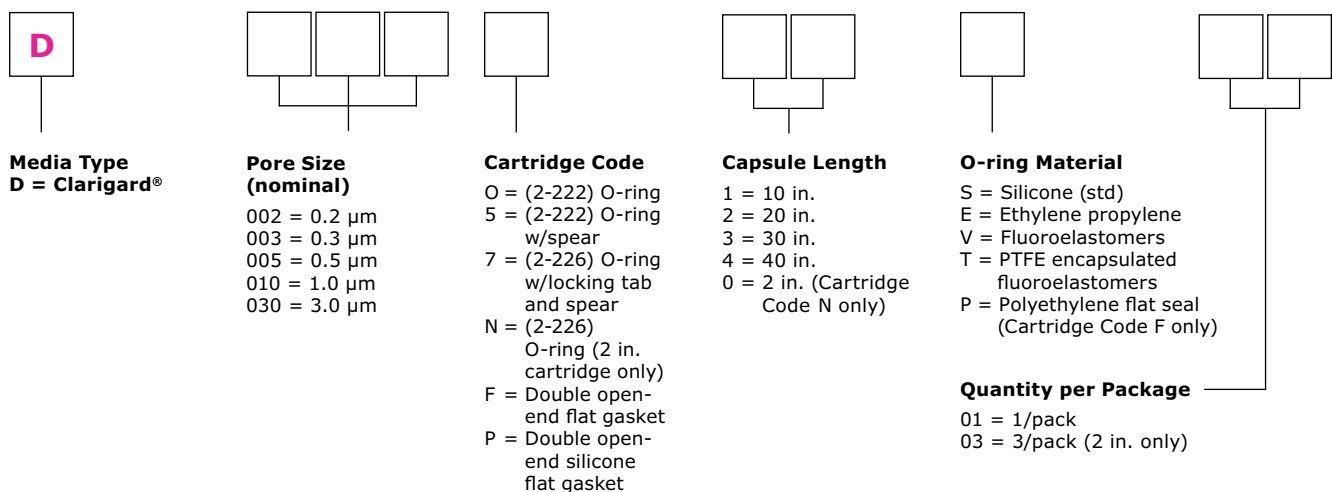
Clarigard® Filters

Opticap® XL Capsule Filters



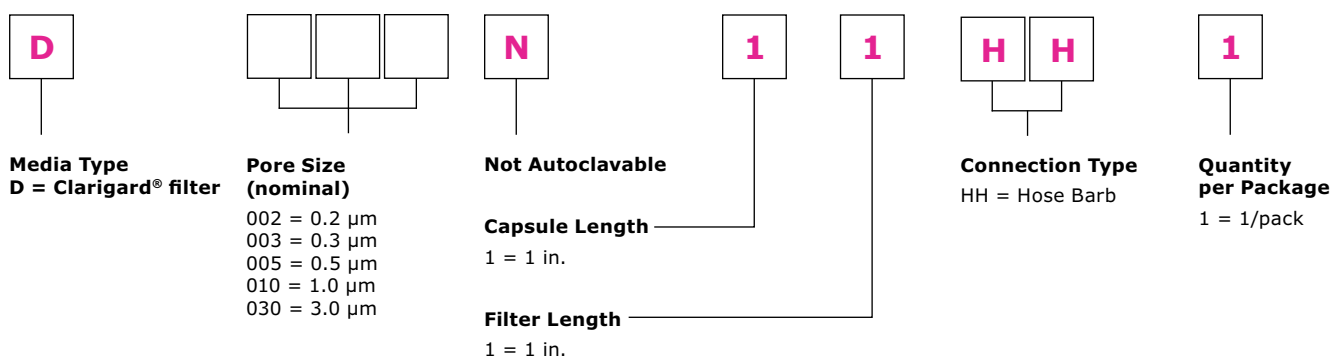
* 1 in. filter element in a 5 in. capsule housing.

Cartridge Filters*



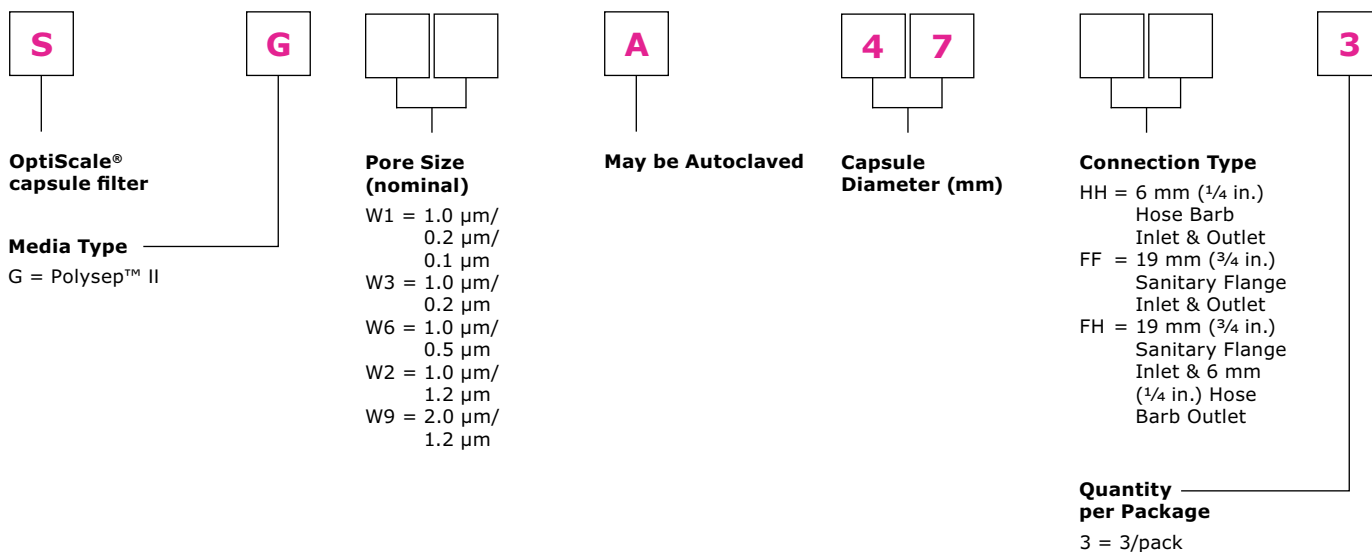
* Not all configurations are available.

Small-scale Capsule Filters

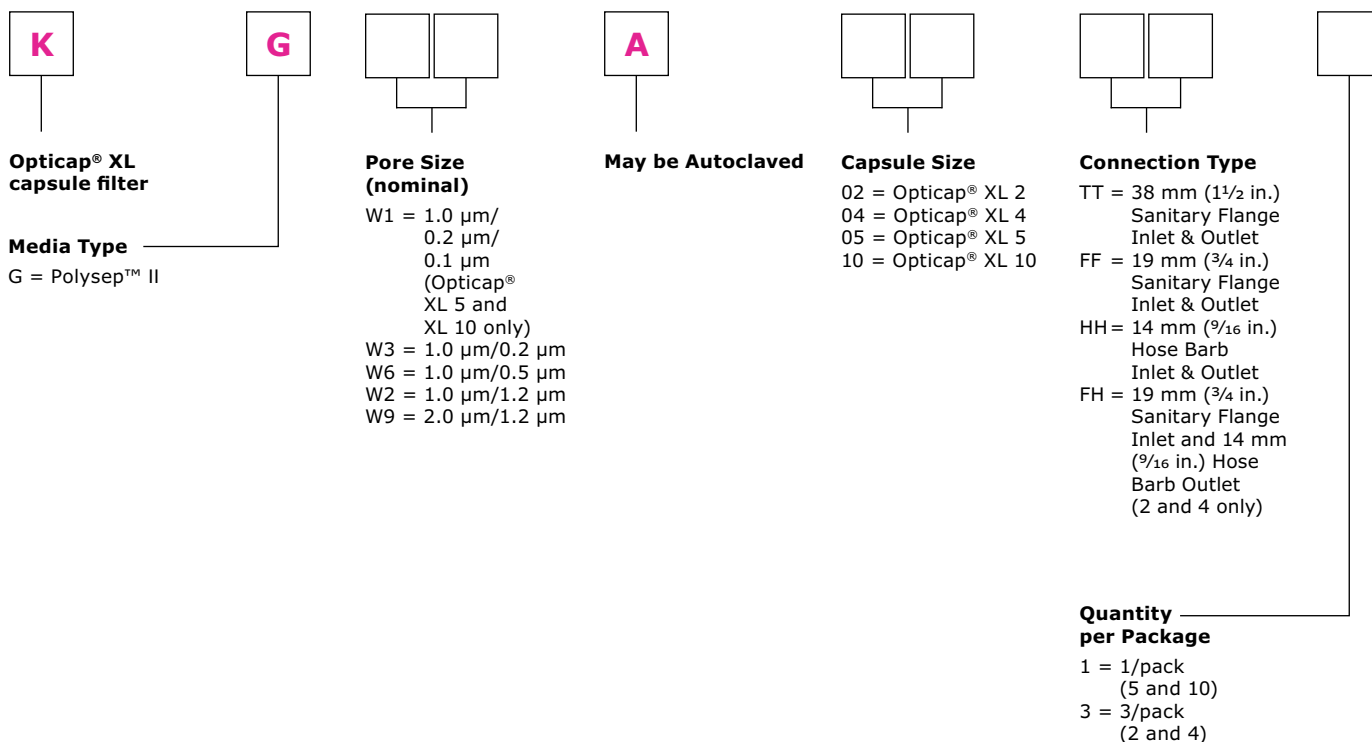


Polysep™ II Filters

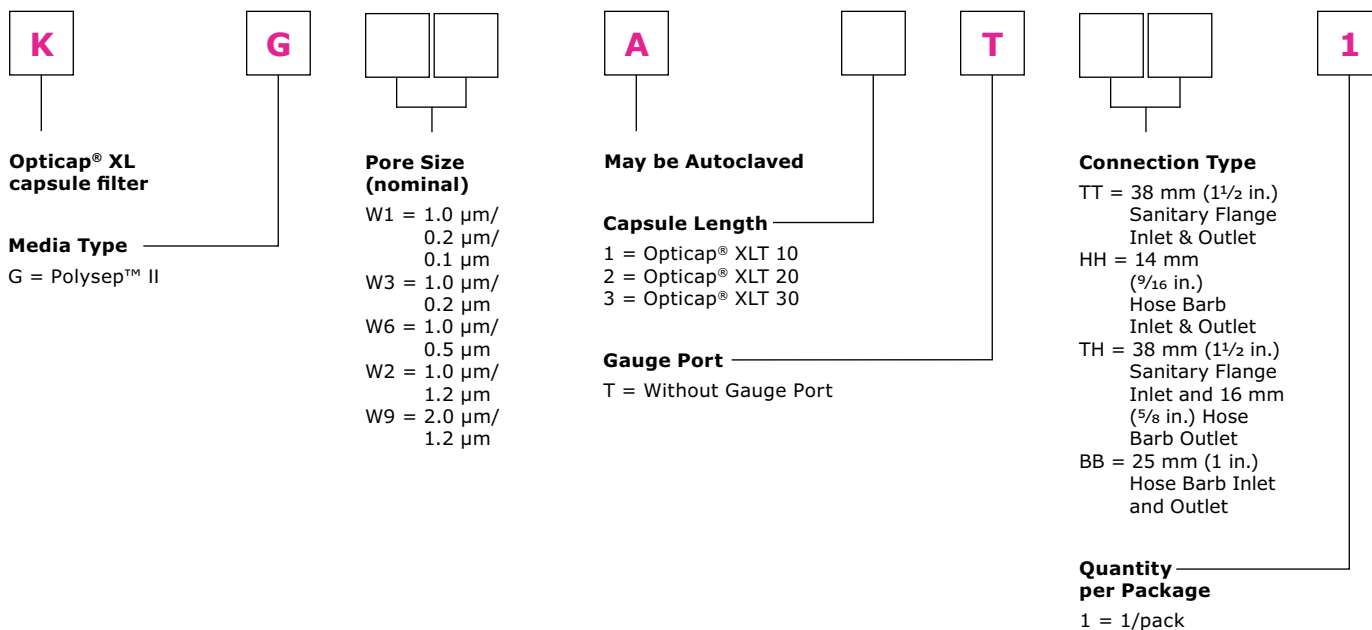
OptiScale® 47 Capsule Filters



Opticap® XL Capsule Filters

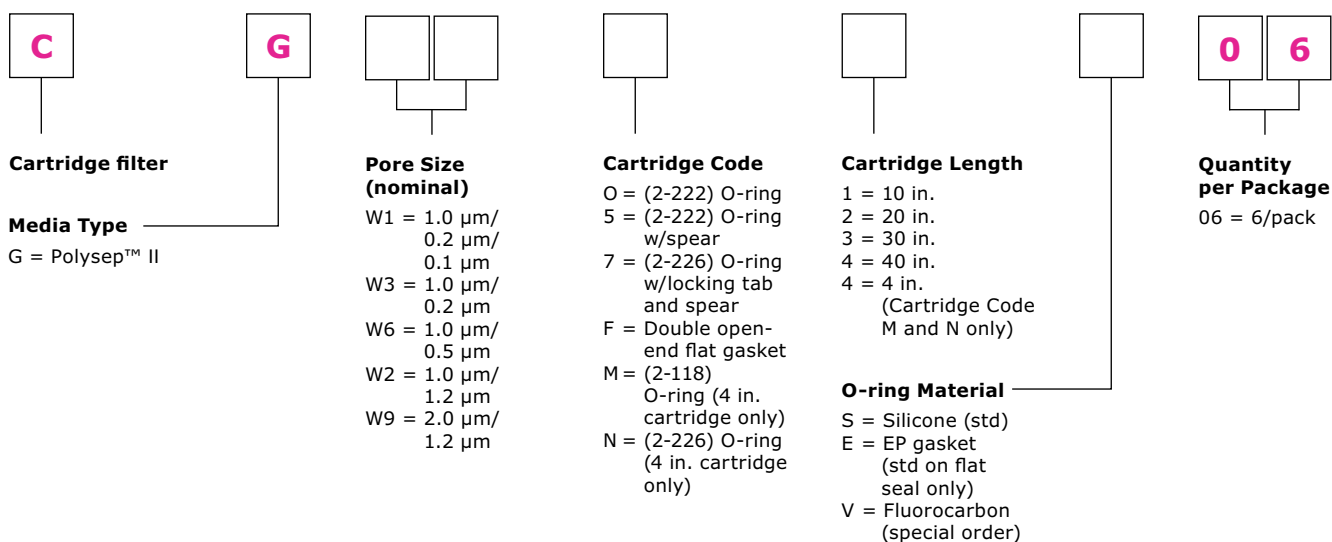


Opticap® XLT Capsule Filters*



* Not all configurations available as standard product.

Cartridge Filters



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