PALL Life Sciences

www.pall.com/lab

Improve Biopurification Processes

Products for Sterile Filtration, Clarification and Separation in the Laboratory

*Filtration. Separation. Solution.*SM

Pall Delivers Improved Purification Technologies for Complex Lab Bioprocessing

With over 50 years of experience supporting the life sciences, Pall understands the critical and ever-changing nature of your work. We have traditionally provided many of the tools used for laboratory bioprocessing applications and currently offer more membrane choices for these applications than any other company. Pall manufactures the highest quality membranes and devices used to sterilize liquid reagents, remove particulate contamination, and clarify solutions prior to further processing. Our quality system represents the most comprehensive and rigorous standard in the ISO 9000 series.

At Pall, our product development teams work to produce familiar products with technically superior performance characteristics, making them convenient and easy-to-use. We also create groundbreaking new products that set the standards for biopurification. We optimize these products for biological, pharmaceutical, and sterilizing filtration requirements from beginning to end.

Our global team of scientists can help you solve complex problems, test and validate products, and provide you with ongoing support even after you purchase our products. We back our products with an extensive library of technical reports, protocols, and validation reports to make your work easier.

Sterile filtration

Sterilization of liquids used during cell culture assures you that media and reagents are not a source of contaminants. Often, heat sterilization is not an option for liquids as it can destroy critical cell culture media components required for normal cell growth. Filtration then becomes the method of choice for sterilizing cell culture media and additives. Pall products are suited for a wide range of sterile filtration applications, allowing you to reduce filtration time, increase throughput, eliminate the need for multiple filter changes, and save in overall filtration costs.

- Acrodisc® syringe filters
- AcroCap™ devices
- VacuCap® devices
- AcroPak™ capsules
- Capsules with HT Tuffryn® membrane

Clarification

Refine and enhance your process involving solutions that are difficult-to-filter by using a prefilter from our wide range of products.

- Acrodisc syringe filters
- Acro 50A devices
- AcroPak capsules
- Capsules with HT Tuffryn membrane
- Versapor® capsules
- Mini Profile® capsules
- Serum capsules
- Polypure® capsules

Venting and gas filtration

Our devices for sterile venting and gas filtration are designed to provide the highest levels of hydrophobicity, the broadest chemical compatibility, and the most versatility with a variety of device sizes and inlet/outlet connections.

- Acro® 37 TF and Acro 50 vent devices
- AcroPak 300 capsules

Protein purification

For larger-scale laboratory separations such as cell harvesting or protein isolation from culture supernatants, turn to tangential flow filtration products from Pall. These products are designed to prevent fouling, enhance flow rates, and result in the highest possible recoveries.

- Minimate™ devices
- Ultrasette™ devices
- LV Centramate™ cassettes
- Centramate cassettes

Membrane chromatography

As a leader in the purification industry, Pall has developed a new range of membrane adsorbers that allow you to purify biomolecules at the molecular level using chromatography techniques. These products exhibit very high dynamic binding capacities at very high flow rates. For the lab bench, we offer Acrodisc units with Mustang® membrane to process endotoxin, nucleic acids, and proteins.

- Acrodisc units with Mustang E membrane
- Products with Mustang Q membrane
- Products with Mustang S membrane

Pall's Broad Selection of Membrane Chemistries Ensures Consistent Performance

Pall manufactures membrane materials with high throughputs and low extractables to produce devices suited for a wide range of applications. Whether you are preparing small volumes of reagents, individual bottles of buffers or media, or developing pharmaceutical processes, we have the products to meet your sterile filtration needs.

We manufacture our membranes to ensure high quality and consistent performance from lot to lot. Our membranes set the standards for sterile filtration and clarification applications in laboratories around the world. It is important to consider your specific application and to match the membrane's unique characteristics for optimal performance to the application.

Filter media selection is easy.

Selecting the proper products starts by selecting the proper membrane. The membrane is the "active" part of the product, or the part of the product that does the work. Understanding the properties of the various membranes will allow you to select the best membrane for your application.

1 Determine if you need hydrophobic or hydrophilic filters

Consider if filter material should be hydrophobic or hydrophilic based on the solution to be filtered.

Hydrophilic Filters

- Possess an affinity for water
- Can be pre-wet with virtually any liquid
- Are preferred for aqueous solutions

Hydrophobic Filters

- Will not allow passage of water
- Best suited for gas filtration, low surface tension solvents, and venting

Hydrophilic or Hydrophobic Characteristics by Media Type

	Versapor® (Acrylic Copolymer)	Nylon	PVDF	PTFE	HT Tuffryn® (Polysulfone)	Supor® (PES)
Hydrophilic	●	●	●	●	●	●
Hydrophobic			●	●		

2 Consider chemical compatibility

Chemical compatibility is defined as the ability of a filter material to resist select chemicals so that the pore structure is not adversely affected by chemical exposure, and the filter material does not shed particles or fibers to add extractables. Temperature, time, concentration, applied pressure, and length of exposure also affect compatibility.

DMSO-safe – Even if all of the other components of your freezing media have been filter sterilized, DMSO can add contaminants that may not be detected until after the cells are removed from storage and thawed. Because DMSO is an aggressive solvent, many commonly used filter materials are unstable in DMSO. The DMSO-Safe Acrodisc® syringe filter can be used to filter sterilize solutions containing DMSO to eliminate surprise contamination upon cell thawing.

3 Choose the right pore size

The filter material's pore size is determined by the diameter of the smallest particle that is to be retained with a defined, high degree of efficiency. Absolute filter ratings have a value associated with a filter that represents the size of the smallest particle completely retained. Below are typical challenge organisms for specific membrane pore sizes.

Absolute-rated Filter Media

(Pore Size)	Challenge Organism
0.1 µm	*Acholeplasma laidlawii*
0.2 µm	*Brevundimonas diminuta*
0.45 µm	*Serratia marcescens*
0.8 µm	*Lactobacillus species*
1 µm	*Candida albicans*

Mycoplasma Reduction – Devices with 0.1 µm pore size have been validated for the reduction of mycoplasma. Using our Supor 0.1 µm membrane is your best assurance that mycoplasma will not be introduced into your cultures by serum or serum-containing media. Pall's 0.1 µm Supor membrane is available in 25 and 32 mm Acrodisc® syringe filters, AcroCap™ devices, VacuCap™ devices, and AcroPak™ capsules.

Prefiltration – The more particulate-laden and/or the higher the protein concentration in a solution, the more difficult it is to filter. These types of liquids may clog filters prematurely and multiple filters may be needed to process single batches, increasing the cost of filtration. The most efficient way to filter these solutions is to choose a filter with a built-in prefilter or a filter with more filtration area (EFA = Effective Filtration Area).

Media Selection	Proteinaceous	General Aqueous	Scaleable Media	Prefiltration	Venting
Supor® membrane (polyethersulfone) – universal Life Sciences membrane, features fast flow rates and low protein binding.	●	●	●	▲	■
HT Tuffryn® membrane (polysulfone) – suitable for dilute-biological fluids.	●	●	■	■	■
Versapor® membrane (acrylic copolymer) – useful for prefiltration.	▲	●	■	●	■
Fluorodyne® II membrane (PVDF) – designed for scale-up and downstream processing.	●	●	●	■	■
Ultipor® membrane (Nylon) – provides broad solvent and chemical compatibility.	■	●	●	■	■
Posidyne® membrane (positively charged nylon) – enhances bioburden and pyrogen removal from aqueous solutions.	■	●	●	■	■
Omega Membrane (modified PES) – available in tangential flow filtration devices	●	●	●	●	■
PTFE Membrane – exceptional chemical and temperature compatibility make this membrane ideal for harsh chemicals that destroy other membrane materials.	■	■	■	■	●
Emflon® II (PVDF) Membrane – hydrophobic PVDF, gamma stable up to 5 mRads	■	■	■	■	●

● Recommended ▲ Suitable ■ Not Recommended

Other parameters to consider.

Extractable materials

Contaminants that elute from the filter media are best prevented by the membrane manufacturer. Pall Life Sciences specifically selects the highest grade of materials and performs rigorous extraction methods on our membrane products to reduce the occurrence of undesired artifacts. Pall Life Sciences filter devices sterilized with gamma irradiation do not exhibit toxic extractables associated with ethylene oxide (EtO) sterilization.

Binding

Membranes may chemically interact with the sample through electrostatic, ionic, covalent, hydrogen bonding or other interactions. Binding can be a desirable or undesirable characteristic depending on the requirements of the application. To minimize protein loss during filtration of proteinaceous solutions, choose our Supor membrane which exhibits low non-specific protein binding.

Sterile Filtration Eliminates Contaminants & Optimizes Bioprocessing

Sterile filtration is a critical application within biotechnology. All too frequently, days or even weeks of cell culture work or large fermentation batches can be lost when bacterial, fungal, or yeast contaminants are unknowingly introduced. Unfortunately, the same nutrient media that is used to grow cell cultures is often ideal for promoting the growth of these contaminants.

Pall manufactures membranes that are used to sterilize liquid reagents, remove particulate contamination, and clarify solutions prior to further processing. These products are optimized for biological, pharmaceutical, and sterilizing filtration requirements, and exhibit superior performance compared to competitive filter devices.

- Reduce filtration time
- Increase throughput
- Reduce the need for multiple filter changes
- Save in overall filtration costs

Delivering Stringent Quality

At Pall, quality and ease of use are engineered into every device. Examples of our stringent quality specifications include:

- **Sterilization by Gamma Irradiation** – Products with Supor®, Fluorodyne® II, Versapor®, and HT Tuffryn® membranes are presterilized by gamma irradiation to eliminate potential cytotoxic residuals associated with EtO sterilization. These presterilized devices are individually packaged for convenience.
- **Biological Safety** – Passes United States Pharmacopeia (USP) Biological Reactivity Test, In Vivo <88>.
- **Non-pyrogenic** – Products are tested for bacterial endotoxin using the Limulus Amoebocyte Lysate (LAL) test to ensure safety.
- **Low Extractables** – Products are optimized to reduce extractables, ensuring that unwanted materials are not introduced into filtered liquids.

Pall offers the widest selection of products to meet your specific sterile filtration needs. Our filtration membranes are available in laboratory device configurations that process volumes from < 5 mL to hundreds of liters. Choose one of our scaleable membranes for easier batch processing at the pilot level. When selecting the appropriate device for your application, consider the following:

Consider filtration volume

Selecting the most appropriate EFA (Effective Filtration Area) will maximize throughput and minimize filter changes. The greater the volume being filtered, the larger the filter diameter you should choose. However, because hold-up volume (fluid retained in the filter) increases with filter diameter, smaller-volume devices should be used for small-volume or expensive samples. The volume recommendations presented in this brochure are intended as a general guide in selecting the most appropriate device.

Throughput, EFA, and Hold-up Relationship

Throughput*	Device	EFA	Hold-up
1 – 10 mL	13 mm Acrodisc syringe filter	1.0 cm^2	< 30 µL
5 – 100 mL	25 mm Acrodisc syringe filter	2.8 cm^2	< 70 µL
20 – 150 mL	32 mm Acrodisc syringe filter	5.8 cm^2	< 100 µL
10 mL – 1 L	AcroCap™ device	15 cm^2	< 2 mL
100 mL – 5 L	AcroPak™ 20 device	20 cm^2	< 2.5 mL
100 mL – 5 L	VacuCap® 60 device	30 cm^2	< 1.2 mL
100 mL – 5 L	VacuCap 90 device	60 cm^2	< 3.4 mL
5 – 25 L	AcroPak 200 capsule	200 cm^2	< 6 mL
10 – 100 L	AcroPak 500 capsule	500 cm^2	< 30 mL
10 – 100 L	AcroPak 1000 capsule	1000 cm^2	< 45 mL
10 – 1500 L	AcroPak 1500 capsule	1500 cm^2	n/a

** Total throughput (capacity) of a filter depends on the characteristics of the fluid being filtered, such as the extent of microbial contamination, viscosity, and particulate load.*

Consider fluid characteristics

The characteristics of the fluid being filtered are extremely important when evaluating the membrane to be used for filtration.

Chemical Compatibility
- Aqueous solvent
- Organic solvent

Fluid Contamination
- Particulate load
- Particulate size

Proteinaceous Solution
- Concentration
- Diafiltration
- Fractionation

Consider process scale up

For process development applications, choose products from Pall's UpScale℠ program.

Pall's UpScale program helps shorten development time by providing products with the same media and consistent materials of construction for all phases of development, from R&D to pilot to full-scale production. Pall's range of scaleable products provides consistent, reproducible, and predictable results regardless of scale. You can reduce evaluation bottlenecks and free up resources to concentrate on process optimization or other research. Our separation and filtration products will meet your needs at the laboratory level and as you move into production.

The UpScale program includes the most comprehensive range of scaleable products for direct flow filtration (syringe filters, assemblies, capsules, cartridges), tangential flow filtration (benchtop tangential flow systems and cassette filtration systems) and chromatography (syringe units, multi-well plates, capsules, and cartridges). Only Pall can offer such a wide variety of membranes and assemblies that truly scale up from the lab bench to the production line, supporting your need to bring new products to market faster.

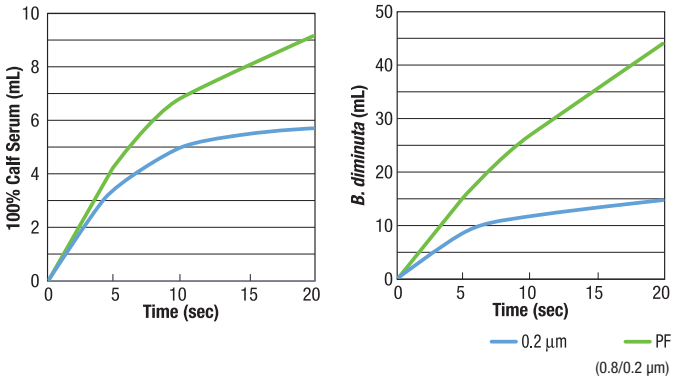
Sterile Acrodisc® Syringe Filters for Maximum Versatility in Small-volume Sterilization

Introduced over 30 years ago, the Acrodisc syringe filter was the first commercially available syringe filter. Today, Pall's Acrodisc brand continues to set industry standards for quality membranes and reproducible device performance in a multitude of sample preparation applications. We have continued to expand and improve our Acrodisc product specifications to meet the demanding and extensive requirements of our customers' sterile applications.

Our syringe filters are designed for versatility and convenience. All sterile Acrodisc syringe filters are individually packaged in blister packs and sterilized using gamma irradiation to eliminate potential for harmful extractables common with other sterilization methods such as EtO. For sterilization of media used for cell cryopreservation, we offer DMSO-Safe Acrodisc syringe filters that necessarily undergo EtO sterilization.

Acrodisc PF syringe filters with a built-in 0.8/0.2 µm prefilter will make it easier for you to filter particulate-laden solutions.

Built-in Prefilter Enhances Throughput of Particulate-laden or Proteinaceous Solutions



Acrodisc and Acrodisc PF syringe filters with 0.2 µm Supor membrane were challenged with bovine serum or a bacterial culture (10^7 cfu/mL) at a constant pressure of 1.4 bar (140 kPa, 20 psi).

Process development applications

For process development applications, choose from our line of 0.2 µm, 25 mm scaleable Acrodisc syringe filters in a versatile array of membrane types. These devices are bacterial retention tested to ensure sterile filtrate and can be integrity tested through use of water bubble point method. The filters have a polypropylene housing for greater chemical compatibility.

Reference material

Sterile Acrodisc Syringe Filter Data Sheet, PN 33175

Small-volume sterilization

For maximum versatility in small-volume sterilization, Pall Life Sciences offers non-scaleable Acrodisc syringe filters in an amazing array of configurations to optimize your application. Device sizes from 13 to 37 mm process volumes from < 5 to 150 mL. Pore sizes are offered from 0.1 to 5 µm to sterilize solutions containing a broad range of contaminants, as well as handle difficult prefiltration requirements. These filters have a modified acrylic housing typically used in aqueous solutions.

	Filter Formats	Sample Size	Hold-up Volume *(with air purge)*	Membrane Type: Supor® *(PES)*	HT Tuffryn® *(polysulfone)*	Versapor® *(acrylic copolymer)*	Fluorodyne® II *(hydrophilic PVDF)*	Ultipor® *(Nylon 6,6)*	Posidyne® *(positively charged Nylon 6, 6)*	Nylon
	**13 mm Acrodisc Syringe Filter** Ideal for small volume filtration to minimize sample hold-up volume.	< 10 mL	< 30 µL	Y 0.2*, 0.45*, 0.8* µm	Y 0.2* µm	–	–	–	–	–
	**25 mm Acrodisc Syringe Filter** Multiple membrane selections for optimizing your sterile filtration application. A variety of pore sizes available for other general aqueous samples, prefiltration and clarification.	< 100 mL	< 70 µL	Y 0.1, 0.2, 0.8/0.2*, 0.45, 0.8 µm	Y 0.2, 0.45 µm	Y 0.8, 1.2, 5 µm	Y 0.2* µm	Y 0.2* µm	Y 0.2* µm	–
	**25 mm DMSO-Safe Acrodisc Syringe Filter** Polypropylene housing and nylon membrane are compatible with solutions containing DMSO.	< 100 mL	< 70 µL	–	–	–	–	–	–	Y 0.2* µm
	**32 mm Acrodisc Syringe Filter** Larger membrane area to increase sample throughput using a single filter.	< 150 mL	< 100 µL	Y 0.1, 0.2, 0.8/0.2, 0.45, 0.8, 1.2, 5 µm	–	–	–	–	–	–
	**37 mm Serum Acrodisc Syringe Filter** Ideal for serum and heavily particulate-laden solutions.	< 150 mL	< 100 µL	Y GF/0.2 µm (ABS housing)	–	–	–	–	–	–

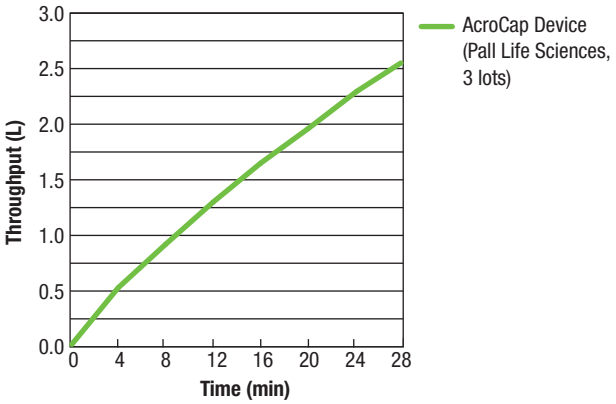
** Available in polypropylene housing.*

Fast, Efficient Processing for Volumes from 100 Milliliters to 5 Liter Volumes

AcroCap® devices for fast, positive-pressure filtration of aqueous solutions

- Designed for filtration of up to 3 liters of serum-free cell culture media, media additives, and other aqueous solutions
- AcroCap devices are ideal for sterilization of solutions that tend to foam when filtered under vacuum
- An integral hydrophobic vent prevents air lock and maximizes use of entire filter area
- These disposable devices are compatible with most positive pressure systems
- 0.1 µm device available to reduce mycoplasma

Throughput of AcroCap Devices with Basal Medium Eagle with 10% Fetal Bovine Serum



Acro® 50A devices have double the throughput of standard 47 mm filter holders

- Acro 50 A devices have a higher filtration capacity than standard-sized syringe filters
- The easy-to-use design makes them ideal for positive pressure filtration systems
- For smaller volumes, Acro 50A devices can be used with syringes, including repeating syringes
- Available with HT Tuffryn® membrane with a built in prefilter and Versapor® membrane downstream of a glass fiber prefilter

AcroPak™ 20 devices for efficient-processing of liquid volumes up to 5 liters

- AcroPak 20 filters feature an upstream air vent that prevents vapor lock
- AcroPak 20 filters are designed for sterile filtration of supplemented culture media and other difficult-to-filter liquids, buffers, water, and chemicals
- Use with a syringe with the female luer slip inside the hose barb, a pressure vessel, or a peristaltic pump
- Positive pressure filtration device

VacuCap® & VacuCap PF vacuum filtration devices for fast filtration of 100 mL to 5 L of aqueous solution

- The patented design of these versatile vacuum filters allows you to choose your own mixing vessel and filtrate container for laboratory sterilization or clarification of cell culture media, buffers, and other aqueous solutions
- To minimize transfer steps, the VacuCap filter draws directly from the mixing reservoir and filters directly into the desired container
- Supor® membrane provides fast flow rates
- Its small size reduces storage space and minimizes laboratory plastic waste
- VacuCap PF device with prefilter is designed to enhance throughput
- 0.1 µm devices available to reduce mycoplasma

Basic procedure

1. Connect the feed tubing to the "INLET" on the VacuCap® device.

2. Connect the vacuum tubing to the VacuCap device.

3. Start the vacuum. The VacuCap device will seal securely to the container top and fluid will be drawn.

4. When full, move VacuCap device to next container and continue filtration.

Reduce Your Filtration Costs with AcroPak™ Capsules

Enhanced throughput of larger volumes

Scaleable AcroPak products are designed to meet the sterilizing filtration requirements of users processing a wide variety of laboratory solutions. These products handle volumes from 10 milliliters to 150 liters and are designed with identical materials of construction as large volume devices for full-scale production, making them ideal for process development. As filtration volume increases, users benefit from consistent product performance throughout the product line. All capsules are sterilized using gamma irradiation.

AcroPak 200 capsules

- Great choice for high flow rate or high throughput sterile processing of volumes up to 20 liters of media and buffers
- Capsules are manufactured without the use of adhesives to minimize extractables
- Upstream air vent prevents vapor lock
- Designed to sterile filter supplemented culture media and other difficult-to-filter liquids, buffers, water, and chemicals
- Membranes exhibit low protein binding to minimize sample loss during filtration
- Provides fast processing of clean batches
- 100% integrity tested during the manufacturing process

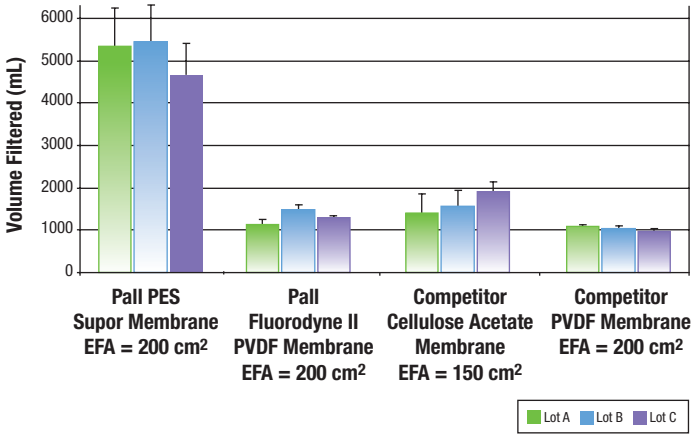
AcroPak™ 500/1000/1500 capsules with Supor® membrane

- For large volume media preparation that requires low protein binding
- Quickly processes difficult-to-filter solutions such as serum or particulate-laden solutions
- A built-in prefilter extends filter life
- Supor membrane has very high flow rates and consistently higher total solution throughputs
- Capsules with Supor membrane are ideal in situations where rapid filtration or short processing times are essential and where low protein binding is required
- Manufactured without adhesives to minimize extractables
- Upstream air vents prevent vapor lock
- Ideal for sterile filtration of media, buffers, and biological solutions
- Lower cost per liter filtered than similar size competitive filters
- Convenient for pilot-scale manufacturing
- 100% integrity tested during the manufacturing process

AcroPak 400/800 capsules with Fluorodyne® II membrane

- Select AcroPak capsules with Fluorodyne II membrane for scale-up and downstream processing applications for biopharmaceutical production
- Suitable for applications where protocol requires PVDF membrane
- Use with fluids containing dilute proteins, preservatives, or other critical components
- Compatible with aqueous and many organic solvents
- 100% integrity tested during the manufacturing process

Total Throughput Using 3% Tryptic Soy Broth (TSB)



A 3% tryptic soy broth solution was filtered at 5 psi. Error bars indicate standard deviation for three samples tested within each lot.

Reference material

AcroPak Product Family Data Sheet, PN 33350

Vacushield™ vent devices should be used between pump and receiving vessels to protect the valve and pump components from damage by aqueous solutions. This will prolong the life of the pump.

"Vacuum lines shall be protected with liquid disinfectant traps and high-efficiency particulate air (HEPA) filters or filters of equivalent or superior efficiency and which are checked routinely and maintained or replaced as necessary." OSHA regulation 29 CFR part 1910.1030 for blood-borne pathogens.

Vent Filters Protect Your Cell Culture and Your Lab Environment

For the safety of lab technicians, sensitive equipment and cell culture solutions, always use a vent filter. Pall offers self-contained, compact filter devices for high efficiency removal of airborne and particulate contamination under dry or moist conditions. These devices contain hydrophobic membranes that prevent moisture or aerosolized contaminants from escaping into the environment and harming equipment or personnel. Vent devices enable air to enter vessels such as bioreactors while maintaining the sterility of the interior environment and protecting valuable solutions. Vent filters also ensure added equipment protection during the delivery of house air or gas pressure.

Use Vent Filters for:

- Bioreactors
- Fermentation tanks
- Isolation or environmental chambers
- Receiving vessels
- Carboys
- Other small containers
- Particulate free air/gas delivery

Important considerations when selecting a gas or vent filter include air flow rate and particulate or microorganism retention. The media in the filter must provide sufficient surface area or open space to accommodate the air flow required by the system. The filter should also efficiently retain particles and aerosol droplets. Use in-line for low-pressure sterile air/gas delivery to instruments and culture vessels, bio-isolation of a vacuum source, flushing instruments, and cleaning parts.

Venting filter selection guide

	Product	Typical Air Flow Rate	Pore Size	Effective Filtration Area
	**Acro® 37 TF Vent Devices with PTFE Membrane** • Ideal for small-volume venting, solvent and gas filtration • Broad chemical compatibility • Economical; available in bulk packaging	3.58 L/min at 0.2 bar (20 kPa, 3 psi)	0.2 µm	7.5 cm^2
	**Bacterial Air Vents with Glass Laminate** • Hydrophobic, glass laminate media prevents the passage of aerosols • Economical, with high air flow rates • High pressure rating ensures product integrity during pressure surges	40 L/min at 0.4 bar (40 kPa, 5.5 psi)	1 µm (nominal)	7.5 cm^2
	**Acro 50 Vent Devices with Emflon® II Membrane** • Made with proprietary, low pressure drop hyrophobic PVDF membrane • Stable up to 50 kGy gamma irradiation • Light weight (< 27 grams) prevents crimping of tubing • Available 100% integrity tested	27 L/min at 1 bar (100 kPa, 15 psi)	0.2 µm	20 cm^2
	**Acro 50 Vent Devices with PTFE Membrane** • Available in a variety of inlet/outlet connections and pore sizes to best match your application requirements • Industry standard for venting bioreactors and fermentors • Broad chemical compatibility	L/min at 0.2 bar (20 kPa, 3 psi): - 0.2 µm: 8 - 0.45 µm:12 - 1 µm: 15	0.2 µm, 0.45 µm, 1 µm	19.6 cm^2
	**AcroPak™ 300 Capsule with PTFE Membrane** • Large EFA gives high air flow rates • 100% integrity tested • Broad chemical compatibility	32 L/min at 0.07 bar (7 kPa, 1 psi)	0.2 µm	300 cm^2
	**Vacushield™ Vent Device** • Features 0.45 µm hydrophobic PTFE membrane • Allows air and gases to pass through freely while blocking aqueous solutions and aerosol contaminants • Highly effective retention of bacteria with minimal restriction of pump performance • Meets OSHA regulations for protection of vacuum lines (29 CFR Part 1910.1030 for bloodborne pathogens)	8 L/min at 0.1 bar (10 kPa, 2 psi)	0.45 µm	19.6 cm^2

Clarify Solutions to Extend Final Filter Life, Improve Visual Appearance, and Protect Your Product

The right prefilter can improve throughput and extend the life of your final sterilizing filters, especially when working with highly particulate-laden solutions. Whether you want to remove particulate for visual appearance, protect your food and beverage product from spoilage organisms, remove suspended solids prior to analytical testing, or remove coarse materials such as cell debris, Pall can supply a filter for you application.

When prefiltration is needed, matching the proper filter media to the application is critical. Pall offers the broadest range of filtration and separation media to assure the best fit for your needs.

Products with HT Tuffryn® membrane are cell culture certified

Capsules and syringe filters with HT Tuffryn membrane are ideal for filtration of batches ranging from 10 milliliters to 20 liters for the sterilization of buffers and cell culture media.

The Micro Culture, Culture, and Maxi Culture capsules are all cell culture certified.

- Double-layer membrane design ensures reliable bacterial retention
- A built-in vent eliminates trapped air bubbles, resulting in accurate fills and uniform flow

Products with Versapor® membrane for prefiltration

Capsules and syringe filters with Versapor membrane are optimized for prefiltration of particulate-laden liquids (such as serum) prior to final sterilizing filtration. They are also useful for removing debris and particulate from liquids or buffers not requiring terminal sterilization.

- Reliable particle retention in prefiltration and non-critical final filtration

Ideal for applications with biological fluids

Mini Profile® capsules for small volume production and scale-up evaluation

Mini Profile Capsule filters have been designed for small-volume production and scale-up evaluation. These scaleable capsule filters are available in two media types and complement and extend the range of depth filters available in the Pall UpScale™ program. They can be used for a wide range of applications including clarification of biological products.

Profile® II filters for larger solids and gels

Pall Profile II filters are all-polypropylene depth filter elements, featuring tapered pores that narrow to an inner (downstream) absolute rated section of 0.5 or 1 µm. This thick depth structure provides high capacity for larger solids and gels as well as for fine particles.

Profile Star filters offer high capacity for viscous solutions

Profile Star filter cartridges feature high area star-shaped pleat construction. The patented design combines the advantages of thick depth filters with those of traditional high area pleated filters. Available in 1.5, 3, and 5 µm.

- Capsule format for ease of use
- Can be used in scale-up evaluation
- Broad chemical compatibilities
- Low extractables and low protein binding

Polypure™ capsules improve throughput and extend final filter life

All-polypropylene components provide superior chemical compatibility and low levels of extractables. The melt-blown media and thermally bonded construction protect the purity and integrity of your filtered solutions. High dirt-holding capacity can improve throughput and extend the life of your final filters, especially when working with particulate-laden solutions.

- Biocompatible. Passes United States Pharmacopeia (USP) Biological Reactivity Test, *In Vivo* <88>. Listed as acceptable for food contact according to the Code of Federal Regulations, Title 21.
- Membrane and housing are sealed using fusion technology that eliminates potential extractables that may be released by uncured sealing adhesives.
- Excellent flow rates make capsules ideal for prefiltration of biologicals, serum-based products, beverages, plating solutions, ink, syrup, water, and a wide range of solvents.

Tangential Flow Filtration Ensures Fast, Efficient Biomolecule Processing

Tangential flow filtration (TFF) is a rapid and efficient method for separation and purification of biomolecules. It can be applied to a wide range of biological fields such as immunology, protein chemistry, molecular biology, biochemistry, and microbiology. TFF can be used to concentrate and desalt sample solutions ranging in volume from 10 milliliters to thousands of liters. It can be used to fractionate large from small biomolecules, harvest cell suspensions, and clarify fermentation broths and cell lysates.

Easy product selection

Consider the biomolecule of interest

Your biomolecule of interest, or product, can be retained and separated from the low molecular weight contaminants, or it can be passed and purified from higher molecular weight contaminants and particles.

In general, a membrane with a molecular weight cut off (MWCO) should be selected that is three to six times smaller than the molecular weight of the protein to be retained. Other factors can also impact the selection of the appropriate MWCO. For example, if flow rate (or processing time) is a major consideration, selection of a membrane with a MWCO toward the lower end of this range (3x) will yield higher flow rates. If recovery is the primary concern, selection of a tighter membrane (6x) will yield maximum recovery (with a slower flow rate). These values should be used as a general guide, as solute retention and selectivity can vary depending on many factors, such as transmembrane pressure, molecular shape or structure, solute concentration, presence of other solutes, and ionic conditions.

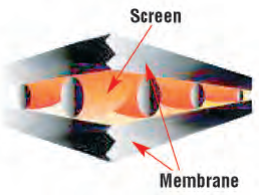
Our membranes are highly selective and typically achieve recoveries in the range of 95 – 99%. The narrow pore size distribution of these membranes results in minimal molecule retention of molecular weights below the MWCO of the membrane. For information on MWCO of specific molecules, visit www.pall.com/lab.

Consider fluid characteristics

Sample concentration and viscosity determine the type of channel that is required for the process run. Most TFF cassettes are available in screen or suspended screen configurations.

Tangential Flow Channel Configurations

Screen Channel

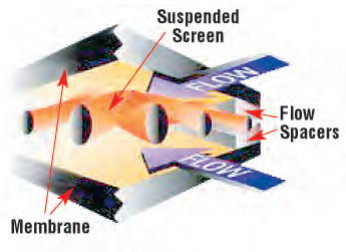


Screen channel available in:

- *Minimate™ devices*
- *Ultrasette™ devices*
- *LV Centramate™ cassettes*
- *Centramate cassettes*

In the screen channel configuration, a woven separator creates gentle turbulence in the retentate flow, minimizing membrane fouling. Screen channel configuration is used with a clean filtered 0.2 µm solution (free of particles or aggregates that can get trapped in the screen).

Suspended Screen



Suspended screen available in:

- *Ultrasette devices*
- *LV Centramate cassettes*
- *Centramate cassettes*

The suspended screen channel configuration has a more open structure in the retentate channel that provides better performance when highly viscous or particle-laden solutions are being processed.

Consider the sample volume and processing time

Choosing the appropriate cassette or device size depends on the total sample volume, the required process time, and the desired final sample volume.

Performance parameters for Pall Life Sciences' laboratory TFF devices are presented below.

General Product Selection Based on Starting Sample Volume

TFF Capsule or Cassette*	Membrane Area/ Capsule or Cassette	Typical Filtrate Flow Rate** at 50 LMH 20 °C	Recommended Retentate Flow Rate/ Capsule or Cassette for Screen Channel	Starting Sample Volume Range	Minimum Concentrated Volume***
LAB SCALE/SCALE-UP					
Minimate	50 cm^2 (0.05 ft^2)	4 mL/min	30 - 40 mL/min	25 - 1000 mL	< 10 mL
LV Centramate	0.01 m^2 (0.1 ft^2)	8 mL/min	60 - 80 mL/min	40 - 2000 mL	10 mL
LV Centramate	0.02 m^2 (0.2 ft^2)	15 mL/min	120 - 160 mL/min	60 - 4000 mL	15 mL
PROCESS DEVELOPMENT AND SMALL-SCALE PRODUCTION					
Ultrasette	0.084 m^2 (0.9 ft^2)	4 L/hr	1200 - 1500 mL/min	0.2 - 5 L	100 mL
Centramate	0.093 m^2 (1.0 ft^2)	4.6 L/hr	600 - 800 mL/min	0.2 - 25 L	100 mL

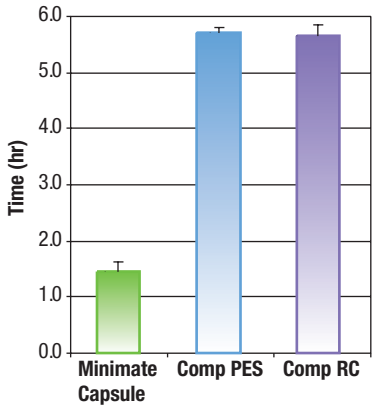
** Data is per unit or cassette. Centramate holder can hold five cassettes. Other column data can be calculated by multiplying table values by the number of cassettes installed in the holder.*

*** Typical filtrate flow rate is based on an average filtrate flow rate of 50 LMH and a process time of about four hours. Actual value may be higher or lower depending on the MWCO of membrane, sample composition and viscosity, operating conditions, i.e., transmembrane pressure, cross flow rate, temperature, etc.*

**** Minimum concentrated volume depends on system hold-up volume, reservoir design and pump type and speed. Smaller volumes can be achieved by minimizing tubing lengths and use of properly sized components, tubing, fittings, etc.*

Streamline Laboratory-scale Concentration, Desalting, and Buffer Exchange Processes

Use of the Minimate TFF Capsule Significantly Reduces Processing Times Compared to Stirred Cell Devices



A 2 mg/mL BSA solution was concentrated tenfold (1000 to 100 mL) in either a 350 mL stirred cell device or Minimate capsule. The Minimate capsule contains a pre-assembled Omega 10K membrane. The cross flow, set at 50 mL/min with retentate loop backpressure, applied to create an initial filtrate flow of about 15 mL/min. The stirred cell devices used polyethersulfone (PES) or regenerated cellulose (RC) discs and were pressurized with filtered air at 55 psi giving a starting filtrate flow of about 6 mL/min. Error bars indicate standard error for five independent runs.

Increased productivity using the Minimate™ TFF Systems and Capsules for processing of up to 1 liter

TFF operations allow a uniform and gentle recirculation of sample flow over the surface of a membrane, effectively controlling membrane fouling. Use of the entire membrane surface results in improved flux rates, significantly reducing processing time and increasing productivity.

Minimate Tangential Flow Filtration Systems

- Plug-n-play – Plug in a Minimate TFF capsule, add sample and turn on the pump to start processing. The Minimate TFF system is simple to use and includes all the hardware, tubing and fittings needed.
- Easy cleaning and maintenance – System components are designed for easy assembly and disassembly; no tools required. Tubing and fitting replacement is simple and quick.
- High concentration factors – The low system working volume achieved through the use of a conical bottom reservoir and compact design enables high concentration factors to be achieved.

Minimate Tangential Flow Filtration Capsules

- Cost-effective design for non-critical applications – the plastic construction of the Minimate TFF capsule and chemical compatibility of the Omega™ PES ultrafiltration membrane facilitate cleaning and reuse
- Scaleable – Several Minimate TFF capsules may be connected in parallel for increased membrane area. Minimate TFF capsules have the same path length and materials of construction as larger Pall Centramate™ and Centrasette™ cassette systems used in pilot and production plants.
- Efficient – Concentration and diafiltration (desalting or buffer exchange) processes can be performed on the same system with minimal user intervention, saving time and avoiding product loss associated with transfer steps

LV Centramate™ Lab Tangential Flow Filtration Holder is designed for maximum product recovery for lab-scale or scale-up process volumes up to 4 L

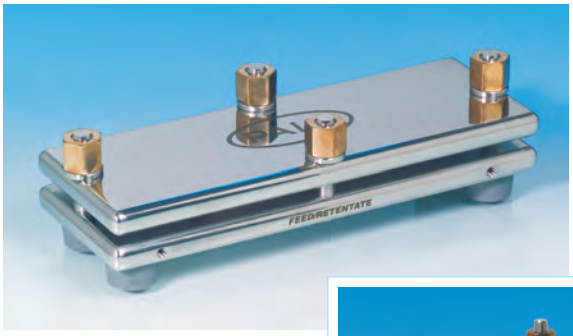
- Scale-up/scale-down device for development of tangential flow filtration (TFF) processes, biopharmaceutical small batch production, scale-down investigations, and production of materials for safety and efficacy studies (Phase I clinicals)
- Low hold-up volume allows high concentration factors to be achieved from small starting volumes. A complete TFF system scaleable to full production plant can be optimized using the volumes typically generated in the development or discovery lab
- Identical path lengths provide linear scale up to Pall Centramate and Centrasette‘ cassette holders. The LV Centramate holder may be attached to a variety of pumps to improve their scalability characteristics
- Easy connections through luer lock fitted ports with polished 316L stainless steel to ensure the same compatibility characteristics as production-scale Centrasette holders

Centramate & Centramate PE Lab Tangential Flow Filtration Hardware are ideal for process development and small-scale production of 1 to 125 L

- Filtration area is easily expanded to 5 ft^2 by adding additional membrane cassettes [0.09 m^2 (1 ft^2) each]. A maximum of 5 cassettes can be used in the Centramate Holder and 4 in the Centramate PE Holder
- Identical fluid path lengths provide precise linear scale up to larger process systems available through Pall Life Sciences BioPharm group
- Cassettes can be easily removed without disassembling system plumbing
- Holders are available with Type 316 L stainless steel (Centramate system) or economically priced, extremely durable, ultra-high molecular weight polyethylene (Centramate PE system)

Ultrasette™ Lab Tangential Flow Filtration Devices are self-contained for optimal processing of 200 mL to 5 L

- Fast sample processing with large membrane area
- Choice of two flow channel separators for maximum control of filtration performance
- Ideal for processing biohazardous samples. Self-contained devices minimize opportunities for contamination or membrane damage
- Reusable or disposable. Can be cleaned for reuse



Mustang® Chromatography Units Offer High Binding Capacities and Fast Flow Rates

Products with Mustang ion exchange chromatography membranes are designed to achieve scaleable purification of biomolecules in biopharmaceutical process development. These units incorporate the same membranes as larger-capacity devices, making them ideal for development and proof of concept testing of biopurification processes.

Mustang membrane is an innovative polyethersulfone membrane containing functional anion or cation exchange groups in a crosslinked polymeric coating. This new membrane adsorber allows researchers to obtain high binding capacity at high flow rates in all chromatography steps.

Chromatography products with Mustang membranes have been designed to obtain high resolution without dilution in a disposable format. Because column packing is no longer required, processing time and validation costs are reduced, and reproduceability is increased.

Mustang chromatography units are available in three membrane chemistries to meet the requirements of a broad range of biopurification applications.

Products with Mustang E membrane for endotoxin removal

Acrodisc® units with Mustang E membrane are designed to effectively remove endotoxin from water, buffer, protein and biological solutions. Unlike most endotoxin removal systems that rely solely on positively-charged moieties to bind and remove endotoxin, the Mustang E membrane has a proprietary surface modification. Common buffers and salt solutions do not adversely affect this proprietary chemistry, which tends to reduce the binding capacity of only positively charged systems.

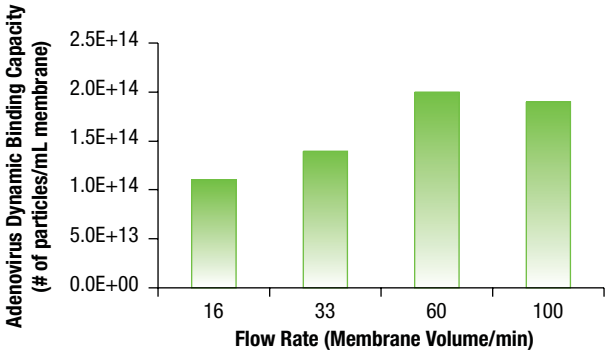
- Reduce endotoxins in water, buffer, neutral sugars, and certain biological solutions
- Plasmid prep for transfection

Products with Mustang® Q membrane for high DNA binding

Products with Mustang Q membrane are designed to remove DNA in a flow-through adsorption step in downstream bioprocessing. These products contain an innovative new anion exchange support with pendant quaternary amine groups in a cross-linked polymeric coating. The pores in Mustang Q membrane are large enough to allow DNA access to all the binding sites by direct fluid convection. This produces very high dynamic DNA capacity in comparison to chromatography beads with diffusive pores.

- Provides contaminant removal such as DNA viral particle, host cell proteins or endotoxin
- Ideal for isolation via capture and release of plasmid DNA, virus or target protein from a complex mixture
- Offers protein polishing for negatively charged proteins
- Purifies virus and oligonucleotides
- Mustang Q membrane chromatography is now available in multi-well plate formats

Effect of Flow Rate on Dynamic Binding Capacity of CsCl Purified Adenovirus with Mustang Q Membrane



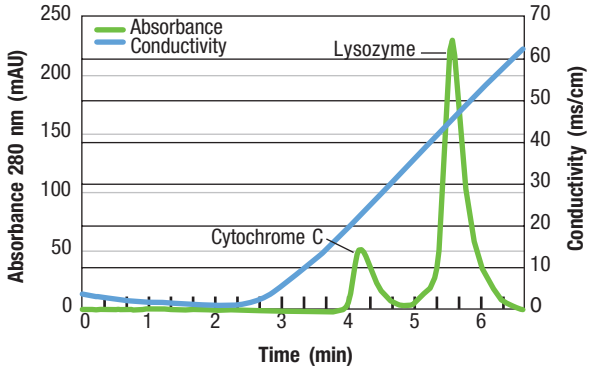
The dynamic binding capacity was determined by loading approximately 1 x 10^{12} VP/mL stock solution of adenovirus in 25mM HEPES buffer pH 7.4 at different flow rates.

Products with Mustang S membrane for high protein binding

Products with Mustang S membrane are designed to purify proteins from cell culture supernatants or fermentation broth. These products contain a cation exchange support with sulfonic acid groups in a cross linked polymeric coating. The larger membrane pores allow proteins to access all the binding sites by direct fluid convection.

- Purifies and concentrates positively-charged proteins and viral particles
- Ideal for evaluation, process development and validation
- Mustang S membrane chromatography is now available in multi-well plate formats

Acrodisc Unit with Mustang S Membrane: Resolution with Cytochrome C and Lysozyme



The conditions used to generate data for the graph above include buffer: 10mM MES pH 5.5; salt: 1M NaCl in 10mM MES pH 5.5; gradient: 0 to 1M NaCl in 50 CV; flow rate: 2.3 mL/min (13 cv/min).

Ordering Information

Acrodisc® Syringe Filters with Supor® Membrane

Part Number	Description	Packaging
4602	0.2 µm, 13 mm, sterile	75/pkg
4604	0.45 µm, 13 mm, sterile	75/pkg
4608	0.8 µm, 13 mm, sterile	75/pkg
4611	0.1 µm, 25 mm, sterile	50/pkg
4612	0.2 µm, 25 mm, sterile	50/pkg
4614	0.45 µm, 25 mm, sterile	50/pkg
4618	0.8 µm, 25 mm, sterile	50/pkg
4651	0.1 µm, 32 mm, sterile	50/pkg
4652	0.2 µm, 32 mm, sterile	50/pkg
4654	0.45 µm, 32 mm, sterile	50/pkg
4656	1.2 µm, 32 mm, sterile	50/pkg
4650	5 µm, 32 mm, sterile	50/pkg

Acrodisc PF Syringe Filters with Supor Membrane

Part Number	Description	Packaging
4187	0.8/0.2 µm, 25 mm, sterile	50/pkg
4658	0.8/0.2 µm, 32 mm, sterile	50/pkg

Serum Acrodisc Syringe Filter with Supor Membrane

Part Number	Description	Packaging
4525	GF/0.2 µm, 37 mm, sterile	20/pkg

Acrodisc Syringe Filters with Supor Membrane Bulk Packaging

Part Number	Description	Packaging
4506	0.2 µm, 25 mm, non-sterile	1000/pkg
4504	0.8/0.2 µm, 25 mm, non-sterile	1000/pkg
4508	0.45 µm, 25 mm, non-sterile	1000/pkg
4509	0.8 µm, 25 mm, non-sterile	1000/pkg
4655	0.2 µm, 32 mm, non-sterile	1000/pkg
4659	0.8/0.2 µm, 32 mm, non-sterile	1000/pkg
4653	0.45 µm, 32 mm, non-sterile	1000/pkg
4661	1.2 µm/0.45 µm, 32 mm, non-sterile	1000/pkg
4660	1.2 µm, 32 mm, non-sterile	1000/pkg
4662	5 µm, 32 mm, non-sterile	1000/pkg

Acrodisc Syringe Filters with HT Tuffryn® Membrane

Part Number	Description	Packaging
4454	0.2 µm, 13 mm, sterile	75/pkg
4192	0.2 µm, 25 mm, sterile	50/pkg
4184	0.45 µm, 25 mm, sterile	50/pkg
4496	0.2 µm, 25 mm, non-sterile	75/pkg, 300/cs
4214	0.2 µm, 25 mm, non-sterile	1000/pkg
4497	0.45 µm, 25 mm, non-sterile	75/pkg, 300/cs
4784	0.45 µm, 25 mm, non-sterile	1000/pkg

DMSO-Safe Acrodisc Syringe Filter

Part Number	Description	Packaging
4433	0.2 µm, 25 mm, sterile	50/pkg

Acrodisc Syringe Filters with Versapor® Membrane

Part Number	Description	Packaging
4188	0.8 µm, 25 mm, sterile	50/pkg
4190	1.2 µm, 25 mm, sterile	50/pkg
4199	5 µm, 25 mm, sterile	50/pkg

Acrodisc Syringe Filters with Versapor Membrane

Part Number	Description	Packaging
4473	0.45 µm, 4 mm, non-sterile	250/pkg, 750/cs
4459	0.8 µm, 13 mm, non-sterile	100/pkg, 300/cs
4487	0.45 µm, 25 mm, non-sterile	75/pkg, 300/cs
4189	0.8 µm, 25 mm, non-sterile	75/pkg, 300/cs
4568	0.8 µm, 25 mm, non-sterile	1000/pkg
4489	5 µm, 25 mm, non-sterile	75/pkg, 300/cs
4488	1.2 µm, 25 mm, non-sterile	75/pkg, 300/cs

Acrodisc Syringe Filters, 25 mm

Part Number	Description	Packaging
4905	0.8/0.2 µm, Supor membrane, sterile	50/pkg
4907	0.2 µm, Fluorodyne® II membrane, sterile	50/pkg
4906	0.2 µm, Ultipor® membrane, sterile	50/pkg
4908	0.2 µm, Posidyne® membrane, sterile	50/pkg

Acro® 50A Devices with HT Tuffryn Membrane

Part Number	Description	Packaging
4260	0.65/0.2 µm, 50 mm, sterile	18/pkg
4262	0.65/0.45 µm, 50 mm, sterile	18/pkg

Acro 50A Devices with Versapor Membrane

Part Number	Description	Packaging
4276	GF/5 µm, 50 mm, sterile	18/pkg
4264	GF/5 µm, 50 mm, non-sterile	18/pkg
4592	GF/5 µm, 50 mm, non-sterile	100/pkg

AcroCap™ Positive Pressure Devices with Supor Membrane

Part Number	Description	Packaging
4481	0.1 µm, sterile	10/pkg
4480	0.2 µm, sterile	10/pkg
4482	0.45 µm, sterile	10/pkg

VacuCap™ 60 Devices with Supor Membrane

Part Number	Description	Packaging
4631	0.1 µm, 60 mm, sterile	10/pkg
4632	0.2 µm, 60 mm, sterile	10/pkg
4634	0.45 µm, 60 mm, sterile	10/pkg
TA4632	0.2 µm, 60 mm (supplied with individually attached tubing for each filter device), sterile	10/pkg

VacuCap 60 PF Device with Supor Membrane

Part Number	Description	Packaging
4638	0.8/0.2 µm, 60 mm, sterile	10/pkg

VacuCap 90 Devices with Supor Membrane

Part Number	Description	Packaging
4621	0.1 µm, 90 mm, sterile	10/pkg
4622	0.2 µm, 90 mm, sterile	10/pkg
4624	0.45 µm, 90 mm, sterile	10/pkg
TA4622	0.2 µm, 90 mm (supplied with individually attached tubing for each filter device), sterile	10/pkg
TA4624	0.45 µm, 90 mm (supplied with individually attached tubing for each filter device), sterile	10/pkg

VacuCap 90 PF Device with Supor Membrane

Part Number	Description	Packaging
4628	0.8/0.2 µm, 90 mm, sterile	10/pkg

Accessory Product

Part Number	Description	Packaging
4623	Feedline accessory kit	1/pkg

AcroPak® 20 Filters with Supor Membrane, with Filling Bell

Part Number	Description	Packaging
12202	0.8/0.2 µm, non-sterile	3/pkg
12203	0.8/0.2 µm, sterile	3/pkg

AcroPak 200 Capsule with Supor Membrane, with Filling Bell

Part Number	Description	Packaging
12941	0.8/0.2 µm, sterile	3/pkg

AcroPak 500 Capsules with Supor Membrane

Part Number	Description	Packaging
12997	0.1/0.1 µm, sterile	1/pkg
12995	0.2/0.2 µm, sterile	1/pkg
12991	0.8/0.2 µm, sterile	1/pkg
12993	0.8/0.45 µm, sterile	1/pkg

AcroPak™ 1000 Sterile Capsules with Supor® Membrane

Part Number	Description	Packaging
12999	0.1/0.1 µm, sterile	1/pkg
12996	0.2/0.2 µm, sterile	1/pkg
12992	0.8/0.2 µm, sterile	1/pkg
12994	0.8/0.45 µm, sterile	1/pkg

AcroPak 1500 Sterile Capsules with Supor Membrane

Part Number	Description	Packaging
12686	0.2/0.2 µm, sterile	1/pkg
12675	0.8/0.2 µm, sterile	1/pkg

AcroPak 20 Capsules with Fluorodyne® II Membrane, with Filling Bell

Part Number	Description	Packaging
12209	0.1 µm, sterile	3/pkg
12208	0.1 µm, non-sterile	3/pkg
12201	0.2 µm, sterile	3/pkg
12200	0.2 µm, non-sterile	3/pkg

AcroPak 200 Capsules with Fluorodyne II Membrane, with Filling Bell

Part Number	Description	Packaging
12069	0.2 µm, sterile	3/pkg

AcroPak 400 & 800 Capsules with Fluorodyne II Membrane

Part Number	Description	Packaging
12472	0.1 µm, AcroPak 400 capsule, sterile	1/pkg
12473	0.1 µm, AcroPak 800 capsule, sterile	1/pkg
12478	0.2 µm, AcroPak 400 capsule, sterile	1/pkg
12471	0.2 µm, AcroPak 800 capsule, sterile	1/pkg

Capsules with HT Tuffryn® Membrane

Part Number	Description	Packaging
12158	Micro Culture Capsule with filling bell, 0.2/0.2 µm, 300 cm^2 (cell culture certified), sterile	1/pkg
12122	Mini Capsule, 0.45/0.2 µm, 500 cm^2, sterile	1/pkg
12140	Culture Capsule, 0.2/0.2 µm, 500 cm^2 (cell culture certified), sterile	1/pkg
12170	Culture Capsule with filling bell, 0.2/0.2 µm, 500 cm^2 (cell culture certified), sterile	1/pkg
12112	Maxi Capsule, 0.2/0.2 µm, 1290 cm^2, sterile	1/pkg
12141	Maxi Culture Capsule, 0.2/0.2 µm, 1290 cm^2 (cell culture certified), sterile	1/pkg

Capsules with Versapor® Membrane

Part Number	Description	Packaging
12117	Pleated capsule, 0.2 µm, sterile	1/pkg
12130	Versacap capsule, 0.45/0.2 µm, sterile	1/pkg
12123	Mini capsule, 0.8/0.45 µm, sterile	1/pkg
12131	Versaflow™ capsule, 0.8/0.45 µm, sterile	1/pkg
12168	Serum capsule, GF/1.2 µm	1/pkg
12116	Pleated capsule, 3 µm	1/pkg

Acro® 37 TF Vent Device

Part Number	Description	Packaging
4464	0.2 µm, 37 mm	24/pkg
4465	0.2 µm, 37 mm	200/pkg

Bacterial Air Vents

Part Number	Description	Packaging
4210	1 µm (nominal), 37 mm	24/pkg
4308	1 µm (nominal), 37 mm, sterile	10/pkg

Acro 50 Vent Devices with Emflon® II Membrane

Part Number	Description	Packaging
A50V002P2NV	Hose barb, no vent, 0.2 µm, 100% integrity tested during manufacturing	100/pkg
A50V002P2	Hose barb with vent, 0.2 µm	3/pkg

Acro 50 Vent Devices with PTFE Membrane

Part Number	Description	Packaging
4251	0.2 µm, hose barb	18/pkg
4400	0.2 µm, 1/8 in. MNPT	18/pkg
4401	0.2 µm, 9.5 mm (3/8 in.) straight pipe	18/pkg
4250	0.2 µm, hose barb	72/pkg
4256	0.45 µm, hose barb	18/pkg
4258	1 µm, hose barb	18/pkg
4003	1 µm, 1/8 in. MNPT	18/pkg

Vacushield™ Vent Device with PTFE Membrane

Part Number	Description	Packaging
4402	0.45 µm, 50 mm, hose barb	3/pkg

AcroPak 300 Capsule with PTFE Membrane

Part Number	Description	Packaging
12082	0.2 µm, stepped hose barb	3/pkg

HEPA Capsule

Part Number	Description	Packaging
12144	HEPA capsule	1/pkg

AcroVent® Device

Part Number	Description	Packaging
4249	0.2 µm, hose barb	10/pkg

Mini Profile® Capsules

Part Number	Description	Packaging
12073	Profile II filter, 0.5 µm	3/pkg
12074	Profile II filter, 1 µm	3/pkg
12070	Profile Star filter, 1.5 µm	3/pkg
12071	Profile Star filter, 3 µm	3/pkg
12072	Profile Star filter, 5 µm	3/pkg

Polypure® Capsules

Part Number	Description	Packaging
12075	1 µm	1/pkg
12076	5 µm	1/pkg
12077	10 µm	1/pkg

AcroPrep™ 96 Filter Plates, 350 µL well

Part Number	Description	Pkg
5047	Mustang Q membrane, natural	10/pkg
5048	Mustang S membrane, natural	10/pkg

AcroPrep 96 Filter Plates, 1 mL well

Part Number	Description	Packaging
5062	Mustang Q membrane, natural	5/pkg
5063	Mustang S membrane, natural	5/pkg

Acrodisc® Unit with Mustang® Q Membrane

Part Number	Description	Packaging
MSTG25Q6	Acrodisc unit with Mustang Q membrane, 0.8 µm, 25 mm, non-sterile	10/pkg (blister packs)

Acrodisc Unit with Mustang S Membrane

Part Number	Description	Packaging
MSTG25S6	Acrodisc unit with Mustang S membrane, 0.8 µm, 25 mm, non-sterile	10/pkg (blister packs)

Acrodisc Unit with Mustang E Membrane

Part Number	Description	Packaging
MSTG25E3	Acrodisc unit with Mustang E membrane, 0.2 µm, 25 mm, sterile	10/pkg (blister packs)

Ordering Information

Minimate™ TFF Capsule with Omega™ Membrane

Part Number	Description	Packaging
OAD65C12	650D	1/pkg
OA001C12	1K	1/pkg
OA003C12	3K	1/pkg
OA005C12	5K	1/pkg
OA010C12	10K	1/pkg
OA030C12	30K	1/pkg
OA050C12	50K	1/pkg
OA070C12	70K	1/pkg
OA100C12	100K	1/pkg
OA300C12	300K	1/pkg
OA500C12	500K	1/pkg
OA990C12	1000K	1/pkg

Minimate TFF Systems

Part Number	Description	Packaging
OAPMP110	115V AC 50/60 Hz	1/pkg
OAPMP220	230V AC 50/60 Hz	1/pkg
OAPMP220UK	230V AC 50/60 Hz with U.K. plug	1/pkg

LV Centramate™ TFF Holder

Part Number	Description	Packaging
FS003K10	LV Centramate cassette holder	1/pkg

Replacement Parts

Part Number	Description	Packaging
FS007X01	Bronze nuts and washers	4/pkg

Alpha™ Membrane LV Centramate Cassettes

MWCO	EFA	Medium Screen	Suspended Screen
10K	0.01 m^2 (0.1 ft^2)	AS010C12P1	AS010C11P1
10K	0.02 m^2 (0.2 ft^2)	AS010C12P2	AS010C11P2

Supor® Membrane LV Centramate Cassettes

Pore Size	EFA	Medium Screen	Suspended Screen
0.1 µm	0.01 m^2 (0.1 ft^2)	PSM10C12P1	PSM10C11P1
0.1 µm	0.02 m^2 (0.2 ft^2)	PSM10C12P2	PSM10C11P2
0.2 µm	0.01 m^2 (0.1 ft^2)	PSM20C12P1	PSM20C11P1
0.2 µm	0.02 m^2 (0.2 ft^2)	PSM20C12P2	PSM20C11P2
0.45 µm	0.01 m^2 (0.1 ft^2)	PSM45C12P1	PSM45C11P1
0.45 µm	0.02 m^2 (0.2 ft^2)	PSM45C12P2	PSM45C11P2
0.65 µm	0.01 m^2 (0.1 ft^2)	PSM65C12P1	PSM65C11P1
0.65 µm	0.02 m^2 (0.2 ft^2)	PSM65C12P2	PSM65C11P2
0.8 µm	0.01 m^2 (0.1 ft^2)	PSM80C12P1	PSM80C11P1
0.8 µm	0.02 m^2 (0.2 ft^2)	PSM80C12P2	PSM80C11P2

Omega Membrane LV Centramate Cassettes

Pore Size	EFA	Medium Screen	Suspended Screen
1K	0.01 m^2 (0.1 ft^2)	OS001C12P1	OS001C11P1
1K	0.02 m^2 (0.2 ft^2)	OS001C12P2	OS001C11P2
3K	0.01 m^2 (0.1 ft^2)	OS003C12P1	OS003C11P1
3K	0.02 m^2 (0.2 ft^2)	OS003C12P2	OS003C11P2
5K	0.01 m^2(0.1 ft^2)	OS005C12P1	OS005C11P1
5K	0.02 m^2 (0.2 ft^2)	OS005C12P2	OS005C11P2
10K	0.01 m^2 (0.1 ft^2)	OS010C12P1	OS010C11P1
10K	0.02 m^2 (0.2 ft^2)	OS010C12P2	OS010C11P2
30K	0.01 m^2 (0.1 ft^2)	OS030C12P1	OS030C11P1
30K	0.02 m^2 (0.2 ft^2)	OS030C12P2	OS030C11P2
50K	0.01 m^2 (0.1 ft^2)	OS050C12P1	OS050C11P1
50K	0.02 m^2 (0.2 ft^2)	OS050C12P2	OS050C11P2
70K	0.01 m^2 (0.1 ft^2)	OS070C12P1	OS070C11P1
70K	0.02 m^2 (0.2 ft^2)	OS070C12P2	OS070C11P2
100K	0.01 m^2 (0.1 ft^2)	OS100C12P1	OS100C11P1
100K	0.02 m^2 (0.2 ft^2)	OS100C12P2	OS100C11P2
300K	0.01 m^2 (0.1 ft^2)	OS300C12P1	OS300C11P1
300K	0.02 m^2 (0.2 ft^2)	OS300C12P2	OS300C11P2
500K	0.01 m^2 (0.1 ft^2)	OS500C12P1	OS500C11P1
500K	0.02 m^2 (0.2 ft^2)	OS500C12P2	OS500C11P2
1000K	0.01 m^2 (0.1 ft^2)	OS990C12P1	OS990C11P1
1000K	0.02 m^2 (0.2 ft^2)	OS990C12P2	OS990C11P2
0.16 µm	0.01 m^2 (0.1 ft^2)	OS994C12P1	OS994C11P1
0.16 µm	0.02 m^2 (0.2 ft^2)	OS994C12P2	OS994C11P2

Centramate Cassette Holders

Part Number	Description	Packaging
FS001K10	Includes stainless steel Centramate cassette holder, assorted fittings, torque wrench and socket	1/pkg
FS002K10	Includes polyethylene holder with Centramate cassette stainless steel top and bottom brace plates, assorted fittings, torque wrench, socket	1/pkg

Centramate Sanitary Gauge Fitting Packages

Part Number	Description	Packaging
FS005K10	2-gauge fitting package consists of (8) 1/2 in. EPDM gaskets, (2) 1-1/2 in. EPDM gaskets, (2) 1/2 in. x 1-1/2 in. TC tees, (3) 1/2 in. TC to 1/4 in. ID tube barbed fittings, (8) 1/2 in. TC clamps, (1) 1/2 in. diaphragm valve, (1) filtrate manifold, (2) 0-60 PSIG glycerin-filled gauges, (3) 3/4 in. TC to 1/2 in. ID tube barbed fittings, and (2) 1-1/2 in. TC sanitary clamps	1/pkg
FS006K10	3-gauge fitting package consists of (10) 1/2 in. EPDM gaskets, (3) 1-1/2 in. EPDM gaskets, (3) 1/2 in. x 1-1/2 in. TC tees, (3) 1/2 in. TC to 1/4 in. ID tube barbed fittings, (13) 1/2 in. TC clamps, (2) 1/2 in. diaphragm valves, (1) filtrate manifold, (3) 0-60 PSIG glycerin-filled gauges, (3) 3/4 in. TC to 1/2 in. ID tube barbed fittings, and (3) 1-1/2 in. TC sanitary clamps	1/pkg

Centramate PE Fitting Packages

Part Number	Description	Packaging
FS007K10	2-gauge fitting package consists of (2) 1/4 in. NPT nipples, (2) 1/4 in. NPT tees, (2) 1/4 in. NPT to 1/4 in. barbed fittings, (1) 1/4 in. NPT to 1/4 in. barbed elbow fitting, (2) PSIG glycerin-filled gauges, (1) 1/4 in. ID tubing, (2) 1/4 in. NPT to 1/2 in. barbed fittings, (5) stainless steel hose clamps, and (1) 1/4 in. NPT to 1/4 in. barbed tee fitting	1/pkg
FS008K10	3-gauge fitting package consists of (4) 1/4 in. NPT nipples, (4) 1/4 in. NPT tees, (3) 1/4 in. NPT to 1/4 in. barbed fittings, (2) 1/4 in. NPT to 1/4 in. barbed elbow fittings, (3) PSIG glycerin-filled gauges, (1) 1/4 in. ID tubing, (2) 1/4 in. NPT to 1/2 in. barbed fittings, and (5) stainless steel hose clamps	1/pkg

Centramate PE Cassette Hardware Systems

Part Number	Description	Packaging
FS012K10	Centramate PE system, 2-gauge includes PN FS002K10 and FS007K10	1/pkg
FS013K10	Centramate PE system, 3-gauge includes PN FS002K10 and FS002K10	1/pkg

Centramate Cassette Hardware Systems

Part Number	Description	Packaging
FS010K10	Centramate system, 2-gauge includes PN FS001K10 and FS005K10	1/pkg
FS011K10	Centramate system, 3-gauge includes PN FS001K10 and FS006K10	1/pkg

Centramate Cassettes with Omega™ Membrane

MWCO	Fine Screen	Medium Screen	Suspended Screen
1K	OS001C10	OS001C12	OS001C11
3K	OS003C10	OS003C12	OS003C11
5K	OS005C10	OS005C12	OS005C11
10K	OS010C10	OS010C12	OS010C11
30K	OS030C10	OS030C12	OS030C11
50K	OS050C10	OS050C12	OS050C11
70K	OS070C10	OS070C12	OS070C11
100K	OS100C10	OS100C12	OS100C11
300K	N/A	OS300C12	OS300C11
500K	N/A	OS500C12	OS500C11
1000K	N/A	OS990C12	OS990C11
0.16 µm	N/A	OS994C12	OS994C11

Centramate Cassettes with Supor® Membrane

Pore Size	Medium Screen	Suspended Screen
0.03 µm	PSM03C12	PSM03C11
0.1 µm	PSM10C12	PSM10C11
0.2 µm	PSM20C12	PSM20C11
0.45 µm	PSM45C12	PSM45C11
0.65 µm	PSM65C12	PSM65C11
0.8 µm	PSM80C12	PSM80C11

Centramate Cassettes with Alpha™ Membrane

MWCO	Fine Screen	Medium Screen	Suspended Screen
10K	AS010C10	AS010C12	AS010C11

Ultrasette™ Device Package with Omega Membrane

MWCO	Screen Channel	Suspended Screen
1K, yellow	OS001C70	OS001C72
3K, gray	OS003C70	OS003C72
5K, tan	OS005C70	OS005C72
10K, blue	OS010C70	OS010C72
30K, red	OS030C70	OS030C72
50K, green	OS050C70	N/A
70K, brown	OS070C70	N/A
100K, clear	OS100C70	OS100C72
300K, orange	OS300C70	OS300C72

Device Packages include (1) device in the MWCO of your choice, (2) storage caps for feed/retentate, filtrate outlet cap, (2) tubing clamps, and 0.6 m (24 in.) of 4.8 mm (3/16 in.) tubing.

Accessory Products

Part Number	Description	Packaging
FS002X70	Accessory kit consists of 1.8 m (6 ft.) of PharMeds* #24 feed/retentate tubing, 0.6 m (24 in.) of 4.8 mm (3/16 in.) Tygons filtrate tubing, (8) stainless steel tubing clamps, (1) screw clamp, and (1) barbed fitting	1/pkg
FS005X70	Gauge fitting package consists of (1) 0 - 4.1 bar (0 - 60 psi) 3.2 mm (1/8 in.) NPT pressure gauge, (2) 6.4 mm (1/4 in.) O.D. polypropylene barbed tube to 3.2 mm (1/8 in.) NPT connectors, (1) 3.2 mm (1/8 in.) threaded polypropylene tee, (1) screw clamp, (2) stainless steel tubing clamps	1/pkg
FS001X70	Mounting bracket, holds Ultrasettedevice securely during operation. Suction cups on the bottom of the bracket allow for placement on smooth surfaces	1/pkg

Ultralab™ Systems with 115 V Pump

Part Number	Description	Packaging
FS006X75	2 L Ultralab system (consists of an Ultrareservoir container, Masterflexs L/Ss variable speed peristalic pump, and Ultrasette accessory kit; connects to Ultrasette device sold separately)	1/pkg
FS007X70	5 L Ultralab system (consists of an Ultrareservoir container, Masterflex L/S variable speed peristalic pump and Ultrasette accessory kit; connects to Ultrasette device sold separately)	1/pkg

Ultralab Systems with 230 V Pump

Part Number	Description	Packaging
FS016X75	2 L Ultralab system (consists of an Ultrareservoir container, Masterflex L/S variable speed peristalic pump, and Ultrasette accessory kit; connects to Ultrasette device sold separately)	1/pkg
FS017X70	5 L Ultralab system (consists of an Ultrareservoir container Masterflex L/S variable speed peristalic pump, and Ultrasette accessory kit; connects to Ultrasette device sold separately)	1/pkg

Ultrareservoir™ Containers

Part Number	Description	Packaging
FS005X75	2 L container (includes 0 - 4.2 bar pressure gauge, 4.0 mm fittings, 6.4 mm fittings, and 3-way valve); suitable for use with Ultrasette device	1/pkg
FS006X70	5 L container (includes 0 - 4.2 bar pressure gauge, 4.0 mm fittings, 6.4 mm fittings, and 3-way valve); suitable for use with Ultrasette device; fittings supplied are 6.4 mm	1/pkg
FS007X75	500 mL container (includes 0 - 4.2 bar pressure gauge, 4.0 mm fittings, 6.4 mm fittings, and 3-way valve); suitable for use with LV Centramate System	1/pkg

Supor 100 Membrane, 0.1 µm

Part Number	Description	Packaging
60309	25 mm, plain	100/pkg
60310	47 mm, plain	100/pkg
60311	90 mm, plain	100/pkg
60312	142 mm, tabbed	25/pkg
66551	142 mm, no tab	25/pkg
60313	293 mm, tabbed	25/pkg
66552	293 mm, no tab	25/pkg

Supor 200 Membrane, 0.2 µm

Part Number	Description	Packaging
60298	13 mm, plain	100/pkg
60300	25 mm, plain	100/pkg
60301	47 mm, plain	100/pkg
63025	47 mm, plain sterile autoclave pack	100/pkg
66234	47 mm, grid, individual sterile pack (S-Pack)	200/pkg
60334	90 mm, plain	100/pkg
66549	142 mm, no tab	25/pkg
60305	142 mm, tabbed	25/pkg
60307	293 mm, tabbed	25/pkg
66550	293 mm, no tab	25/pkg

Supor 450 Membrane, 0.45 µm

Part Number	Description	Packaging
60170	13 mm, plain	100/pkg
60172	25 mm, plain	100/pkg
60173	47 mm, plain	100/pkg
61854	47 mm, grid	100/pkg
60174	50 mm, plain	100/pkg
60206	90 mm, plain	100/pkg
60177	142 mm, tabbed	25/pkg
66553	142 mm, no tab	25/pkg
60179	293 mm, tabbed	25/pkg
66554	293 mm, no tab	25/pkg

Supor 800 Membrane, 0.8 µm

Part Number	Description	Packaging
60109	25 mm, plain	100/pkg
5010	47 mm, grid,sterile autoclave pack	100/pkg
60110	47 mm, plain	100/pkg
60112	90 mm, plain	100/pkg
60114	142 mm, tabbed	25/pkg
66555	142 mm, no tab	25/pkg
60116	293 mm, tabbed	25/pkg
66556	293 mm, no tab	25/pkg

HT Tuffryn® 200 Membrane, 0.2 µm

Part Number	Description	Packaging
66197	25 mm	100/pkg
66199	47 mm	100/pkg
66204	142 mm	25/pkg
66205	293 mm	25/pkg

HT Tuffryn 450 Membrane, 0.45 µm

Part Number	Description	Packaging
66221	25 mm	100/pkg
66223	47 mm	100/pkg
66228	142 mm	25/pkg
66229	293 mm	25/pkg

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