HPLC and Chromatography Sample Prep

As the world's largest producer of membrane filters, Pall offers more types of membranes for quality control testing than any other company. Our patented GH Polypro (GHP) membrane, with its uniquely broad solvent compatibility, is globally recognized as the universal membrane for HPLC sample preparation applications. Our diversified portfolio of membranes enables us to select the most appropriate materials and optimize them for each unique application. That's why you can depend on Pall to consistently provide dependable products that deliver superior performance for confident decisions.

Content

General HPLC and Chromatography Sample Prep Application Selector

	Page Number	Sample Filtration HPLC (0.45 µm)	Sample Filtration UHPLC (0.2 µm)	HPLC (0.45 µm) Mobile Phase/ UHPLC (0.2 µm) Mobile Phase	Sample Filtration Gas Chromatography	Sample Filtration Ion Chromatography	Sample Clarification (1 µm and Larger)	Cell Reduction
Membranes								
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Acrodisc® PSF GxF syringe filters with glass/GHP membrane	182	•	•		•			•
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Acrodisc PSF GxF syringe filters with glass/nylon membrane	186	•	•		•			•
Acrodisc PSF GxF syringe filters with glass/PTFE membrane	188	•	•		•			•
Acrodisc PSF GxF syringe filters with glass/PVDF membrane	184	•	•		•			•
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Acrodisc PSF syringe filters with GHP membrane	182	•	•		•			•
Acrodisc PSF syringe filters with HT Tuffryn® membrane	193	•			•			•
Acrodisc PSF syringe filters with nylon membrane	186	•	•		•			•
Acrodisc PSF syringe filters with PTFE membrane	188	•	•		•			•
Acrodisc PSF syringe filters with PVDF membrane	184	•	•		•			•
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Acrodisc syringe filters with glass fiber	195				•		•	•
Acrodisc syringe filters with GHP membrane	182	•	•		•			•
Acrodisc syringe filters with nylon membrane	186	•	•		•			•
Acrodisc syringe filters with PTFE membrane	188	•	•		•		•	•
Acrodisc syringe filters with PVDF membrane	184	•	•		•			•
Acrodisc syringe filters with Versapor membrane	192	•			•		•	•
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Macrosep® Advance centrifugal devices with Supor membrane	201	•	•		•			•
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Nanosep MF centrifugal devices with GHP membrane	199	•			•			•
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AcroPrep 24 filtration system	196	•	•					
SolVac® filter holder	180			•				
Stainless steel forceps	225, 274			•				

Solid Oral Dosage Sample Filtration Application Selector*

	Page Number	Aqueous - Acidic	Aqueous - Basic	Organic - Strong	Organic - Weak
Membranes					
GH Polypro (GHP) membrane disc filters	176	•	•	•	•
Nylaflo™ membrane disc filters	177			•	•
PTFE membrane disc filters	178			•	•
PVDF membrane disc filters	179	•			•
Syringe Filters					
Acrodisc PSF GxF syringe filters with glass/GHP membrane	182	•	•	•	•
Acrodisc PSF GxF syringe filters with glass/glass fiber	195	•	•	•	•
Acrodisc PSF GxF syringe filters with glass/nylon membrane	186			•	•
Acrodisc PSF GxF syringe filters with glass/PTFE membrane	188			•	•
Acrodisc PSF GxF syringe filters with glass/PVDF membrane	184	•			•
Acrodisc PSF GxF syringe filters with glass/Supor® membrane	194	•	•		•
Acrodisc PSF syringe filters with GHP membrane	182	•	•	•	•
Acrodisc PSF syringe filters with HT Tuffryn® membrane	193	•	•		
Acrodisc PSF syringe filters with nylon membrane	186			•	•
Acrodisc PSF syringe filters with PTFE membrane	188			•	•
Acrodisc PSF syringe filters with PVDF membrane	184	•			•
Acrodisc PSF syringe filters with Versapor® membrane	192		•		•
Acrodisc syringe filters with GHP membrane	182	•	•	•	•
Acrodisc syringe filters with glass fiber	195	•	•	•	•
Acrodisc syringe filters with nylon membrane	186			•	•
Acrodisc syringe filters with PTFE membrane	188			•	•
Acrodisc syringe filters with PVDF membrane	184	•			•
Acrodisc syringe filters with Versapor® membrane	192		•		•
Ion Chromatography (PES) Acrodisc syringe filters	190	•	•		•
Ion Chromatography (PES) Acrodisc PSF syringe filters	190	•	•		•
Centrifugal Devices					
Macrosep® Advance centrifugal devices with Supor membrane	201	•	•		•
Microsep™ Advance centrifugal devices with Supor membrane	200	•	•		•
Nanosep MF centrifugal devices with GHP membrane	199	•	•	•	•
Hardware					
47 mm filter funnels, glass	202	•	•	•	•
SolVac® filter holder	180	•	•	•	•
Stainless steel forceps	225, 274	•	•	•	•

**Pall's analytical quality control filters are used in typical HPLC applications including dissolution, content uniformity, pharmaceutical finished product, pharmaceutical raw material, and food and beverage testing. The choice of membrane filters for these tests is based on chemical compatibility of the membrane and the liquid being filtered. For additional guidance, review the Chemical Compatibility guide on page 286 - 287. Active Pharmaceutical Ingredients (API) adsorption should also be a consideration when making your selection.*

HPLC and Chromatography Sample Prep

Supporting the Integrity of Your Sample Prep Results

Whether you are pursuing goals in the life sciences, pharmaceutical methods, research and development, quality control, or specialty environmental applications, Pall's HPLC and chromatography sample prep products offer unfailing quality in a range of processing volumes. Our superior media separation technology ensures:

- Accurate pore size ratings for better chromatography, and instrument and column protection.
- Uniform membrane materials (lot-to-lot) for consistent analytical results.
- Low extractable materials for less chromatographic interference.
- Materials of construction selected specifically for analytical analysis with lower extractables and lower API adsorption.

Multiple Sample Processing

AcroPrep™ Advance 96-Well Filter Plates

AcroPrep Advance filter plates are excellent for sample clean-up in sample prep or molecular biology applications. These plates alleviate the most common problems of filter-bottom plates with special design features:

- Optimized outlet tips minimize sample leakage during incubation steps and reduce the presence of hanging drops following filtration.
- Automation compatible. Manufactured in accordance with SBS guidelines, allowing plates to be run in manual, semi-automated, and automated processes.
- Polypropylene filter plate assembly is chemically resistant and low biomolecule binding.

See page 65 for information on how to select a filter plate for your application.

AcroPrep 24 Filtration System

The AcroPrep 24 filtration system accelerates sample preparation and reduces labor by simultaneously filtering up to 24 samples:

- Designed for use with Waters' Alliance♦ HPLC systems.
- Eliminates the need for individually-wrapped syringes.
- System is economical and requires less bench space compared to the traditional syringe filter technique.
- HPLC certified to ensure analytical results will not be compromised by extractable materials.
- No cross-contamination because each well is individually sealed.

The AcroPrep 24 filtration system simultaneously processes up to 24 samples.

Single Sample Processing

Acrodisc® PSF Syringe Filters

Acrodisc PSF syringe filters are available in many membrane types, sizes, and packaging configurations to fit all applications ensuring:

- Smooth operation and worry-free performance in automated applications with smooth filter-to-filter release, consistent turret advancement, exceptional housing strength, and strict outside filter geometry.
- Best protection for HPLC columns – extend column life as much as 46 times.
- Maximum throughput with the GxF multi-layer prefilter.

Nanosep® MF Centrifugal Devices

Centrifugal devices are a simple-to-use alternative for analytical sample preparation, especially when your application calls for maximum filtrate recovery from limited sample volumes. These devices provide:

- Rapid and high recovery (96.5%) of critical proteins.
- Low extractables. Our HPLC-grade centrifugal devices are certified to be low in UV extractables.
- Low hold-up volume (< 5 µL) makes these devices ideal for expensive samples.
- High g-force ratings. Can be spun at 14,000 x g assuring rapid sample processing.

How to Choose a Filter for Your Application

When selecting the best filter for your application, four main considerations need to be addressed:

1. Is an automation-certified filter required?
2. What is the filter's chemical compatibility?
   - Resistance of membrane to fluid contact
   - Extractables
   - Adsorption
3. What Effective Filtration Area (EFA) is needed for filtration?
4. What pore size rating is optimal for sample clean-up?

AUTOMATION CERTIFICATION IS IMPORTANT

Pall Life Sciences has specifically designed and certified our Acrodisc® PSF syringe filters to be fully compatible and reliable for use with automated equipment. The following special features make our syringe filters reliable for worry-free performance 24 hours a day:

- Smooth filter-to-filter release
- Consistent turret advancement
- Exceptional housing strength
- Strict "outside filter geometry"

Acrodisc PSF syringe filters from Pall Life Sciences are the only syringe filters to receive the SOTAX◆ and Zymark◆ Automation Certified guarantee. This certification is only granted to syringe filters that meet the stringent requirements for automated dispensing and robotic handling. Pall works in close partnership with the SOTAX AG manufacturing and engineering teams to ensure proper fit, function, and compatibility with SOTAX and Zymark workstations.

Pall's Acrodisc PSF syringe filters work best with SOTAX AG's Zymark TPW◆, APW◆, and MultiDose◆ workstations. Pall's standard Acrodisc syringe filters work best with SOTAX's AT-70 SMART◆, CTS, and FS workstations. These robotic workstations are all uniquely designed to work with SOTAX and Zymark Automation Certified filters for proper operation.

CONSIDER CHEMICAL COMPATIBILITY

Does the filter need to be resistant to bases, acids, or organic solvents? Chemical compatibility is a critical consideration when selecting the sample prep syringe filter or mobile phase disc filter for your application. The following broad guidelines can be used for basic information. Please refer to the Chemical Compatibility charts on pages 286 - 289 to determine which filter is best for your application.

Aqueous Samples

Hydrophilic membranes, which have an affinity for water, are preferable when filtering aqueous samples. Use Pall Life Sciences filters with GHP, PVDF, nylon, or PES membranes.

Gases and Aggressive Organic Solvents

Hydrophobic membranes repel water and are inert to aggressive organic solvents, making them ideal for gases and organic solvents. Choose Pall Life Sciences filters with PTFE membrane.

Aqueous and Organic Solvent Solutions

Different polymeric membranes have different chemical compatibilities. Based on the application and chemical compatibility, there may be one or several membrane and Acrodisc syringe filter possibilities. Generally, one filter type will not function for all applications due to limitations in hydrophobicity/hydrophilicity and chemical compatibility. However, Pall Life Sciences patented hydrophilic polypropylene (GHP) membrane is a universal membrane for both aqueous and organic applications.

Exceptionally Low Extractable Levels

A filter is designed to increase accuracy by removing unwanted particles. However, the wrong filter can be a source of contaminants in the form of extractables that elute into the sample from the filter device. These undesired artifacts can jeopardize analytical results. Some extractable concerns include coelution, false quantitation, and extraneous peaks.

Pall Life Sciences specifically selects the highest grade of materials and performs rigorous extraction methods on our membrane products to reduce undesired artifacts.

HPLC Certified for Low Extractables

Pall Life Sciences HPLC certification ensures that analytical results will not be compromised by extractable filter materials. To verify low levels of UV-detectable extractables, samples of the HPLC Acrodisc syringe filter line are randomly taken and tested for compatibility with common HPLC solvents using standard HPLC conditions.

How to Choose a Filter for Your Application (continued)

IC Certified for Low Levels of Inorganic Extractables

Pall Life Sciences certifies that Ion Chromatography (IC) Acrodisc® syringe filters have been tested using a highly sensitive IC protocol to monitor inorganic extractables. For IC applications, only the IC Acrodisc (PES) syringe filter is certified for low levels of inorganic extractables. Actual background levels of filter extractables are typically less than 20 ppb for chloride, 6 ppb for nitrate, 1 ppb for phosphate, and 10 ppb for sulfate.

Sample Adsorption

Choose a low adsorbing filter such as the Acrodisc syringe filter with GHP membrane. GHP membrane is extremely low in biomolecule binding. Typical binding levels are far below 1%.

Easy Identification

All analytical sample prep Acrodisc syringe filters and their packaging have color-coded printing with membrane type and pore size on each filter:

- GHP
- Nylon
- PTFE
- Glass Fiber
- PVDF
- Polyethersulfone (PES)

CONSIDER EFFECTIVE FILTRATION AREA

The particulate contained within a fluid affects the life of a filter. As particles are removed from the fluid, they block pores and reduce the useable portion of the filter. Particulate-laden fluids plug a filter more quickly than "clean" fluids. Increasing the EFA can lengthen the life of a filter.

Filters come in a variety of sizes ranging from the area within a single well of a 96-well plate, to spin filters and syringe filters.

Acrodisc syringe filters are available in 25 mm Acrodisc PSF syringe filters as well as in 13 and 4 mm diameters for smaller sample volumes. All are available in a variety of membrane and pore size choices.

Hold-Up Volume

Another aspect of choosing the right filter size is the hold-up volume. This is the volume of liquid remaining in the filter after use. A filter with a low hold-up volume is recommended for use with expensive fluids or those with limited availability. What device size will assure complete sample filtration with minimal hold-up volumes? Pall Life Sciences offers a broad range of device sizes. The minispike outlet, available on the 13 mm device, allows for minimal sample hold-up and easy dispensing into autosampler vials. Additional options include the 4 mm Acrodisc syringe filter, the Nanosep® MF centrifugal device, and the AcroPrep™ filter plate.

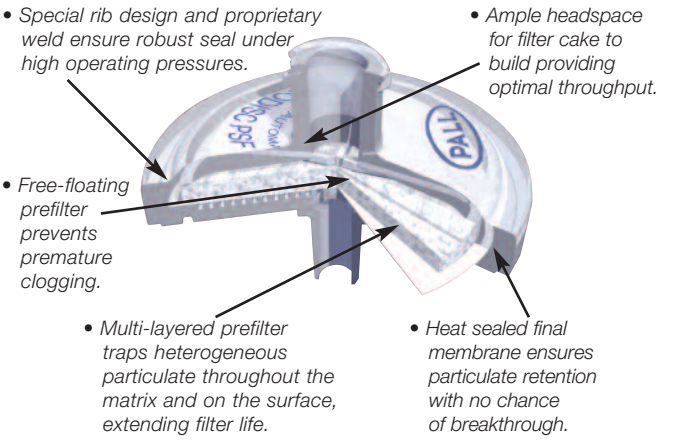
The table below outlines general guidelines to the appropriate filter size for different volumes of fluid.

Volume to be Filtered	Filter Type	Typical Hold-Up Volume
< 500 µL	Nanosep MF Device	< 2 µL
< 900 µL	AcroPrep 96 1 mL Filter Plate	< 18 µL/well
< 2 mL	4 mm Acrodisc Syringe Filter	< 10 µL
< 2 mL	AcroPrep 24 Filter Plate	< 50 µL/well
< 10 mL	13 mm Acrodisc Syringe Filter (Minispike)	< 14 µL
< 10 mL	13 mm Acrodisc Syringe Filter	< 30 µL
< 125 mL	25 mm Acrodisc PSF Syringe Filter	< 200 µL

Prefiltration

For difficult-to-filter samples, it is best to use a product with a glass fiber prefilter over the membrane. The Acrodisc PSF syringe filter with GxF multi-layered glass fiber prefilter is the best option for extremely particulate-laden samples. Our traditional Acrodisc syringe filters with GHP and nylon membranes are also available with a single layer glass fiber prefilter.

Acrodisc PSF Filter Design Extends Filter Life

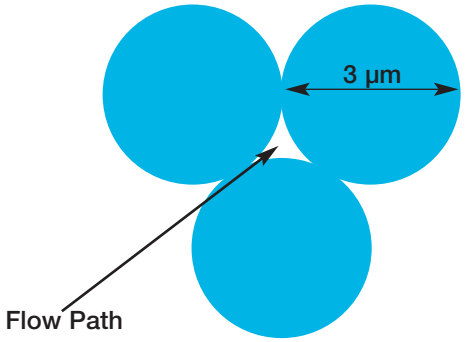


The Acrodisc PSF GxF syringe filter has a serial glass fiber (GxF) prefilter to allow for maximum throughput and faster flow rates than standard glass fiber prefilter devices. The multi-layered prefilter, rated from > 40 to 1 µm, traps particulate, thereby extending filter life.

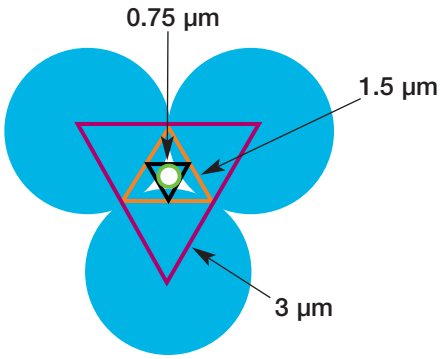
CONSIDER PORE SIZE

Assumption: it is desirable to extend the life of your HPLC column and reduce maintenance due to particulate in the pumping system; thereby giving more analyses per dollar spent.

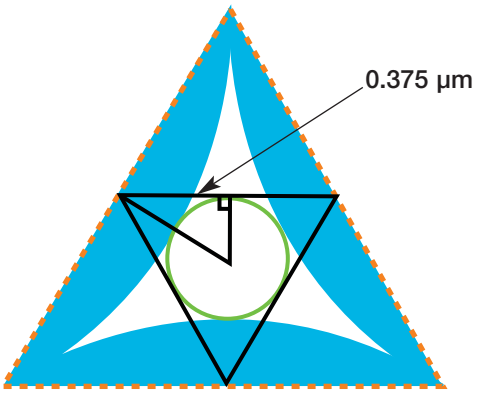
Given this assumption, the filter pore size should be determined based on the column packing size. As you can see below, the column packing particles touch each other. Ideally, you would not want contamination to fit into the space between the particles of packing. This space (labeled Flow Path) is identified below. The recommendation is to find out how large that space is and remove particles of that size.



For example, start with a 3 µm packing size and draw a few well-placed equilateral triangles as suggested in the image below. Determine the largest particle capable of fitting through the column by circumscribing an equilateral triangle with a side length of 0.75 µm.



Now enlarge the diagram and look further. Visualize a series of equilateral triangles whose side length gets down to 0.75 µm. The following image illustrates a right triangle whose short side describes the radius of the sphere. The angle is one half of 60°, or 30°. The horizontal side of this new right triangle has a length of 0.375 µm (half of 0.75 µm). Calculating the tangent of 30° gives the ratio of the length of the opposite side over the adjacent side, in this case 0.58. This means that the short side of the triangle is equal to 0.58 x 0.375 or 0.217 µm. Coincidentally, this is also the radius of the particle. So, if the column packing is 3 µm in diameter, the flow path is 0.43 µm.



When an HPLC column has a packing size of 3 µm or smaller, you should use a 0.2 µm filter because a 0.45 µm filter may let particles through that will plug the column.

Are You Concerned About Accurate Retention of Particulate?

For liquid chromatography systems using columns with larger than 3 µm packings, the filtration industry standard is 0.45 µm for syringe filters and mobile phase membranes. For columns with 3 µm or smaller packings, including UHPLC, microbore columns, or when concerned about microbial growth, a 0.2 µm filter is recommended.

Once the best pore size rating is chosen for the application, you must rely on the filter manufacturer to provide an accurate pore size rating. For more information on the importance of accurate pore size rating – and how to prolong the life of your HPLC column – please visit www.pall.com/lab and access our Literature Library online.

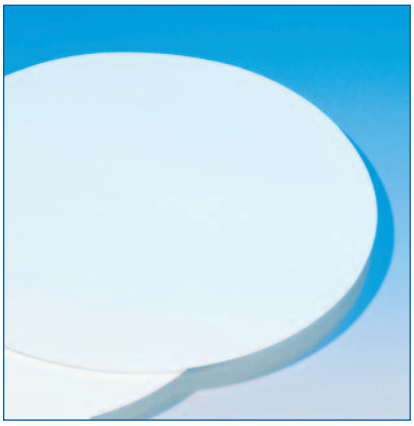
HPLC and Chromatography Sample Prep – Online Reference Library

Pall's website offers an extensive collection of product, technical, and application information. This valuable online reference library features hundreds of technical articles, posters, podcasts, application notes, and more that can help you get the most out of your process. To view the following titles online – and many others – click the Literature Library link in the left sidebar when you visit **www.pall.com/lab**.

- Acrodisc® Syringe Filters for Analytical Sample Preparation: Quality Assurance and Certifications
- Analytical Sample Prep Filters
- Certification of Pall Acrodisc PSF Syringe Filters for Use with Zymark◆ Workstations
- Chemical Compatibility Guide and Life Expectancy for the SolVac® Filter Holder
- Clarification of 0.1-1.0 mL Samples Using AcroPrep™ 96 and 384 Multi-Well Filter Plates
- Clarification of Samples (< 1 mL) by MF Filtration in Nanosep® Spin Filters
- Clarification of Samples (1-100 mL) in an Acrodisc Syringe Filter
- Exploring IC Syringe Filters
- Filtration: Preventative Maintenance for HPLC
- Getting More Life and Better Performance From Your HPLC Column
- Instantly Increase Your HPLC Column Life - Up to 46 Times
- Maintaining Analytical Integrity During Sample Preparation
- Suitability of Various Filters for Sample Preparation in Dissolution Testing, Based on Drug Binding
- Syringe Filter Efficiency and the Effect of Filtration on HPLC Column Life
- Use of Acrodisc Syringe Filters for Analytical Sample Preparation, Including HPLC and Dissolution Testing
- Using the SolVac Filter Holder for Mobile Phase Filtration

HPLC Mobile Phase Filtration Membranes

Membranes designed specifically for the stringent requirements of mobile phase filtration



- Membranes are identical in composition and quality to those used in Pall's HPLC-certified Acrodisc® syringe filters.
- HPLC certification assures that the filters will not add artifacts to your analysis.
- GH Polypro membrane is the best choice for filtering mobile phases.
- PTFE membrane provides the ultimate in chemical compatibility for filtering harsh chemicals and HPLC mobile phases.

Applications

- Purification and degassing of mobile phase solvents used in liquid chromatography applications.

Specifications

Filter Media
GH Polypro (GHP, hydrophilic polypropylene), TF (PTFE, hydrophobic polytetrafluoroethylene), PVDF (hydrophilic polyvinylidene fluoride), and Nylaflo™ (hydrophilic nylon) membranes

Pore Size
0.2 and 0.45 µm

Typical Thickness
GHP Membrane
0.2 µm: 101 µm (4.0 mils)
0.45 µm: 114 µm (4.5 mils)

TF (PTFE) Membrane
0.2 µm: 139 µm (5.5 mils)
0.45 µm: 135 µm (5.3 mils)

PVDF Membrane
0.2 µm: 140 µm (5.5 mils)
0.45 µm: 127 µm (5.0 mils)

Nylaflo Membrane
0.2 and 0.45 µm: 127 µm (5.0 mils)

Maximum Operating Temperature
GHP Membrane
55 ºC (131 ºF)

PVDF, TF (PTFE), and Nylaflo Membranes
100 ºC (212 ºF)

Minimum Bubble Point – Water
GHP Membrane
0.2 µm: 2.9 bar (290 kPa, 42 psi)
0.45 µm: 1.38 bar (138 kPa, 20 psi)

PVDF Membrane
0.2 µm: 2.3 bar (230 kPa, 34 psi)
0.45 µm: 1.1 bar (110 kPa, 16 psi)

Nylaflo Membrane
0.2 µm: 3.4 bar (340 kPa, 49 psi)
0.45 µm: 2.6 bar (260 kPa, 37 psi)

Minimum Bubble Point - IPA
TF (PTFE) Membrane
0.2 µm: 1.0 bar (100 kPa, 15 psi)
0.45 µm: 0.4 bar (40 kPa, 6 psi)

Ordering Information

HPLC Mobile Phase Filtration Membranes, 47 mm

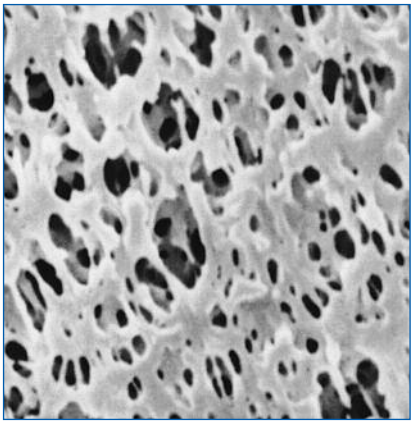
VWR #	Pall #	Description	Pkg
28140-037	66557	0.2 µm, GH Polypro (PP) membrane	100/pkg
28143-288	66548	0.45 µm, GH Polypro (PP) membrane	100/pkg
28150-021	66143	0.2 µm, TF (PTFE) membrane	100/pkg
28149-962	66149	0.45 µm, TF (PTFE) membrane	100/pkg
28149-929	66477	0.2 µm, PVDF membrane	100/pkg
28149-827	66480	0.45 µm, PVDF membrane	100/pkg
28140-040	66602	0.2 µm, Nylaflo (nylon) membrane	100/pkg
28140-141	66608	0.45 µm, Nylaflo (nylon) membrane	100/pkg

Related Products

47 mm Filter Funnels, Glass 202
SolVac® Filter Holder 180
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

GH Polypro (GHP) Membrane Disc Filters

All purpose, universal membrane with maximum chemical compatibility for both aqueous solutions and aggressive solvents



- Maximum versatility. Filters aqueous solutions or aggressive chemicals.
- Low protein binding membrane gives high recovery of critical proteinaceous samples.
- HPLC certified. Provides assurance that the filter will not add artifacts to your analysis.
- Low API adsorption.

Applications

- Our number-one choice for filtering HPLC mobile phases.
- Available in 0.2 µm for UHPLC.
- Suitable for pharmaceutical HPLC applications.

Specifications

Filter Media
Hydrophilic polypropylene

Pore Size
0.2 and 0.45 µm

Typical Thickness
0.2 µm: 101 µm (4.0 mils)
0.45 µm: 114 µm (4.5 mils)

Typical Water Flow Rate
mL/min/cm^2 at 0.7 bar
(70 kPa, 10 psi)
0.2 µm: 20
0.45 µm: 31

Maximum Operating Temperature
55 °C (131 °F)

Minimum Bubble Point - Water
0.2 µm: 2.9 bar (290 kPa, 42 psi)
0.45 µm: 1.38 bar (138 kPa, 20 psi)

Performance

GHP Membrane is Virtually a Universal Membrane for All Applications

Membrane	Proteinaceous	General Aqueous	Non-Aggressive Organic	Aggressive Organic
GHP	+ +	+ +	+ +	+ +
PTFE	–	–	+ +	+ +
PVDF	+ +	+ +	+	–
Nylon	+*	+ +	+	–

+ + Recommended
+ Suitable
– Not Recommended
* Dependent on protein type and concentration.

Ordering Information

GH Polypro (GHP) Membrane Disc Filters

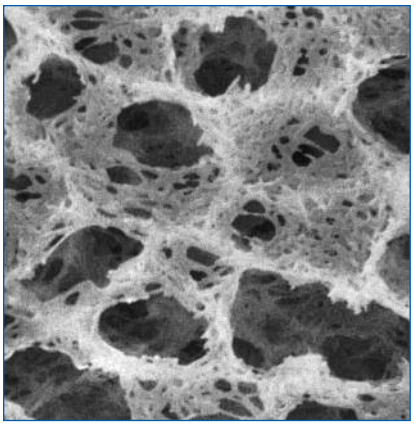
VWR #	Pall #	Description	Pkg
87003-808	60189	0.2 µm, 25 mm	100/pkg
28140-037	66557	0.2 µm, 47 mm	100/pkg
28140-164	66628	0.2 µm, 50 mm	100/pkg
28140-166	66629	0.45 µm, 13 mm	100/pkg
28143-014	66340	0.45 µm, 25 mm	100/pkg
—	66640	0.45 µm, 37 mm	100/pkg
28143-288	66548	0.45 µm, 47 mm	100/pkg
28140-160	66625	0.45 µm, 50 mm	100/pkg
28140-162	66626	0.45 µm, 90 mm	100/pkg

Related Products

47 mm Filter Funnels, Glass 202
SolVac® Filter Holder 180
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

Nylaflo™ Membrane Disc Filters

A highly versatile laboratory membrane filter



- Excellent chemical compatibility with esters, bases, and alcohols.
- Naturally hydrophilic.
- Available in 0.2 and 0.45 µm pore sizes, in diameters ranging from 13 to 142 mm.
- HPLC certified. Provides assurance that the filter will not add artifacts to your analysis.

Applications

- Useful for a wide range of applications. Offers broad chemical resistance to common solvents.
- Not recommended for acids > 1N or halogenated solvents.

Specifications

Filter Media
Hydrophilic nylon

Pore Size
0.2 and 0.45 µm

Typical Thickness
127 µm (5 mils)

Typical Water Flow Rate
mL/min/cm^2 at 0.7 bar (70 kPa, 10 psi)
0.2 µm: 12
0.45 µm: 16

Maximum Operating Temperature - Water
100 °C (212 °F)

Minimum Bubble Point - Water
0.2 µm: 3.4 bar (340 kPa, 49 psi)
0.45 µm: 2.6 bar (260 kPa, 37 psi)

Ordering Information

Nylaflo Membrane Disc Filters, 0.2 µm

VWR #	Pall #	Description	Pkg
28140-006	66600	13 mm	100/pkg
28140-028	66601	25 mm	100/pkg
28140-040	66602	47 mm	100/pkg
28140-041	66603	90 mm	100/pkg
28140-042	66604	142 mm	25/pkg

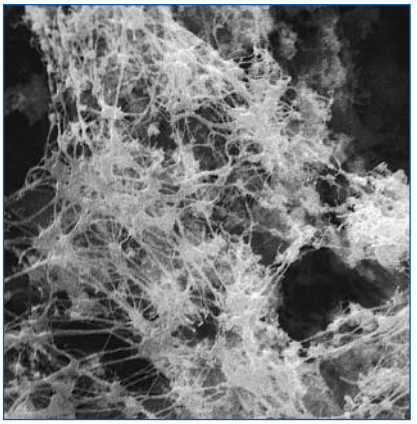
Nylaflo Membrane Disc Filters, 0.45 µm

VWR #	Pall #	Description	Pkg
28140-108	66606	13 mm	100/pkg
28140-120	66607	25 mm	100/pkg
28140-141	66608	47 mm	100/pkg
28140-044	66609	90 mm	100/pkg
28140-143	66610	142 mm	25/pkg

Related Products

PTFE Membrane Disc Filters

Strong, chemically resistant membranes for solvent and HPLC mobile phase filtration



- Low chemical background permits highly sensitive, interference-free determinations.
- Ideal for filtration of gas and/or organic solvents.

Applications

- Ultimate in chemical compatibility for filtering harsh chemicals and HPLC mobile phases that destroy other membrane materials.

Specifications

Filter Media
Hydrophobic polytetrafluoroethylene (PTFE) on a polypropylene support

Pore Size
0.2, 0.45 µm, and 1 µm

Typical Thickness
0.2 µm: 139 µm (5.5 mils)
0.45 and 1 µm: 135 µm (5.3 mils)

Typical Air Flow Rate
L/min/cm^2 at 0.7 bar (70 kPa, 10 psi)
0.2 µm: 2
0.45 µm: 3
1 µm: 7

Maximum Operating Temperature
100 ºC (212 ºF)

Minimum Bubble Point - IPA
0.2 µm: 1.0 bar (100 kPa, 15 psi)
0.45 µm: 0.4 bar (40 kPa, 6 psi)
1 µm: 0.1 bar (10 kPa, 2 psi)

Ordering Information

TF (PTFE) Membrane Disc Filters

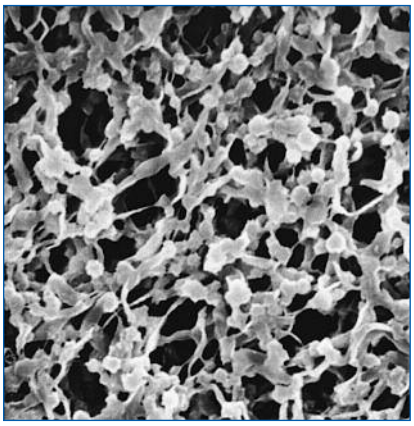
VWR #	Pall #	Description	Pkg
28150-000	66141	TF 200, 0.2 µm, 13 mm	100/pkg
28150-010	66142	TF 200, 0.2 µm, 25 mm	100/pkg
28150-021	66143	TF 200, 0.2 µm, 47 mm	100/pkg
28140-168	66630	TF 200, 0.2 µm, 50 mm	100/pkg
28150-043	66145	TF 200, 0.2 µm, 142 mm	25/pkg
28150-054	66146	TF 200, 0.2 µm, 293 mm	25/pkg
28149-951	66147	TF 450, 0.45 µm, 13 mm	100/pkg
28149-973	66148	TF 450, 0.45 µm, 25 mm	100/pkg
28149-962	66149	TF 450, 0.45 µm, 47 mm	100/pkg
28140-170	66631	TF 450, 0.45 µm, 50 mm	100/pkg
28150-056	66151	TF 450, 0.45 µm, 142 mm	25/pkg
28150-057	66152	TF 450, 0.45 µm, 293 mm	25/pkg
28150-816	66153	TF 1000, 1 µm, 13 mm	100/pkg
28150-817	66154	TF 1000, 1 µm, 25 mm	100/pkg
28150-804	66159	TF 1000, 1 µm, 37 mm, with support pads	100/pkg
28150-837	66155	TF 1000, 1 µm, 47 mm	100/pkg
—	66158	TF 1000, 1 µm, 293 mm	25/pkg

Related Products

47 mm Filter Funnels, Glass . . . 202
SolVac® Filter Holder . . . 180
Stainless Steel Forceps . . . 225, 274
Vacuum/Pressure Pumps . . . 273

PVDF Membrane Disc Filters

Compatible with aggressive and non-aggressive solvent-based solutions



- Useful for a wide range of applications including aggressive and non-aggressive solvent-based mobile phase.
- HPLC certified. Provides assurance that the filter will not add artifacts to your analysis.
- Membrane is autoclavable.

Applications

- Offers excellent chemical compatibility, even with aggressive acids and alcohols.
- Not recommended for acetone, DMF, DMSO, or bases > 6N.

Specifications

Filter Media
Hydrophilic polyvinylidene fluoride (PVDF)

Pore Size
0.2 and 0.45 µm

Typical Thickness
0.2 µm: 140 µm (5.5 mils)
0.45 µm: 127 µm (5.0 mils)

Typical Water Flow Rate
mL/min/cm^2 at 0.7 bar (70 kPa, 10 psi)
0.2 µm: 5
0.45 µm: 26

Maximum Operating Temperature - Water
100 °C (212 °F)

Minimum Bubble Point - Water
0.2 µm: 2.3 bar (230 kPa, 34 psi)
0.45 µm: 1.1 bar (110 kPa, 16 psi)

Sterilization
Provided non-sterile. Autoclavable if desired.

Ordering Information

PVDF 200 Membrane Disc Filters, 0.2 µm

VWR #	Pall #	Description	Pkg
28149-908	66475	13 mm	100/pkg
28149-909	66476	25 mm	100/pkg
28149-929	66477	47 mm	100/pkg

PVDF 450 Membrane Disc Filters, 0.45 µm

VWR #	Pall #	Description	Pkg
28149-935	66478	13 mm	100/pkg
28149-816	66479	25 mm	100/pkg
28149-827	66480	47 mm	100/pkg

Related Products

47 mm Filter Funnels, Glass 202
SolVac® Filter Holder 180
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

SolVac® Filter Holder

Magnetic filter holder simplifies clean-up and degassing of mobile phase solvents and other solutions

- Versatile design fits most HPLC bottles, flasks, and containers, and eliminates the added steps of washing flasks and transferring mobile phase solvent from flask to reservoir.
- Draws directly from HPLC solvent bottle. Less likely to spill aggressive solvents than glass funnels or disposable cups.
- Durable plastic construction is less likely to break than glass funnels, assemblies, or adapters.
- Patented magnetic seal is reliable and leak proof. Eliminates the possibility of membrane shifting or tearing which can occur with aluminum clamps or threaded holders.
- Reusable, chemically resistant polypropylene construction is resistant to common HPLC mobile phase solvents such as methanol, acetonitrile, and tetrahydrofuran.

Applications

- Remove contaminating particulate from mobile phase or other solutions.
- De-gas mobile phase solvents and solutions.
- Eliminate pour-and-wait filtration.
- Remove microbial growth every 24 hours from aqueous buffer mobile phases.

Specifications

Materials of Construction
Upper Housing, Housing Base: Polypropylene
Feedline Tubing: Ultra chemical-resistant Tygon♦, 4.8 mm (3/16 in.) ID
Thumb Clamp: Celcon♦
Feedline Sinker: PTFE
Vacuum Port Adapter, Membrane Seal Gasket, and Seal Gasket: Polyethylene

Effective Filtration Area
10.2 cm^2

Filter Size
Accepts 47 mm filter

Inlet/Outlet Connections
Tapered inlet accepts 3.2 - 6.4 mm (1/8 - 1/4 in.) ID tubing; outlet seals to bottles with openings 17.8 mm (0.7 in.) ID to 48.3 mm (1.9 in.) OD

Vacuum Port Adapter
4.8 - 7.9 mm (3/16 - 5/16 in.) tapered hose barb

Maximum Vacuum
63.5 cm Hg (25 in. Hg)

Operating Temperature
Ambient; not to exceed 38 °C (100 °F); not autoclavable

Chemical Compatibility
For detailed information about chemical compatibility by membrane type, see the Chemical Compatibility Chart on pages 286 - 287.

Ordering Information

SolVac Filter Holder

VWR #	Pall #	Description	Pkg
28145-283	4020	SolVac holder with 61 cm (2 ft.) feedline tubing, thumb clamp, sinker, vacuum port adapter, 2 membrane seal gaskets, and 2 seal gaskets	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28145-285	4022	122 cm (4 ft.) replacement feedline tubing	1/pkg
28145-287	4023	Replacement seal gaskets	10/pkg
28145-289	4025	Membrane seal gasket kit	10/pkg
28145-291	4026	Sinker replacement kit	2/pkg
28145-293	4028	Clamp replacement kit	2/pkg

Related Products

Instructions for Use

1. Place base on the receiving vessel. Place the membrane on the clean, dry filter support.

2. Attach inlet feedline tubing to the upper housing. Place upper housing onto housing base to securely seal the membrane.

3. Attach vacuum tubing from vacuum source to the vacuum port adapter on the housing base.

4. Place feedline tubing into solvent to be filtered.

5. Apply vacuum to pull liquid through the filter.

Always use a safety-coated receiving vessel that is less than 4 L and rated for vacuum applications. Failure to do so may result in implosion of the receiving vessel and potential injury to the user.

HPLC Mobile Phase Filtration Membranes

Membrane	Mobile Phase Application	Technical Information
TF (PTFE)	Recommended for use with all organic liquids	Page 178
GH Polypro (GHP, polypropylene)	Recommended for use with organic and aqueous liquids	Page 176
Nylaflo™ (nylon)	Not recommended for use with some acidic solutions	Page 177
PVDF	Not recommended for use with some basic solutions	Page 179

Acrodisc® Syringe Filters With GHP Membrane

The "universal" membrane filter for all your analytical filtration requirements

- Acrodisc PSF syringe filters are Zymark• and SOTAX• Automation Certified to ensure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Avoid the expense and inconvenience of keeping a variety of filters on hand. Versatile filter for aqueous and aggressive organic solvent-based solutions.
- Low protein binding membrane gives high recovery of critical proteinaceous samples.
- Accurate analysis. HPLC certified for low levels of UV-absorbing extractables.
- Easy filtration of particulate-laden samples with glass fiber prefilter version.
- 13 mm Acrodisc syringe filter with minispike configuration offers low hold-up and easy filtration into autosampler vials.
- Protects columns and instrumentation from particulate buildup better than other filters.

Applications

- Highly recommended for filtering HPLC samples.
- Available in 0.2 µm for UHPLC applications.
- The Acrodisc PSF GxF syringe filter provides two to four times the throughput of standard prefilter devices for particulate-laden samples.
- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART• and CTS and Zymark TPW•, APW•, and MultiDose• dissolution systems.

Specifications

Materials of Construction
Filter Media: GH Polypro membrane (GHP, hydrophilic polypropylene)
Housing: Polypropylene
GxF Prefilter: Borosilicate glass

Pore Size
GHP Membrane: 0.2 and 0.45 µm
Glass Fiber: 1 µm
GxF Prefilter: 40 - 1 µm

Effective Filtration Area
13 mm: 1.0 cm^2
25 mm PSF: 3.9 cm^2

Sample Volume
13 mm: < 10 mL
25 mm PSF: < 150 mL

Inlet/Outlet Connections
13 mm: Female luer lock inlet, minispike outlet
25 mm PSF: Female luer lock inlet, male slip luer outlet

Typical Hold-Up Volume
(with air purge)
13 mm: < 14 µL
25 mm PSF: < 125 µL
25 mm PSF GxF: < 200 µL

Maximum Operating Temperature
25 mm PSF: 55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)

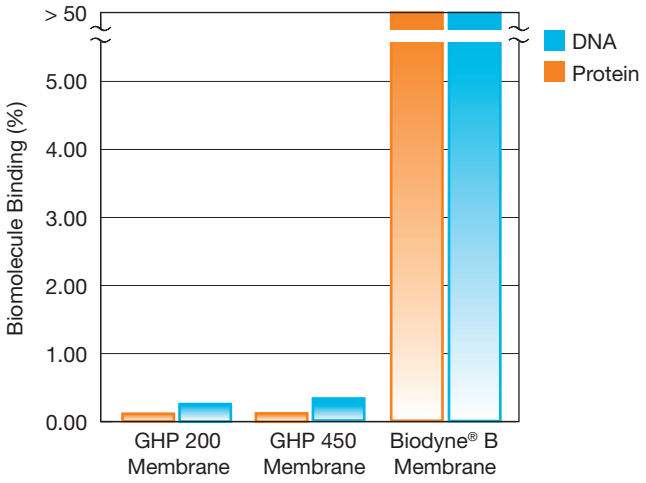
Maximum Operating Pressure
13 mm: 6.3 bar (630 kPa, 90 psi)
25 mm PSF: 4.1 bar (410 kPa, 60 psi) at 21 - 24 ºC (70 - 75 ºF)
2.1 bar (210 kPa, 30 psi) at 55 ºC (131 ºF)

Typical Water Flow Rate
mL/min at 0.7 bar (70 kPa, 10 psi)
13 mm, 0.2 µm: 17
13 mm, 0.45 µm: 28

mL/min at 2.1 bar (210 kPa, 30 psi)
25 mm PSF, 0.2 µm: 215
0.45 µm: 300
25 mm GxF/PSF, 0.2 µm: 175
0.45 µm: 195

Performance

GHP Membrane is Extremely Low in Biomolecule Binding



^{125}I-labeled BSA (1.6 µg) or ^{32}P-labeled DNA (500 ng) were diluted to 5 mL in PBS (BSA) or Tris-EDTA (DNA) and filtered through a 13 mm disc of the indicated membrane. Filtration was carried out using a 10 mL syringe at a flow rate of 1.0 mL/min.

Binding was determined by comparing the amount of radioactivity remaining in the membrane (triplicate) to the activity of the starting material by placing the disc or solution directly into scintillation cocktail and counting in a scintillation counter. Biodyne B membrane is designed for biomolecule binding and was used as a positive control.

Ordering Information

Acrodisc® Syringe Filters With GHP Membrane, 13 mm

VWR #	Pall #	Description	Pkg
28139-550	4554	0.2 µm, minispike outlet	100/pkg, 300/cs
28139-554	4567	0.2 µm, minispike outlet	1000/pkg
28143-260	4556	0.45 µm, minispike outlet	100/pkg, 300/cs
34181-050	4563	0.45 µm, minispike outlet	1000/pkg

Acrodisc Syringe Filters With GHP Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28139-548	4564	0.2 µm	50/pkg, 200/cs
28139-552	4566	0.2 µm	1000/pkg
28143-266	4560	0.45 µm	50/pkg, 200/cs
28139-450	4562	0.45 µm	1000/pkg

Acrodisc GF Syringe Filters With GHP Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-264	4559	GF/0.45 µm	50/pkg, 200/cs
28143-263	4558	GF/0.45 µm	1000/pkg

Related Products

Zymark♦ and SOTAX♦ Automation Certified Acrodisc PSF Syringe Filters With GHP Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-899	AP-4364	0.2 µm, AutoPack™ tubes	25/pkg, 200/cs
28143-272	AP-4564	0.2 µm	50/pkg, 200/cs
28143-270	AP-4566	0.2 µm	1000/pkg
28143-881	AP-4357	0.45 µm, AutoPack tubes	25/pkg, 200/cs
28143-922	AP-4560	0.45 µm	50/pkg, 200/cs
28143-888	AP-4562	0.45 µm	1000/pkg

Zymark and SOTAX Automation Certified Acrodisc PSF GxF Syringe Filters With GHP Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-875	AP-4305	GxF/0.2 µm, AutoPack tubes	25/pkg, 200/cs
28143-878	AP-4307	GxF/0.2 µm	50/pkg, 200/cs
28143-876	AP-4306	GxF/0.2 µm	1000/pkg
28143-917	AP-4557	GxF/0.45 µm, AutoPack tubes	25/pkg, 200/cs
28143-920	AP-4559	GxF/0.45 µm	50/pkg, 200/cs
28143-918	AP-4558	GxF/0.45 µm	1000/pkg

(continued)

Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

Acrodisc® Syringe Filters With PVDF Membrane

Hydrophilic membrane compatible with a wide variety of solvents

- Acrodisc PSF syringe filters are Zymark♦ and SOTAX♦ Automation Certified to assure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Useful for a wide range of applications, including aggressive and non-aggressive solvent-based mobile phase.
- Reduces experimental variables. HPLC certified for low levels of UV-absorbing extractables.
- Protects columns and instrumentation against particulate build up.
- 13 mm device with minispike configuration offers low hold-up and easy filtration into autosampler vials.

Applications

- Offers excellent chemical compatibility, even with aggressive acids and alcohols.
- Not recommended for acetone, DMF, DMSO, or bases > 6N.
- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART♦ and CTS and Zymark TPW♦, APW♦, and MultiDose♦ dissolution systems.

Specifications

Materials of Construction
Filter Media: Hydrophilic polyvinylidene fluoride (PVDF)
Housing: Polypropylene
GxF Prefilter: Borosilicate glass

Pore Size
PVDF Membrane: 0.2 and 0.45 µm
GxF Prefilter: 40 - 1 µm

Effective Filtration Area
13 mm: 1.0 cm^2
25 mm PSF: 3.9 cm^2

Sample Volume
13 mm: < 10 mL
25 mm PSF: < 150 mL

Inlet/Outlet Connections
13 and 25 mm PSF: Female luer lock inlet, male slip luer outlet
13 mm: Available with minispike outlet

Typical Hold-Up Volume
(with air purge)
13 mm (minispike): < 14 µL
13 mm (male luer): < 30 µL
25 mm PSF: < 100 µL
25 mm PSF GxF: < 125 µL

Maximum Operating Temperature
13 mm: 55 °C (131 °F)
25 mm PSF: 82 °C (180 °F) at 2.1 bar (210 kPa, 30 psi)

Maximum Operating Pressure
13 mm: 3.5 bar (350 kPa, 50 psi)
25 mm PSF: 4.1 bar (410 kPa, 60 psi) at 21 - 24 ºC (70 - 75 ºF);
2.1 bar (210 kPa, 30 psi) at 82 ºC (180 ºF)

Typical Water Flow Rate
mL/min at 3.1 bar (310 kPa, 45 psi)
13 mm, 0.2 µm: 5
13 mm, 0.45 µm: 15
mL/min at 2.1 bar (210 kPa, 30 psi)
25 mm, 0.45 µm PSF and GxF: 144

Ordering Information

Acrodisc® Syringe Filters With PVDF Membrane, 13 mm

VWR #	Pall #	Description	Pkg
28143-989	4450	0.2 µm, minispike outlet	100/pkg, 300/cs
28143-942	4544	0.2 µm, minispike outlet	1000/pkg
28143-991	4452	0.45 µm, minispike outlet	100/pkg, 300/cs
28143-938	4545	0.45 µm, minispike outlet	1000/pkg
28143-994	4455	0.2 µm, male slip luer outlet	100/pkg, 300/cs
28143-997	4457	0.45 µm, male slip luer outlet	100/pkg, 300/cs

Acrodisc Syringe Filters With PVDF Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-936	4406	0.2 µm	50/pkg, 200/cs
28143-280	4520	0.2 µm	1000/pkg
28143-247	4519	0.45 µm, AutoPack™ tubes	25/pkg, 200/cs
28143-940	4408	0.45 µm	50/pkg, 200/cs
28144-583	4500	0.45 µm	1000/pkg

Related Products

Zymark* and SOTAX* Automation Certified Acrodisc PSF Syringe Filters With PVDF Membrane, 25 mm

VWR #	Pall #	Description	Pkg
97027-960	AP-4795	0.2 µm, AutoPack tubes	25/pkg, 200/cs
97027-962	AP-4796	0.2 µm	50/pkg, 200/cs
97027-964	AP-4797	0.2 µm	1000/pkg
16003-722	AP-4519	0.45 µm, AutoPack tubes	25/pkg, 200/cs
16003-724	AP-4408	0.45 µm	50/pkg, 200/cs
16003-720	AP-4500	0.45 µm	1000/pkg

Zymark and SOTAX Automation Certified Acrodisc PSF GxF Syringe Filters With PVDF Membrane, 25 mm

VWR #	Pall #	Description	Pkg
97027-948	AP-4792	GxF/0.2 µm, AutoPack tubes	25/pkg, 200/cs
97027-950	AP-4793	GxF/0.2 µm	50/pkg, 200/cs
97027-956	AP-4794	GxF/0.2 µm	1000/pkg
16003-728	AP-4309	GxF/0.45 µm, AutoPack tubes	25/pkg, 200/cs
16003-730	AP-4310	GxF/0.45 µm	50/pkg, 200/cs
16003-726	AP-4308	GxF/0.45 µm	1000/pkg

Acrodisc® Syringe Filters With Nylon Membrane

Versatile filters for both aqueous and solvent-based sample filtration

- Acrodisc PSF syringe filters are Zymark♦ and SOTAX♦ Automation Certified to assure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Excellent chemical compatibility with esters, bases, and alcohols.
- Saves time because no prewetting is required.
- Easy filtration of particulate-laden samples with the glass fiber prefilter version.
- 13 mm device with minispike configuration offers low hold-up and easy filtration into autosampler vials.
- Prevents spurious peaks on chromatograms for accurate experimental results. HPLC certified for low levels of UV-absorbing extractables.

Applications

- The Acrodisc PSF GxF syringe filter provides two to four times the throughput of standard prefilter devices.
- Not recommended for acids > 1 N or halogenated solvents.
- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART♦ and CTS and Zymark TPW♦, APW♦, and MultiDose♦ dissolution systems.

Specifications

Materials of Construction
Filter Media: Nylon
Housing: Polypropylene
GxF Prefilter: Borosilicate glass

Pore Size
Nylon Membrane: 0.2 and 0.45 µm
GxF Prefilter: 40 - 1 µm

Effective Filtration Area
4 mm: 0.2 cm^2
13 mm: 1.0 cm^2
25 mm PSF: 3.9 cm^2

Sample Volume
4 mm: < 2 mL
13 mm: < 10 mL
25 mm PSF: < 150 mL

Inlet/Outlet Connections
4, 13, and 25 mm PSF: Female luer lock inlet, male slip luer outlet
13 mm: Available with minispike outlet

Typical Hold-Up Volume
(with air purge)
4 mm: < 10 µL
13 mm (minispike): < 14 µL
13 mm (male luer): < 30 µL
25 mm PSF: < 125 µL
25 mm PSF GxF: < 150 µL

Maximum Operating Temperature
55 °C (131 °F) at 2.1 bar
(210 kPa, 30 psi)

Maximum Operating Pressure
4 mm: 5.2 bar (520 kPa, 75 psi)
13 mm: 6.9 bar (690 kPa, 100 psi)
25 mm PSF: 4.1 bar (410 kPa, 60 psi) at 21 - 24 ºC (70 - 75 ºF); 2.1 bar (210 kPa, 30 psi) at 55 ºC (131 ºF)

Typical Water Flow Rate
mL/min at 2.1 bar (210 kPa, 30 psi)
13 mm, 0.2 µm: 10
13 mm, 0.45 µm: 15
25 mm PSF, 0.2 µm: 115
0.45 µm: 245
25 mm PSF GxF/0.45 µm: 215

Ordering Information

Acrodisc® Syringe Filter With Nylon Membrane, 4 mm

VWR #	Pall #	Description	Pkg
28144-031	4484	0.45 µm	250/pkg, 750/cs

Acrodisc Syringe Filters With Nylon Membrane, 13 mm

VWR #	Pall #	Description	Pkg
28143-250	4550	0.2 µm, minispike outlet	100/pkg, 300/cs
—	4561	0.2 µm, minispike outlet	1000/pkg
28143-252	4551	0.45 µm, minispike outlet	100/pkg, 300/cs
34181-048	4546	0.45 µm, minispike outlet	1000/pkg

Acrodisc Syringe Filters With Nylon Membrane, 13 mm

VWR #	Pall #	Description	Pkg
28143-985	4427	0.2 µm, male slip luer outlet	100/pkg, 300/cs
28143-242	4540	0.2 µm, male slip luer outlet	1000/pkg
28143-984	4426	0.45 µm, male slip luer outlet	100/pkg, 300/cs
28143-240	4541	0.45 µm, male slip luer outlet	1000/pkg

Acrodisc Syringe Filters With Nylon Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-946	4436	0.2 µm	50/pkg, 200/cs
28144-592	4522	0.2 µm	1000/pkg
28143-243	4517	0.45 µm, AutoPack™ tubes	25/pkg, 200/cs
28143-948	4438	0.45 µm	50/pkg, 200/cs
28144-588	4502	0.45 µm	1000/pkg

Acrodisc GF Syringe Filters With Nylon Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-284	4548	GF/0.45 µm, AutoPack tubes	25/pkg, 200/cs
28143-286	4549	GF/0.45 µm	50/pkg, 200/cs
28139-304	4528	GF/0.45 µm	1000/pkg

Zymark♦ and SOTAX♦ Automation Certified Acrodisc PSF Syringe Filters With Nylon Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-277	AP-4437	0.2 µm, AutoPack tubes	25/pkg, 200/cs
28143-274	AP-4436	0.2 µm	50/pkg, 200/cs
28143-278	AP-4522	0.2 µm	1000/pkg
28143-901	AP-4517	0.45 µm, AutoPack tubes	25/pkg, 200/cs
28143-882	AP-4438	0.45 µm	50/pkg, 200/cs
28143-886	AP-4502	0.45 µm	1000/pkg

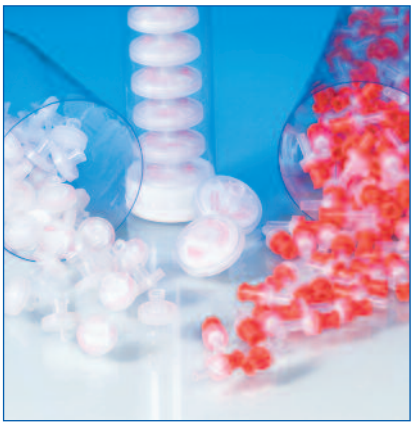
Zymark and SOTAX Automation Certified Acrodisc PSF GxF Syringe Filters With Nylon Membrane, 25 mm

VWR #	Pall #	Description	Pkg
97027-936	AP-4786	GxF/0.2 µm, AutoPack tubes	25/pkg, 200/cs
97027-938	AP-4787	GxF/0.2 µm	50/pkg, 200/cs
97027-940	AP-4788	GxF/0.2 µm	1000/pkg
28143-915	AP-4548	GxF/0.45 µm, AutoPack tubes	25/pkg, 200/cs
28143-910	AP-4549	GxF/0.45 µm	50/pkg, 200/cs
28143-912	AP-4528	GxF/0.45 µm	1000/pkg

Related Products

Acrodisc® Syringe Filters With PTFE Membrane

Exceptional chemical and temperature compatibility



- Acrodisc PSF syringe filters are Zymark• and SOTAX• Automation Certified to assure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Ideal for filtration of gas and/or organic solvents.
- Prevents spurious peaks on chromatograms for accurate experimental results. HPLC certified for low levels of UV-absorbing extractables.
- Prevents "air bubble" lock when filling sample vials with 13 mm minispike outlet.
- 4 mm device offers the lowest sample hold-up (< 10 µL) and is useful for samples up to 2 mL in volume.

Applications

- Ultimate in chemical compatibility for filtering harsh chemicals that destroy other membrane materials.
- The Acrodisc PSF GxF syringe filter provides two to four times the throughput of standard prefilter devices.
- Moisture barrier for venting applications.
- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART• and CTS and Zymark TPW•, APW•, and MultiDose• dissolution systems.

Specifications

Materials of Construction
Filter Media: Hydrophobic PTFE membrane on a polypropylene support
Housing: Polypropylene
GxF Prefilter: Borosilicate glass

Pore Size
PTFE Membrane: 0.2 and 0.45 µm
GxF Prefilter: 40 - 1 µm

Effective Filtration Area
4 mm: 0.2 cm^2
13 mm: 1.0 cm^2
25 mm PSF: 3.9 cm^2

Sample Volume
4 mm: < 2 mL
13 mm: < 10 mL
25 mm PSF: < 150 mL

Inlet/Outlet Connections
4, 13, and 25 mm PSF: Female luer lock inlet, male slip luer outlet
13 mm: Available with minispike outlet

Typical Hold-Up Volume
(with air purge)
4 mm: < 10 µL
13 mm (minispike): < 14 µL
13 mm (male luer): < 30 µL
25 mm PSF: < 125 µL

Typical Liquid Flow Rate (MeOH)
mL/min at 1.0 bar (100 kPa, 15 psi)
25 mm PSF, 0.2 µm: 245
25 mm PSF, 0.45 µm: 510
25 mm PSF, GxF/0.45 µm: 395

Maximum Operating Temperature
100 °C (212 °F) at 2.1 bar (210 kPa, 30 psi)

Maximum Operating Pressure
4 mm: 5.2 bar (520 kPa, 75 psi)
13 mm: 6.9 bar (690 kPa,100 psi)
25 mm PSF: 4.1 bar (410 kPa, 60 psi) at 21 - 24 ºC (70 - 75 ºF);
2.1 bar (210 kPa, 30 psi) at 100 ºC (212 ºF)

Sterilization of 25 mm Filters
Provided non-sterile. If desired, autoclave at 121- 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for a maximum of 15 min.

Ordering Information

Acrodisc® Syringe Filter With PTFE Membrane, 4 mm

VWR #	Pall #	Description	Pkg
28143-978	4472	0.45 µm	250/pkg, 750/cs

Acrodisc Syringe Filters With PTFE Membrane, 13 mm

VWR #	Pall #	Description	Pkg
28143-254	4552	0.2 µm, minispike outlet	100/pkg, 300/cs
28143-256	4553	0.45 µm, minispike outlet	100/pkg, 300/cs
28139-556	4555	0.45 µm, minispike outlet	1000/pkg

Acrodisc Syringe Filters With PTFE Membrane, 13 mm

VWR #	Pall #	Description	Pkg
28143-982	4423	0.2 µm, male slip luer outlet	100/pkg, 300/cs
28143-930	4542	0.2 µm, male slip luer outlet	1000/pkg
28143-981	4422	0.45 µm, male slip luer outlet	100/pkg, 300/cs
28143-931	4543	0.45 µm, male slip luer outlet	1000/pkg

Acrodisc Syringe Filters With PTFE Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-926	4225	0.2 µm	50/pkg, 200/cs
28144-593	4521	0.2 µm	1000/pkg
28143-245	4518	0.45 µm, AutoPack™ tubes	25/pkg, 200/cs
28143-924	4219	0.45 µm	50/pkg, 200/cs
28144-584	4501	0.45 µm	1000/pkg
28143-928	4226	1 µm	50/pkg, 200/cs
28100-062	4503	1 µm	1000/pkg

Related Products

Zymark♦ and SOTAX♦ Automation Certified Acrodisc PSF Syringe Filters With PTFE Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-390	AP-4520	0.2 µm, AutoPack tubes	25/pkg, 200/cs
28143-384	AP-4225	0.2 µm	50/pkg, 200/cs
28143-392	AP-4521	0.2 µm	1000/pkg
28143-903	AP-4518	0.45 µm, AutoPack tubes	25/pkg, 200/cs
28143-866	AP-4219	0.45 µm	50/pkg, 200/cs
28143-884	AP-4501	0.45 µm	1000/pkg

Zymark and SOTAX Automation Certified Acrodisc PSF GxF Syringe Filters With PTFE Membrane, 25 mm

VWR #	Pall #	Description	Pkg
97027-942	AP-4789	GxF/0.2 µm, AutoPack tubes	25/pkg, 200/cs
97027-944	AP-4790	GxF/0.2 µm	50/pkg, 200/cs
97027-946	AP-4791	GxF/0.2 µm	1000/pkg
28143-869	AP-4301	GxF/0.45 µm, AutoPack tubes	25/pkg, 200/cs
28143-872	AP-4303	GxF/0.45 µm	50/pkg, 200/cs
28143-870	AP-4302	GxF/0.45 µm	1000/pkg

Ion Chromatography (IC) Acrodisc® Syringe Filters

Optimized to provide the most consistent results when analyzing ionic species

- Acrodisc PSF syringe filters are Zymark• and SOTAX• Automation Certified to assure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Accurate results for the most sensitive analysis of ionic species. Certified for low levels of extractables detected by conductivity.
- High flow rates with optimized Supor® polyethersulfone membrane.
- Conforms to quality release criteria for ion chromatography (IC) extractables.
- Convenient sizes for small sample volumes.

Applications

- Specifically designed for IC applications.
- Excellent filter selection for dissolution samples.
- Low drug and protein binding for pharmaceutical filtration.
- Supor (IC) membrane discs are recommended for aqueous samples only.
- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART• and CTS and Zymark TPW•, APW•, and MultiDose• dissolution systems.

Specifications

Materials of Construction
Filter Media: Supor [hydrophilic polyethersulfone (PES)] membrane
Housing: Polypropylene

Pore Size
0.2 and 0.45 µm

Effective Filtration Area
13 mm: 1.0 cm^2
25 mm PSF: 3.9 cm^2

Sample Volume
13 mm: < 10 mL
25 mm PSF: < 150 mL

Inlet/Outlet Connections
Female luer lock inlet, male slip luer outlet

Typical Hold-Up Volume
(with air purge)
13 mm: < 30 µL
25 mm PSF: < 125 µL

Maximum Operating Temperature
13 mm: 55 °C (131 °F)
25 mm PSF: 100 ºC (212 ºF) at 2.1 bar (210 kPa, 30 psi)

Maximum Operating Pressure
13 mm: 6.9 bar (690 kPa, 100 psi)
25 mm PSF: 4.1 bar (410 kPa, 60 psi) at 21 - 24 ºC (70 - 75 ºF);
2.1 bar (210 kPa, 30 psi) at 100 ºC (212 ºF)

Typical Water Flow Rate
mL/min at 1.0 bar (100 kPa, 15 psi)
13 mm, 0.2 µm: 15
13 mm, 0.45 µm: 20

mL/min at 2.1 bar (210 kPa, 30 psi)
25 mm, 0.45 µm PSF: 420

Performance

Ion Chromatography Certification

Pall Life Sciences certifies that the maximum allowable levels of extractables from the filter are 50 ppb of Cl^-, NO_3^-, and SO_4^{-2}. Data shows that the actual background levels found are typically less than 20 ppb for chloride, 6 ppb for nitrate, 1 ppb for phosphate, and 10 ppb for sulfate. This is based on 2 mL of H_2O filtrate being concentrated on-line and injected into an ion chromatograph with conductivity detection.

Ordering Information

Ion Chromatography Acrodisc® Syringe Filters, 13 mm

VWR #	Pall #	Description	Pkg
28144-030	4483	0.2 µm	100/pkg, 300/cs
34181-034	4683	0.2 µm	1000/pkg
28144-032	4485	0.45 µm	100/pkg, 300/cs
34181-032	4685	0.45 µm	1000/pkg

Ion Chromatography (PES) Acrodisc Syringe Filters, 25 mm

VWR #	Pall #	Description	Pkg
28143-290	4583	0.2 µm	50/pkg 200/cs
34181-074	4783	0.2 µm	1000/pkg
28143-292	4585	0.45 µm	50/pkg 200/cs
34181-052	4785	0.45 µm	1000/pkg

Related Products

Zymark♦ and SOTAX♦ Automation Certified Ion Chromatography Acrodisc PSF Syringe Filters, 25 mm

VWR #	Pall #	Description	Pkg
97027-966	AP-4801	0.2 µm AutoPack™ tubes	25/pkg, 200/cs
97027-968	AP-4802	0.2 µm	50/pkg, 200/cs
97027-970	AP-4803	0.2 µm	1000/pkg
28143-893	AP-4587	0.45 µm AutoPack tubes	25/pkg, 200/cs
28143-890	AP-4585	0.45 µm	50/pkg, 200/cs
28143-894	AP-4785	0.45 µm	1000/pkg

Acrodisc® Syringe Filters With Versapor® Membrane

Meets all prefiltration and clarification requirements

- Acrodisc PSF syringe filters are Zymark♦ and SOTAX♦ Automation Certified to assure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Meets aqueous sample filtration needs.

Applications

- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART♦ and CTS and Zymark TPW♦, APW♦, and MultiDose♦ dissolution systems.
- Useful for prefiltration of particulate-laden samples, serum filtration, and dissolution testing.
- Protects instrumentation against particulate build up.

Specifications

Materials of Construction
Filter Media: Versapor membrane (acrylic copolymer on a non-woven support)
Housing: Polypropylene

Pore Size
0.45, 0.8, and 10 µm

Effective Filtration Area
4 mm: 0.2 cm^2
13 mm: 1.0 cm^2
25 mm PSF: 3.9 cm^2

Inlet/Outlet Connections
Female luer lock inlet, male slip luer outlet

Typical Hold-Up Volume
(with air purge)
4 mm: < 7.5 µL
13 mm: < 28 µL
25 mm PSF: < 125 µL

Maximum Operating Temperature
0.8 µm: 55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)
10 µm: 82 ºC (180 ºF) at 2.1 bar (210 kPa, 30 psi)

Maximum Operating Pressure
4 and 13 mm: 5.2 bar (520 kPa, 75 psi)
25 mm PSF: 4.1 bar (410 kPa, 60 psi) at 21 - 24 ºC (70 - 75 ºF)

Typical Water Flow Rate
mL/min at 3.1 bar (310 kPa, 45 psi)
4 mm, 0.45 µm: 3
13 mm, 0.8 µm: 180
25 mm PSF, 0.8 µm: 905

mL/min at 1.0 bar (100 kPa, 15 psi)
25 mm PSF, 10 µm: 1182

Ordering Information

Acrodisc Syringe Filters With Versapor Membrane, 4 and 13 mm

VWR #	Pall #	Description	Pkg
28143-975	4473	0.45 µm, 4 mm	250/pkg, 750/cs
28143-998	4459	0.8 µm, 13 mm	100/pkg, 300/cs

Zymark and SOTAX Automation Certified
Acrodisc PSF Syringe Filters With Versapor Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-382	AP-4190	0.8 µm, AutoPack tubes	25/pkg, 200/cs
28143-280	AP-4189	0.8 µm	50/pkg, 200/cs
28143-394	AP-4568	0.8 µm	1000/pkg
16003-732	AP-4000	10 µm, AutoPack tubes	25/pkg, 200/cs
16003-734	AP-4001	10 µm	50/pkg, 200/cs
16003-736	AP-4002	10 µm	1000/pkg

Related Products

PALL Life Sciences

Acrodisc® Syringe Filters With HT Tuffryn® Membrane

Proven performance

- Acrodisc PSF syringe filters are Zymark• and SOTAX• Automation Certified to assure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Reliable filter for dilute biological fluids.
- Available non-sterile for analytical preparation of biologicals.
- Low protein binding.

Applications

- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART• and CTS and Zymark TPW•, APW•, and MultiDose• dissolution systems.
- Useful for preparation of biological samples for HPLC or FPLC.
- For general aqueous samples.

Specifications

Materials of Construction
Filter Media: HT Tuffryn membrane (polysulfone)
Housing: Polypropylene

Effective Filtration Area
3.9 cm^2

Inlet/Outlet Connections
Female luer lock inlet, male slip luer outlet

Typical Hold-Up Volume
(with air purge)
< 125 µL

Maximum Operating Temperature
25 mm: 55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)

Maximum Operating Pressure
4.1 bar (410 kPa, 60 psi) at 21 - 24 ºC (70 - 75 ºF)

Typical Water Flow Rate
mL/min at 3.1 bar (310 kPa, 45 psi): 390

Ordering Information

Zymark and SOTAX Automation Certified
Acrodisc PSF Syringe Filters With HT Tuffryn Membrane, 25 mm

VWR #	Pall #	Description	Pkg
28143-388	AP-4498	0.45 µm, AutoPack tubes	25/pkg, 200/cs
28143-386	AP-4497	0.45 µm	50/pkg, 200/cs
28143-396	AP-4784	0.45 µm	1000/pkg

Related Products

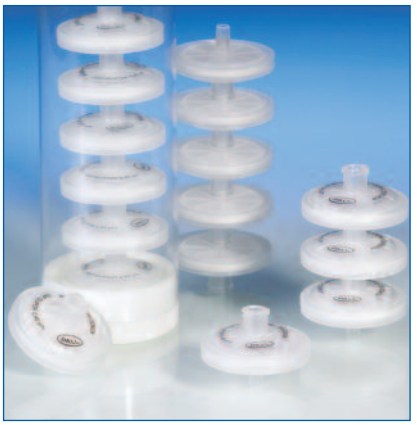
47 mm Filter Funnels, Glass . . . 202
HT Tuffryn Polysulfone Membrane Disc Filters . . . 110
SolVac® Filter Holder . . . 180
Stainless Steel Forceps . . . 225, 274
Vacuum/Pressure Pumps . . . 273

Acrodisc® Syringe Filters With Supor® Membrane

Universal life science membrane for general aqueous samples

NEW PRODUCT

Zymark AND SOTAX AUTOMATION CERTIFIED



- Acrodisc PSF syringe filters are Zymark♦ and SOTAX♦ Automation Certified to assure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Superior flow rates and higher throughputs than competitive devices.
- Low protein binding to minimize sample loss.
- Acrodisc PSF syringe filters feature unique built-in prefilter for increased throughput of difficult-to-filter liquids.

Applications

- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART♦ and CTS and Zymark TPW♦, APW♦, and MultiDose♦ dissolution systems.
- Widely used in dissolution testing.
- Larger pore size filters are used for prefiltration and particulate removal.
- > 0.8 µm pore sizes are excellent for difficult-to-filter dissolution samples.

Related Products

Supor PES Membrane Disc Filters 109
47 mm Filter Funnels, Glass 202
SolVac® Filter Holder 180
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps.....273

Specifications

Materials of Construction
Filter Media: Supor membrane (hydrophilic polyethersulfone)
GxF Prefilter: Borosilicate glass
Housing:
25 mm PSF: Polypropelene
32 mm: Modified acrylic

Pore Size
Supor Membrane: 0.2, 0.45, 1.2, and 5 µm
GxF Prefilter: 40 - 1 µm

Effective Filtration Area
25 mm PSF: 3.9 cm^2
32 mm: 5.8 cm^2

Inlet/Outlet Connections
Female luer lock inlet, male slip luer outlet

Typical Hold-Up Volume
(with air purge)
25 mm PSF GxF: ≤ 200 µL
32 mm: ≤ 100 µL

Maximum Operating Temperature
25 mm PSF GxF: 100 °C (212 °F) at 2.1 bar (210 kPa, 30 psi)
32 mm: 55 °C (131 °F)

Maximum Operating Pressure
25 mm PSF GxF: 4.1 bar (410 kPa, 60 psi) at 21 - 24 °C (70 - 75 °F); 2.1 bar (210 kPa, 30 psi) at 100 °C (212 °F)
32 mm: 5.2 bar (520 kPa, 75 psi)

Typical Water Flow Rate
mL/min at 2.1 bar (210 kPa, 30 psi)
25 mm PSF, GxF/0.45 µm: 360

mL/min at 3.1 bar (310 kPa, 45 psi)
32 mm, 0.2 µm: 490
32 mm, 0.45 µm: 560
32 mm, 0.8/0.2 µm: 440
32 mm, 1.2 µm: 1700
32 mm, 5 µm: 1750

Ordering Information

Zymark and SOTAX Automation Certified
Acrodisc PSF GxF Syringe Filters With Supor Membrane, 25 mm

VWR #	Pall #	Description	Pkg
97027-952	AP-4798	GxF/0.2 µm AutoPack Tubes	25/pkg, 200/cs
97027-954	AP-4799	GxF/0.2 µm	50/pkg, 200/cs
97027-958	AP-4800	GxF/0.2 µm	1000/pkg
28143-370	AP-4424	GxF/0.45 µm AutoPack Tubes	25/pkg, 200/cs
28143-372	AP-4425	GxF/0.45 µm	50/pkg, 200/cs
28143-374	AP-4426	GxF/0.45 µm	1000/pkg

Acrodisc Syringe Filters With Supor Membrane, 32 mm (Bulk Packaging)

VWR #	Pall #	Description	Pkg
34181-088	4655	0.2 µm, modified acrylic housing	1000/pkg
34181-086	4653	0.45 µm, modified acrylic housing	1000/pkg
28139-710	4659	0.8/0.2 µm, modified acrylic housing	1000/pkg
28143-046	4661	1.2/0.45 µm, modified acrylic housing	1000/pkg
28143-044	4660	1.2 µm, modified acrylic housing	1000/pkg
97035-178	4662	5 µm, modified acrylic housing	1000/pkg

Acrodisc® Syringe Filters With Glass Fiber

Maximize throughput for hard-to-filter samples

- Acrodisc PSF syringe filters are Zymark♦ and SOTAX♦ Automation Certified to assure smooth operation and worry-free performance 24 hours a day in automated workstations.
- Available with GxF multi-layered glass fiber prefilter, providing two to four times the throughput of standard glass fiber prefilter devices, and allowing quick and easy filtration of your most difficult-to-filter samples.
- Reduces clogging. Use alone or in series with final membrane filter to increase flow rate and throughput.
- Ensures broad chemical compatibility with polypropylene housing.

Applications

- For high throughput prefiltration of particulate-laden samples.
- Can be used alone or in series with another Acrodisc syringe filter.
- 25 mm Acrodisc PSF syringe filter is available in robotic-compatible AutoPack™ packaging for SOTAX AT-70 SMART♦ and CTS and Zymark TPW♦, APW♦, and MultiDose♦ dissolution systems.
- Removes particulate that interferes with UV/VIS spectrophotometric analysis.

Specifications

Materials of Construction
Filter Media: Borosilicate glass fiber
Housing: Polypropylene

Pore Size
40 - 1 µm

Effective Filtration Area
3.9 cm^2

Sample Volume
< 150 mL

Inlet/Outlet Connections
Female luer lock inlet, male slip luer outlet

Typical Hold-Up Volume
(with air purge)
< 125 µL

Maximum Operating Temperature
82 °C (180 °F) at 2.1 bar (210 kPa, 30 psi)

Maximum Operating Pressure
4.1 bar (410 kPa, 60 psi) at 21 - 24 °C (70 - 75 °F);
2.1 bar (210 kPa, 30 psi) at 82 °C (180 °F)

Typical Water Flow Rate
795 mL/min at 1.0 bar (100 kPa, 15 psi)

Ordering Information

Acrodisc Syringe Filters With Glass Fiber, 25 mm

VWR #	Pall #	Description	Pkg
28143-282	4527	1 µm (nominal), AutoPack tubes	25/pkg, 200/cs
28143-986	4523	1 µm (nominal)	50/pkg, 200/cs
34181-092	4529	1 µm (nominal)	1000/pkg

Zymark and SOTAX Automation Certified
Acrodisc PSF GxF Syringe Filters With Glass Fiber, 25 mm

VWR #	Pall #	Description	Pkg
28143-907	AP-4527	GxF/Glass, AutoPack tubes	25/pkg, 200/cs
28143-904	AP-4523	GxF/Glass	50/pkg, 200/cs
28143-908	AP-4529	GxF/Glass	1000/pkg

Related Products

47 mm Filter Funnels, Glass . . . 202
HPLC Mobile Phase Filtration Membranes . . . 175
SolVac® Filter Holder . . . 180
Stainless Steel Forceps . . . 225, 274
Vacuum/Pressure Pumps . . . 273

AcroPrep™ 24 Filtration System

Eliminates the time-consuming, one-at-a-time syringe filter process by simultaneously filtering up to 24 samples in seconds

- Reduces labor time by 20 minutes per carousel over the conventional syringe filter technique.
- No need to use cumbersome, individually wrapped, disposable syringes. Use disposable pipette tips which are less costly, easier to use, and require less bench space.
- Designed for use with Waters Alliance® HPLC systems.
- Pall's HPLC certification ensures that analytical results will not be compromised by extractable filter material.
- No cross-contamination. Each 1.9 mL well is individually sealed, ensuring your sample will accurately dispense into the Waters Alliance sample carousel* with no cross-contamination or splashing.
- Materials of construction are identical to Pall's Acrodisc® syringe filters; if you are currently using Acrodisc syringe filters, this will reduce the requirements for validation of the AcroPrep 24 filter plates.
- Can be used with any conventional 12 x 32 mm vials; simply transfer your filtered samples from the Waters Alliance sample carousel to any HPLC sample carousel that houses 12 x 32 mm vials and save both time and labor.
- Can be used to process fewer than 24 samples. Simply label used wells or isolate unused wells with parafilm for application at a later time.

Applications

- Ideal for use with HPLC sample preparation.

Specifications

Materials of Construction
Filter Media: GH Polypro (GHP, hydrophilic polypropylene), nylon, PTFE, and PVDF membranes
Housing: Polypropylene

Pore Size
0.2 and 0.45 µm

Effective Filtration Area/Well
0.94 cm^2

Filter Plate Diameter
15.24 cm (6.0 in.) plate containing 24 wells

Outlet Connections
Minispike outlet

Maximum Well Volume
1.9 mL

Recommended Sample Volume
1.7 mL

Typical Hold-Up Volume/Well
< 50 µL

Operating Temperature Range
18 - 27 °C (64 - 80 °F); ambient

Maximum Vacuum
56.0 cm Hg (22 in. Hg)

Chemical Compatibility
For detailed information about chemical compatibility by membrane type, see the Chemical Compatibility Chart on pages 286 - 287.

Performance

The AcroPrep 24 Filtration System Saves Time and Materials

Syringe Filter Technique	AcroPrep 24 Filtration System
24 disposable syringes + 24 syringe filters	24 disposable pipette tips + 1 AcroPrep 24 filter plate
25 minutes	**5 minutes**

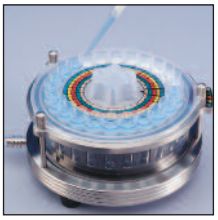
*The Waters Alliance 2690 Sample Carousel kit (PN WAT270328) can be ordered directly from your local Waters sales office or contact Waters Corporation at 800-252-4752 (in the USA) or 508-478-2000.

Instructions for Use

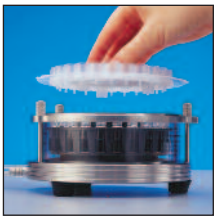
The AcroPrep™ 24 Filtration System operates by vacuum. Conventional lab pumps such as Pall Life Sciences' 115 V (PN 13157) or 230 V (PN 13158) Vacuum/Pressure pumps are ideal for use. For maximum convenience, we recommend the use of snap-cap vials to eliminate the need to remove vials for screw capping after filtration.

1. *Attach vacuum hose to the connector on the base.*
2. *Place the Alliance® sample carousel with empty 2 mL vials into the manifold.*

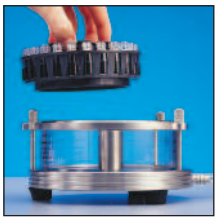
3. *Place the filter plate onto the manifold. The filter plate has a numerically-sequenced label that matches the carousel's sample numbers.*



4. *Pipette 1.7 mL (1,700 µL) of sample into each of the filter wells.*
5. *Apply vacuum.*



6. *Allow vacuum to run until all wells are evacuated.*
7. *Shut off vacuum source. Dispose of filter plate.*



8. *Cap sample vials and place the sample carousel into the Waters Alliance HPLC system or simply transfer the vials to any HPLC sample carousel that houses 12 x 32 mm vials.*

The cleanliness of the AcroPrep filter plate results in very low levels of extractables, therefore eliminating the need to pre-rinse the filter.

Ordering Information

AcroPrep 24 Filtration System Manifold

VWR #	Pall #	Description	Pkg
28143-020	289000159	Filtration manifold	1/pkg

AcroPrep 24 Filter Plates

VWR #	Pall #	Description	Pkg
28143-016	186000158	0.2 µm, GHP membrane	10/pkg
28143-030	600000158	0.45 µm, GHP membrane	2/pkg
28143-022	186000154	0.45 µm, GHP membrane	10/pkg
87003-889	186000154P	0.45 µm, GxF/GHP membrane	10/pkg
28143-018	186000159	0.2 µm, nylon membrane	10/pkg
28143-024	186000155	0.45 µm, nylon membrane	10/pkg
28143-026	186000156	0.45 µm, PTFE membrane	10/pkg
28143-028	186000157	0.45 µm, PVDF membrane	10/pkg

Related Products

47 mm Filter Funnels, Glass 202
SolVac® Filter Holder 180
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28140-954	13157	Vacuum/Pressure pump, 115 V	1/pkg
28140-956	13158	Vacuum/Pressure pump, 230 V CE	1/pkg
28143-032	700000231	Glass housing for filtration manifold	1/pkg
28143-034	700000232	O-ring kit	3/pkg
28143-036	700000233	Rubber feet	3/pkg
28143-038	700000234	Manifold alignment post	3/pkg

Vacuum General Information

- Do not exceed a vacuum level of 56.0 cm (22 in.) Hg.
- Allow vacuum to run until all filter wells are evacuated. Continue running vacuum for 10 to 20 seconds to eliminate potential dripping of samples from tips when plate is removed.

How to Choose a Centrifugal Device for HPLC

Nanosep® MF, Microsep™ Advance, and Macrosep® Advance centrifugal devices are ideal for particulate removal prior to sample analysis. Designed to rapidly process small- to medium-volume samples, these spin filters are simple to use and can save on sample preparation time.

Pall's Nanosep MF centrifugal devices are certified to be low in UV extractables and feature low hold-up volumes (< 5 µL). Their high g-force ratings allow them to be spun at up to 14,000 x g, resulting in rapid sample processing. Designed with a unique sealing technology, Pall's centrifugal devices assure leak-free operation without the use of O-rings or adhesives that can add extractables. For HPLC/UHPLC applications, GHP membrane (Nanosep MF) and Supor® membrane (Microsep Advance and Macrosep Advance) deliver low protein binding and decreased processing time for high recovery rates.

An added benefit of Pall's centrifugal devices is their ease of use. Each filter is color-coded by retention level and laser etched for easy identification. The sample to be processed is pipetted into the upper reservoir of the device. The device is then placed into the appropriate centrifuge (taking care that the rotor is balanced) and spun at the desired rate. Filtrate can be recovered by removing the lower reservoir of the device and using a pipette or pipette tip to remove the liquid.

Match Device Size to Sample Volume

After choosing membrane and pore size rating, the next consideration in selecting the correct centrifugal device is the volume of starting material. Pall's centrifugal devices are available in a range of sizes to accommodate your specific sample volumes.

Device	Retention	Sample Volume
Nanosep MF	0.45 µm, clear	< 0.5 mL
Microsep Advance	0.2 µm, aqua	0.5 - 5 mL
Microsep Advance	0.45 µm, wildberry	0.5 - 5 mL
Macrosep Advance	0.2 µm, aqua	5 - 20 mL
Macrosep Advance	0.45 µm, wildberry	5 - 20 mL

Nanosep® MF Centrifugal Devices With GHP Membrane

Ideal for particulate removal, especially when sample recovery is a concern

- Rapid processing of samples. Centrifugal devices are simple to use and save on sample preparation time. Spin multiple samples at once!
- Universal membrane filter. The GHP hydrophilic polypropylene membrane is ideal for aqueous solutions and offers maximum chemical compatibility for aggressive solvents.
- GHP membrane is a low protein binding membrane. It removes unwanted particulate from samples with high recovery of critical proteins.
- Low extractables. Our HPLC-grade centrifugal devices are certified to be low in UV extractables.
- Low hold-up volume (< 5 µL) makes these devices ideal for expensive samples.
- High g-force ratings. Can be spun at 14,000 x g for confident rapid sample processing.
- Leak-free operation. Unique sealing technology assures leak-free operation without the use of O-rings or adhesives that can add extractables.
- Constructed of low binding polypropylene.
- Fits standard centrifuge rotors that accept 1.5 mL tubes.

Applications

- Sample preparation (particulate removal prior to sample analysis - HPLC, IC, GC).
- Removal of precipitates (metals, polymers, or crystals).
- Applications requiring maximum filtrate recovery from limited sample volumes.
- Removal of cells from media prior to analysis.

Specifications

Materials of Construction
Filter Media: GH Polypro (GHP, hydrophilic polypropylene) membrane
Upper Housing, Filtrate Receiver: Polypropylene

Pore Size
0.45 µm

Effective Filtration Area
0.3 cm^2

Dimensions
Overall Length (Fully Assembled With Cap): 4.5 cm (1.8 in.)

Capacities
Maximum Sample Volume: 500 µL
Final Concentrate Volume: 15 µL
Filtrate Receiver Volume: 500 µL
Hold-Up Volume (Membrane/Support): < 5 µL

Operating Temperature Range
0 - 40 °C (32 - 104 °F)

pH Range
3 - 14

Maximum Centrifugal Force
14,000 x g

Centrifuge
A rotor is required that accepts 1.5 mL tubes.

Sterilization
Provided non-sterile; may be sanitized by filtering 70% ethanol through the device prior to use.

Ordering Information

Nanosep MF Centrifugal Devices With GHP membrane*

VWR #	Pall #	Description	Pkg
28139-560	ODGHPC34	0.45 µm, clear	100/pkg
28139-562	ODGHPC35	0.45 µm, clear	500/pkg

*For more information on Nanosep centrifugal devices with Bio-Inert® or Omega™ membrane, please see page 21.

Microsep™ Advance Centrifugal Devices With Supor® Membrane

Precise, quick recovery of microliter volumes

NEW PRODUCT

- Particulate removal for longer HPLC and UHPLC column life.
- High spin speed and larger EFA reduces spin times.
- Color-coded and laser etched for easy identification.
- For samples from 0.5 - 5 mL.

Applications

- Remove particulate from samples for HPLC analyses.
- Clarify samples with gross particulate.

Specifications

Materials of Construction
Filter Media: Supor (polyethersulfone) membranes
Sample Reservoir, Filtrate Receiver, and Cap: Polypropylene
Paddle: Polyethylene

Effective Filtration Area
3.3 cm^2

Dimensions
Diameter: 17 mm (0.7 in.)
Length: 12.0 cm (4.9 in.)

Operating Temperature Range
0 - 40 °C (32 - 104 °F)

Capacities
Maximum Sample Volume: 5.0 mL
Final Concentrate Volume:
65 µL (swinging bucket)
80 µL (45° angle rotor)
100 µL (34° angle rotor)
Filtrate Receiver Volume: 6.5 mL
Hold-Up Volume: 40 µL (membrane and paddle)

pH Range
1 - 14

Maximum Centrifugal Force
14,000 x g (microfiltration)

Centrifuge
A fixed angle rotor that accepts standard 17 x 100 mm tubes and is capable of 3,000 to 14,000 x g.

Sanitization
Provided non-sterile. May be sanitized by filtering 70% ethanol through the device prior to use.

Ordering Information

Microsep Advance Centrifugal Devices With Supor Membrane*

VWR #	Pall #	Description	Pkg
89132-020	MCPM02C67	0.2 µm, aqua	24/pkg
89132-022	MCPM02C68	0.2 µm, aqua	100/pkg
89132-024	MCPM45C67	0.45 µm, wildberry	24/pkg
89132-026	MCPM45C68	0.45 µm, wildberry	100/pkg

*For more information on Microsep Advance centrifugal devices with Omega™ 3K - 100K MWCO membrane, please see page 23.

Macrosep® Advance Centrifugal Devices With Supor® Membrane

Quickly concentrates up to 20 mL of biological sample

NEW PRODUCT

- Particulate removal for longer HPLC and UHPLC column life.
- High spin speed and larger EFA reduces spin times.
- Color-coded and laser etched for easy identification.
- For samples from 3 - 20 mL.

Applications

- Remove particulate from samples for HPLC analyses.

Specifications

Materials of Construction
Filter Media: Supor (polyethersulfone) membranes
Sample Reservoir, Filtrate Receiver, and Cap: Polypropylene
Paddle: Polyethylene

Effective Filtration Area
7.2 cm^2

Dimensions
Diameter: 29 mm (1.2 in.)
Length: 12.0 cm (4.7 in.)

Operating Temperature Range
0 - 40 °C (32 - 104 °F)

Capacities
Maximum Sample Volume: 20 mL
Final Concentrate Volume: As low as 450 µL, depending on rotor used
Filtrate Receiver Volume: 22 mL
Hold-Up Volume: 80 µL (membrane and paddle)

pH Range
1 - 14

Maximum Centrifugal Force
14,000 x g (microfiltration)

Centrifuge
Fits centrifuges that accept standard 50 mL conical end tubes.

Sanitization
Provided non-sterile. May be sanitized by filtering 70% ethanol through the device prior to use.

Performance

Rotor Selection Determines Final Concentrate Volume

Rotor Angle	Deadstop Volume
Swinging Bucket	450 µL
45° Fixed Angle	1.2 - 1.5 mL
34° Fixed Angle	1.5 mL

Ordering Information

Macrosep Advance Centrifugal Devices With Supor Membrane*

VWR #	Pall #	Description	Pkg
89131-996	MAPM02C67	0.2 µm, aqua	24/pkg
89131-998	MAPM02C68	0.2 µm, aqua	100/pkg
89132-000	MAPM45C67	0.45 µm, wildberry	24/pkg
89132-002	MAPM45C68	0.45 µm, wildberry	100/pkg

*For more information on Macrosep Advance centrifugal devices with Omega™ 3K - 100K MWCO membrane, please see pages 24 - 25.

47 mm Filter Funnels, Glass

Ideal for vacuum filtration of liquids and degassing of HPLC solvents and mobile phases

- Made of 100% borosilicate glass, assures resistance to even the most aggressive solvents.
- One-liter 47 mm glass funnel/ support assembly permits filtration of an entire liter at once.
- Support assembly's unique base design with integral vacuum connection prevents contamination of the vacuum line with filtrate.
- One-liter glass funnel is graduated from 300 to 1,000 mL in 50 mL increments.
- 300 mL glass funnel is graduated from 100 to 250 mL in 25 mL increments. Stepped stem fits into standard one-hole stoppers (9 mm).

Applications

- Ideal for filtration and degassing of HPLC solvents and aqueous mobile phase solutions and buffers.
- Ideal for mobile phase particulate removal.

Specifications

47 mm Glass Filter Funnel With Stopper Support Assembly

Materials of Construction
All parts are borosilicate glass except:
Stopper: Silicone No. 8
Clamp: Aluminum

Effective Filtration Area
9.6 cm^2

Dimensions
Overall Height:
Base: 11.7 cm (4.6 in.)
Funnel: 11.1 cm (4.4 in.)
Diameter:
Base: 5.8 cm (2.3 in.)
Funnel: 7.9 cm (3.1 in.)

Filter Size
Accepts 47 mm filter

Funnel Capacity
300 mL

47 mm Glass Filter Funnel With Sidearm Support Assembly and Flask

Materials of Construction
All parts are borosilicate glass except:
Clamp: Aluminum
Support Base/Flask Connection: Standard taper 40/35 ground joint

Effective Filtration Area
9.6 cm^2

Dimensions
Overall Height:
PN 4012 and 4013 Base: 11.7 cm (4.6 in.)
PN 4012 Funnel: 16.7 cm (6.6 in.)
PN 4013 Funnel: 11.1 cm (4.4 in.)
Diameter:
PN 4012 and 4013 Base: 5.8 cm (2.3 in.)
PN 4012 Funnel: 12.0 cm (4.7 in.)
PN 4013 Funnel: 7.9 cm (3.1 in.)

Filter Size
Accepts 47 mm filter

Funnel Capacity
300 mL or 1 L

Flask Capacity
1 or 4 L

Ordering Information

47 mm Filter Funnels, Glass

VWR #	Pall #	Description	Pkg
28144-608	4011	Glass filter funnel with No. 8 stopper support base (300 mL funnel, no flask)	1/pkg
28144-620	4012	Glass filter funnel with sidearm support assembly and flask (1 L funnel with 4 L flask)	1/pkg
28144-624	4013	Glass filter funnel with sidearm support assembly and flask (300 mL funnel with 1 L flask)	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28144-622	4014	Glass funnel, 300 mL	1/pkg
28150-410	4015	Glass funnel, 1 L	1/pkg
—	4018	Glass flask, 1 L	1/pkg
28150-412	4016	Glass flask, 4 L	1/pkg
28150-414	4017	Fritted glass support base with sidearm	1/pkg
28150-416	4019	Fritted glass support base/No. 8 silicone stopper	1/pkg
—	81595	Aluminum clamp, anodized	1/pkg

Microbiology Quality Control

When left undetected, microorganisms can halt the production of pharmaceuticals, spoil food, ruin the taste of beverages, negatively impact the performance of computer chips, and cause serious illness. That's why Pall is dedicated to finding new and better ways to help you accurately and reliably identify these microorganisms to protect both public safety and the integrity of industrial assets.

Pall has been setting performance standards in Microbiology Quality Control laboratories for more than 50 years, and our products are referenced and recommended by regulatory agencies worldwide. We invite you to explore the many ways Pall's sample prep solutions can enhance your pharmaceutical and beverage quality control applications.

Content

Pharmaceutical Quality Control Application Selector

	Page Number	*Pseudomonas sp.* Detection	Total Bacteria Detection	Total Coliforms Detection	Fecal Coliforms Detection	Yeast and Mold Detection
Membranes						
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Metricel Black PES membrane disc filters, S-pack	210		•			•
Supor® 200 PES membrane disc filters, S-pack	211	•	•			
Ampoule Media*						
HPC with TTC indicator broth	212		•			
M-FC broth	212				•	
MF-Endo broth	212			•		
M-Green YM broth	212					•
M-TGE broth	212		•			
Pseudomonas broth	212	•				
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MicroFunnel™ filter funnels, 100 and 300 mL	214	•	•	•	•	•
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Vents						
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Hardware and Accessories						
Absorbent pad kits	226	•	•	•	•	•
Filter funnel manifolds	224	•	•	•	•	•
Filter funnel manifolds for MicroFunnel filter funnels	223	•	•	•	•	•
Petri dishes	225, 274	•	•	•	•	•
Stainless steel forceps	225, 274	•	•	•	•	•
Vacuum/pressure pumps	273	•	•	•	•	•

* Culture media listed may or may not meet the requirements of a regulated test method. It is the responsibility of the user to determine applicability in each situation.

Beverage Quality Control Application Selector

Membranes	Page Number	*Lactobacillus sp.* Detection	Total Bacteria Detection	Total Coliforms Detection	Fecal Coliforms Detection	Yeast and Mold Detection
GN-6 Metricel® MCE membrane disc filters, S-pack	209	•	•	•	•	•
Metricel Black PES membrane disc filters, S-pack	210	•	•		•	•
Supor® 200 PES membrane disc filters, S-pack	211	•	•			
Ampoule Media*						
HPC with TTC indicator broth	212		•			
M-FC broth	212				•	
MF-Endo broth	212			•		
M-Green YM broth	212					•
M-TGE broth	212		•			
Orange Serum broth	212	•				
Trypticase Soy broth - USP	212		•			
Filter Funnels						
47 mm magnetic filter funnels	221	•	•	•	•	•
Microcheck® II beverage monitors	222	•	•	•	•	•
Vents						
Vacushield™ vent device	163	•	•	•	•	•
Hardware and Accessories						
Filter funnel manifolds	224	•	•	•	•	•
Filter funnel manifolds for MicroFunnel™ filter funnels	223	•	•	•	•	•
Petri dishes	225, 274	•	•	•	•	•
Stainless steel forceps	225, 274	•	•	•	•	•
Vacuum/pressure pumps	273	•	•	•	•	•

* Culture media listed may or may not meet the requirements of a regulated test method. It is the responsibility of the user to determine applicability in each situation.

Microbiology Quality Control

Rapid, Reliable Results

The accurate, reliable detection and identification of micro-organisms is critical to public safety and industrial economics. As we become more aware of the presence and variety of the organisms that share the world we live in, we realize the importance of knowing how to detect and control them.

Pall is a leader in the development and manufacture of products to detect and control these microorganisms. Our products comply with international testing methods, are supported by technical literature, and carry certifications of quality. You can be confident that our affordable, easy-to-use products will meet the high quality standards you require.

Membranes

Culturing sensitive organisms can be difficult, and identification is critical for process control and public safety. Analysis membranes must be manufactured to the highest standards for accurate microbial growth and recovery. Pall's mixed cellulose ester GN Metricel® membrane has set the standard worldwide for meeting stringent microbial regulations. Supor® and Metricel Black membranes provide additional benefits that range from low drug and protein binding characteristics to background contrast for ease in counting colonies. These membranes provide uniform and consistent growth of organisms.

MicroFunnel™ Disposable Filter Funnels

Pall offers the widest selection of disposable filter funnels for microbiological analysis, offering unique design features that give these products a reputation for quality and ease of use.

- MicroFunnel filter funnels make analysis easy. Design permits a simple squeeze separation of funnel from base to access membrane.
- Funnels attach directly to standard laboratory manifolds, and volume graduations are clearly marked to make it easy to measure your sample volume.
- Each unit is individually bagged, gamma-irradiated, and labeled for added assurance of lot traceability.

Rely on Pall Life Sciences to simplify your microbiological analysis with our popular line of disposable MicroFunnel filter funnels, quality hardware, and convenient accessories.

Thoughtfully Designed Hardware and Accessories

Pall offers a full line of microbiological ampoule media, laboratory hardware, and accessories like Petri dishes and stainless steel forceps to simplify your microbial analysis procedures.

Industrial Microbiology Products

Ensuring the effectiveness of cleaning procedures, quality of raw materials, and reliable processing capabilities are essential to preparing a safe, high quality end product. Pall's 37 mm Quality Monitor is used to monitor microelectronics water quality to detect microorganism contamination that can block a sub-micron circuit path on a computer chip. The food and beverage industry chooses the easy-to-use Microcheck™ II beverage monitors to improve speed, productivity, and accuracy in the lab.

Responding to Contamination Control With Disposable Funnels

The pharmaceutical microbiology market requires reliable and accurate results as a basis for quality control of raw materials, processes, and finished product. Critical decisions are made daily and confidence in results, as well as methods to control contamination during sampling and analysis, is a driving force in this market. A false positive on a test result can trigger a series of events that lead to unnecessary retesting, product release delays, and extensive paperwork to document a course of action. This all leads to increased operating costs.

One way Pall Life Sciences has responded to contamination control is by broadening our range of disposable filter funnels with designs to help improve the sampling process. Whether the need is bioburden analysis, sterility testing, or water system monitoring, we have a MicroFunnel™ filter funnel to suit the application. Certified MicroFunnel disposable filter funnels are individually bagged, labeled, and ready to use. Each lot is evaluated for recovery performance. The standard selection of MicroFunnel filter funnels is ideal for any bioburden analysis.

MicroFunnel Plus filter funnels streamline QC testing.

Simple, Versatile Contamination Control

MicroFunnel Plus filter funnels are the only disposable filter funnels on the market that can serve as a sample cup and filter funnel in one product. This unique design further streamlines sample collection and analysis of purified water systems while providing more protection to the integrity of the sample. This is a critical consideration for any contamination control program. Another important distinction of the MicroFunnel Plus filter funnel is its ability to sample water from systems maintained up to 90 ºC.

The MicroFunnel ST filter funnel is packaged for ease of use when performing sterility testing within an isolator. Designed to be an acceptable sterility testing alternative and to reduce testing costs, the MicroFunnel ST filter funnel meets critical conditions of sterility testing and all requirements found in the U.S. Pharmacopeia, current edition.

MicroFunnel Filter Funnels Demonstrate High Recovery of Test Organisms

	Test organism: *Escherichia coli* ATCC 11229	
PN 4800 (GN-6 Metricel® membrane, 0.45 µm, white, gridded)	**% recovery incubated in base using TSB broth, 5 test units**	**% recovery incubated by removing to MF-Endo broth, 5 test units**
Lot 1048L	98%	96%
Lot 1382L	98%	94%
Lot 1878L	94%	98%

	Test organism: *Pseudomonas aeruginosa* ATCC 14207	
PN 4803 (Supor® membrane, 0.2 µm, white, gridded)	**% recovery incubated in base using TSB broth, 5 test units**	**% recovery incubated by removing to *Pseudomonas* broth, 5 test units**
Lot 1305L	97%	91%
Lot 1443L	97%	97%
Lot 1179M	96%	101%

	Test organism: *Saccharomyces cerevisiae* ATCC 4117	
PN 4805 (Metricel Black membrane, 0.45 µm, gridded)	**% recovery incubated in base using M-Green YM broth, 5 test units**	**% recovery incubated by removing to M-Green YM broth, 5 test units**
Lot 1197M	96%	101%
Lot 1626M	100%	97%
Lot 1933M	100%	103%

Microbiology Quality Control – Online Reference Library

Pall's website offers an extensive collection of product, technical, and application information. This valuable online reference library features hundreds of technical articles, posters, podcasts, application notes, and more that can help you get the most out of your process. To view the following titles online – and many others – click the Literature Library link in the left sidebar when you visit **www.pall.com/lab**.

- Membrane Filter Technique
- Microbiologist Discusses the Benefits of Using Disposable Filter Funnels for Contamination Control
- MicroFunnel™ Filter Funnels Performance Guide
- MicroFunnel ST Filter Funnel Validation of Suitability for Sterility Testing Applications
- Monitoring for Bacteriological Contamination with MicroFunnel Plus Filter Funnels
- Using MicroFunnel Plus Filter Funnels to Reduce Sample Contamination

GN-6 Metricel® MCE Membrane Disc Filters

Certified 0.45 µm membrane for microbiological analysis meets or surpasses regulatory requirements

- Mixed cellulose esters is the most accepted filter media for microbiological analysis, and provides maximum recovery of organisms.
- Unique dot grid pattern provides guidance for quantification of bacterial colonies without growth inhibition or enhancement.
- Suitable for microbiological analysis using the Membrane Filter (MF) Technique.
- Variety of packaging options meets any need. Available in gamma-irradiated, individually packaged S-packs, autoclave packs, or non-sterile packs.
- Use with Pall microbiological ampoule media for high growth levels and easy identification of contaminants.

Applications

- Certified for the microbiological analysis of potable, waste, process, and natural waters in accordance with the MF Technique referenced in *Standard Methods for the Examination of Water and Wastewater*, current edition, and the U.S. EPA's Microbiological Methods for Monitoring the Environment, 600/8-78-017.
- Ideal for isolation and enumeration of Total and Fecal Coliforms, *E. coli, Fecal Streptococcus*, fungi, and other heterotrophic organisms.

Specifications

Filter Media
Hydrophilic mixed cellulose esters

Pore Size
0.45 µm

Typical Thickness
152 µm (6 mils)

Typical Filter Weight
4 mg/cm²

Typical Water Flow Rate
> 65 mL/min/cm² at 0.7 bar (70 kPa, 10 psi)

Maximum Operating Temperature – Water
74 °C (165 °F)

Typical Moisture Pick-Up
< 1% after 24 hr at 48% relative humidity at 23 °C (73 °F)

Extractables - Boiling Water
< 2%

Minimum Bubble Point - Water
1.8 bar (180 kPa, 26 psi)

Recovery
(measured vs. control)
> 90% *E. coli*

Refractive Index
1.512

Gamma-Irradiated
Provided gamma-irradiated or non-sterile. Validated dose 15 - 30 kGy. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

GN-6 Metricel Membrane Disc Filters, 0.45 µm (S-Packs)

VWR #	Pall #	Description	Pkg
28148-399	66265	47 mm, plain, gamma-irradiated	200/pkg
28148-926	66278	47 mm, grid, gamma-irradiated	200/pkg
28148-813	66068	47 mm, grid, gamma-irradiated	1000/pkg
28148-815	66191	47 mm, grid, gamma-irradiated	2000/pkg
28143-326	66539	50 mm, grid, gamma-irradiated	200/pkg
87003-868	60016	85 mm, grid, gamma-irradiated (not individually packed)	50/pkg

GN-6 Metricel Membrane Disc Filters, 0.45 µm (Autoclave Packages)

VWR #	Pall #	Description	Pkg
28148-733	63077	47 mm, grid, gamma-irradiated	100/pkg

GN-6 Metricel Membrane Disc Filters, 0.45 µm (Non-Sterile Packages)

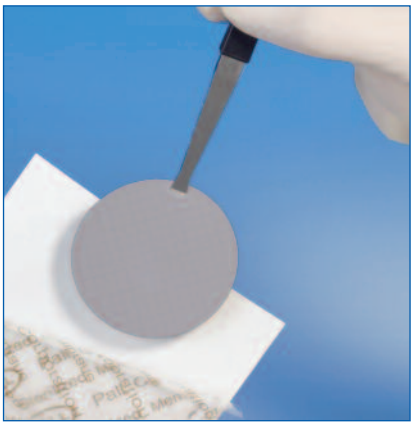
VWR #	Pall #	Description	Pkg
28148-030	63066	13 mm, plain	100/pkg
28148-562	63068	25 mm, plain	100/pkg
28148-675	64191	25 mm, grid	100/pkg
28148-530	64382	37 mm, plain, with support pads	100/pkg
28148-584	63069	47 mm, plain	100/pkg
28148-642	63020	47 mm, grid	100/pkg
28148-740	66536	142 mm, plain	25/pkg

Related Products

MicroFunnel™ Filter Funnels 215

Metricel® Black PES Membrane Disc Filters

Contrasting membrane for microbiological analysis



- Dark background provides excellent contrast for counting opaque colonies in microbiology labs.
- Exclusive dot grid pattern does not enhance or inhibit colony growth.
- Certified for use in the Membrane Filter (MF) Technique as described in Standard Methods for the Examination of Water and Wastewater, current edition.
- Sharp contrast between black membrane and white grid line provides guidance while viewing and counting.
- Available non-sterile or in individual gamma-irradiated packs (S-packs) for critical applications.

Applications

- Excellent membrane for the isolation and enumeration of yeast and mold colonies.
- Spoilage organism monitoring and identification in food and beverage quality control laboratories.

Specifications

Filter Media
Hydrophilic modified polyethersulfone, black

Pore Size
0.45 and 0.8 µm

Typical Thickness
0.45 µm: 130 µm (5.1 mils)
0.8 µm: 147 µm (5.8 mils)

Typical Water Flow Rate
mL/min/cm^2 at 0.7 bar (70 kPa, 10 psi)
0.45 µm: > 34
0.8 µm: > 102

Minimum Bubble Point – Water
0.45 µm: 1.6 bar (160 kPa, 23 psi)
0.8 µm: 1.0 bar (100 kPa, 15 psi)

Gamma-Irradiated
Provided gamma-irradiated or non-sterile. Validated dose 15 - 30 kGy. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

Metricel Black Membrane Disc Filters

VWR #	Pall #	Description	Pkg
87003-820	60138	0.45 µm, 25 mm, grid	100/pkg
87003-822	60065	0.8 µm, 25 mm, grid	100/pkg
28149-472	66585	0.45 µm, 47 mm, grid, gamma-irradiated (S-pack)	200/pkg
28149-470	66586	0.45 µm, 47 mm, grid	100/pkg
28149-468	66587	0.8 µm, 47 mm, grid, gamma-irradiated (S-pack)	200/pkg
28149-478	66588	0.8 µm, 47 mm, grid	100/pkg

Related Products

Supor® 200 PES Membrane Disc Filters

Highly retentive, certified membrane for isolation and enumeration of organisms

- Ensures accurate analysis. Exclusive dot grid pattern neither inhibits nor enhances microbial growth.
- Certified for use in the MF Technique as described in Standard Methods for the Examination of Water and Wastewater, current edition.
- Reduces filtration time. Superior flow rates and high throughputs provide fast, easy filtration.

Applications

- Ideal choice for microbiology labs requiring isolation and enumeration of organisms stunted in size from exposure to harsh conditions.
- Easily isolate and enumerate *Pseudomonas* species, especially stressed organisms, found in process water and other fluid samples (like those analized in the electronics and pharmaceutical industries).

Specifications

Filter Media
Hydrophilic polyethersulfone

Pore Size
0.2 µm

Diameter
47 mm

Typical Thickness
145 µm (5.7 mils)

Typical Water Flow Rate
> 19 mL/min/cm^2 at 0.7 bar (70 kPa,10 psi)

Maximum Operating Temperature - Water
100 °C (212 °F)

Extractables - Soxhlet Extraction
< 4%

Minimum Bubble Point - Water
3.5 bar (350 kPa, 51 psi)

Minimum Recovery
> 90% (measured vs. controlled)

Refractive Index
1.640

Gamma-Irradiated
Provided gamma-irradiated. Validated dose 15 - 30 kGy. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

Supor 200 Membrane Disc Filter

VWR #	Pall #	Description	Pkg
28147-979	66234	0.2 µm, 47 mm, grid, gamma-irradiated (S-pack)	200/pkg

Related Products

Ampoule Media for Microbiological Analysis

Wide variety of sterile ampoule media pre-measured for efficiency and convenience

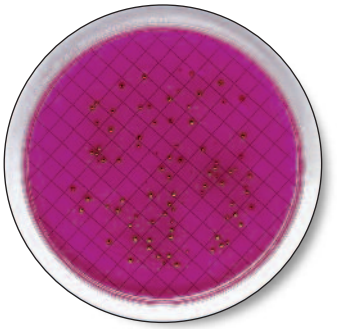
- Meets Membrane Filter (MF) Technique Standard Method requirements with 2 mL ampoules.*
- Maximizes efficiency with premixed and presterilized media.
- Choose between plastic or glass ampoules for your applications.
- Simplify pouring of the media with wide-mouth glass ampoules.
- All plastic ampoule media is economically packaged with 50 ampoules per box.

* Requirements referenced in *Standard Methods for the Examination of Water and Wastewater,* current edition.

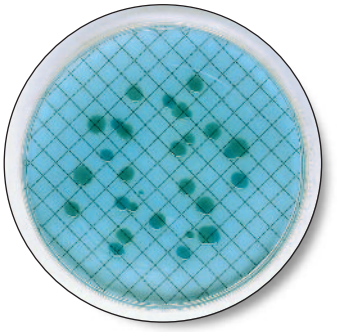
Applications

Pall Life Sciences ampoule media is available in a variety of selective, nutrient broths for use in municipal water, food and beverage, pharmaceutical, and microelectronics industries.

- **Municipal Wastewater and Drinking Water:** MF-Endo and M-FC (with and without rosolic acid) media are used when analyzing water samples for Total Coliforms, Fecal Coliforms, and *E. coli*.
- **Food and Beverage:** M-TGE, HPC, M-Green YM, and Orange Serum broths are used in the food and beverage industry to QC final products (and fluids used in the manufacture of these products) to detect potential spoilage organisms.
- **Pharmaceutical and Microelectronics:** Trypticase Soy broth, M-TGE, and HPC may be used to test final products and process waters for total bacteria in the pharmaceutical and microelectronics industries.
- **General:** Pseudomonas and KF-Streptococcal broths are highly selective media for detecting contamination in water samples.

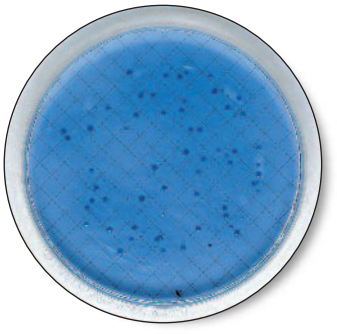


MF-Endo Broth, *E. coli*
24 hr. culture @ 35 ºC (95 ºF)



Pseudomonas Broth, *P. aeruginosa*
48 hr. culture @ 35 ºC (95 ºF)

M-TGE Broth, *S. epidermidis*
24 hr. culture @ 35 ºC (95 ºF)



M-FC Broth, *E. coli*
24 hr. culture @ 44.5 ºC (112 ºF)

Specifications

Broth	Target Organism(s)	Recovery (vs. Control)	Test Organism(s)	pH at 25 °C	Shelf Life (2 - 8 °C)	Media Color	Target Colony Color
MF-Endo	Total Coliforms	> 85%	*E. coli*	7.2 ± 0.2	1 year	pinkish red	dark red with metallic sheen
M-FC	Fecal Coliforms	> 85%	*E. coli*	7.4 ± 0.2	1 year	blue	blue
M-FC with Rosolic Acid*	Fecal Coliforms	> 85%	*E. coli*	7.4 ± 0.2	1 year	violet	blue
M-TGE	Total Bacteria	> 85%	*E. coli; S. epidermidis*	7.0 ± 0.2	1 year*	pale yellow	organism dependent
M-TGE with TTC Indicator	Total Bacteria	> 85%	*E. coli*	7.0 ± 0.2	1 year	pale yellow	red
Trypticase Soy - USP	Total Bacteria	> 85%	*E. coli; S. epidermidis*	7.3 ± 0.2	1 year	pale yellow	organism dependent
KF-Streptococcal	*Fecal Streptococcus*	> 85%	*S. faecalis*	7.2 ± 0.2	1 year	light purple	red
Pseudomonas	*Pseudomonas sp.*	> 85%	*P. aeruginosa*	7.1 ± 0.2	1 year	light amber	green-blue
M-Green YM	Yeasts and Molds	> 85%	*S. cerevisiae*	4.6 ± 0.2	1 year**	green	pale green
Orange Serum	*Lactobacillus,* Acid Resistant Bacteria	> 85%	*L. plantarum; S. cerevisiae*	5.6 ± 0.2	1 year	dark amber	organism dependent
HPC with TTC Indicator	Total Bacteria	> 85%	*E. coli; S. epidermidis*	7.1 ± 0.2	1 year	pale yellow	red

*Rosolic acid is a selective agent that helps increase the specificity of the medium for Fecal Coliforms.
**Does not require refrigeration during the one-year shelf life.

Ordering Information

Microbiological Media, 2 mL Plastic Ampoules

VWR #	Pall #	Description	Pkg
28150-500	68105	MF-Endo broth, Total Coliforms	50/pkg
28145-680	4302	M-FC broth with rosolic acid, Fecal Coliforms	50/pkg
28145-740	68106	M-TGE broth, Total Bacteria	50/pkg
21432-940	68111	M-TGE with TTC indicator, Total Bacteria	50/pkg
28145-686	4307	Trypticase Soy broth - USP, Total Bacteria	50/pkg
28150-502	68108	KF-Streptococcal broth, *Fecal Streptococcus*	50/pkg
28145-684	4306	Pseudomonas broth, *Pseudomonas sp.*	50/pkg
28150-504	68107	M-Green YM broth, yeast and mold	50/pkg
28150-506	68109	Orange Serum broth, *Lactobacillus sp.*	50/pkg
28145-602	4352	HPC Media with TTC indicator, Total Bacteria	50/pkg

Microbiological Media, 2 mL Wide-mouth Glass Ampoules

VWR #	Pall #	Description	Pkg
28145-695	68100	M-FC broth, Fecal Coliforms	20/pkg
28145-696	68101	M-FC broth with rosolic acid, Fecal Coliforms	20/pkg
28145-697	68102	MF-Endo broth, Total Coliforms	20/pkg

Microbiological Media, 100 mL Bottle

VWR #	Pall #	Description	Pkg
28145-700	4313	MF-Endo broth, Total Coliforms, bottle	1/pkg

Related Products

37 mm Quality Monitors . . . 220
Absorbent Pad Kits . . . 226
GN-6 Metricel® MCE Membranes . . . 209
Metricel Black PES Membranes . . . 210
Microcheck II Beverage Monitors . . . 222
MicroFunnel™ Filter Funnels . . . 215
Petri Dishes . . . 225, 274
Stainless Steel Forceps . . . 225, 274
Supor® 200 PES Membranes . . . 211

MicroFunnel™ Filter Funnels

Increase laboratory efficiency with convenient, ready-to-use disposable filter funnels

- Certified. Each lot is certified for microbiological analysis to provide added assurance of reliable results.
- Easy to use. Unique squeeze separation of cylinder from base allows easy access to membrane.
- Individually bagged, disposable filter units prevent cross-contamination of samples.
- Available in 300 mL capacity to process larger samples.
- Allows easy and accurate sample measurement. The 100 mL funnels are marked in 10 mL increments. The 100 mL increment is marked completely around the funnel for higher visibility. The 300 mL funnel is marked in 50 mL increments.
- Saves time. Disposable design eliminates the cleaning and sterilization required with reusable funnels.
- Ready to use. Pre-assembled and gamma-irradiated to eliminate the potential for toxic extractables associated with EtO sterilization.
- Variety of options. Choose from GN-6 Metricel® membrane in 0.45 µm pore size, Supor® membrane with 0.2 or 0.45 µm pore size, or Metricel Black membrane with 0.45 or 0.8 µm pore size.
- Easily remove the membrane for culturing on agar or broth medium.

Applications

- Test any aqueous solution for microbial contamination using the principles of the Membrane Filter (MF) Technique.
- Ideal for quality control analysis of aqueous fluids used in pharmaceutical production. Individually labeled for lot traceability.
- Convenient for last-minute samples at the end of the day or work week. Maintain a supply of MicroFunnel filter funnels in case the autoclave breaks down and reusable hardware cannot be sterilized.
- The 300 mL funnel is ideal for processing larger samples without the "pour and wait" of smaller funnels. Processing larger samples can improve sensitivity and confidence in the results.
- Test for a variety of bacterial contaminants, such as Total Coliforms or *Pseudomonas* species, by choosing between the 0.45 and 0.2 µm pore sizes.
- MicroFunnel filter funnel with Metricel Black membrane provides a better contrast for counting yeast and other light-colored colonies.

Specifications

Materials of Construction

Filter Media: Supor (hydrophilic polyethersulfone), GN-6 Metricel (mixed cellulose esters), and Metricel Black (modified polyethersulfone) membranes
Cylinder, Base, Lid, Petri Dish Base: Polypropylene
Cover: Polystyrene
Plug: Polyethylene
Funnel Adapter: Polyethylene
Support Pad: Cellulose

Effective Filtration Area

13.46 cm^2

Dimensions

100 mL Funnels
Height:
8.1 cm (3.2 in.) with Petri dish lid
7.6 cm (3.0 in.) with cover
Diameter:
6.4 cm (2.5 in.) with Petri dish lid
6.1 cm (2.4 in.) with cover

300 mL Funnel
Height:
9.1 cm (3.6 in.) with cover
Diameter:
8.8 cm (3.5 in.) with cover

Maximum Vacuum

63.5 cm Hg (25 in. Hg)
(vacuum use only)

Gamma-Irradiated

Validated dose 15 - 30 kGy

Procedures for MicroFunnel LP Filter Funnel (With Petri Dish Lid Kit)

1. *Dispense the contents of an ampoule of culture medium onto the absorbent pad in the Petri dish lid kit, supplied only with MicroFunnel LP filter funnel, PN 4810.*
2. *With Petri dish lid kit removed, perform filtration then access membrane by gently squeezing near the top of the funnel cylinder.*
3. *Remove the membrane filter from the base with forceps.*
4. *Place the membrane filter onto the broth-soaked absorbent pad in the Petri dish lid kit.*
5. *Cover, invert, and incubate.*

Ordering Information

MicroFunnel™ Filter Funnels, 100 mL

VWR #	Pall #	Description	Pkg
28143-544	4800	MicroFunnel unit with 0.45 µm GN-6 Metricel® membrane, white, gridded, individually bagged	50/pkg
55095-060	4804	MicroFunnel unit with 0.45 µm GN-6 Metricel membrane, white, gridded, individually bagged	200/pkg
28143-540	4810	MicroFunnel LP unit with 0.45 µm GN-6 Metricel membrane, white, gridded, individually bagged, Petri dish lid kit	50/pkg
43300-292	4801	MicroFunnel unit with 0.45 µm GN-6 Metricel membrane, white, gridded, unbagged	50/pkg
28143-542	4803	MicroFunnel unit with 0.2 µm Supor® membrane, white, gridded, individually bagged	50/pkg
28143-554	4806	MicroFunnel unit with 0.2 µm Supor membrane, white, no grid, individually bagged	50/pkg
97003-750	4852	MicroFunnel unit with 0.45 µm Supor membrane, white, gridded, individually bagged	50/pkg
28143-556	4805	MicroFunnel unit with 0.45 µm Metricel Black membrane, black, gridded, individually bagged	50/pkg

Related Products

Ampoule Media for Microbiological Analysis 213
Petri Dishes 225, 274

MicroFunnel Filter Funnels, 300 mL

VWR #	Pall #	Description	Pkg
28143-560	4815	MicroFunnel 300 unit with 0.45 µm GN-6 Metricel membrane, white, gridded, individually bagged	20/pkg
28143-574	4818	MicroFunnel 300 unit with 0.2 µm Supor membrane, white, gridded, individually bagged	20/pkg
83008-126	4828	MicroFunnel 300 unit with 0.45 µm Supor membrane, white, gridded, individually bagged	20/pkg
28143-572	4817	MicroFunnel 300 unit with 0.45 µm Metricel Black membrane, gridded, individually bagged	20/pkg
28143-576	4819	MicroFunnel 300 unit with 0.8 µm Metricel Black membrane, gridded, individually bagged	20/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28143-322	4701	Autoclavable adapters for vacuum manifold when using rubber stopper	3/pkg
28143-532	4713	Vacuum pump adapter for MicroFunnel filter funnel with Milliflex PLUS◆ pump	1/pkg
97058-852	4895	Lid kit accessory for culturing membrane in place	20/pkg
87003-804	15408	1-place aluminum manifold	1/pkg
89030-434	15411	3-place aluminum manifold	1/pkg
97003-752	15413	6-place aluminum manifold	1/pkg
28140-954	13157	Vacuum/pressure pump, 115 V CE	1/pkg
28140-956	13158	Vacuum/pressure pump, 230 V	1/pkg
34181-102	4690	Forceps with multi-colored grips	3/pkg

MicroFunnel™ Plus Filter Funnels

Combined filter funnel and sample cup revolutionizes water system monitoring to eliminate the risk of contamination

- Product performs as sample container and filter funnel all in one. No need to transfer sample from cup to disposable funnel and risk introducing contamination.
- MicroFunnel Plus AP unit allows aseptic collection of the sample through the lid sample port. No need to remove lid.
- MicroFunnel Plus products with Supor® membrane are designed to allow sampling of hot water up to 90 °C.
- Vented lid snaps to a liquid-tight seal and allows filtration without having to open the funnel and risk introducing contamination.
- Vent filter ensures no airborne contamination is drawn into the funnel during filtration.
- Attaches directly to a standard laboratory manifold or use with adapter and stopper.
- Volume graduations are clearly marked for ease in measuring your sample volume.
- Individually bagged and labeled for contamination control and lot traceability.

Related Products

Ampoule Media for Microbiological Analysis 213
Filter Funnel Manifolds 223
Petri Dishes 225, 274
Stainless Steel Forceps 225, 274

Applications

- Improves the efficiency of monitoring your water system while reducing the introduction of contamination.
- Eliminates steps in sample collection and testing that could potentially contaminate your sample.
- Gridded 0.45 µm GN-6 Metricel® membrane is ideal for analysis of ambient water by Membrane Filter (MF) Technique.
- MicroFunnel Plus with 0.45 or 0.2 µm Supor membrane is designed for sampling hot water (such as that found in hot loop WFI systems).

Specifications

Materials of Construction

Filter Media: GN-6 Metricel (mixed cellulose esters), Supor (hydrophilic polyethersulfone), and Metricel Black (modified polyethersulfone) membranes
Support Pad: Cellulose
Funnel and Base: Polypropylene
Adhesive Gasket: Urethane
Funnel Cover: Polyethylene with hydrophobic Versapor® membrane (acrylic copolymer on a non-woven support)
Bag: Polyethylene
Adapter: Polyethylene
Plug: Polyethylene (PN 4807, 4808)

Effective Filtration Area

13.46 cm^2

Dimensions

100 mL Funnel
Height: 7.6 cm (3.0 in.) with cover
Diameter: 6.1 cm (2.4 in.) with cover

300 mL Funnel
Height: 8.9 cm (3.5 in.)
Diameter: 8.7 cm (3.4 in.)

Maximum Vacuum

63.5 cm Hg (25 in. Hg)
(vacuum use only)

Maximum Sample Collection Temperature

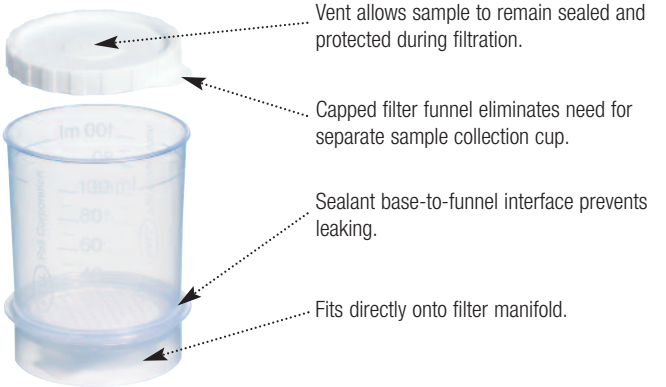
PN 4807, 4808, 4829: Ambient
PN 4809, 4813, 4814, 4823, 4843, and 4844: 90 °C (194 °F)

Gamma-Irradiated

Validated dose 15 - 30 kGy

Performance

MicroFunnel Plus Filter Funnel Features



Save yourself time, avoid sample contamination or mix-ups, and reduce the steps in sample collection and testing.

PALL Life Sciences

How to Use the MicroFunnel™ Plus Filter Funnel

Sampling Ambient Water

1. Carefully remove the vented lid and collect the sample.

2. Securely snap lid in place to prevent sample loss. Transport sample to laboratory for filtration.

3. Remove membrane vent from base, place funnel directly onto manifold, and filter the sample.

4. Gently grasp funnel then remove and discard lid.

5. Release cylinder from base by squeezing the midpoint of the cylinder.

6. Remove the membrane, plate the filter, and incubate.

Note: When using this product for sampling hot water, observe safety precautions. This includes the use of insulated rubber gloves, safety glasses, and Pall Life Sciences funnel holder (PN 4824 for 100 mL funnels and PN 4825 for 300 mL funnels).

Collecting Hot Water Samples

1. Place funnel into holder with graduations visible through the viewing slot. Carefully remove the vented lid and collect the hot water sample.

2. With funnel and holder resting on a firm, level surface, securely snap lid in place to prevent sample loss. Remove funnel from holder and transport sample to laboratory for filtration. (Proceed with steps 3-6 for ambient water.)

Ordering Information

MicroFunnel Plus Filter Funnels, 100 mL

VWR #	Pall #	Description	Pkg
28143-570	4807*	0.45 µm GN-6 Metricel® membrane, white, gridded, individually bagged (not compatible with hot water applications)	50/pkg
28143-580	4808*	0.45 µm Metricel Black membrane, gridded, individually bagged (not compatible with hot water applications)	50/pkg
28143-582	4809	0.2 µm Supor® membrane, gridded, individually bagged	50/pkg
28143-588	4823	0.45 µm Supor membrane, white, gridded, individually bagged	50/pkg

MicroFunnel Plus Filter Funnels, 300 mL

VWR #	Pall #	Description	Pkg
28143-584	4813	0.2 µm Supor membrane, white, gridded, individually bagged	20/pkg
28143-586	4814	0.45 µm Supor membrane, white, gridded, individually bagged	20/pkg
—	4829*	0.45 µm GN-6 Metricel membrane, white, gridded, individually bagged (not compatible with hot water applications)	20/pkg

*For use with ambient temperature samples only.

MicroFunnel Plus AP Filter Funnels, 100 mL

VWR #	Pall #	Description	Pkg
82028-610	4843	0.2 µm Supor membrane, white, gridded, individually bagged	50/pkg
82028-612	4844	0.45 µm Supor membrane, white, gridded, individually bagged	50/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
83008-128	4824	Funnel holder, 100 mL	1/pkg
83008-130	4825	Funnel holder, 300 mL	1/pkg
28143-322	4701	Autoclavable adapters for vacuum manifold when using rubber stopper	3/pkg
28143-532	4713	Vacuum pump adapter for using MicroFunnel filter funnel with Milliflex PLUS◆ pump	1/pkg
97058-852	4895	Lid kit accessory for culturing membrane in place	20/pkg
82028-614	4845	MicroFunnel Plus AP sampling tubes, individually bagged	50/pkg

MicroFunnel™ ST Disposable Filter Funnels

Convenient and economical choice for sterility testing within isolators

NEW PRODUCT

- MicroFunnel ST filter funnels offer an alternative to costly closed-system sterility testing when using an isolator or containment suite.
- 0.45 µm GN-6 Metricel® membrane or low binding Supor® membrane provides a choice for sterility testing applications in the pharmaceutical industry.
- Supor membrane is ideal for testing antibiotic solutions.
- Double bagged packaging ensures easy transfer through airlock.
- Simple squeeze separation design makes membrane retrieval easy.
- Meets requirements of U.S., Japan, and European Pharmacopeias for sterility testing.

Applications

- Test any aqueous solution for microbial contamination using MicroFunnel ST disposable filter funnels and the principles of the Membrane Filter (MF) Technique.
- Ideal for quality control analysis of aqueous fluids used in pharmaceutical production.
- Quality control testing of final product for release.

Specifications

Materials of Construction

Filter Media: Supor (hydrophilic polyethersulfone) and GN-6 Metricel (mixed cellulose esters) membranes
Cylinder and Base: Polypropylene
Funnel Cover: Polystyrene
Funnel Adapter and Bag: Polyethylene
Support Pad: Cellulose

Effective Filtration Area

13.46 cm^2

Dimensions

100 mL Funnel
Height: 7.6 cm (3.0 in.)
Diameter: 6.1 cm (2.4 in.)

300 mL Funnel
Height: 9.1 cm (3.6 in.)
Diameter: 8.8 cm (3.5 in.)

Maximum Vacuum

63.5 cm Hg (25 in. Hg)
(vacuum use only)

Gamma-Irradiated

Validated dose 15 - 30 kGy.

Packaging Note

100 mL Funnel
40 units total per box: 10 individually bagged funnels within an overpack bag; 4 overpack bags per box.

300 mL Funnel
20 units total per box: 5 individually bagged funnels within an overpack bag; 4 overpack bags per box.

Ordering Information

MicroFunnel ST Disposable Filter Funnels

VWR #	Pall #	Description	Pkg
28143-562	4750	MicroFunnel ST unit with 0.45 µm Supor membrane, plain, 100 mL capacity	40/pkg
28143-564	4751	MicroFunnel 300 ST unit with 0.45 µm Supor membrane, plain, 300 mL capacity	20/pkg
28143-566	4811	MicroFunnel ST unit with 0.45 µm GN-6 Metricel membrane, gridded, 100 mL capacity	40/pkg
28143-568	4812	MicroFunnel 300 ST unit with 0.45 µm GN-6 Metricel membrane, gridded, 300 mL capacity	20/pkg
89047-136	4851	MicroFunnel ST unit with 0.2 µm Supor membrane, gridded, 100 mL capacity	40/pkg
—	4853	MicroFunnel 300 ST unit with 0.2 µm Supor membrane, gridded, 300 mL capacity	20/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28143-322	4701	Autoclavable adapters for vacuum manifold when using rubber stopper	3/pkg
28143-532	4713	Vacuum pump adapter for using MicroFunnel filter funnel with Milliflex PLUS◆ pump	1/pkg

Related Products

Ampoule Media for Microbiological Analysis . . . 213
Filter Funnel Manifolds . . . 224
Stainless Steel Forceps . . . 225, 274
Vacuum/Pressure Pumps . . . 273

MicroFunnel™ Filter Funnels With Polycarbonate Membrane

NEW PRODUCT

Ideal for concentrating organisms in fluid samples

- Flat, smooth surface allows for easy elution of organisms or particulate.
- Collection of organisms or particulate on one planar surface is ideal prior to electron microscopy (SEM) or light microscope (LM) techniques.
- Ready-to-use, disposable design eliminates sample cross contamination.

Applications

- Concentrate organisms in aqueous samples for further examination by PCR or eppifluorescence.
- Cell biology.
- Bioassays.
- Parasitology.
- Water microbiology.

Specifications

Filter Media
Filter Media: Polycarbonate with PVP (polyvinylpyrrolidone) wetting agent
Support Pad: Cellulose
Funnel and Base: Polypropylene
Funnel Cover: Polystyrene
Funnel Adapter: Polyethylene

Membrane Diameter
47 mm

Pore Size
0.4 µm

Effective Filtration Area
13.46 cm^2

Maximum Vacuum
635 mm Hg (25 in. Hg)
(vacuum use only)

Gamma-Irradiated
Validated Dose: 15 - 30 kGY
(1.5 - 3.0 MRad)

Dimensions
100 mL Capacity
Height: 7.6 cm (3.0 in.) with cover
7.3 cm (2.9 in.) without cover
Diameter: 6.1 cm (2.4 in.) with cover
5.7 cm (2.3 in.) without cover

300 mL Capacity
Height: 9.1 cm (3.6 in.) with cover
8.9 cm (3.5 in.) without cover
Diameter: 8.8 cm (3.5 in.) with cover
8.5 cm (3.4 in.) without cover

Ordering Information

MicroFunnel Filter Funnels With Polycarbonate Membrane

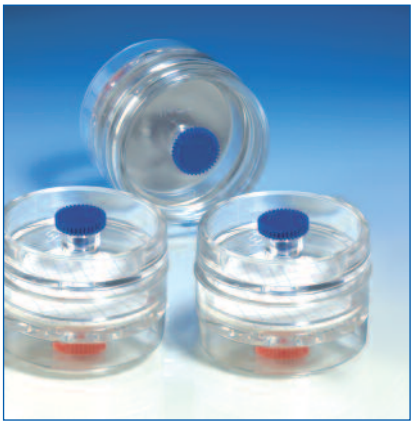
VWR #	Pall #	Description	Pkg
97058-848	FMFNL1050	Polycarbonate membrane, 0.4 µm, 100 mL capacity, individually bagged, gamma-irradiated	50/pkg
97058-850	FMFNL3020	Polycarbonate membrane, 0.4 µm, 300 mL capacity, individually bagged, gamma-irradiated	20/pkg

Related Products

Filter Funnel Manifolds 224
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

37 mm Quality Monitors

Compact and disposable filtration units for analysis of process water



- Convenient, ready-to-use, and portable for easy transport to sample site.
- Saves time. Disposable design eliminates the cleaning and sterilization required of reusable filter funnels.

Applications

- Monitor high purity water systems for microbial contamination. Simple design allows for sampling at the source or filtration in the lab.

Specifications

Materials of Construction

Filter Media: 0.45 µm GN-6 Metricel® (mixed cellulose esters), 0.2 µm Supor® (hydrophilic polyethersulfone) and 0.45 µm Metricel Black (modified polyethersulfone) membranes
Monitor Inlet, Center Ring, and Outlet: Styrene
Plugs: Polyethylene
Absorbent Pad: Cellulose

Effective Filtration Area

9.1 cm^2

Dimensions

Height: 2.8 cm (1.1 in.)
Diameter: 4.2 cm (1.7 in.)

Operating Temperature

Room temperature, typically 20 - 25 ºC (68 - 77 ºF)

Maximum Vacuum

63.5 cm Hg (25 in. Hg)

Etheylene Oxide Exposed

Ordering Information

37 mm Quality Monitors

VWR #	Pall #	Description	Pkg
82028-606	4717	2 piece, GN-6 Metricel membrane, white, gridded	50/pkg
82028-608	4718	2 piece, Metricel Black membrane, gridded	50/pkg
—	4719	2 piece, 0.2 µm Supor membrane, white, gridded	50/pkg

Related Products

Ampoule Media for Microbiological Analysis 213

47 mm Magnetic Filter Funnels

Unique magnetic seal allows easy, one-handed vacuum filtration of liquids

- No-leak magnetic seal allows one-handed operation.
- Polyphenylsulfone construction is compatible with anti-foaming agents and many other solvents.
- Convenient, 150 mL size allows for easy fit into small autoclaves, and 500 mL size is ideal for filtration of large samples.
- Sturdy and safe. Polyphenylsulfone construction provides durability and added safety at a cost less than most glass funnels.
- Forceps access point allows easy filter retrieval.
- Graduated at 50 mL increments for accurate sample measurement.

Applications

- Use for the Membrane Filter (MF) Technique.
- Municipal water treatment testing.
- Surface water analysis.
- Plant process water testing.
- Drinking water analysis.

Specifications

Materials of Construction
Funnel Body, Stem, Lid, and Support Screen: Polyphenylsulfone
Vent Plugs: Polypropylene

Effective Filtration Area
150 and 300 mL: 9.6 cm^2, 35 mm effective diameter
500 mL: 13.1 cm^2, 41 mm effective diameter

Dimensions
Overall Height:
150 mL: 17.8 cm (7.0 in.)
300 mL: 22.9 cm (9 in.)
500 mL: 19.6 cm (7.7 in.)
Maximum Diameter:
150 and 300 mL: 7.6 cm (3 in.)
500 mL: 8.9 cm (3.5 in.)

Filter Size
Accepts 47 mm filter

Funnel Capacity
150, 300, or 500 mL

Outlet Connection
Stem fits into standard one-hole stopper.

Sterilization
Provided non-sterile. Withstands multiple autoclavings* at 121 - 123 °C (250 -253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min; UV sterilizable.

*Repeated use of detergents containing polyoxyethylated alkyl phenols and alcohols, and/or anti-corrosion, anti-scaling boiler additives that may carry over in steam, may cause polyphenylsulfone to crack, thereby reducing the life of the product. Do not autoclave rubber stoppers. Do not autoclave with aluminum foil; use autoclave paper. Consult Pall Technical Service if using with thin membranes, such as track-etched material.

Ordering Information

47 mm Magnetic Filter Funnels

VWR #	Pall #	Description	Pkg
28143-546	4247	47 mm, 150 mL capacity	1/pkg
28143-550	4242	47 mm, 300 mL capacity	1/pkg
28143-548	4241	47 mm, 300 mL capacity, with lid	1/pkg
28150-496	4238	47 mm, 500 mL capacity	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28144-908	4235	Stainless steel support screen	1/pkg
28144-636	87264	Support screen, polyphenylsulfone	1/pkg
28143-522	4244	Base, without support screen	1/pkg
28143-524	4246	Lid kit (for 300 mL funnel only)	1/pkg
28143-526	4248	150 mL funnel housing	1/pkg
28143-520	4243	300 mL funnel housing	1/pkg
28143-528	4254	500 mL funnel housing	1/pkg
28150-498	82728	No. 8 rubber stopper	1/pkg

Related Products

Ampoule Media for Microbiological Analysis 213
Filter Funnel Manifolds 224
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

Microcheck® II Beverage Monitors

Easy-to-use disposable filter funnel to meet microbial analysis needs for beverages

- Can convert to a Petri dish for culturing or easily remove the membrane for placing on separate agar dish.
- Ready to use; simply remove from box and place directly on a filter manifold. No need for rubber stoppers or adapters.
- Volume graduations are marked clearly for easy reading from any point of view.
- Volume graduations marked externally on the funnel to prevent potential hold-up of organisms. External marks meet guidelines listed in *Standard Methods for the Analysis of Water and Wastewater,* current edition.

Applications

- Finished product and raw material testing of beverages for microbial contamination prior to release. Available with 0.45 and 0.8 µm, white or black membranes, to easily quantify organisms.

Specifications

Materials of construction

Filter Media: GN Metricel® (mixed cellulose esters) and Metricel Black (modified polyethersulfone) membranes
Cylinder and Base: Polypropylene
Cover: Polystyrene
Plug: Polyethylene
Funnel Adapter: Polyethylene
Support Pad: Cellulose

Dimensions:

Height: 7.6 cm (3.0 in.)
Diameter: 6.1 cm (2.4 in.)

Packaging Note

Two layers of 25 funnels bulk packaged within one box-liner bag.

Gamma-Irradiated

Ordering Information

Microcheck II Beverage Monitors

VWR #	Pall #	Description	Pkg
87004-338	4761	0.45 µm, GN-6 Metricel membrane, white, gridded, 100 mL capacity	50/pkg
87004-340	4762	0.8 µm, GN-4 Metricel membrane, white, gridded, 100 mL capacity	50/pkg
87004-342	4763	0.45 µm, Metricel black membrane, black, gridded, 100 mL capacity	50/pkg
87004-344	4764	0.8 µm Metricel black membrane, black, gridded, 100 mL capacity	50/pkg

Related Products

Ampoule Media for Microbiological Analysis 213
Filter Funnel Manifolds 224
Petri Dishes 225, 274
Stainless Steel Forceps 225, 274

Filter Funnel Manifolds for MicroFunnel™ Filter Funnels

Perfect fit vacuum manifolds for use with the MicroFunnel filter funnel

- No adapters or rubber stoppers required to hold the filter funnel in place.
- Works with all Pall Life Sciences MicroFunnel filter funnels, including the 100 mL and 300 mL sizes.
- Durable aluminum and stainless steel construction for easy clean-up and compatibility with many chemicals.
- Single-place manifold has a small footprint that reduces the need for large counter space.
- Single-place manifold is easily portable for moving around a lab or offsite, and easy to store out of the way.

Applications

- Designed to work with the MicroFunnel filter funnel when performing the MF Technique for microbial analysis. The filter funnel is placed directly onto the manifold, the liquid is added, and the vacuum is turned on to begin filtration.
- Process multiple samples simultaneously or use the 1-place manifold when infrequent or minimal numbers of samples are tested each day.

Specifications

1-Place Manifold

Materials of Construction

Body: Anodized aluminum
Check Valve: 316 stainless steel with ethylene propylene O-ring
Hose Barb Adapter: Stainless steel 1/4 in. straight, 1/8 in. MNPT

Dimensions

Height: 5.9 cm (2.4 in.)
Diameter (Without Hose Barb): 7.5 cm (3.0 in.)

Sterilization

Autoclave if desired at 121 - 123 ºC (250 - 253 ºF) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

3- and 6-Place Manifolds

Materials of Construction

Body: Anodized aluminum
Drain Plug: Stainless steel 1/4 in. MNPT
Check Valve: 316 stainless steel with ethylene propylene o-ring
Valves: Chrome-plated brass
Valve O-Rings: Viton♦
Hose Barb Adapter: Nylon 6.4 mm (1/4 in.)

Dimensions

3-Place Manifold
Height: 14.2 cm (5.6 in.)
Width: 40.6 cm (16.0 in.)
Depth: 15.2 cm (6.0 in.)

6-Place Manifold
Height: 14.2 cm (5.6 in.)
Width: 82.6 cm (32.5 in.)
Depth: 15.2 cm (6.0 in.)

Sterilization

Autoclave if desired at 121 - 123 ºC (250 - 253 ºF) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

Filter Funnel Manifolds for MicroFunnel Filter Funnels

VWR #	Pall #	Description	Pkg
87003-804	15408	1-place aluminum	1/pkg
89030-434	15411	3-place aluminum	1/pkg
97003-752	15413	6-place aluminum	1/pkg

Accessories and Replacement Parts (Aluminum Manifold)

VWR #	Pall #	Description	Pkg
—	15412	Funnel holder	1/pkg
—	96430	End stand	1/pkg
—	99130	Valve, 2-way	1/pkg
—	99132	Hose barb adapter, nylon, 1/4 in. MNPT to 9.5 mm (3/8 in.) ID tubing	1/pkg
—	99238	Stainless steel end plug	1/pkg
—	88160	O-ring kit for valves, includes: 3 O-rings, ARP No. -006; 6 O-rings, ARP No. -010	1/pkg
—	15415	Check valve for 3- or 6-place aluminum manifolds	3/pkg

Related Products

Ampoule Media for Microbiological Analysis 213
MicroFunnel Filter Funnels . . . . . 215 - 219
Petri Dishes 225, 274

Filter Funnel Manifolds

The most convenient way to filter multiple samples

- Independent operation. Each funnel location has individual port control valves.
- Lightweight and durable for easy handling.
- Saves money. Less costly than stainless steel filter funnel manifolds.
- Large port opening makes sanitizing easy.
- Versatile. Accommodates both 25 and 47 mm filter funnels.
- Aluminum manifolds available with either 3 or 6 places.

Applications

- Designed for use in the vacuum filtration of liquids for analysis of microbiological or particulate contamination. Increase laboratory productivity by processing multiple samples simultaneously.
- Polyurethane manifold is ideal for small work areas. Only 27.9 cm (11.0 in.) wide, it still holds three funnels.
- Aluminum manifold is especially suited for applications where chemical compatibility is critical and easy clean-up is desired. Lightweight aluminum is easier to handle and less expensive than stainless steel, while retaining the strength of an alloy.

Specifications

Aluminum Manifolds

Materials of Construction
Body: Anodized aluminum
Drain Plugs: Stainless steel 1/4 in. MNPT
Valves: Chrome-plated brass
Valve O-Rings: Viton♦
Adapter: Nylon 6.4 mm (1/4 in.)

Dimensions
3-place
Height: 15.7 cm (6.2 in.)
Width: 40.6 cm (16.0 in.)
Depth: 15.2 cm (6.0 in.)

6-place
Height: 15.7 cm (6.2 in.)
Width: 82.6 cm (32.5 in.)
Depth: 15.2 cm (6.0 in.)

Sterilization
Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Polyurethane Manifold

Materials of Construction
Body: High impact polyurethane
Drain Plugs: Nylon 1/4 in. MNPT
Valves: Glass-filled polypropylene
Valve O-Rings: Buna♦-N

Dimensions
Height: 10.2 cm (4.0 in.)
Width: 27.9 cm (11.0 in.)
Depth: 15.2 cm (6.0 in.)

Ordering Information

Filter Funnel Manifolds

VWR #	Pall #	Description	Pkg
28145-305	4205	3-place polyurethane	1/pkg
28145-349	15402	3-place aluminum	1/pkg
28145-348	15403	6-place aluminum	1/pkg

Accessories and Replacement Parts (Aluminum Manifold)

VWR #	Pall #	Description	Pkg
—	96429	Funnel holder	1/pkg
—	96430	End stand	1/pkg
—	99130	Valve, 2-way	1/pkg
—	99132	Hose barb adapter, nylon, 1/4 in. MNPT to 9.5 mm (3/8 in.) ID tubing	1/pkg
—	99238	Stainless steel end plug	1/pkg
28150-498	82728	No. 8 rubber stopper	1/pkg
—	88160	O-ring kit for valves, includes: 3 O-rings, ARP No. -006; 6 O-rings, ARP No. -010	1/pkg
—	15415	Check valve for 3- or 6-place aluminum manifolds	3/pkg

Accessories and Replacement Parts (Polyurethane Manifold)

VWR #	Pall #	Description	Pkg
—	81308	No. 2 stopper for manifold	1/pkg
28145-307	39961	Manifold rebuild kit, includes 3 stainless steel retaining rings; 6 O-rings, ARP No. -016; 3 O-rings, ARP No. -015; 6 O-rings, ARP No. 009; 1 1/4 in. MNPT plug; 2 1/4 in. MNPT to 6.4 mm (1/4 in.) hose barb adapters; 4 foot pads; and 1 each knob and valve	1/pkg

Stainless Steel Forceps

Make filter handling easy

- Tips have a flat, smooth surface to avoid membrane filter damage.
- Polypropylene finger grips provide a comfortable and secure hold.
- Choose traditional black or multi-colored finger grips. Bright colors make forceps easy to identify, track, and see on the lab bench.

Applications

- Ideal for handling and moving membrane to and from filter holders and Petri dishes.

Specifications

Materials of Construction
Stainless steel with polypropylene finger grips

Sterilization
Provided non-sterile. "Flame" the tips prior to use, or autoclave at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min. Do not autoclave in aluminum foil.

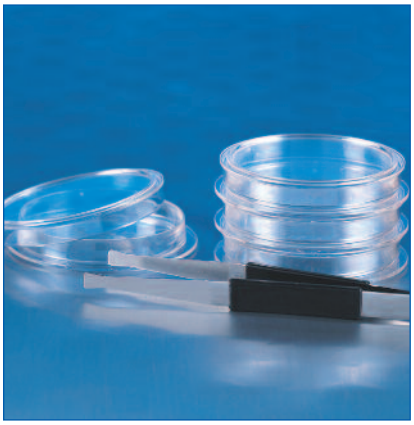
Ordering Information

Stainless Steel Forceps

VWR #	Pall #	Description	Pkg
30033-042	51147	Stainless steel forceps, black grips	1/pkg
34181-102	4690	Stainless steel forceps, multi-colored grips (1 each of orange, blue, chartreuse)	3/pkg

Petri Dishes

Unique patented design for easy handling and storage



- Opens easily with one hand, yet closes to a tight seal.
- Uses less space on the lab bench or in the incubator with easy stacking base.
- Gamma-irradiated. No EtO residuals to impede microbial growth.
- Available with or without absorbent pads.
- Bulk packaging offers additional value.

Applications

- Ideal for microbiological analysis when performing the Membrane Filter (MF) Technique.
- Petri dishes with absorbent pads can be used with broth media, or users can pour agar into dishes without absorbent pads.

Specifications

Petri Dish

Material of Construction
Polystyrene

Dimensions
Height: 9.0 mm (0.35 in.)
Diameter: 50.0 mm (1.97 in.)

Filter Size
Accepts 47 mm membrane filter

Gamma-Irradiated
Validated dose 15 - 30 kGy

Absorbent Pads

Composition
Cellulose

Typical Thickness
0.9 mm (35 mils)

Ordering Information

Petri Dishes

VWR #	Pall #	Description	Pkg
25388-606	7242	Petri dishes, without absorbent pads	100/pkg
25388-581	7232	Petri dishes, bulk pack, without absorbent pads	500/pkg
25388-640	7245	Petri dishes, with absorbent pads	100/pkg

- Contact Pall for technical support: 1.800.521.1520 or www.pall.com/lab

VWR®

- Contact VWR to order: 1.800.932.5000 or www.vwr.com

Absorbent Pad Kits

One-handed dispensing of cellulose absorbent pads

- Enables user to dispense a clean cellulose pad into a Petri dish whenever needed without touching the pad.
- Handy dispenser kit holds 1 tube of 100 absorbent pads (10 tubes included). Each tube drops quickly into the hand dispenser for easy use.
- Available non-sterile or gamma-irradiated. No EtO residuals to impede microbial growth.

Applications

- Absorbent pads are ideal for absorbing broth media to culture colonies in accordance with the Membrane Filter (MF) Technique.

Specifications

Pad Composition
Cellulose

Typical Thickness
0.9 mm (35 mils)

Diameter
45.5 mm

Ordering Information

Absorbent Pad Kits

VWR #	Pall #	Description	Pkg
28150-677	66025	Absorbent pads, gamma-irradiated	1,000/pkg
28150-679	66190	Absorbent pads, non-sterile	1,000/pkg

Related Products

47 mm Membrane Disc Filters . . . . . 209 - 211
Ampoule Media for Microbiological Analysis 213
Petri Dishes 225, 274

Environmental Water and Air

Pall is one of the world's largest suppliers of membranes and glass fiber filters designed specifically for environmental monitoring and testing. As knowledge about the impact of industrial by-products and the need for monitoring have increased, so has our commitment to developing new methods and products for air, groundwater and surface water analysis. We're proud that our water quality products set industry standards and define methods for testing groundwater, surface water, and drinking water. Pall environmental testing products are referenced by regulatory agencies worldwide for air monitoring and hazardous waste analysis of both organic and inorganic matrices. Proper product selection is critical to the integrity of your analysis. For the most accurate results possible, use the handy application selectors in this section to help you identify the best products for your environmental quality control needs.

Content

Water – Environmental/Drinking/Waste Application Selector

	Page Number	Cryptosporidium and Giardia Testing	Fecal Streptococcus Detection	Pseudomonas sp. Detection	Total Bacteria Detection	Total Coliforms/Fecal Coliforms Detection	Total Suspended Solids Detection	Groundwater Sampling
Membranes and Glass Fiber								
Glass fiber filters, type A/E	236						•	
GN-6 Metricel® MCE membrane disc filters, S-pack	209, 242		•	•	•	•		
Metricel Black PES membrane disc filters, S-pack	210		•	•	•	•		
Supor® 200 PES membrane disc filters, S-pack	211		•	•	•	•		
Capsules								
AquaPrep™ 600 groundwater sampling capsules	246							•
AquaPrep groundwater sampling device	246							•
AquaPrep-V groundwater sampling devices	246							•
Envirochek® HV sampling capsules	248	•						
Envirochek sampling capsules	248	•						
GWV high capacity groundwater sampling capsules	247							•
Ampoule Media*								
HPC with TTC indicator broth	212				•			
KF-*Streptococcal* broth	212		•					
M-FC broth	212					•		
M-TGE broth	212				•			
MF-Endo broth	212					•		
Pseudomonas broth	212			•				
Trypticase Soy broth - USP	212				•			
Filter Funnels								
47 mm Magnetic filter funnels	221		•	•	•	•	•	
MicroFunnel™ filter funnels, 100 and 300 mL	214		•	•	•	•		
Hardware								
Filter funnel manifolds	224		•	•	•	•	•	
Filter funnel manifolds for MicroFunnel filter funnels	223		•	•	•	•	•	
Laboratory shaker	250	•						
Petri dishes	225, 274		•	•	•	•		
Stainless steel forceps	225, 274		•	•	•	•	•	
Vacuum/pressure pumps	273		•	•	•	•	•	

* Culture media listed may or may not meet the requirements of a regulated test method. It is the responsibility of the user to determine applicability in each situation.

Air Monitoring Application Selector

Membranes and Glass Fiber	Page Number	Acidic Dry Deposition	Aggressive Environments/ Aerosol Testing	Asbestos Fibers Detection	Diesel Fuel Testing	Gravimetric Testing	Lead Detection	Nuisance Dust Detection	PM 10 and PM 2.5 Testing	Polynuclear Aromatic Hydrocarbon Testing	Silica Detection
Emfab™ filters	234		•		•	•					
Fiberfilm™ filters	234		•		•	•					
GLA-5000 PVC membrane disc filters	239					•		•			•
Glass fiber filters, type A/E	236					•			•		
GN-4 Metricel® MCE membrane disc filters	242			•		•	•				•
GN-6 Metricel MCE membrane disc filters	209, 242			•		•					
Metricel polypropylene membrane filters	243							•			
Nylasorb™ nylon membrane disc filters	240	•									
Teflo (PTFE with PMP) membrane disc filters	240				•	•			•		
TF (PTFE) membrane disc filters	240		•			•					
Tissuquartz™ filters, 2500 QAO-UP	234		•			•			•		
Tissuquartz filters, 2500 QAT-UP	234		•			•			•		
Zefluor™ (PTFE) membrane disc filters	240		•		•	•			•	•	
Zylon™ membrane disc filters	240		•			•				•	
Air Monitoring Cassettes											
25 mm air monitoring cassettes	244			•		•	•	•			
37 mm air monitoring cassettes	245			•		•	•	•		•	•
25 mm support pads	244			•		•	•	•		•	•
37 mm support pads	245			•		•	•	•			
Hardware											
13 mm Swinney filter holder, stainless steel	260		•			•					
25 and 47 mm filter holders, stainless steel	255 - 256		•			•					
37 and 47 mm open-face filter holders, aluminum	267	•				•					
47 mm in-line filter holder, aluminum	266		•		•	•					
47 mm in-line filter holder, polycarbonate	263					•					
Analyslide® Petri dish	276	•	•	•	•	•	•	•	•	•	•

Environmental Quality Control

Meeting Global Requirements for Monitoring and Testing

Cryptosporidium and *Giardia* Capture and Recovery

Patented Envirochek® HV sampling capsules are designed for 100% capture of *Cryptosporidium* oocysts and *Giardia* cysts from source or finished water. The protocol is faster, safer, and simpler than other methods and allows for processing of up to eight samples at once using Pall's laboratory shaker.

- Approved by regulatory agencies worldwide for *Cryptosporidium* and *Giardia* monitoring, including U.S. EPA methods 1622 and 1623, United Kingdom DWI standard operating protocols, and ISO/DIS 15553:2006.
- Field-friendly design allows for a lower pressure source than competitive products, and is easier to transport and handle. Each capsule has a unique serial number for traceability.
- Disposable design eliminates false positives from cross-contamination. 1 µm pore size membrane ensures complete capture of the organisms, eliminating false negatives.
- Designed to eliminate human contact with organisms. No filter holder assembly or cleaning is required. Self-contained capsule's filter element does not need to be handled.

Drinking Water Quality Control

Pall has been involved with water quality monitoring for coliforms since Standard Methods adopted the use of Membrane Filtration as an acceptable, and often preferable, method for monitoring drinking water quality. Our mixed cellulose ester GN Metricel® membranes set the standard worldwide for meeting stringent regulations by providing uniform and consistent growth of organisms. In addition to our membranes, Pall offers a variety of accessories to support water quality labs including Petri dishes, prepared microbiological media, and hardware. Pall's unique Magnetic Filter Funnel is used extensively throughout the water quality testing community because of its one-handed operation that simplifies testing and improves aseptic technique.

Envirochek HV sampling capsules set the standards for Cryptosporidium *and* Giardia *testing.*

Groundwater Sampling Capsules

Pall's products for groundwater analysis are cited in methods worldwide and set industry standards for performance. For dissolved metals analysis of groundwater, our disposable groundwater capsules ensure rapid sample filtration with low levels of metals extractables. Our versatile line of groundwater sampling products ensures a good fit with your sampling situation, regardless of volume or particulate level.

Air Monitoring Products

You'll find Pall environmental testing products referenced and recommended by regulatory agencies worldwide for air monitoring. Pall's time-tested filtration membranes, glass fiber media, and convenient air monitoring devices are reliable allies in the pursuit of contamination control.

Groundwater Monitoring Products Reduce Contamination

Protecting natural resources is critical to governments around the world. Groundwater quality is of particular importance because of its use as a source for drinking water. Heavy metals contamination of groundwater is a concern around landfills, industrial plants, and previously contaminated sites. Monitoring for heavy metals around landfills and industrial plants ensures that unwanted metals are not leaching into surrounding groundwater where they can be distributed farther and more quickly from the source of contamination. Monitoring these sites is maintained to ensure that remediation of the sites is progressing and effective at reducing the spread of contamination. Pall's versatile line of groundwater sampling products ensures a good fit with your sampling situation, regardless of volume or particulate level. Our capsule products are provided with a metals certification to ensure the product is not contributing metals to the sample before analysis. If you prefer reusable hardware, Pall offers a complete line of filter holders and funnels, as well as trusted membrane and glass fiber filters.

GWV High Capacity Groundwater Sampling Capsules offer five times the filtration area of conventional 142 mm filters.

Pall GWV High Capacity Groundwater Capsules Are Tested to Ensure Minimum Detectable Metals in Their Composition

Element/Ion (Periodic Symbol)	µg/L
Aluminum (Al)	0.2
Antimony (Sb)	0.02
Arsenic (As)	0.2
Barium (Ba)	0.01
Beryllium (Be)	0.04
Bismuth (Bi)	0.04
Boron (B)	2
Bromide (Br^-)	5
Cadmium (Cd)	0.03
Calcium (Ca)	25
Cerium (Ce)	0.01
Cesium (Cs)	0.02
Chloride (Cl^-)	50
Chromium (Cr)	0.03
Cobalt (Co)	0.02
Copper (Cu)	0.5
Dysprosium (Dy)	0.04
Erbium (Er)	0.02
Europium (Eu)	0.02
Fluoride (F^-)	2
Gadolinium (Gd)	0.04
Gallium (Ga)	0.04
Germanium (Ge)	0.05
Gold (Au)	0.05
Hafnium (Hf)	0.03
Holmium (Ho)	0.01
Indium (In)	0.02
Iridium (Ir)	0.06
Iron (Fe)	1
Lanthanum (La)	0.01
Lead (Pb)	0.05
Lithium (Li)	0.03
Lutetium (Lu)	0.01
Magnesium (Mg)	10
Manganese (Mn)	0.03
Mercury (Hg)	0.05
Molybdenum (Mo)	0.05
Neodymium (Nd)	0.02

Element/Ion (Periodic Symbol)	µg/L
Nickel (Ni)	0.5
Niobium (Nb)	0.02
Nitrate (NO_3^-)	10
Nitrite (NO_2^-)	10
Osmium (Os)	0.02
Palladium (Pd)	0.06
Phosphate (PO_4^{3-})	5
Platinum (Pt)	0.08
Potassium (K)	25
Praseodymium (Pr)	0.01
Rhenium (Re)	0.06
Rhodium (Rh)	0.02
Rubidium (Rb)	0.1
Ruthenium (Ru)	0.05
Samarium (Sm)	0.04
Scandium (Sc)	0.2
Selenium (Se)	7
Silicon (Si)	0.5
Silver (Ag)	0.03
Sodium (Na)	25
Strontium (Sr)	0.01
Sulfate (SO_4^{2-})	10
Tantalum (Ta)	0.02
Tellurium (Te)	0.04
Terbium (Tb)	0.02
Thallium (Tl)	0.05
Thorium (Th)	0.02
Thulium (Tm)	0.01
Tin (Sn)	0.2
Titanium (Ti)	0.05
Tungsten (W)	0.2
Uranium (U)	0.02
Vanadium (V)	0.03
Ytterbium (Yb)	0.03
Yttrium (Y)	0.02
Zinc (Zn)	1
Zirconium (Zr)	0.05

Air Monitoring Products Comply With Global Testing Standards

Air quality is a concern worldwide due to its known impact on health issues. Globally, federal regulators set standards to control pollution in the air we breathe. Pall began research on the development and production of filters for air sampling and analysis more than 40 years ago. We are now one of the world's largest suppliers of membranes and glass fiber filters designed specifically for environmental monitoring and testing.

As knowledge about the impact of industrial by-products and the need for monitoring have increased, so has our commitment to supplying products for air analysis. You will find Pall environmental testing products referenced and recommended by regulatory agencies worldwide for air monitoring and hazardous waste analysis of both organic and inorganic matrices.

Application	Membranes	Devices and Accessories
Acid Rain	Nylasorb™ and Zefluor™ Membranes	37 and 47 mm Open-Face Aluminum Filter Holders
Aggressive Environments/ Aerosol Testing	Tissuquartz™, Emfab™, and Fiberfilm™ Membranes	47 mm In-Line Filter Holders
Asbestos/Fibers	GN-6 Metricel® and GN-4 Metricel Membranes	25 and 37 mm Air Monitoring Cassettes, 25 and 37 mm Support Pads, Analyslide® Petri Dish
Diesel Fuel	Emfab and Fiberfilm Membranes	47 mm In-Line Filter Holders
Gravimetric	A/E Glass Fiber, GLA-5000, Zefluor, Emfab, Tissuquartz, and Teflo Membranes	37 mm Air Monitoring Cassettes, 25 mm Open-Face Delrin♦ Holder, 37 and 47 mm Open-Face Aluminum Holders, Analyslide Petri Dish
Lead	GN-4 Metricel Membrane	37 mm Air Monitoring Cassettes, 37 mm Support Pads
Nuisance Dust	GLA-5000 Membrane	37 mm Air Monitoring Cassettes, 37 mm Support Pads
PM 10, PM 2.5	A/E Glass Fiber, Tissuquartz, Teflo, and Zefluor Membranes	Analyslide Petri Dish
Polynuclear Aromatic Hydrocarbon	Zefluor and Zylon™ Membranes	37 mm Air Monitoring Cassettes, 37 mm Support Pads
Silica	GLA-5000 and GN-4 Metricel Membranes	37 mm Air Monitoring Cassettes, 37 mm Support Pads, Analyslide Petri Dish

For more detailed information on how to select the correct filter for the specific NIOSH method you are using, visit our web site, contact your local Pall Life Sciences representative, or call our Technical Services Department.

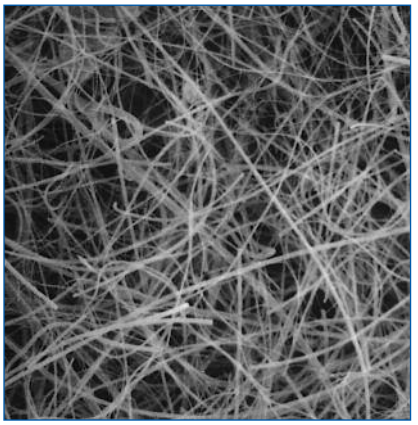
Environmental Water and Air – Online Reference Library

Pall's website offers an extensive collection of product, technical, and application information. This valuable online reference library features hundreds of technical articles, posters, podcasts, application notes, and more that can help you get the most out of your process. To view the following titles online – and many others – click the Literature Library link in the left sidebar when you visit **www.pall.com/lab**.

- Air Analysis Sampling Membrane Selection Guide
- Analysis of Envirochek® Sampling Capsule versus Traditional String Wound Cartridges for Collection and Recovery of *Cryptosporidium*
- *Cryptosporidium* Occurrence in Wastewaters and Control Using UV Disinfection
- Envirochek HV Capsule: Recovering *Cryptosporidium* From High Volume Source and Finished Drinking Water Samples
- Envirochek HV Sampling Capsule Protocol
- Envirochek Sampling Capsule Protocol
- Evaluation of Teflo Filters for Applicability to X-Ray Fluorescence Analysis of Air Particulate Deposits
- Filter Funnels Selection Guide
- Filter Holders Selection Guide
- Filtration Hardware Selection Guide
- Groundwater Sampling Devices Selection Guide
- Membranes and Devices for Air Analysis Selection Guide
- Methods for the Recovery, Isolation, and Detection of *Cryptosporidium* Oocysts in Wastewaters
- Testing Water for *Cryptosporidium* Podcast

Pallflex® Air Monitoring Filters

Versatile filters uniquely suited for a broad range of air monitoring applications



- Useful for high temperature and hot gas air monitoring applications.
- Ideal for stack sampling and diesel emissions testing.

Applications

Tissuquartz™ Filters

- Heat treated for reduction of trace organics and superior chemical purity.
- High temperature use for analysis of acidic gases and stack sampling aerosols.
- High flow rate and filtration efficiency.
- Ultra-pure soft water processing to reduce residual ion content. (Contact Pall Technical Service for typical values.)

Filberfilm™ Filters

- Economical filter suited for a range of air sampling applications.
- Moisture variations in air or gases during air sampling will not cause chemical reactions on the filter.
- Heat-treated version available for reduction of trace organics.

Emfab™ Filters

- Withstands folding for weighing and transport.
- Every filter flushed with DI water to remove water-soluble residue.
- Low air resistance for use in critical aerosol sampling tests, such as diesel exhaust.

Specifications

Description	Tissuquartz Filters	Emfab Filters*	Fiberfilm Filters
Filter Media	Pure quartz, no binder	Borosilicate glass microfibers reinforced with woven glass cloth and bonded with PTFE	Heat resistant borosilicate glass fiber coated with fluorocarbon (TFE)
Diameter	25 - 142 mm and 8 x 10 in.	12 - 142 mm and 8 x 10 in.	25 - 100 mm and 8 x 10 in.
Typical Thickness	432 µm (17 mils)	178 µm (7 mils)	203 µm (8 mils)
Typical Filter Weight	5.8 mg/cm^2	5.0 mg/cm^2	3.4 mg/cm^2
Typical Water Flow Rate 0.35 bar (35 kPa, 5 psi)	220 mL/min/cm^2	32 mL/min/cm^2	220 mL/min/cm^2
Typical Air Flow Rate 0.7 bar (70 kPa, 10 psi)	73 L/min/cm^2	68 L/min/cm^2	180 L/min/cm^2
Maximum Operating Temperature - Air	1,093 ºC (2,000 ºF)	260 ºC (500 ºF)	315.5 ºC (600 ºF)
Typical Aerosol Retention**	99.90%	99.95%	96.40%
pH in Boiled Water Extract	6.5 - 7.5	–	–

* The TX40HI45 and TX40HI75 are made from the same materials but were developed in conjunction with the U.S. EPA (Method 26) when a need arose to sample the exhaust gases from the stacks at incinerator facilities. These two grades are made with higher levels of the PTFE binder resin than the TX40HI20WW to withstand the corrosive atmosphere. The TX40HI75 has a higher level of binder than the TX40HI45 and both have a higher level than the TX40HI20WW.

** Following ASTM D 2986-95A 0.3 µm (DOP) at 32 L/min/100 cm^2 filter media.

Ordering Information

Tissuquartz™ Filters, 2500 QAT-UP

VWR #	Pall #	Description	Pkg
28150-897	7200	25 mm	100/pkg
28150-899	7201	37 mm	25/pkg
28150-901	7202	47 mm	25/pkg
21431-426	7199	54 mm	25/pkg
21431-410	7191	60 mm	25/pkg
21431-422	7197	63.5 mm	25/pkg
21431-420	7196	64 mm	25/pkg
28150-907	7205	82.6 mm	25/pkg
21431-342	7190	83 mm	25/pkg
29301-678	7206	85 mm	25/pkg
21431-348	7187	87.5 mm	25/pkg
28150-903	7203	90 mm	25/pkg
21431-418	7195	100 mm	25/pkg
29301-690	7207	102 mm	25/pkg
29301-692	7250	110 mm	25/pkg
29301-694	7249	115 mm	25/pkg
29301-696	7208	125 mm	25/pkg
29301-698	7251	142 mm	25/pkg
28150-905	7204	8 x 10 in.	25/pkg

Non-Heat-Treated Tissuquartz Filters, 2500 QAO-UP

VWR #	Pall #	Description	Pkg
21431-424	7198	37 mm	25/pkg
21431-416	7194	47 mm	25/pkg
29301-670	7240	70 mm	25/pkg
29301-704	7241	90 mm	25/pkg
21431-414	7193	142 mm	25/pkg

Emfab™ Filters

VWR #	Pall #	Description	Pkg
21431-352	7258	TX40HI20WW, 12 mm	100/pkg
28150-925	7219	TX40HI20WW, 25 mm	100/pkg
28150-921	7217	TX40HI20WW, 37 mm	100/pkg
21431-438	7256	TX40HI20WW, 41 mm	100/pkg
28150-927	7220	TX40HI20WW, 44 mm	100/pkg
28150-929	7221	TX40HI20WW, 47 mm	100/pkg
28150-931	7222	TX40HI20WW, 70 mm	100/pkg
28150-923	7218	TX40HI20WW, 81 mm	100/pkg
29301-726	7234	TX40HI20WW, 85 mm	100/pkg
28150-933	7223	TX40HI20WW, 90 mm	100/pkg
21431-428	7225	TX40HI20WW, 110 mm	100/pkg
21431-430	7252	TX40HI20WW, 142 mm	100/pkg
28150-935	7224	TX40HI20WW, 8 x 10 in.	100/pkg
21431-354	7259	TX40HI45, 25 mm	100/pkg
87003-870	7262	TX40HI45, 47 mm	100/pkg
21431-432	7253	TX40HI45, 82.6 mm	100/pkg
21431-356	7260	TX40HI45, 83 mm	100/pkg
21431-434	7254	TX40HI45, 110 mm	100/pkg
87003-872	7263	TX40HI75, 25 mm	100/pkg
87003-874	7264	TX40HI75, 47 mm	100/pkg
87003-876	7265	TX40HI75, 82.6 mm	100/pkg
21431-358	7266	TX40HI75, 110 mm	100/pkg

Fiberfilm™ Filters

VWR #	Pall #	Description	Pkg
28150-909	7210	T60A20, 25 mm	100/pkg
28150-911	7211	T60A20, 37 mm	50/pkg
28150-913	7212	T60A20, 47 mm	50/pkg
29301-742	7216	T60A20, 55 mm	50/pkg
28150-915	7213	T60A20, 70 mm	50/pkg
87003-840	7209	T60A20-HT, 70 mm, heat-treated	50/pkg
28150-917	7214	T60A20, 90 mm	50/pkg
21431-440	7257	T60A20, 100 mm	50/pkg
28150-919	7215	T60A20, 8 x 10 in.	50/pkg

Related Products

In-Line Filter Holders . . . . . 262 - 266
Stainless Steel Forceps 225, 274

Glass Fiber Filters

Superior grade filters for a variety of biological and environmental methods

- Type A/E meets the requirements for suspended solids testing, as described in *Standard Methods for the Examination of Water and Wastewater*, current edition.
- Reduces filtration costs and premature clogging when filtering difficult-to-filter or highly contaminated solutions.
- Extends filter life and reduces final filter changes with high capacity prefilters.
- Eliminates sample contamination. Binder-free borosilicate glass fiber has no added extractables.
- Filters a wide range of particulate loads and viscous solutions with a selection of filter thicknesses from which to choose.
- Filters with binder offer excellent wet strength for easy handling and filter integrity.

Applications

- Used in a variety of sample clean-up, prefiltration, and analytical testing applications. Choose between binder-free borosilicate glass for complete purity or glass fiber with acrylic binder for added strength.

Type A/E Glass Fiber

- For testing dissolved and suspended solids in wastewater and gravimetric analysis of air pollutants.
- High flow rates, wet strength, and dirt (solids) holding capacities.

Type A/B Glass Fiber

- High dirt-loading capacity with 2.5 times thicker glass than Type A/C.
- Manufactured of the highest quality borosilicate glass microfibers.

Type A/C Glass Fiber

- For testing dissolved and suspended solids in wastewater.
- Useful for cell harvesting applications.
- Purity eliminates risk of unwanted contaminants leaching into the filtrate.

Type A/D Glass Fiber

- Excellent prefilters for solutions with a heavy load of large-sized particulate that must be removed.
- Large nominal pore size reduces membrane clogging.

Extra Thick Glass Fiber With Binder

- Preferred for prefiltration of viscous biological solutions.
- High particulate-holding capacity makes discs efficient depth filters and allows for filtration of large volumes of solutions.

Metrigard™ Glass Fiber With Binder

- Useful for prolonging membrane filter life in liquid systems that contain substantial amounts of particulate matter.

TCLP Glass Fiber

- Designed to meet requirements for use in U.S. EPA SW-846 Method 1311: Toxic Characteristics Leaching Procedure (TCLP).

Specifications and Selection Chart

Description	Type A/E	Type A/B	Type A/C
Typical Applications	Water solids testing, air monitoring, gravimetric analysis	Diagnostic applications, sample prefiltration	Cell harvesting, prefiltration, solids testing
Filter Media	Borosilicate glass without binder	Borosilicate glass without binder	Borosilicate glass without binder
Pore Size (Nominal)	1 µm	1 µm	1 µm
Typical Thickness	330 µm (13 mils)	660 µm (26 mils)	254 µm (10 mils)
Typical Water Flow Rate mL/min/cm² at 0.3 bar (30 kPa, 5 psi)	250	124	153
Typical Air Flow Rate L/min/cm² at 0.7 bar (70 kPa, 10 psi)	60	24	40
Maximum Operating Temperature	Air - 550 °C (1,022 °F)	Air - 550 °C (1,022 °F)	Air - 550 °C (1,022 °F)
Sterilization	Autoclavable	Autoclavable	Autoclavable
Typical Aerosol Retention*	99.98%	–	–

Description	Type A/D	Extra Thick Discs	Metrigard™ Discs	TCLP
Typical Applications with large-sized particulate	Prefiltration of solutions contaminated samples	Prefiltration of heavily	Prefiltration in systems with high particulate matter	U.S. EPA Method 1311
Filter Media	Borosilicate glass without binder	Glass fiber with acrylic binder**	Ultrafine glass fiber with acrylic binder**	Borosilicate glass without binder***
Pore Size (Nominal)	3 µm	1 µm	0.5 µm	0.7 µm
Typical Thickness	660 µm (26 mils)	1270 µm (50 mils)	330 µm (13 mils)	432 µm (17 mils)
Typical Water Flow Rate mL/min/cm² at 0.3 bar (30 kPa, 5 psi)	649	210	80	–
Typical Air Flow Rate L/min/cm² at 0.7 bar (70 kPa, 10 psi)	139	26	21	–
Maximum Operating Temperature	Air - 550 °C (1,022 °F)	Water - 135 °C (275 °F)	Water - 135 °C (275 °F)	Water - 135 °C (275 °F)
Sterilization	Autoclavable	Autoclavable	Autoclavable	Autoclavable
Typical Aerosol Retention*	–	99.97%	–	–

* Following ASTM D 2986-95A 0.3 µm (DOP) at 32 L/min/100 cm² filter media.
** Binder is 5% of total material.
*** TCLP glass fiber filters are not acid washed.

Ordering Information

Type A/E Glass Fiber Discs and Sheets, 1 µm

VWR #	Pall #	Description	Pkg
28150-134	61628	13 mm	500/pkg
28150-178	61630	25 mm	500/pkg
87003-844	60097	30 mm	100/pkg
28150-262	61654	35 mm	100/pkg
28150-260	61652	37 mm	500/pkg
87003-842	65475	42.5 mm	100/pkg
28150-190	61631	47 mm	100/pkg
28150-192	61632	50 mm	100/pkg
87003-846	60140	55 mm	100/pkg
28146-984	60012	57 mm	100/pkg
87003-848	60150	63 mm	100/pkg
28150-234	61665	70 mm	100/pkg
28150-203	61663	76 mm	100/pkg
28146-982	60010	81 mm	100/pkg
28150-230	60127	82.5 mm	100/pkg
87003-850	60118	85 mm	100/pkg
28150-269	61664	90 mm	100/pkg
28150-214	61633	102 mm	100/pkg
87003-852	60115	110 mm	100/pkg
28150-263	61655	124 mm	100/pkg
—	65476	125 mm	100/pkg
28150-225	61669	127 mm	100/pkg
28140-033	66559	142 mm	25/pkg
28150-236	61635	142 mm	100/pkg
28150-240	61675	257 mm	100/pkg
28150-238	61636	265 mm	100/pkg
87003-854	66560	293 mm	25/pkg
28150-247	61637	293 mm	100/pkg
28150-258	61638	8 x 10 in.	100/pkg

Ordering Information

Type A/B Glass Fiber Discs and Sheets, 1 µm

VWR #	Pall #	Description	Pkg
28150-937	66196	13 mm	100/pkg
28150-938	66198	25 mm	100/pkg
28150-975	66208	37 mm	100/pkg
28150-976	66209	47 mm	100/pkg
28150-977	66210	142 mm	25/pkg
28150-978	66211	8 x 10 in.	25/pkg

Type A/C Glass Fiber Discs and Sheets, 1 µm

VWR #	Pall #	Description	Pkg
28150-979	66213	25 mm	100/pkg
28150-980	66214	37 mm	100/pkg
28150-981	66215	47 mm	100/pkg
87003-856	65529	70 mm	100/pkg
28150-982	66216	142 mm	25/pkg
28150-984	66217	8 x 10 in.	25/pkg

Type A/D Glass Fiber Discs and Sheets, 3 µm

VWR #	Pall #	Description	Pkg
28150-985	66218	13 mm	100/pkg
28150-986	66220	25 mm	100/pkg
28150-993	66222	37 mm	100/pkg

Type A/D Glass Fiber Discs and Sheets, 3 µm

VWR #	Pall #	Description	Pkg
28150-995	66224	47 mm	100/pkg
28150-996	66226	142 mm	25/pkg
28150-999	66227	8 x 10 in.	25/pkg

Glass Fiber Discs With Binder, Extra Thick, 1 µm

VWR #	Pall #	Description	Pkg
28150-702	66073	13 mm	100/pkg
28150-713	66075	25 mm	100/pkg
28150-735	66078	47 mm	100/pkg
28150-768	66084	127 mm	50/pkg
28150-779	66085	142 mm	50/pkg
28150-780	66086	257 mm	25/pkg
28150-790	66088	293 mm	25/pkg

Metrigard™ Glass Fiber Discs With Binder, 0.5 µm

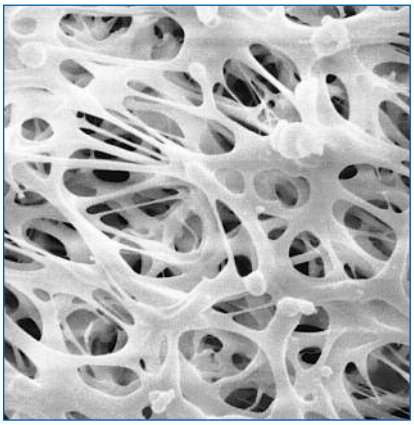
VWR #	Pall #	Description	Pkg
28150-371	64798	47 mm	100/pkg
28150-373	64803	142 mm	100/pkg

TCLP Glass Fiber Filters

VWR #	Pall #	Description	Pkg
87003-858	66251	13 mm	100/pkg
28149-455	66258	47 mm	50/pkg
28149-456	66256	90 mm	50/pkg
28149-458	66259	110 mm	50/pkg
87003-860	60159	115 mm	50/pkg
28149-457	66257	142 mm	50/pkg
87003-862	60076	293 mm	25/pkg

GLA-5000 PVC Membrane Disc Filters

Inherently low ash membrane ideally suited for multiple NIOSH analytical methods



- Assures gravimetric stability with low moisture pick-up and low tare weight.
- Low ash. Provides interference-free silica determinations.
- 5 µm pore size meets NIOSH and OSHA requirements.
- 25 and 37 mm sizes are ideal for use in Pall Air Monitoring Cassettes.

Applications

- Excellent membrane choice for sampling airborne metals, silica, and dust.

Specifications

Filter Media
Polyvinyl chloride (PVC)

Pore Size
5 µm

Typical Air Flow Rate
53 L/min/cm^2 at 0.7 bar
(70 kPa, 10 psi)

Maximum Operating Temperature – Water
52 °C (125 °F)

Gravimetric Stability
< 0.5% after 24 hrs at 48% relative humidity at 50 °C (122 °F)

Ash Content
< 1%

Typical Aerosol Retention*
99.94% 0.3 µm (DOP) at
32 L/min/100 cm^2 of filter media

*Following ASTM D 2986-95A

Ordering Information

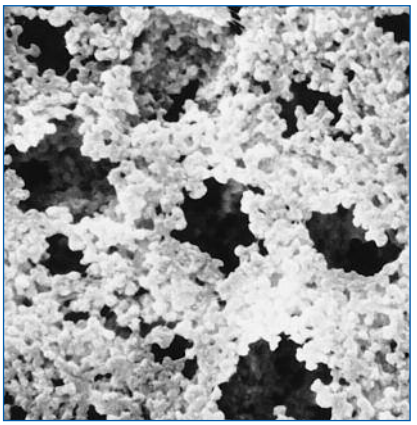
GLA-5000 Membrane Disc Filters, 5 µm

VWR #	Pall #	Description	Pkg
28139-700	66466	25 mm	100/pkg
28139-787	66469	37 mm	100/pkg
28139-743	66467	37 mm, with support pads	100/pkg
28139-823	66468	47 mm	100/pkg

Related Products

Nylasorb™ Nylon Membrane Disc Filters

Pure nylon membrane specifically for the requirements of acidic dry deposition (acid rain) measurements



- Selectively adsorbs HNO_3 and SO_2.
- Accurate HNO_3 determinations. Adsorbs extremely low levels of NO, NO_2, and polynuclear aromatic hydrocarbons (PAHs).
- Assures low background levels of NO_3^- and SO_4^{-2}. Each lot tested by ion chromatography.

Applications

- For acidic dry deposition measurements.

Specifications

Filter Media
Nylon

Pore Size
1 µm (nominal)

Typical Thickness
90 µm (3 mils)

Maximum Operating Temperature
180 °C (356 °F)

Maximum NO_3- Background Level
0.025 µg/cm²

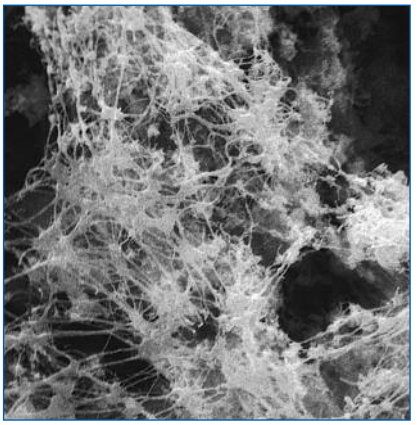
Ordering Information

Nylasorb Membrane Disc Filters, 1 µm

VWR #	Pall #	Description	Pkg
27377-064	66509	47 mm	100/pkg
27377-065	66510	90 mm	50/pkg

PTFE Membrane Disc Filters

Strong, chemically resistant membranes for air monitoring and sampling in aggressive environments



- Low chemical background permits highly sensitive, interference-free determinations.
- Ensures accurate gravimetric determinations with low tare mass.
- Zefluor™ membrane, available in 0.5 µm pore size.
- Ideal for filtration of gas and/or organic solvents.

Applications

- For air monitoring and sampling in aggressive environments.
- Supported membranes offer increased durability for hostile testing environments or acid aerosol monitoring.
- Teflo membrane offers unique PMP support ring for PM 10 and PM 2.5 dichotomous and other air sampling techniques.
- Ultimate in chemical compatibility for filtering harsh chemicals and HPLC mobile phases that destroy other membrane materials.

Specifications

Description	Zefluor™ Membrane	Teflo Membrane	Zylon™ Membrane	TF (PTFE) Membrane
Filter Media/Support	PTFE with PTFE support	PTFE with PMP (polymethylpentene) support ring	Unsupported PTFE	PTFE on a polypropylene support
Typical Thickness	0.5 µm: 178 µm (7 mils) 1 µm: 165 µm (6.5 mils) 2 and 3 µm: 152 µm (6 mils)	1 µm: 76 µm (3 mils) 2 µm: 46 µm (1.8 mils) 3 µm: 30.4 µm (1.2 mils)	140 µm (5.5 mils)	0.2 µm: 139 µm (5.5 mils) 0.45 and 1 µm: 135 µm (5.3 mils)
Typical Air Flow Rate L/min/cm² at 0.7 bar (70 kPa, 10 psi)	0.5 µm: 1 1 µm: 14.6 2 µm: 25.3 3 µm: 53	1 µm: 17 2 µm: 53 3 µm: 90	5 µm: 13	0.2 µm: 2 0.45 µm: 3 1 µm: 7
Minimum Bubble Point - IPA bar (psi)	Not applicable	Not applicable	Not applicable	0.2 µm: 1.0 (15) 0.45 µm: 0.4 (6) 1 µm: 0.1 (2)
Water Breakthrough bar (psi)	Not applicable	Not applicable	Not applicable	0.2 µm: 2.8 (40) 0.45 µm: 1.1 (16) 1 µm: 1.0 (15)
Typical Aerosol Retention*	0.5, 1, and 2 µm: 99.99% 3 µm: 99.98%	1 and 2 µm: 99.99% 3 µm: 99.79%	Not applicable	Not applicable

*Following ASTM D 2986-95A 0.3 µm (DOP) at 32 L/min/100 cm² filter media.

Ordering Information

Zefluor and Zylon Membrane Disc Filters

VWR #	Pall #	Description	Pkg
28139-540	P5PQ025	Zefluor, 0.5 µm, 25 mm	100/pkg
28139-583	P5PQ047	Zefluor, 0.5 µm, 47 mm	50/pkg
—	P5PL025	Zefluor, 1 µm, 25 mm	100/pkg
28139-588	P5PL037	Zefluor, 1 µm, 37 mm, with support pads	50/pkg
28139-590	P5PL047	Zefluor, 1 µm, 47 mm	50/pkg
28139-594	P5PL090	Zefluor, 1 µm, 90 mm	50/pkg
28149-585	P5PL001	Zefluor, 1 µm, 8 x 10 in.	25/pkg
—	60048	Zefluor, 2 µm, 25 mm	100/pkg
28139-222	P5PJ037	Zefluor, 2 µm, 37 mm, with support pads	50/pkg
28139-244	P5PJ047	Zefluor, 2 µm, 47 mm	50/pkg
—	60224	Zefluor, 2 µm, 70 mm	25/pkg
28139-595	P5PJ001	Zefluor, 2 µm, 8 x 10 in.	25/pkg
87003-802	60230	Zefluor, 3 µm, 50 mm	50/pkg
—	60214	Zefluor, 3 µm, 63 mm	100/pkg
—	60537	Zefluor, 3 µm, 90 mm	25/pkg
28139-597	P5PI001	Zefluor, 3 µm, 8 x 10 in.	25/pkg
28139-601	P4PH037	Zylon, 5 µm, 37 mm, with support pads	50/pkg
28139-599	P4PH047	Zylon, 5 µm, 47 mm	50/pkg

Teflo Membrane Disc Filters

VWR #	Pall #	Description	Pkg
28150-400	R2PL037	1 µm, 37 mm	50/pkg
28139-125	R2PL047	1 µm, 47 mm	50/pkg
28139-109	R2PJ037	2 µm, 37 mm	50/pkg

Teflo Membrane Disc Filters

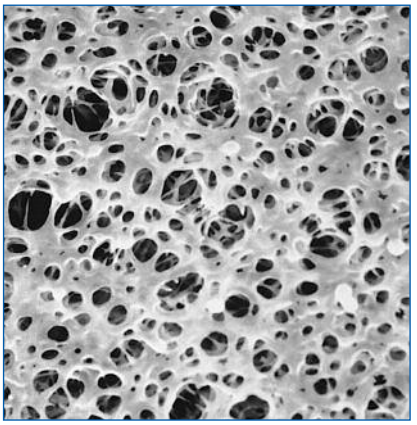
VWR #	Pall #	Description	Pkg
28139-120	R2PJ041	2 µm, 41 mm	50/pkg
28139-129	R2PJ047	2 µm, 47 mm	50/pkg
28139-131	R2PI025	3 µm, 25 mm	50/pkg
87003-880	60146	3 µm, 47 mm	50/pkg

TF (PTFE) Membrane Disc Filters

VWR #	Pall #	Description	Pkg
28150-000	66141	TF 200, 0.2 µm, 13 mm	100/pkg
28150-010	66142	TF 200, 0.2 µm, 25 mm	100/pkg
28150-021	66143	TF 200, 0.2 µm, 47 mm	100/pkg
28140-168	66630	TF 200, 0.2 µm, 50 mm	100/pkg
28150-043	66145	TF 200, 0.2 µm, 142 mm	25/pkg
28150-054	66146	TF 200, 0.2 µm, 293 mm	25/pkg
28149-951	66147	TF 450, 0.45 µm, 13 mm	100/pkg
28149-973	66148	TF 450, 0.45 µm, 25 mm	100/pkg
28149-962	66149	TF 450, 0.45 µm, 47 mm	100/pkg
28140-170	66631	TF 450, 0.45 µm, 50 mm	100/pkg
28150-056	66151	TF 450, 0.45 µm, 142 mm	25/pkg
28150-057	66152	TF 450, 0.45 µm, 293 mm	25/pkg
28150-816	66153	TF 1000, 1 µm, 13 mm	100/pkg
28150-817	66154	TF 1000, 1 µm, 25 mm	100/pkg
28150-804	66159	TF 1000, 1 µm, 37 mm, with support pads	100/pkg
28150-837	66155	TF 1000, 1 µm, 47 mm	100/pkg
—	66158	TF 1000, 1 µm, 293 mm	25/pkg

GN Metricel® MCE Membrane Disc Filters

Membrane for air monitoring applications



- Dissolves completely using standard digestion procedures.
- Clears completely, possesses low artifacts, and offers minimal interference in fiber counting.

Applications

- GN-4 Metricel filters meet NIOSH requirements for airborne metals and asbestos monitoring.

Specifications

Filter Media
Hydrophilic mixed cellulose esters

Pore Size
0.8 µm, 0.45 µm

Typical Thickness
152 µm (6 mils)

Typical Filter Weight
4 mg/cm²

Typical Water Flow Rate
0.8 µm: 129 mL/min/cm² at 0.7 bar (70 kPa, 10 psi)
0.45 µm: > 65 mL/min/cm² at 0.7 bar (70 kPa, 10 psi)

Typical Air Flow Rate
0.8 µm: 55 L/min/3.7 cm² at 0.9 bar (90 kPa, 13.5 psi)

Maximum Operating Temperature - Water
74 °C (165 °F)

Typical Moisture Pick-Up
< 1% after 24 hr at 48% relative humidity at 23 °C (73 °F)

Extractables - Boiling Water
< 2%

Minimum Bubble Point - Water
1.0 bar (100 kPa, 15 psi)

Refractive Index
1.512

Ordering Information

GN-4 Metricel MCE Membrane Disc Filters, 0.8 µm

VWR #	Pall #	Description	Pkg
28148-290	64677	25 mm, plain, with support pads	100/pkg
28100-001	66263	25 mm, plain	100/pkg
87003-866	66276	25 mm, grid, packaged in 4 cavities	100/pkg
28148-303	64678	37 mm, plain, with support pads	100/pkg
28148-325	64679	47 mm, plain	100/pkg
28148-391	66179	47 mm, grid	100/pkg

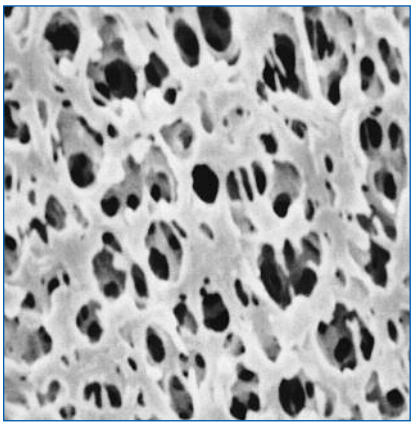
GN-6 Metricel MCE Membrane Disc Filters, 0.45 µm (Non-Sterile Packages)

VWR #	Pall #	Description	Pkg
28148-030	63066	13 mm, plain	100/pkg
28148-562	63068	25 mm, plain	100/pkg
28148-675	64191	25 mm, grid	100/pkg
28148-530	64382	37 mm, plain, with support pads	100/pkg
28148-584	63069	47 mm, plain	100/pkg
28148-642	63020	47 mm, grid	100/pkg
28148-740	66536	142 mm, plain	25/pkg

Related Products

Metricel® Polypropylene Membrane Disc Filters

Pure polypropylene membrane for filtration of aggressive solvents



- Pure polypropylene gives high chemical stability.
- Offers high temperature resistance and low extractable levels.

Applications

- Inherently hydrophobic.
- Economical alternative to PTFE.

Specifications

Filter Media
Hydrophobic polypropylene

Pore Size
0.1 µm

Typical Thickness
89 µm (3.5 mils)

Typical Liquid Flow Rate - Isopropyl Alcohol
1.9 mL/min/cm^2 at 0.7 bar (70 kPa, 10 psi)

Typical Air Flow Rate
0.8 L/min/cm^2 at 0.7 bar (70 kPa, 10 psi)

Maximum Operating Temperature - Water
82 °C (180 °F)

Minimum Bubble Point - Isopropyl Alcohol
1.7 bar (170 kPa, 25 psi)

Sterilization
Provided non-sterile. Autoclavable if desired.

Ordering Information

Metricel Polypropylene Membrane Disc Filters, 0.1 µm

VWR #	Pall #	Description	Pkg
28140-527	M5PU025	25 mm	100/pkg
28140-549	M5PU047	47 mm	100/pkg

Related Products

In-Line Filter Holders . . . . . 262 - 266
Stainless Steel Forceps 225, 274

25 mm Air Monitoring Cassettes

Conductive, non-static cowl prevents adherence of particles to cassette walls for more accurate analysis

- 0.8 µm GN-4 Metricel® membrane has a low fiber background count. It is widely accepted for air monitoring of fibers, asbestos fibers, and metals.
- Leak proof and tamper proof. Banded cassettes ensure air-tight seal for critical applications.
- Available unassembled for cost-effective monitoring with a variety of Pall membranes.

Applications

- GN-4 Metricel membrane meets fiber count and background requirements to comply with NIOSH Methods 7400 and 7402.
- Cassettes can be used to monitor respirable constituents, such as silica, metal, and dust.

Specifications

Materials of Construction
Filter Media: GN-4 Metricel membrane (mixed cellulose esters) with cellulose support pad
Housing: Carbon-filled polypropylene

Effective Filtration Area
3.85 cm^2

Dimensions
Overall Length [Includes 5 cm (2 in.) Extension]: 7.9 cm (3.1 in.)
Diameter: 2.8 cm (1.1 in.)

Filter Size
25 mm

Inlet/Outlet Connections
Luer-type female inlet, female luer built-in hose adapter outlet

Operating Temperature
Ambient

Ordering Information

Air Monitoring Cassettes, 25 mm

VWR #	Pall #	Description	Pkg
10277-988	4375	Three-piece unit with GN-4 Metricel membrane and support pad	50/pkg
10277-996	4382	Three-piece unit with GN-4 Metricel membrane and support pad, banded	50/pkg
10277-990	4376	Three-piece unit, unassembled	50/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28151-000	66238	25 mm support pads, non-sterile	100/pkg

Related Products

Air Monitoring Membranes:

37 mm Air Monitoring Cassettes

Consistent performance for industrial hygiene sampling

- 37 mm diameter meets NIOSH and other regulatory requirements for industrial hygiene sampling using vacuum filtration.
- 0.8 µm GN-4 Metricel® membrane has a low fiber background count. It is widely accepted for air monitoring of fibers, asbestos fibers, and metals.
- Choose from two- or three-piece units.
- Disposable after a single use or may be reused.

Applications

- Designed to meet NIOSH and other regulatory requirements for industrial hygiene sampling.
- Ideally suited for particulate and air sampling analysis using vacuum filtration.
- Can be used to monitor respirable constituents, such as nuisance dust, silica, aerosols, and airborne particulates.
- For open- or closed-face monitoring methods.

Specifications

Materials of Construction
Filter Media: GHP hydrophilic polypropylene membrane, GN-4 Metricel membrane (mixed cellulose esters) with a cellulose support pad
Housing: SAN (styrene acrylonitrile)

Effective Filtration Area
9.1 cm^2

Dimensions
Overall Length:
Two-piece Unit: 2.8 cm (1.1 in.)
Three-piece Unit: 3.8 cm (1.5 in.)
Diameter: 4.2 cm (1.7 in.)

Filter Size
37 mm

Inlet/Outlet Connections
Luer-taper (female)

Operating Temperature
Ambient

Ordering Information

Air Monitoring Cassettes, 37 mm

VWR #	Pall #	Description	Pkg
28145-397	4338	Two-piece unit, unassembled	100/pkg
28145-430	4339	Three-piece unit, unassembled	100/pkg
28145-393	4336	Three-piece unit with 0.8 µm GN-4 Metricel membrane and support pad	50/pkg
—	4327	Three-piece unit with 0.45 µm GHP membrane and support pad	50/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28150-633	64747	37 mm support pads, non-sterile	500/pkg
—	88066	Plugs, blue	100/pkg
—	88067	Plugs, red	100/pkg

Related Products

Air Monitoring Membranes:

AquaPrep™ Groundwater Sampling Capsules and Devices

Optimized for minimal background in dissolved metals analysis of water samples

- Easiest and most efficient way to meet filtration requirements of the U.S. EPA for 0.45 µm filtration.
- Self-contained, disposable units eliminate the time and hazards associated with cleaning filter holders.
- AquaPrep 600 capsule features over four times higher EFA than 142 mm disc filters, reducing the need for multiple filter changes during the sampling process and ensuring rapid sample filtration.
- AquaPrep 600 capsules have Metals Analysis Certification on 48 metals printed on each package.

Applications

- Designed for the preparation of groundwater samples for dissolved metals analysis.
- EFA of 19.6 cm^2 makes AquaPrep devices perfect for samples with relatively low levels of particulate matter.
- AquaPrep 600 capsules are recommended for moderately silty and particulate-laden groundwater.

Specifications

AquaPrep and AquaPrep-V Sampling Devices

Materials of Construction
Filter Media:
AquaPrep Device
Thermopor membrane (polyester-reinforced polysulfone)
AquaPrep-V Device
Versapor® membrane (acrylic copolymer on a non-woven support)
Housing: Polypropylene

Effective Filtration Area
19.6 cm^2

Dimensions
Length: 8.2 cm (3.2 in.)
Diameter: 7.3 cm (2.9 in.)

Inlet/Outlet Connections
AquaPrep Device
Stepped hose barb accepts 6.4 - 12.7 mm (1/4 - 1/2 in.) ID tubing
AquaPrep-V Device
1/8 in. MNPT

Maximum Operating Temperature
60 °C (140 °F)

Maximum Operating Pressure
5.1 bar (510 kPa, 75 psi) at ambient temperature

AquaPrep 600 Capsules

Materials of Construction
Filter Media: Supor® membrane (hydrophilic polyethersulfone)
Housing: Polypropylene

Effective Filtration Area
600 cm^2

Dimensions
Length (With Fittings): 14.5 cm (5.7 in.)
Diameter: 6.9 cm (2.7 in.)

Inlet/Outlet Connections
Stepped hose barb accepts 6.4 - 12.7 mm (1/4 - 1/2 in.) ID tubing

Maximum Operating Temperature
60 °C (140 °F)

Maximum Operating Pressure
4.1 bar (410 kPa, 60 psi) at ambient temperature

Ordering Information

AquaPrep Groundwater Sampling Device

VWR #	Pall #	Description	Pkg
28145-158	4270	0.45 µm, Thermopor membrane	20/pkg

AquaPrep-V Groundwater Sampling Device

VWR #	Pall #	Description	Pkg
28145-160	4272	0.45 µm, Versapor membrane	20/pkg
28145-162	4274	0.45 µm, Versapor membrane	100/pkg

AquaPrep 600 Groundwater Sampling Capsule

VWR #	Pall #	Description	Pkg
28145-143	12175	0.45 µm, Supor membrane	1/pkg
28145-142	12176	0.45 µm, Supor membrane	10/pkg

Related Products

GWV High Capacity Goundwater Sampling Capsules 247
Versapor® Membrane 111

GWV High Capacity Groundwater Sampling Capsules

Superior flow rates and higher throughputs

- 75 Metals Analysis Certification is printed on each package.
- Meets filtration requirements of the U.S. EPA.
- Available in a variety of pore sizes to meet regional regulatory requirements.
- Saves time and money. Self-contained devices reduce the need for costly decontamination and multiple filter change steps associated with reusable filter holders.
- Ensures rapid filtration. GWV provides five times the filtration area of conventional 142 mm filters.

Applications

- Designed for the preparation of groundwater samples for dissolved metals analysis.
- Reduces the need for multiple changes when filtering particulate-laden samples.

Specifications

Materials of Construction
Filter Media: Versapor® membrane (acrylic copolymer on a non-woven support)
Housings: Polypropylene

Effective Filtration Area
700 cm^2

Dimensions
Length (With Fittings): 11.4 cm (4.5 in.)
Diameter: 6.4 cm (2.5 in.)

Inlet/Outlet Connections
1/8 in. MNPT

Maximum Operating Temperature
88 °C (190 °F)

Maximum Operating Pressure
3.4 bar (340 kPa, 50 psi) at ambient temperature

Ordering Information

GWV High Capacity Groundwater Sampling Capsules

VWR #	Pall #	Description	Pkg
28145-146	12178	0.45 µm	1/pkg
28145-147	12179	0.45 µm	10/pkg
28145-148	12180	0.45 µm	50/pkg
28100-054	12023	1 µm	1/pkg
28100-056	12024	1 µm	10/pkg
28139-434	12025	1 µm	50/pkg
28100-050	12019	5 µm	1/pkg
28100-052	12020	5 µm	10/pkg
28139-432	12050	5 µm	50/pkg

Related Products

AquaPrep 600 Groundwater Sampling Capsules 246
AquaPrep™ Groundwater Sampling Devices. 246
Versapor® Membrane. 111

Envirochek® and Envirochek HV Sampling Capsules

For the concentration and recovery of Cryptosporidium *oocysts and* Giardia *cysts from source or finished water*

- Simple to use. No assembly or cleaning of filter holders or elution equipment.
- Saves time by allowing the processing of multiple samples at the same time.
- Disposable design eliminates cross-contamination and false positives.
- Typically greater than 70% recovery of target organisms.
- Eliminates false negatives with 1 µm pore size membrane for retention of *Cryptosporidium* and *Giardia*. Envirochek HV capsules are 100% integrity tested.
- Safer to use. Self-contained capsules mean that the potentially contaminated filter element does not need to be handled or cut apart.
- Capsules are serialized for traceability.

Applications

- Envirochek sampling capsules are validated and listed in U.S. EPA Methods 1622 and 1623, and used for sampling source water for *Cryptosporidium* and *Giardia*.
- Envirochek HV capsule is designed for sampling up to 1,000 L or more of treated water and is validated for up to 50 L of source water.
- Envirochek HV capsules, PNs 12096 and 12097, are approved for the United Kingdom DWI regulatory testing of finished water.
- Envirochek capsules are listed in ISO/DIS 15553-2006.

Specifications

Materials of Construction

Envirochek Capsule
(PN 12110 and 12107)
Filter Media: Supor® membrane (hydrophilic polyethersulfone)
Housing: Polycarbonate
Filter Support Material: Polypropylene
End Caps: Green vinyl
Adhesive: Urethane

Envirochek HV Capsule
(PN 12099, 12098, 12097, and 12096)
Filter Media: Polyester, hydrophilic membrane
Housing: Polycarbonate
Filter Support Material: Polypropylene
End Caps: Blue vinyl
Adhesive: Urethane

Effective Filtration Area

1,300 cm^2

Dimensions

Length: 21.6 cm (8.5 in.)
Diameter: 6.1 cm (2.4 in.)

Inlet/Outlet Connections

12.7 mm (1/2 in.) straight hose barb

Elution Capacity

Minimum of 127 mL

Performance

	Approximate Time to Process Eight Samples (Minutes)	
Step	**Envirochek Capsule**	**Other Major Device**
Set-Up	5	50
Elution	55	240
Concentration	65	240
Cleaning Equipment	0	320
Total Time	**125**	**850**
Time/Test (minutes)	**16**	**106**

For more information on the sampling procedure and additional test data, visit our online Literature Library at www.pall.com/lab.

Performance (continued)

The Envirochek® HV capsule has been validated for testing source water up to 50 L and for high volumes of drinking water analysis up to 1,000 liters (see Table 2). High flow rates and throughput are achieved due to the high filtration area that comes from the patented pleated design. This pleated design provides 1,300 cm^2 of filtration area that allows for high flow rate at very low differential pressures. This means gravity feed or smaller pumps can be used and easily carried into the field for site sampling. Site sampling eliminates the need for carrying and shipping bulky containers of water.

The patented recovery method used with the Envirochek HV capsule allows for processing up to eight filters at one time, saving valuable lab time. The method is the easiest and simplest one available.

IPR Tier 1 Validation Data for *Cryptosporidium* Recovery Using Method 1622 and the Envirochek HV Capsule for 1,000 L Finished Drinking Water Samples Using the Sodium Hexametaphosphate Elution

Sample Description	Turbidity (ntu)	Spike Dose (#)	% Recovery		
Reagent Blank	< 0.1	0			
IPR2	< 0.1	99.3	68.5		
IPR2	< 0.1	99.3	58.4		
IPR3	< 0.1	99.3	60.4	**Mean % Recovery**	**RSD or RPD**
IPR4	< 0.1	99.3	61.4	**62.2**	**7.0**
IPR Acceptable Range				**13 - 143**	**< 67 %**

IPS and MS/MSD Validation Data for *Cryptosporidium* Recovery Using Method 1622 and the Envirochek HV Capsule with 50 L of Source Water

IPR Reagent Water

N	Turbidity (ntu)	Packed Pellet Size (mL)	Spike Dose (#)	Avg. % Recovery	Avg. RSD (%)
12	< 0.1	< 0.1	95.9	57.7	15.1
IPR Acceptable Range				**24 - 100**	**< 55%**

IPR Matrix Spike

N	Turbidity (ntu)	Packed Pellet Size (mL)	Spike Dose (#)	Avg. % Recovery	Avg. RSD (%)
6	1.8 - 10.6	0.45 - 3.0	95.9	52.5	10.5
IPR Acceptable Range				**13 - 111**	**< 51%**

IPR = Initial Precision and Recovery
RSD = Relative Standard Deviation
RPD = Relative Percent Difference

NEW PRODUCT

Ordering Information

Envirochek and Envirochek HV Sampling Capsules

VWR #	Pall #	Description	Pkg
28145-722	12099	Envirochek HV sampling capsule	1/pkg
28145-720	12098	Envirochek HV sampling capsule, bulk pack, individually bagged	25/pkg
—	12097	Envirochek HV sampling capsule, for U.K. DWI	1/pkg
—	12096	Envirochek HV sampling capsule, for U.K. DWI	25/pkg
28143-552	12110	Envirochek sampling capsule	1/pkg
28145-715	12107	Envirochek sampling capsule, bulk pack, individually bagged	25/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28144-005	4820	Laureth-12 paste, 50 g bottle	1/pkg
28140-950	4821	Laboratory shaker, 115 V, 50/60 Hz	1/pkg
28140-952	4822	Laboratory shaker, 230 V, 50/60 Hz CE	1/pkg
21433-000	89051	Clamp with collar	1/pkg

The Laboratory Shaker processes up to eight Envirochek sampling capsules at once. Shaker speed is adjustable from 0 to ~ 700 RPMs.

Hardware

Pall Life Sciences provides filter holders, filter funnels, products for pressure applications, and accessories in a range of materials to help you maximize your filtration efficiency and economy. Our durable stainless steel and aluminum filter funnels and holders are manufactured to provide years of continuous service. We also provide disposable funnels and holders in a variety of plastic materials for use with non-aggressive samples, or for convenient one-time use.

Content

Filter Funnel Application Selector

Pall offers a wide variety of filter funnels to meet the specific needs of your process. In laboratory applications, filter funnels are used to measure and concentrate particulate in a fluid sample onto a membrane filter or to purify the filtrate. When selecting a funnel, consider:

- **Materials of Construction**
  Consider the temperature and chemical resistance of the funnel materials. For liquid clarification, particulate and microbial analysis, and situations requiring autoclaving, choose one of our plastic funnels. They are generally less expensive than stainless steel funnels and more durable than glass.

- **Sample Volume**
  Match your sample volume to funnel capacity for maximum efficiency. Our filter funnels range in capacity from 50 mL to 1 liter and feature clearly marked calibrations for easy measurement.

- **Cleaning Requirements**
  Pall funnels are provided non-sterile and most are autoclavable. Some microbiologists flame sanitize hardware when conducting microbial monitoring. Our stainless steel and glass funnels are ideal for these applications.

Selection Guide – Filter Funnels

Filter Size (mm)	25	25, 47	47	47	47
Part Number	4203, 4204	4240, 4221	4230	4011, 4012, 4013	4238, 4241, 4242, 4247
Description	Polysulfone	Stainless Steel	Parabola Stainless Steel[2]	Glass	Polyphenylsulfone
Page Number	254	255 - 256	257	259	221
Autoclavable[1]	Yes[3]	Yes	Yes	Yes	Yes[3]
HPLC/IC/Mobile Phase/Degassing				•	
Microbiology, Pharmaceutical	•	•	•	•	•
Microbiology, Environmental	•	•	•	•	•
Microbiology, Beverage	•	•	•	•	•
Microbiology, Industrial Process Water	•	•	•	•	•
Solvent Filtration		•	•	•	
Water Sampling (Ground/Surface)	•		•	•	•

[1] Limited by filter type.
[2] Do not use funnel for filtration of high purity fuels as explosion may occur.
[3] Repeated use of detergents containing polyoxyethylated alkyl phenols and alcohols, and/or anti-corrosion, anti-scaling boiler additives that may carry over in steam, may cause funnel material to crack, thereby reducing the life of the product. Do not autoclave rubber stoppers. Do not autoclave with aluminum foil; use autoclave paper.

Pressure Application Selector

Applications	Description	Part Number
Rapid batch filtration of bacteriological or cell culture media, food liquids, viscous oils, hydraulic oils, or lubricants	47 mm Pressure Filtration Funnel, Stainless Steel	4280
Rinse critical mechanical or electronic components, flush filter holders, and rinse laboratory glassware	Pressure Rinser	7074
Process batches of liquids for sterilization or clarification	Pressure Vessels, Stainless Steel	15203, 15207, 15220

Filter Holder Application Selector

Filter holders are designed for a variety of laboratory applications including sterile filtration, stack sampling, product sampling, and clarification of fluids or gases.

Filter Size (mm)	13	25	25	25, 47	47	47	47	25, 37, 47	142, 293
Part Number	4317	4320	1109	1209, 2220	1235	1119	4020	1107, 1219, 1220	11872, 11873
Description	Plastic and Stainless Steel Swinney	Easy Pressure Syringe	In-Line Delrin♦	In-Line Stainless Steel	In-Line Aluminum	In-Line Polycar-bonate	SolVac® Holder	Open-Face	Stainless Steel
Page Number	260	261	262	264	266	263	180	267	268
Autoclavable[1]	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Ambient Air Monitoring	•		•	•	•	•		•	
Cell Harvesting	•	•		•	•				•
HPLC/IC Sample Preparation	•	•	•	•	•	•	•		
Industrial Hygiene Monitoring	•		•	•	•	•		•	
Liquid Sterilization	•	•	•	•	•	•			•
Nucleic Acid/Protein Purification/ Concentration	•	•	•	•	•	•			•
Solvent Filtration	•	•	•	•	•	•	•		•
Venting/Gas Filtration	•		•	•	•	•		•	
Water Sampling (Ground/Surface)	•	•	•	•		•	•		•

[1] Autoclavability may be limited by filter type or hose barb adapters. Please contact Pall Life Sciences technical service or consult product literature for the holder being used. Do not autoclave with aluminum foil; use autoclave paper.

25 mm Filter Funnels, Polysulfone

Economical, autoclavable funnels for vacuum filtration

- Transparent funnels with graduations permit easy visual measurement.
- Less expensive than stainless steel and more durable than glass.
- Tapered stem fits standard size #2 stoppers.
- Available in 50 and 200 mL capacities.
- Changing filters is easy. Twist-lock coupling minimizes filter tearing.

Applications

- Ideal for liquid clarification, vacuum filtration, and scintillation counting studies.

Specifications

Material of Construction
Polysulfone

Effective Filtration Area
2.9 cm^2

Dimensions
Overall Length:
50 mL: 15.8 cm (6.2 in.)
200 mL: 20.1 cm (7.9 in.)
Diameter: 7.1 cm (2.8 in.)

Filter Size
Accepts 25 mm filter

Funnel Capacity
50 or 200 mL

Connections
Tapered funnel stem inserts into standard size No. 2 rubber stopper

Maximum Operating Temperature
Limited by membrane or 121 °C (250 °F)

Sterilization
Provided non-sterile. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

25 mm Filter Funnels, Polysulfone

VWR #	Pall #	Description	Pkg
28144-700	4204	25 mm, 50 mL capacity	1/pkg
28144-754	4203	25 mm, 200 mL capacity	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28144-907	79791	Support screen, Type 316 stainless steel	1/pkg
28144-638	87265	Support screen, polysulfone	1/pkg

Related Products

25 mm Glass Fiber Filters . . . . . 237 - 238
25 mm Membrane Disc Filters . . . . . 109 - 113, 176 - 179, 209 - 210, 239, 241 - 243
Filter Funnel Manifolds . . . . . 271 - 272
Vacuum/Pressure Pumps 273

25 mm Filter Funnel, Stainless Steel

High quality, corrosion-resistant funnel for vacuum filtration

- Stainless steel construction offers excellent chemical resistance.
- Threaded collar seals to base.

Applications

- Vacuum filtration of small volumes of solutions for particulate contamination analysis.

Specifications

Materials of Construction
Funnel, Base, Support Screen, Underdrain Disc, and Spiral Retaining Ring: Type 316 stainless steel
Cap: Type 303 stainless steel

Effective Filtration Area
2.8 cm^2

Dimensions
Overall Length: 15.5 cm (6.1 in.)
Diameter: 4.45 cm (1.8 in.)

Funnel Capacity
50 mL

Connection
Stem inserts into standard size No. 2 rubber stopper

Maximum Operating Temperature
Limited by filter type

Sterilization
Provided non-sterile. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Note: Not recommended for use with volatile liquids or high purity fuels as explosion may result from the static discharge.

Ordering Information

25 mm Filter Funnel, Stainless Steel

VWR #	Pall #	Description	Pkg
28144-905	4240	25 mm, 50 mL capacity	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28144-907	79791	Support screen, Type 316 stainless steel	1/pkg
—	79792	Underdrain disc, Type 316 stainless steel	1/pkg

Related Products

Filter Funnel Manifolds . . . . . 271 - 272
Membrane Disc Filters . . . . . 107 - 113, 175 - 179, 209 - 211, 239 - 243
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

47 mm Filter Funnel, Stainless Steel

Ultimate chemical resistance and easy assembly

- Quick, easy assembly. Funnel's weight seals filter to base.
- 100 mL capacity with 50 mL calibration facilitates easy measurement.
- Stainless steel construction offers excellent chemical resistance.

Applications

- For applications requiring the ultimate in chemical resistance.
- Designed for vacuum filtration to collect biological or particulate matter from liquids.
- For use with standard manifold systems or vacuum flasks.

Specifications

Material of Construction
Type 316 stainless steel

Effective Filtration Area
9.6 cm^2

Dimensions
Overall Length: 16.3 cm (6.4 in.)
Diameter: 6.6 cm (2.6 in.)

Filter Size
Accepts 47 and 50 mm filters

Funnel Capacity
100 mL with 50 mL calibration

Connection
Stem fits into standard size No. 8 rubber stopper

Maximum Operating Temperature
Limited by filter type

Sterilization
Provided non-sterile. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Note: Not recommended for use with volatile liquids or high purity fuels as explosion may result from the static discharge.

Ordering Information

47 mm Filter Funnel, Stainless Steel

VWR #	Pall #	Description	Pkg
28144-958	4221	47 mm, 100 mL capacity	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
—	81312	Support screen, Type 316 stainless steel	1/pkg

Related Products

Filter Funnel Manifolds . . . . . 271 - 272
Membrane Disc Filters . . . . . 107 - 113, 175 - 179, 209 - 211, 239 - 243
Stainless Steel Forceps 225, 274
Vacuum/Pressure Pumps 273

47 mm Parabola Filter Funnel, Stainless Steel

One-liter funnel with excellent chemical compatibility

- Bayonet twist-lock seal provides reliable sealing without an O-ring.
- Stainless steel construction offers excellent chemical resistance.

Applications

- For large-volume vacuum filtration of microbiological samples, oils, and solvents.

Specifications

Materials of Construction
Funnel Housing: Type 316 stainless steel
Support Screen, Retaining Ring Assembly, and Base: Type 304 stainless steel

Effective Filtration Area
9.6 cm^2

Dimensions
Overall Length: 22.2 cm (8.7 in.)
Diameter: 15.2 cm (6.0 in.)

Filter Size
Accepts 47 mm filter

Funnel Capacity
1 L

Connection
Stem inserts into standard size No. 2 rubber stopper

Maximum Operating Temperature
Limited by filter type

Sterilization
Provided non-sterile. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Note: Not recommended for use with volatile liquids or high purity fuels as explosion may result from the static discharge.

Ordering Information

47 mm Parabola Filter Funnel, Stainless Steel

VWR #	Pall #	Description	Pkg
28144-903	4230	47 mm Parabola	1/pkg

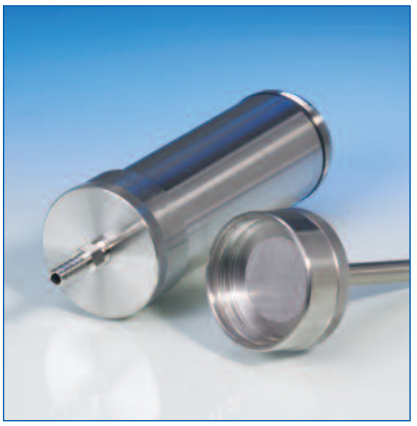
Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
—	4231	Type 304 stainless steel base	1/pkg
28144-908	4235	Support screen, Type 304 stainless steel	1/pkg
—	4301	Funnel and retaining ring assembly	1/pkg

Related Products

47 mm Pressure Filtration Funnel, Stainless Steel

High quality, corrosion-resistant funnel for rapid batch filtration



- Stainless steel construction offers excellent chemical resistance.
- Convenient hand tightening makes filter changing easy.

Applications

- Best choice for rapid batch filtration of bacteriological or cell culture media, food liquids, viscous oils, hydraulic oils, or lubricants.

Specifications

Materials of Construction
Funnel Barrel, Support Screen, and Adapter Tube: Type 304 stainless steel
Cap and Base: Type 303 stainless steel
Hose Barb: Type 316L stainless steel
Gaskets: PTFE
O-Ring: Viton♦

Effective Filtration Area
9.6 cm^2

Dimensions
Housing Length: 16.4 cm (6.5 in.)
Diameter: 5.8 cm (2.3 in.)

Funnel Capacity
200 mL

Connection
1/8 in. -27 FNPT pipe thread; includes hose barb adapter for 6.4 mm (1/4 in.) ID tubing; funnel stem accepts 10 mm (3/8 in.) ID tubing or standard stopper

Maximum Operating Temperature
Limited by filter type, by Viton O-ring 204 °C (399 °F), or PTFE gasket 288 °C (550 °F)

Maximum Operating Pressure
13.8 bar (1380 kPa, 200 psi) using compressed air or nitrogen

Sterilization
Provided non-sterile. Autoclavable at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min; dry heat if desired at 170 °C (338 °F) for a minimum of 1 hr.

Note: Not recommended for use with volatile liquids or high purity fuels as explosion may result from the static discharge.

Ordering Information

47 mm Pressure Filtration Funnel, Stainless Steel

VWR #	Pall #	Description	Pkg
28144-652	4280	47 mm, pressure filtration funnel	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
—	2110	Adapter tube, stainless steel	1/pkg
28144-908	4235	Support screen, Type 304 stainless steel	1/pkg
—	4281	Type 303 stainless steel base	1/pkg
—	4282	Type 304 stainless steel center barrel	1/pkg
—	4284	PTFE gasket	1/pkg
28144-648	4287	Spare seal kit contains 5 PTFE gaskets, 10 Viton O-rings, and 1 stainless steel hose barb adapter to 6.4 mm (1/4 in.) ID tubing	1/pkg
—	72833	Viton O-ring	1/pkg

Related Products

Membrane Disc Filters . . . . . 107 - 113, 175 - 179, 209 - 211, 239 - 243
Stainless Steel Forceps 225, 274

47 mm Filter Funnels, Glass

Ideal for vacuum filtration of liquids and degassing of HPLC solvents and mobile phases

- Made of 100% borosilicate glass, assures resistance to even the most aggressive solvents.
- One-liter 47 mm glass funnel/support assembly permits filtration of an entire liter at once.
- Support assembly's unique base design with integral vacuum connection prevents contamination of the vacuum line with filtrate.
- One-liter glass funnel is graduated from 300 to 1,000 mL in 50 mL increments.
- 300 mL glass funnel is graduated from 100 to 250 mL in 25 mL increments. Stepped stem fits into standard one-hole stoppers (9 mm).

Applications

- Ideal for filtration and degassing of HPLC solvents and aqueous mobile phase solutions and buffers.
- Offers excellent chemical compatibility, even with aggressive solvents.

Specifications

47 mm Glass Filter Funnel With Stopper Support Assembly

Materials of Construction
All parts are borosilicate glass except:
Stopper: Silicone No. 8
Clamp: Aluminum

Effective Filtration Area
9.6 cm^2

Dimensions
Overall Height:
Base: 11.7 cm (4.6 in.)
Funnel: 11.1 cm (4.4 in.)
Diameter:
Base: 5.8 cm (2.3 in.)
Funnel: 7.9 cm (3.1 in.)

Filter Size
Accepts 47 mm filter

Funnel Capacity
300 mL

47 mm Glass Filter Funnel With Sidearm Support Assembly and Flask

Materials of Construction
All parts are borosilicate glass except:
Clamp: Aluminum
Support Base/Flask Connection:
Standard taper 40/35 ground joint

Effective Filtration Area
9.6 cm^2

Dimensions
Overall Height:
PN 4012 and 4013 Base:
11.7 cm (4.6 in.)
PN 4012 Funnel: 16.7 cm (6.6 in.)
PN 4013 Funnel: 11.1 cm (4.4 in.)
Diameter:
PN 4012 and 4013 Base:
5.8 cm (2.3 in.)
PN 4012 Funnel: 12.0 cm (4.7 in.)
PN 4013 Funnel: 7.9 cm (3.1 in.)

Filter Size
Accepts 47 mm filter

Funnel Capacity
300 mL or 1 L

Flask Capacity
1 or 4 L

Ordering Information

47 mm Filter Funnels, Glass

VWR #	Pall #	Description	Pkg
28144-608	4011	Glass filter funnel with No. 8 silicone stopper support base (300 mL funnel, no flask)	1/pkg
28144-620	4012	Glass filter funnel with sidearm support assembly and flask (1 L funnel with 4 L flask)	1/pkg
28144-624	4013	Glass filter funnel with sidearm support assembly and flask (300 mL funnel with 1 L flask)	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28144-622	4014	Glass funnel, 300 mL	1/pkg
28150-410	4015	Glass funnel, 1 L	1/pkg
—	4018	Glass flask, 1 L	1/pkg
28150-412	4016	Glass flask, 4 L	1/pkg
28150-414	4017	Fritted glass support base with sidearm	1/pkg
28150-416	4019	Fritted glass support base/No. 8 silicone stopper	1/pkg
—	81595	Aluminum clamp, anodized	1/pkg

13 mm Swinney Filter Holders

Available in plastic and stainless steel

- Economical for small-volume (1 to 10 mL) filtration.
- Accepts 13 mm filter discs.
- Luer inlet and outlet fittings provide easy connections.

Applications

- Clarification of small volumes using a syringe.
- Useful in filtering biologicals, ophthalmics, GC and HPLC samples, and lubricants that must be applied dust-free to critical parts such as bearings.

Specifications

13 mm Swinney, Plastic

Materials of Construction
Inlet/Outlet Housing and Support Screen: Celcon♦ (acetal copolymer)
Seal Washer: PTFE

Effective Filtration Area
0.8 cm^2

Dimensions
Overall Length: 3.5 cm (1.4 in.)
Diameter: 1.6 cm (0.6 in.)

Filter Size
Accepts 13 mm filter

Inlet/Outlet Connections
Female threaded luer inlet, male slip luer outlet

Maximum Operating Temperature
Limited by filter type

Maximum Operating Pressure
2.8 bar (280 kPa, 40 psi)

Sterilization
Provided non-sterile. Autoclavable at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 min.

13 mm Swinney, Stainless Steel

Materials of Construction
Body: Type 304 stainless steel
Gaskets: PTFE
Support Screen: Photoetched type 304 stainless steel

Effective Filtration Area
0.9 cm^2

Dimensions
Overall Length: 3.9 cm (1.54 in.)
Diameter: 1.6 cm (0.6 in.)

Inlet/Outlet Connections
Standard female luer lock inlet, male slip luer outlet

Maximum Operating Temperature
Limited by filter type

Maximum Operating Pressure
6.9 bar (690 kPa, 100 psi)

Ordering Information

13 mm Swinney Filter Holder, Plastic

VWR #	Pall #	Description	Pkg
28144-164	4317	13 mm Swinney	5/pkg

Accessories and Replacement Parts for 13 mm Swinney Filter Holder, Plastic

VWR #	Pall #	Description	Pkg
—	83072	PTFE seal washer	1/pkg

13 mm Swinney Filter Holder, Stainless Steel

VWR #	Pall #	Description	Pkg
28145-295	4042	13 mm Swinney	1/pkg

Related Products

13 mm Glass Fiber Filters. . . . . 237 - 238
13 mm Membrane Disc Filters . . . . . 109, 176 - 179, 209, 242

25 mm Easy Pressure Syringe Filter Holder, Delrin® Plastic

Large filtration area for easy operation and fast liquid flow

- Economical for small-volume (10 to 100 mL) filtration.
- Accepts 25 mm filter discs.
- Luer inlet and outlet fittings provide easy connections.
- Delrin (acetal resin) construction provides broad chemical compatibility and material strength.

Applications

- Designed for particulate filtration of small volumes using a syringe.
- Can be used as a final filter for gas systems.
- Delrin caps allow for easy sample storage and transportation.

Specifications

Materials of Construction
Body/Caps: Delrin (acetal resin)
Support Screen: Type 316 stainless steel
O-Ring: Viton®

Effective Filtration Area
3.7 cm^2

Dimensions
Overall Length: 2.7 cm (1.1 in.)
Diameter: 3.5 cm (1.4 in.)

Filter Size
Accepts 25 mm filter

Inlet/Outlet Connections
Standard female luer inlet, male slip luer outlet

Maximum Operating Temperature
In Air: 85 °C (185 °F)
In Water: 66 °C (151 °F)

Maximum Operating Pressure
2.8 bar (280 kPa, 40 psi)

Sterilization
Provided non-sterile. Autoclavable at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

25 mm Easy Pressure Syringe Filter Holder, Delrin Plastic

VWR #	Pall #	Description	Pkg
28144-109	4320	25 mm, easy pressure	6/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
—	83475	O-ring, Viton ARP No. -117	1/pkg
—	86362	O-ring, PTFE encapsulated	1/pkg

Related Products

25 mm Glass Fiber Filters . . . . . 237 - 238
25 mm Membrane Disc Filters . . . . . 109 - 113, 176 - 179, 209 - 210, 239, 241 - 243
Stainless Steel Forceps 225, 274

25 mm In-Line Filter Holder, Delrin‘ Plastic

Lightweight filter holder for particulate sampling

- Domed inlet provides uniform sample distribution on the filter.
- Delrin plastic offers broad chemical compatibility and material strength.
- Accepts 25 mm filter discs.
- Lightweight for venting and air monitoring applications.

Applications

- Useful for low pressure, in-line air cleaning, liquid filtering, or sampling applications.
- Can be easily incorporated into liquid- or gas-carrying tubing systems at the point of use.

Specifications

Materials of Construction
Body: Delrin (acetal resin)
Hose Barb Adapters: Nylon
O-Ring: Viton♦
Support Screen: Type 316 stainless steel

Effective Filtration Area
3.7 cm^2

Dimensions
Overall Length: 2 cm (0.8 in.)
Diameter: 3.5 cm (1.4 in.)

Inlet/Outlet Connections
1/8 in. FNPT; hose barb adapter accepts 6.4 mm (1/4 in.) ID tubing

Maximum Operating Temperature
In Water: 66 °C (151 °F)
In Air: 85 °C (185 °F); will perform effectively with intermittent use up to 121 °C (250 °F)

Maximum Operating Pressure
2.8 bar (280 kPa, 40 psi)

Sterilization
Provided non-sterile. Autoclavable if desired at 121 - 123 ºC (250 - 253 ºF) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

25 mm In-Line Filter Holder, Delrin Plastic

VWR #	Pall #	Description	Pkg
28144-255	1109	25 mm, in-line	6/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
—	73179	Hose barb adapter, nylon, 1/8 in. MNPT to 6.4 mm (1/4 in.) tubing	1/pkg
—	83475	Viton O-ring, ARP No. -117	1/pkg

Related Products

25 mm Glass Fiber Filters . . . . . 237 - 238
25 mm Membrane Disc Filters . . . . . 109 - 113, 176 - 179, 209 - 210, 239, 241 - 243
Stainless Steel Forceps 225, 274

47 mm In-Line Filter Holder, Polycarbonate

Sturdy, lightweight unit for monitoring particulate in gases or liquids

- Lightweight plastic construction.
- Luer-Lok® vent plug facilitates removal of air bubbles in liquid filtration.

Applications

- Designed for in-line liquid or gas filtration.
- Indoor and outdoor air monitoring or sampling.
- Ideal for venting.

Specifications

Materials of Construction
Body: Polycarbonate
Hose Barb Adapters: Nylon
Support Screen: Polyphenylsulfone
O-Ring: Silicone
Vent Cap: Polypropylene

Effective Filtration Area
9.6 cm^2

Dimensions
Overall Length (Includes Vent Cap, Excludes Hose Barb): 5.8 cm (2.3 in.)
Diameter: 6.4 cm (2.5 in.)

Inlet/Outlet Connections
1/4 in. -18 FNPT; hose barb adapters accept 6.4 mm (1/4 in.) ID tubing

Maximum Operating Temperature
Limited by filter type or by hose barb
121 °C (250 °F)

Maximum Operating Pressure
3.4 bar (340 kPa, 50 psi)

Sterilization
Provided non-sterile. Autoclavable if desired at 121 - 123 ºC (250 - 253 ºF) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

47 mm In-Line Filter Holder, Polycarbonate

VWR #	Pall #	Description	Pkg
28144-257	1119	47 mm, in-line polycarbonate	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28144-908	4235	Support screen, type 304 stainless steel	1/pkg
—	BB-9651-1D106	Polypropylene Luer-Lock vent plug	1/pkg
—	81314	Hose barb adapter, nylon, 1/4 in. MNPT to 6.4 mm (1/4 in.) ID tubing	1/pkg
28144-636	87264	Support screen, polyphenylsulfone	1/pkg
—	86366	Silicone O-ring	1/pkg

Related Products

25 and 47 mm In-Line Filter Holders, Stainless Steel

High quality, corrosion-resistant holders for stack sampling

- Stainless steel construction offers excellent chemical resistance.
- Holders open and close easily. Filter remains undisturbed for particulate analysis.
- Upstream threaded vent on 47 mm holder allows release of trapped gas during liquid filtration.
- Convenient in-line opening and closing capability.

Applications

- Designed for in-line liquid or gas filtration.
- Durable construction for stack sampling.
- Capable of continuous processing of fluids at high pressure.

Specifications

25 mm In-line Stainless Steel

Materials of Construction
Body, Underdrain Disc, and Support Screen: Type 316 stainless steel
Hose Barb Adapters: Nylon
Center Ring Collar: Type 303 stainless steel
O-ring: Viton♦

Effective Filtration Area
3.7 cm^2

Dimensions
Overall Length (Excluding Hose Barb): 4.0 cm (1.6 in.)
Diameter: 3.7 cm (1.5 in.)

Inlet/Outlet Connections
1/8 in. FNPT; hose barb adapters accept 6.4 mm (1/4 in.) ID tubing

Maximum Operating Temperature
Limited by filter type or by Viton O-ring 204 °C (399 °F) or by Nylon adapter 121 °C (250 °F)

Maximum Operating Pressure
14 bar (1400 kPa, 200 psi)

Sterilization
Provided non-sterile; autoclavable at 121 to 123 °C (250 to 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 to 20 minutes.

47 mm In-line Stainless Steel

Materials of Construction
Body: Type 316 stainless steel
Hose Barb Adapters: Polyethylene
Support Screen and Underdrain Disc: Electropolished type 316 stainless steel
O-Ring: Viton
Thrust Ring: PTFE
Center Ring Collar: Type 303 stainless steel

Effective Filtration Area
9.6 cm^2

Dimensions
Overall Length (Excluding Hose Barb): 5.7 cm (2.2 in.)
Diameter: 5.9 cm (2.3 in.)

Inlet/Outlet Connections
3/8 in. FNPT; hose barb adapters accept 6.4 mm (1/4 in.) ID tubing

Maximum Operating Temperature
Limited by filter type or by hose barb 93 °C (199 °F)

Maximum Operating Pressure
14 bar (1400 kPa, 200 psi)

Sterilization
Provided non-sterile; autoclavable at 121 to 123 °C (250 to 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 to 20 minutes.

Ordering Information

25 mm In-Line Filter Holder, Stainless Steel

VWR #	Pall #	Description	Pkg
28144-200	1209	25 mm stainless steel	1/pkg

47 mm In-Line Filter Holder, Stainless Steel

VWR #	Pall #	Description	Pkg
28144-506	2220	47 mm stainless steel	1/pkg

Accessories and Replacement Parts, 25 mm In-Line Filter Holder

VWR #	Pall #	Description	Pkg
—	73179	Hose barb adapter	1/pkg
—	73336	Viton♦ O-ring, ARP No. -020	1/pkg
—	79759	Base outlet, Type 316 stainless steel	1/pkg
—	79760	Collar, Type 303 stainless steel	1/pkg
—	79761	Cover inlet, Type 316 stainless steel	1/pkg
28144-907	79791	Support screen, Type 316 stainless steel	1/pkg
—	79792	Underdrain disc, Type 316 stainless steel	1/pkg

Accessories and Replacement Parts, 47 mm In-Line Filter Holder

VWR #	Pall #	Description	Pkg
—	71242	Viton O-ring	1/pkg
—	71243	PTFE thrust ring	1/pkg
—	71244	Center ring collar, Type 303 stainless steel	1/pkg
—	71245	Outlet, Type 316 stainless steel	1/pkg
28144-480	72970	Support screen, Type 316 stainless steel	1/pkg
28144-632	72971	Underdrain disc, Type 316 stainless steel	1/pkg
—	73184	Hose barb adapter, polyethylene, 3/8 in. MNPT to 6.4 mm (1/4 in.) ID tubing	1/pkg
—	76901	O-ring, EPR-008	1/pkg
—	81377	Hose barb adapter, Type 316 stainless steel, 3/8 in. MNPT to 6.4 mm (1/4 in.) ID tubing	1/pkg
—	82536	Vent screw, Type 304 stainless steel	1/pkg
—	82537	Inlet with vent, Type 316 stainless steel	1/pkg
—	82762	PTFE flat vent washer	1/pkg

Related Products

Membrane Disc Filters .....107 - 113, 175 - 179, 209 - 211, 239 - 243
Stainless Steel Forceps 225, 274

47 mm In-Line Filter Holder, Aluminum

Lightweight, anodized aluminum filter holder

- Convenient design allows opening and closing without disrupting membrane.

Applications

- Designed for in-line liquid or gas filtration.
- Durable construction for stack sampling.

Specifications

Materials of Construction

Inlet-Cover, Base, and Collar Cap: Anodized aluminum
Hose Barb Adapters: Polyethylene
Support Screen and Underdrain Disc: Electropolished type 316 stainless steel
O-Ring: Viton♦
Thrust Ring: PTFE

Effective Filtration Area

9.6 cm^2

Dimensions

Overall Length (Excluding Hose Barbs): 5.7 cm (2.2 in.)
Diameter: 5.9 cm (2.3 in.)

Inlet/Outlet Connections

3/8 in. FNPT; hose barb adapters accept 6.4 mm (1/4 in.) ID tubing

Maximum Operating Temperature

Limited by filter type, hose barb adapters 93 °C (199 °F), or O-ring 204 ºC (399 ºF)

Maximum Operating Pressure

14 bar (1400 kPa, 200 psi)

Sterilization

Provided non-sterile. Autoclavable if desired at 121 - 123 ºC (250 - 253 ºF) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

47 mm In-Line Filter Holder, Aluminum

VWR #	Pall #	Description	Pkg
28144-459	1235	47 mm, in-line aluminum	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
—	71242	Viton O-ring	1/pkg
—	71243	PTFE thrust ring	1/pkg
—	71735	Base, aluminum	1/pkg
—	71736	Collar cap, aluminum	1/pkg
—	71737	Inlet cover, aluminum	1/pkg
28144-480	72970	Support screen, Type 316 stainless steel	1/pkg
28144-632	72971	Underdrain disc, Type 316 stainless steel	1/pkg
—	73184	Hose barb adapter, polyethylene, 3/8 in. MNPT to 6.4 mm (1/4 in.) ID tubing	1/pkg
—	81377	Hose barb adapter, Type 316 stainless steel, 3/8 in. MNPT to 6.4 mm (1/4 in.) ID tubing	1/pkg

Related Products

47 mm Membrane Disc Filters . . . . . 107 - 113, 175 - 179, 209 - 211, 239 - 243
Stainless Steel Forceps 225, 274

Open-Face Filter Holders

Lightweight, corrosion-resistant filter holders for routine air sampling

- 25 mm holder is autoclavable. Can be used for bacterial monitoring and particulate analysis.
- 37 and 47 mm holders include a plastic cap that protects samples after filtration.

Applications

- 25 mm holder is designed for clean room sampling and collection of breathing-zone air samples.
- 37 and 47 mm holders can be used for trapping airborne particles, fluorescent tracers, and other contaminants.

Specifications

Materials of Construction

Holder
25 mm: Delrin♦ (acetal resin)
37 and 47 mm: Aluminum
Hose Barb Adapter: Nylon

Support Screen
25 mm: Type 316 stainless steel
37 and 47 mm: Type 304 stainless steel
O-Ring: Viton♦
Cap, 37 and 47 mm: Polyethylene

Effective Filtration Area

25 mm: 3.7 cm^2
37 mm: 4.9 cm^2
47 mm: 9.6 cm^2

Dimensions

Overall Length
25 mm: 2 cm (0.8 in.)
37 and 47 mm: 2.4 cm (0.9 in.)

Diameter
25 mm: 3.5 cm (1.4 in.)
37 mm: 4.4 cm (1.7 in.)
47 mm: 5.4 cm (2.1 in.)

Inlet/Outlet Connections

1/8 in. -27 FNPT; includes 6.4 mm (1/4 in.) ID hose barb adapter

Sterilization

Provided non-sterile. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min. Polyethylene cap not autoclavable.

Ordering Information

25 mm Open-Face Filter Holder, Delrin Plastic

VWR #	Pall #	Description	Pkg
28144-302	1107	25 mm, open-face Delrin plastic	6/pkg

37 and 47 mm Open-Face Filter Holders, Aluminum

VWR #	Pall #	Description	Pkg
28144-403	1219	37 mm, open-face aluminum	1/pkg
28144-404	1220	47 mm, open-face aluminum	1/pkg

Accessories and Replacement Parts, 25 mm Open-Face Filter Holder, Delrin Plastic

VWR #	Pall #	Description	Pkg
—	73179	Hose barb adapter, nylon, 1/8 in. MNPT to 6.4 mm (1/4 in.) ID tubing	1/pkg
—	83475	O-ring, ARP No. -117, Viton	1/pkg

Accessories and Replacement Parts, 37 and 47 mm Open-Face Filter Holders, Aluminum

VWR #	Pall #	Description	Pkg
—	1222	47 mm aluminum collar	1/pkg
—	245	47 mm plastic cap plug	1/pkg
28144-908	4235	47 mm support screen, Type 304 stainless steel	1/pkg
—	4239	47 mm wave washer	1/pkg
—	73179	Hose barb adapter, nylon, 1/8 in. MNPT to 6.4 mm (1/4 in.) ID tubing	1/pkg
—	96406	37 mm aluminum collar	1/pkg
—	99121	37 mm support screen, Type 304 stainless steel	1/pkg
—	99122	37 mm wave washer	1/pkg

142 and 293 mm Disc Filter Holders, Stainless Steel

Convenient sizes and durable materials for filtration of all your laboratory samples

- Design optimizes use of filter area with 15% more EFA than most competitive units, giving higher flow rates and extending the filter's service life.
- Sanitary connections are easy to use and suitable for pharmaceutical applications.
- Corrosion-resistant type 316 stainless steel construction provides broad chemical resistance.

Applications

- Can be used with a variety of aggressive chemicals, solvents, reagents, and solutions (gases and liquids).
- Recommended for filtration of products such as laboratory solvents, cell culture media, ophthalmics, pharmaceuticals, vitamins, process water, antibiotics, and photoresists.

Specifications

Materials of Construction
Body: Electropolished type 316 stainless steel
O-Rings: Viton♦
Legs: Type 316 stainless steel with copper threads
Knob Assembly: Aluminum with copper threads

Effective Filtration Area
142 mm: 126 cm^2
293 mm: 587 cm^2

Dimensions
Clearance between flange and benchtop: 29 cm (11.4 in.)

Prefilter Size
142 mm: 127 mm if used with a final filter, 142 mm if used alone
293 mm: 265 mm if used with a final filter, 293 mm if used alone

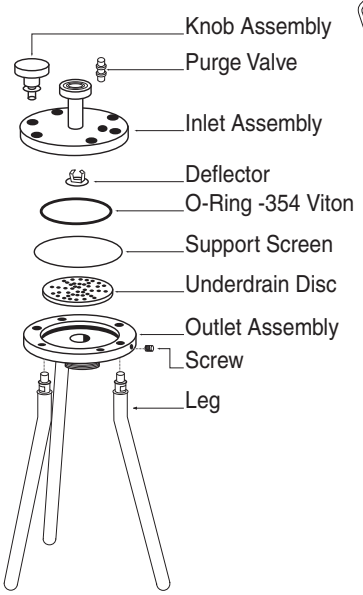
Inlet/Outlet Connections
Sanitary 3.8 cm (1.5 in.) fittings

Maximum Operating Pressure
6.9 bar (690 kPa, 100 psi)

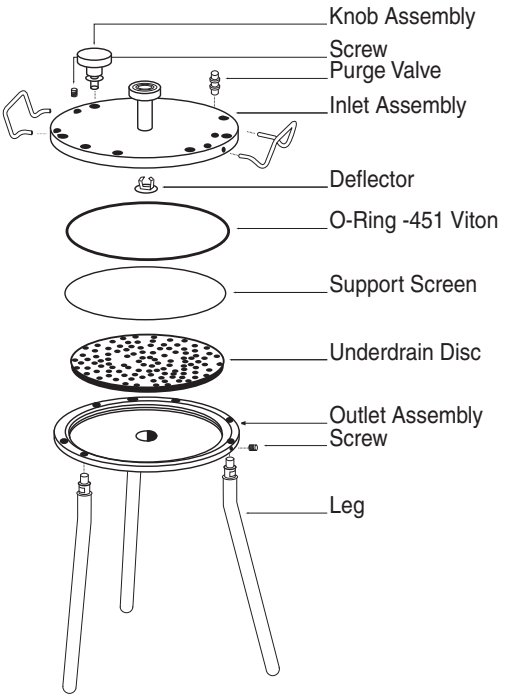
Weight
142 mm: 7 kg (15 lb.)
293 mm: 17 kg (38 lb.)

Sterilization
Provided non-sterile. Autoclavable if desired:
142 mm: 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 45 min
293 mm: 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 60 min
(Do not autoclave with aluminum foil; use autoclave paper or other permeable wrap such as Tyvek♦.)

Components



142 mm Filter Holder



293 mm Filter Holder

Ordering Information

142 and 293 mm Disc Filter Holders, Stainless Steel

VWR #	Pall #	Description	Pkg
28145-258	11872	142 mm, stainless steel	1/pkg
28145-269	11873	293 mm, stainless steel	1/pkg

Accessories and Replacement Parts for 142 mm Disc Filter Holder

VWR #	Pall #	Description	Pkg
—	72978	Support screen, Type 316 stainless steel	1/pkg
—	72989	Viton♦ O-ring, ARP No. -354	1/pkg
—	72994	Underdrain disc, Type 316 stainless steel	1/pkg
—	73045	O-ring, Buna♦-N, PTFE coated, ARP No. -354	1/pkg
—	76425	O-ring, ethylene polypropylene, ARP No. -354	1/pkg

Accessories and Replacement Parts for 293 mm Disc Filter Holder

VWR #	Pall #	Description	Pkg
—	70975	Viton O-ring, ARP No. -451	1/pkg
—	72161	Support screen, Type 316 stainless steel	1/pkg
—	72191	293 mm underdrain disc, Type 316 stainless steel	1/pkg
—	72220	O-ring, Buna-N, PTFE coated, ARP No. -451	1/pkg

Accessories and Replacement Parts for 142 and 293 mm Disc Filter Holder

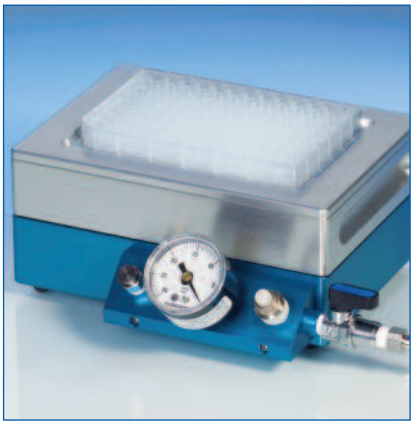
VWR #	Pall #	Description	Pkg
28138-558	15206	Hose assembly kit includes clamp and PTFE gasket, Type 316 stainless steel inlet/outlet adapter, 3.8 cm (1.5 in.) sanitary to 9.5 mm (3/8 in.) hose barb	1/pkg
—	70638	Purge valve, 1/8 in. threaded MNPT Type 316 stainless steel	1/pkg
28150-476	72197	Inlet/outlet adapter, Type 316 stainless steel,3.8 mm (1.5 in.) sanitary to 3/4 in. -14 FNPT	1/pkg
28150-480	72202	Inlet/outlet clamp, 38 mm, Type 304 stainless steel	1/pkg
—	72215	Anodized aluminum hand knob	1/pkg
—	76441	Bottom screw	1/pkg
—	83191	Type 316 stainless steel deflector	1/pkg
28150-482	72204	Inlet/outlet gasket, PTFE	1/pkg
28150-484	72205	Inlet/outlet gasket, Viton	1/pkg

Related Products

Membrane Disc Filters .....107 - 113, 175 - 179, 209 - 211, 239 - 243
Stainless Steel Pressure Vessels 277

Vacuum Manifold and Accessories

Designed to perfectly fit AcroPrep™, AcroPrep Advance, and AcroWell™ filter plates



- Comes complete with the necessary O-ring and gasket. The control block includes the vacuum pressure gauge, vacuum metering valve, vacuum release valve, and 1/4 in. hose barb for vacuum line attachment.
- Vacuum manifold unit includes a Delrin• spacer block designed to accommodate standard 350 µL receiver plates. The spacer block has been optimized to reduce the space between the receiver plate and the filter plate during vacuum filtration.
- Optional spacer block available for use with 1 mL receiver plates.
- Adapter collar holds filter plates tightly to receiver plates for centrifugation.

Applications

- The multi-well plate vacuum manifold is an anodized aluminum manifold that has been designed and optimized for the vacuum filtration of AcroPrep, AcroPrep Advance, and AcroWell multi-well filter plates.

Specifications

Materials of Construction

Vacuum Manifold: Anodized aluminum
Gasket: EDPM (Ethylene propylene)
O-Ring: Silicone
Spacer Blocks: Delrin plastic
Adapter Collar: Stainless steel

Dimensions

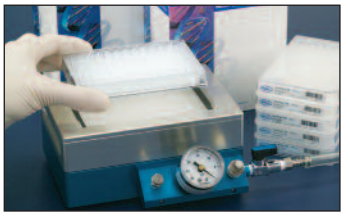
Length: 17.48 cm (6.88 in.)
Width: 12.37 cm (4.87 in.)
Height: 8.05 cm (3.17 in.)
Weight: 2.85 kg (6.27 lb.)

Maximum Operating Vacuum

71.12 cm Hg (28 in. Hg)

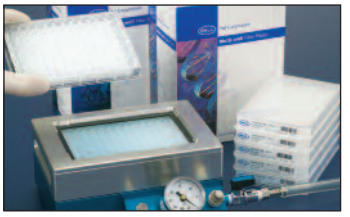
Note: The multi-well plate vacuum manifold can be used with multi-well filter plates that meet the specifications set forth by the ANSI/SBS X-2004.

Methodology



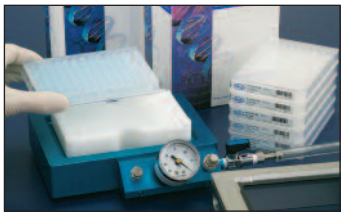
1. Place plate on vacuum manifold or hold the plate so the outlets on the bottom of the plate are not touched.

2. Add sample and incubate. Apply vacuum.



3A. Release vacuum from the manifold. Remove filter plate and retained sample for further processing.

(OR)



3B. Release vacuum from the manifold. Remove filter plate. Remove collection (receiver) plate and utilize collected filtrate in downstream applications.

Ordering Information

Vacuum Manifold and Accessories

VWR #	Pall #	Description	Pkg
16003-836	5017	Multi-well plate vacuum manifold	1/pkg
16003-830	5014	1 mL receiver plate spacer block	1/pkg
16003-832	5015	350 µL receiver plate spacer block	1/pkg
16003-834	5016	Replacement accessory kit (includes O-ring, gasket, and allen wrench)	1/pkg
—	5028	Waste drain adapter	1/pkg

Filter Funnel Manifolds for MicroFunnel™ Filter Funnels

Perfect fit vacuum manifolds for use with the MicroFunnel filter funnel

- No adapters or rubber stoppers required to hold the filter funnel in place.
- Works with all Pall Life Sciences MicroFunnel filter funnels including the 100 mL and 300 mL sizes.
- Durable aluminum and stainless steel construction for easy clean-up and compatibility with many chemicals.
- Single-place manifold has a small footprint which reduces the need for large counter space.
- Single-place manifold is easily portable for moving around a lab or offsite, and easy to store out of the way.

Applications

- Designed to work with the MicroFunnel filter funnel when performing the MF Technique for microbial analysis. The filter funnel is placed directly onto the manifold, the liquid is added, and the vacuum is turned on to begin filtration.
- Process multiple samples simultaneously or use the 1-place manifold when infrequent or minimal numbers of samples are tested each day.

Specifications

1-Place Manifold

Materials of Construction

Body: Anodized aluminum
Check Valve: 316 stainless steel with ethylene propylene O-ring
Hose Barb Adapter: Stainless steel 1/4 in. straight, 1/8 in. MNPT

Dimensions

Height: 5.9 cm (2.4 in.)
Diameter (Without Hose Barb): 7.5 cm (3.0 in.)

Sterilization

Autoclave if desired at 121 - 123 ºC (250 - 253 ºF) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

3- and 6-Place Manifolds

Materials of Construction

Body: Anodized aluminum
Drain Plug: Stainless steel 1/4 in. MNPT
Check Valve: 316 stainless steel with ethylene propylene O-ring
Valves: Chrome-plated brass
Valve O-Rings: Viton♦
Hose Barb Adapter: Nylon 6.4 mm (1/4 in.)

Dimensions

3-Place Manifold
Height: 14.2 cm (5.6 in.)
Width: 40.6 cm (16.0 in.)
Depth: 15.2 cm (6.0 in.)

6-Place Manifold
Height: 14.2 cm (5.6 in.)
Width: 82.6 cm (32.5 in.)
Depth: 15.2 cm (6.0 in.)

Sterilization

Autoclave if desired at 121 - 123 ºC (250 - 253 ºF) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

Filter Funnel Manifolds for MicroFunnel Filter Funnels

VWR #	Pall #	Description	Pkg
87003-804	15408	1-place aluminum	1/pkg
89030-434	15411	3-place aluminum	1/pkg
97003-752	15413	6-place aluminum	1/pkg

Accessories and Replacement Parts (Aluminum Manifold)

VWR #	Pall #	Description	Pkg
—	15412	Funnel holder	1/pkg
—	96430	End stand	1/pkg
—	99130	Valve, 2-way	1/pkg
—	99132	Hose barb adapter, nylon, 1/4 in. MNPT to 9.5 mm (3/8 in.) ID tubing	1/pkg
—	99238	Stainless steel end plug	1/pkg
—	88160	O-ring kit for valves, includes: 3 O-rings, ARP No. -006; 6 O-rings, ARP No. -010	1/pkg
—	15415	Check valve for 3- or 6-place aluminum manifolds	3/pkg

Filter Funnel Manifolds

The most convenient way to filter multiple samples

- Independent operation. Each funnel location has individual port control valves.
- Lightweight and durable for easy handling.
- Saves money. Less costly than stainless steel filter funnel manifolds.
- Large port opening makes sanitizing easy.
- Versatile. Accommodates both 25 and 47 mm filter funnels.
- Aluminum manifolds available with either 3 or 6 places.

Applications

- Designed for use in the vacuum filtration of liquids for analysis of microbiological or particulate contamination. Increase laboratory productivity by processing multiple samples simultaneously.
- Polyurethane manifold is ideal for small work areas. Only 27.9 cm (11.0 in.) wide, it still holds three funnels.
- Aluminum manifold is especially suited for applications where chemical compatibility is critical and easy clean-up is desired. Lightweight aluminum is easier to handle and less expensive than stainless steel, while retaining the strength of an alloy.

Specifications

Aluminum Manifolds

Materials of Construction
Body: Anodized aluminum
Drain Plugs: Stainless steel 1/4 in. MNPT
Valves: Chrome-plated brass
Valve O-Rings: Viton♦
Adapter: Nylon 6.4 mm (1/4 in.)

Dimensions
3-place
Height: 15.7 cm (6.2 in.)
Width: 40.6 cm (16.0 in.)
Depth: 15.2 cm (6.0 in.)

6-place
Height: 15.7 cm (6.2 in.)
Width: 82.6 cm (32.5 in.)
Depth: 15.2 cm (6.0 in.)

Sterilization
Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Polyurethane Manifold

Materials of Construction
Body: High impact polyurethane
Drain Plugs: Nylon 1/4 in. MNPT
Valves: Glass-filled polypropylene
Valve O-Rings: Buna♦-N

Dimensions
Height: 10.2 cm (4.0 in.)
Width: 27.9 cm (11.0 in.)
Depth: 15.2 cm (6.0 in.)

Ordering Information

Filter Funnel Manifolds

VWR #	Pall #	Description	Pkg
28145-305	4205	3-place polyurethane	1/pkg
28145-349	15402	3-place aluminum	1/pkg
28145-348	15403	6-place aluminum	1/pkg

Accessories and Replacement Parts (Aluminum Manifold)

VWR #	Pall #	Description	Pkg
—	96429	Funnel holder	1/pkg
—	96430	End stand	1/pkg
—	99130	Valve, 2-way	1/pkg
—	99132	Hose barb adapter, nylon, 1/4 in. MNPT to 9.5 mm (3/8 in.) ID tubing	1/pkg
—	99238	Stainless steel end plug	1/pkg
28150-498	82728	No. 8 rubber stopper	1/pkg
—	88160	O-ring kit for valves, includes: 3 o-rings, ARP No. -006; 6 O-rings, ARP No. -010	1/pkg
—	15415	Check valve for 3- or 6-place aluminum manifolds	3/pkg

Accessories and Replacement Parts (Polyurethane Manifold)

VWR #	Pall #	Description	Pkg
—	81308	No. 2 stopper for manifold	1/pkg
28145-307	39961	Manifold rebuild kit, includes 3 stainless steel retaining rings; 6 O-rings, ARP No. -016; 3 O-rings, ARP No. -015; 6 O-rings, ARP No. 009; 1 1/4 in. MNPT plug; 2 1/4 in. MNPT to 6.4 mm (1/4 in.) hose barb adapters; 4 foot pads; and 1 each knob and valve	1/pkg

Vacuum/Pressure Pumps

Cost-effective, reliable pumps now smaller and lighter weight

- Reduces the risk of sample contamination. An air seal between the pump and cylinder provides oil- and dust-free vacuum/pressure delivery.
- Compact design saves laboratory space.
- Features a diaphragm for cleaner, quieter operation.

Applications

- Ideal addition to any busy laboratory that requires a vacuum and/or pressure source for various applications.
- Oil- and dust-free delivery helps maintain a clean laboratory environment in which to produce reliable, reproducible data.

Specifications

Materials of Construction
Body: Die-cast aluminum
Diaphragm: Neoprene♦
Seals: Stainless steel
Filter Elements: Polyurethane foam

Dimensions
Overall Length: 20 cm (7.9 in.)
Overall Height: 27.5 cm (10.8 in.)
Width: 16.5 cm (6.5 in.)

Weight
6.54 kg (14.4 lb.)

Free Air Flow
115 V: 519 cm^3/s (1.1 cfm) (60 Hz)
230 V: 472 cm^3/s (1.0 cfm) (50 Hz),
613 cm^3/s (1.3 cfm) (60 Hz)

Vacuum
61 cm Hg (24 in. Hg)

Pressure
4.2 kg/cm^2 (60 psig)

Motor
1/8 hp

Current
115 V: 4.2 A (60 Hz)
230 V: 1.9 A (50 Hz), 2.2 A (60 Hz)

Vacuum/Pressure Connection
1/4 in. hose barb

Warranty
Unlimited one year warranty

Ordering Information

Vacuum/Pressure Pumps

VWR #	Pall #	Descriptionn	Pkg
28140-954	13157	115 V, 60 Hz, single phase	1/pkg
28140-956	13158	230 V, 50/60 Hz, single phase (interchangeable powercords accommodate European 2 round-pin sockets and UK 3 flat-blade sockets) CE	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28140-934	13159	Cover gasket, filter/muffler element (2), filter element, valve screw (2), valve limiter, leaf valve (2), valve retainer, and instructions	1/pkg

Related Products

Stainless Steel Forceps

Make filter handling easy

- Tips have a flat, smooth surface to avoid membrane filter damage.
- Polypropylene finger grips provide a comfortable and secure hold.
- Choose traditional black or multi-colored finger grips. Bright colors make forceps easy to identify, track, and see on the lab bench.

Applications

- Ideal for handling and moving membrane to and from filter holders and Petri dishes.

Specifications

Materials of Construction
Stainless steel with polypropylene finger grips

Sterilization
Provided non-sterile. "Flame" the tips prior to use, or autoclave at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min. Do not autoclave in aluminum foil.

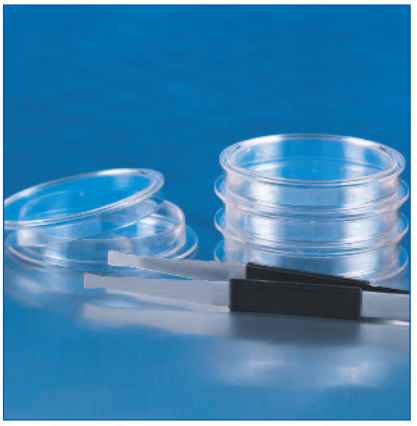
Ordering Information

Stainless Steel Forceps

VWR #	Pall #	Description	Pkg
30033-042	51147	Stainless steel forceps, black grips	1/pkg
34181-102	4690	Stainless steel forceps, multi-colored grips (1 each of orange, blue, chartreuse)	3/pkg

Petri Dishes

Unique patented design for easy handling and storage



- Easy to use. Opens easily with one hand, yet closes to a tight seal.
- Uses less space on the lab bench or in the incubator with easy stacking base.
- Gamma-irradiated. No EtO residuals to impede microbial growth.
- Available with or without absorbent pads.
- Bulk packaging offers additional value.

Applications

- Ideal for microbiological analysis when performing the Membrane Filter (MF) Technique.
- Petri dishes with absorbent pads can be used with broth media, or users can pour agar into dishes without absorbent pads.

Specifications

Petri Dish

Material of Construction
Polystyrene

Dimensions
Height: 9.0 mm (0.35 in.)
Diameter: 50.0 mm (1.97 in.)

Filter Size
Accepts 47 mm membrane filter

Sterilization
Gamma-irradiated

Absorbent Pads

Composition
Cellulose

Typical Thickness
0.9 mm (35 mils)

Ordering Information

Petri Dishes

VWR #	Pall #	Description	Pkg
25388-606	7242	Petri dishes, without absorbent pads	100/pkg
25388-581	7232	Petri dishes, bulk pack, without absorbent pads	500/pkg
25388-640	7245	Petri dishes, with absorbent pads	100/pkg

Absorbent Pad Kits

One-handed dispensing of cellulose absorbent pads

- Enables user to dispense a clean cellulose pad into a Petri dish whenever needed without touching the pad.
- Handy dispenser kit holds 1 tube of 100 absorbent pads (10 tubes included). Each tube drops quickly into the hand dispenser for easy use.
- Available non-sterile or gamma-irradiated. No EtO residuals to impede microbial growth.

Applications

- Absorbent pads are ideal for absorbing broth media to culture colonies in accordance with the Membrane Filter (MF) Technique.

Specifications

Pad Composition
Cellulose

Typical Thickness
0.9 mm (35 mils)

Diameter
45.5 mm

Ordering Information

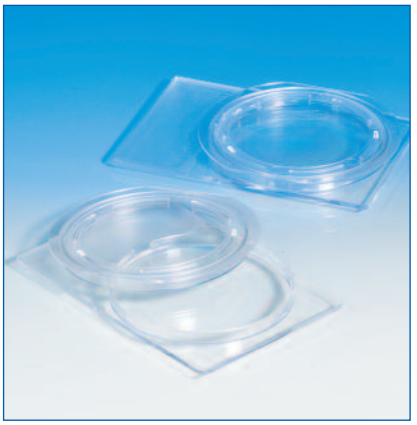
Absorbent Pad Kits

VWR #	Pall #	Description	Pkg
28150-677	66025	Absorbent pads, gamma-irradiated	1,000/pkg
28150-679	66190	Absorbent pads, non-sterile	1,000/pkg

Related Products

Analyslide® Petri Dish

For transport, storage, and viewing membrane samples



- Rectangular base fits most microscope stages.
- Inner cover ring for secure closure.
- Clear lid does not interfere with viewing sample.
- Frosted area on base permits identification of the sample with pencil or marker.
- Convenient box simplifies collection and storage of samples.

Applications

- Protect the integrity of sample membrane during microscopic examination.
- Store and protect membrane filters for reference.

Specifications

Material of Construction
Base and Lid: Polystyrene

Filter Size
Accepts 47 mm filter

Ordering Information

Analyslide Petri Dish

VWR #	Pall #	Description	Pkg
28145-473	7231	Analyslide Petri dish	100/pkg

Related Products

Membrane Disc Filters . . . . . 107 - 113, 175 - 179, 209 - 211, 239 - 243
Stainless Steel Forceps 225, 274

Stainless Steel Pressure Vessels

Highest quality stainless steel pressure vessels

- Long vessel life. Materials are corrosion resistant, with broad chemical compatibility.
- Wide-mouth opening makes clean-up easy.
- Multiple ports allow for temperature probes, pressure gauges, or other monitoring devices.
- Provided with pressure gauge, safety relief valve, flow shut-off valve, and hose barb connectors.
- Resists baking. Electropolished finish provides ultra-smooth walls.
- American Society of Mechanical Engineers (ASME) coded.

Applications

- Designed for processing of batches of liquids for sterilization or clarification.

Specifications

Materials of Construction
Housing: Electropolished type 316 stainless steel
O-ring: Ethylene propylene
Base: Vinyl

Dimensions
Housing Length:
PN 15220: 21.1 cm (8.3 in.)
PN 15207: 38.4 cm (15.1 in.)
PN 15203: 56.6 cm (22.3 in.)
Housing Diameter:
23.3 cm (9.2 in.)

Inlet/Outlet Connections
Accepts 9.5 mm (3/8 in.) ID tubing

Minimum Operating Temperature
-29 ºC (-20 ºF) at 10.7 bar (1,070 kPa, 155 psi)*

Maximum Operating Temperature
38 °C (100 °F) at 10.7 bar (1,070 kPa, 155 psi)*

Recommended Operating Pressure
7.0 bar (700 kPa, 100 psi)*

Sterilization
Provided non-sterile. Autoclaving is not recommended due to vinyl base and pressure gauge.

*For safety, the supplied pressure relief valve is preset at 7 bar (700 kPa, 100 psi).

Ordering Information

Stainless Steel Pressure Vessels

VWR #	Pall #	Description	Pkg
—	15220	3.8 L (1 gallon) capacity	1/pkg
28145-316	15207	11 L (3 gallon) capacity	1/pkg
28145-338	15203	19 L (5 gallon) capacity	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28145-344	15214	Pressure vessel replacement parts kit (pressure gauge, safety relief valve, and all necessary connections)	1/pkg

Pressure Rinser

Dispenses a pressurized stream of ultra-clean liquid at the touch of a finger

- Sturdy chrome-plated brass exterior provides long operating life.
- One-liter capacity eliminates frequent refills.
- Can be pressurized with a hand pump, gas cylinder, or laboratory air supply.
- Comes with 25 mm filter holder with a PTFE encapsulated O-ring.

Applications

- Rinse critical mechanical or electronic components.
- Flush filter holders.
- Rinse laboratory glassware.

Specifications

Materials of Construction
Exterior: Chrome-plated brass
Interior: Brass
Nozzle: Type 316 stainless steel
Gasket: PTFE
Washer: Nylon
Filter Holder: Delrin® acetal resin with PTFE encapsulated O-ring

Effective Filtration Area
3.7 cm^2

Filter Size
Accepts 25 mm filter

Capacity
1 L

Inlet/Outlet Connections
Filler Cap Connection: Straight connection accepts standard air chuck

Maximum Operating Temperature
38 °C (100 °F)

Operating Pressure Range
1.4 - 5.2 bar (140 - 520 kPa, 20 - 75 psi)

Sterilization
Provided non-sterile. Autoclavable if desired at 121 - 123 °C (250 - 253 °F) at 1.0 bar (100 kPa, 15 psi) for 15 - 20 min.

Ordering Information

Pressure Rinser

VWR #	Pall #	Description	Pkg
28145-350	7074	Pressure rinser	1/pkg

Accessories and Replacement Parts

VWR #	Pall #	Description	Pkg
28144-255	1109	25 mm filter holder	6/pkg
28145-352	39947	Repair kit (includes valve stem, washer flat nylon, valve spring, valve cap, valve core, filler cap, filler cap gasket, cotton pin, valve stem, valve trigger, adapter, and filter nozzle assembly)	1/pkg
—	72032	Nozzle assembly only*	1/pkg
—	86362	O-ring, PTFE encapsulated	1/pkg

*Includes 25 mm filter holder and stainless steel nozzle.

Related Products

In-Line Filter Holders, Delrin . . . . . 262 - 266
Membrane Disc Filters . . . . . 107 - 113, 175 - 179, 209 - 211, 239 - 243
Stainless Steel Forceps 225, 274

Appendix

With Pall as your partner, you have access to hundreds of scientists, engineers, and technicians in laboratories around the world who are dedicated to helping you optimize Pall membranes and devices for your applications. Our mission is to help you achieve the very best possible results when you use Pall products in your process.

In the following pages, we present a brief summary of basic filtration concepts and definitions, as well as the chemical compatibilities for many of Pall's laboratory products. This handy reference guide will give you a basic understanding of the different types of filtration technologies that are available to you, and that can help you achieve the separation and purification results you need.

To access our complete library of reference materials, please visit us at ***www.pall.com/lab****.*

Content

Principles of Filtration

Filtration is a science of growing information, distinctive terminology, and proprietary knowledge. These basic concepts have been compiled so that we at Pall Life Sciences can establish a common ground with you, our customer, on the basic language of filtration. As always, if you have questions about any of these concepts or how they apply to your specific applications, contact our Technical Service Department.

We will explain some of the fundamental aspects of filtration technology and how they relate to each other and to your application. Then, we will guide you through the logic of selecting the proper filter media and devices.

Filter media have many different properties that affect the performance of the filter in certain applications. When selecting the best filter media or device for your application, consider the important properties described on the following pages.

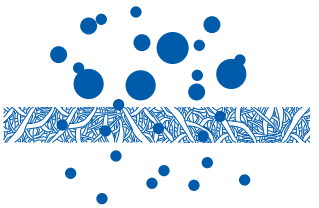
For information on the use of our products in detection procedures, see pages 78 - 85.

Depth vs. Membrane Filtration

A **Depth Media** is a filter consisting of either multiple layers or a single layer of a medium having depth, which captures contaminants within its structure as opposed to on the surface. *(Example: Glass Fiber media.)*

Advantages

- Lower cost
- High throughputs
- High dirt-holding capacity
- Final filter
- Removes variety of particle sizes



Potential Disadvantages

- Media migration (shedding)
- Nominal pore size
- Particulate unloading at increased differential pressure

A **Membrane Filter** typically traps contaminants larger than the pore size on the surface of the membrane. Contaminants smaller than the rated pore size may pass through the membrane or may be captured within the membrane by other mechanisms. Membrane filters are typically used for critical applications such as sterilizing and final filtration. *(Examples: Supor® and GN-6 Metricel® membranes.)*

Advantages

- Absolute sub-micron pore size ratings are possible
- Can be bacteria and particle retentive (pore size dependent)
- Generally lower extractables
- Generally integrity testable

Potential Disadvantages

- Lower flow rates than depth media
- More costly than depth media

A **Combination Filter** combines different membrane pore sizes, or combines depth media and a membrane filter to create self-contained serial filter units. They can offer an economical alternative to using individual prefilters and final filters. *(Examples: Acrodisc® syringe filters with GxF glass fiber/0.45 µm GHP membrane, Acrodisc PF syringe filters, VacuCap® PF devices, and AcroPak™ 500 capsules.)*

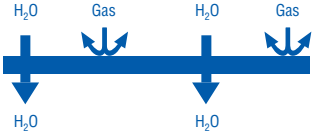
Chemical Compatibility

Chemical Compatibility is defined as the ability of a filter's materials of construction to resist chemicals so that the filter's function is not adversely affected, and the filter material does not shed particles or fibers, or add extractables to the sample being filtered. It is important to remember that compatibility is specific for a particular chemical or combination of chemicals at a particular temperature. To select the proper filter or device, you must determine the compatibility of the filter components with the fluid. Temperature, concentration, applied pressure, and length of exposure time affect compatibility. The materials used in the manufacture of filtration products are carefully chosen for their resistance to a wide range of chemical solutions. Still, understanding the compatibility between the fluid to be filtered and the filter elements under actual conditions of use is essential. (See pages 286 - 291 for the chemical compatibility of media and housing materials, centrifugal and TFF devices, and ultrafiltration membranes with common fluids.)

Hydrophilic vs. Hydrophobic

Hydrophilic filters are easily wet with water. Hydrophilic filters can be wetted with virtually any liquid and are the preferred filters for aqueous solutions, as appropriate by compatibility. *(Example: Supor membrane.)* Note that in the filtration industry, "hydrophilic" is used somewhat differently than in some other fields where it refers to a material to which water clings.

Once wetted, hydrophilic filters do not allow the free passage of gases until the applied pressure exceeds the bubble point and the liquid is expelled from the pores of the membrane. (See page 283.)



Wetted membrane prior to bubble point.

Hydrophobic filters will not wet in water but will wet in low surface tension liquids, for example, organic solvents such as alcohols. Once a hydrophobic filter has been wetted with a water-miscible fluid, aqueous solutions may also pass through.

Hydrophobic filters are best suited for gas filtration, low surface tension solvents, and venting. In certain applications, hydrophobic filters are used to filter aqueous solutions because of compatibility requirements. [*Example: TF (PTFE) membrane.]*

Water or aqueous solutions can also pass through a hydrophobic filter once the water breakthrough pressure is reached. (See page 283.)

Ratings

Pore Size Rating is the pore size of the filter determined by the diameter of the particle that it can be expected to retain with a defined, high degree of efficiency under specific conditions. Pore size ratings are usually stated in **Micrometers** (µm). **Ratings** can be stated as either nominal or absolute.

Nominal filter ratings are an arbitrary value indicating a particulate size range at which the filter manufacturer claims the filter removes a certain percentage of particulate load. Nominal ratings vary from manufacturer to manufacturer and cannot be used to compare filters among manufacturers. Processing conditions such as operating pressure and concentration of contaminant have a significant effect on the retention efficiency of the nominally-rated filters. *(Example: depth media, such as glass fiber media.)*

Absolute filter ratings are a value associated with a filter that represents the size of the smallest particle completely retained. Complete retention is within the experimental uncertainty of a standard test method consistent with the intended filter usage. Among the test conditions that must be specified are test organism (or particle size), challenge pressure, concentration, and detection method used to identify the contaminant. (*Example: most membrane filters, such as Supor® membrane products*.)

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*

Binding

Binding is the tendency of certain substances to "stick" to the filter medium (or other filter components) and be removed from the fluid. This is usually based on charge. Binding can be a desirable characteristic, as in the case of nucleic acid or protein binding on transfer membranes, which allows them to be separated and identified. Binding can also be an undesirable characteristic, as in the case of protein binding during filtration, which can lead to a loss of valuable products. *[Examples: HT Tuffryn®, Supor, Omega™, Fluorodyne® II, and GH Polypro (GHP) membranes are extremely low protein binding.]*

Extractables

Extractables are substances that may leach or otherwise come off the filtration system and into the fluid being filtered. These contaminants may include wetting agents in the filter media, manufacturing debris, chemical residue from sterilizing the filter, adhesives, or components of the filter materials of construction. The type and amount of extractables will vary with the type of liquid being filtered.

Extractables can be minimized by flushing the filter with either water or a process-compatible solvent before using it. Careful manufacturing procedures can eliminate the need to flush filters. *(Example: filter devices sterilized with gamma irradiation do not exhibit toxic extractables associated with ethylene oxide sterilization.)*

Extractables can affect filtration in almost every application:

- In HPLC analysis, they can add extraneous peaks.
- In cell culture, they can cause cytotoxicity (kill cells).
- In microbiological analysis, they can inhibit growth and affect recovery of microorganisms.
- In environmental analysis, they can appear as additional contaminants.

Thermal Stability

Thermal Stability is the ability of the filter media and device components to maintain integrity and functionality at elevated temperatures. Thermal stability is important when considering filter sterilization, such as autoclaving. Certain filters cannot be autoclaved because of insufficient thermal stability. Keep in mind that there is a relationship between chemical compatibility and thermal stability; many types of filter media may be compatible with a chemical at room temperature, but not at high temperature. Thermal stability can be characterized by determining the maximum operating temperature under specified conditions.

Principles of Filtration (continued)

Flow Rate and Throughput

Flow Rate and **Throughput** are two important related measures of filter media and device performance described in this section. This performance is affected by many different variables. The most important variables are detailed in the subsequent text.

Water Flow Rate is a measure of the amount of water that flows through a filter at a defined pressure. It is related to the degree of contamination, differential pressure, total porosity, and effective filtration area. It is commonly expressed in the membrane industry in units of milliliters/minute (mL/min).

Air Flow Rate is a measure of the amount of air that flows through a filter. It is related to the degree of contamination, differential pressure, total porosity, and filter area. It is commonly expressed in the membrane industry in liters/minute (L/min) at a given pressure.

Throughput is the amount of fluid able to pass through a filter prior to plugging. (See Filter Life, page 283.)

Differential Pressure (ΔP) is the difference between the pressure in the system before the fluid reaches the filter (upstream pressure) and the pressure after the fluid flows through the filter (downstream pressure). In a constant flow application, the differential pressure increases as the filter begins to clog.

Viscosity is a measurement of a fluid's resistance to flow. For example, a slow-flowing liquid like honey has a higher viscosity than a "thin" liquid like water. The higher the viscosity (at a constant pressure), the lower the flow rate through a filter (assuming that the fluid is Newtonian, i.e., that the viscosity does not change as the conditions change).

Porosity (also called "open area" or "void volume") is a measurement of all of the open spaces (pores) in the membrane. Generally, membranes have 50 - 90% open space. Flow rate is directly proportional to the porosity of the membrane (more pores = higher flow rate for a given pore size and thickness of filter medium).

Filter Area. Filter media and devices are available in a wide range of sizes with different Effective Filtration Areas (EFA). EFA is the filter area that is available for filtration. For a given membrane, the larger the filter area, the higher the flow rate at a given differential pressure.

Filter Media and Device Configurations are available in a wide variety of sizes and configurations from disc membranes to small syringe filters to large capsule filters.

Disposable Filtration Devices, such as syringe filters and capsule filters, are the most convenient means for filtering any sample volume. These devices usually consist of a membrane integrally sealed into a polymeric housing with fittings that attach easily to a syringe, tubing, or piping on the inlet and/or outlet of the device. These devices are typically pre-sterilized, ready for use, and intended primarily for one-time use.

Disc Filters are installed by the end-user into a reusable filter holder made of stainless steel, glass, or a polymeric housing material. From strictly a material cost standpoint, the membrane disc is less expensive. However, this method requires the end-user to install the filter integrally (i.e., without bypass) into the filter holder and often to sterilize the filtration system prior to use.

Filter Area, Flow Rate, and Throughput Examples

0.2 µm Supor® Membrane Devices	Filter Area (cm^2)	Typical Water Flow Rate Lpm at 0.7 bar (70 kPa, 10 psi)	Throughput* (L)
25 mm Acrodisc® Syringe Filter	2.8	0.039	0.1
AcroCap™ Device	15	0.20	2
AcroPak™ 200 Capsule	200	2.35	12
AcroPak 500 Capsule	500	8.0	25
AcroPak 1000 Capsule	1000	16	50

*Estimated throughput when filtering RPMI media with 10% bovine calf serum.

More Terms and Definitions

To access a comprehensive reference of filtration and separation terms and definitions, visit **www.pall.com/lab**. Then, click the Literature Library sidebar link and select "Terms and Definitions" under literature type. You can easily access this document online or download and print the pdf.

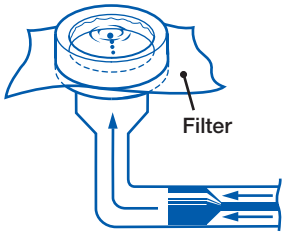
Measuring a Filter's Performance

To help determine whether a filter will be suitable for your applications, manufacturers use various tests to rate the performance of the filter under certain conditions.

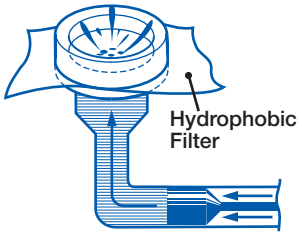
Biological Safety Test is a general term used to categorize tests performed to determine whether the filter's materials of construction are capable of inducing measurable degrees of systemic toxicity, localized skin irritation, sensitization reaction, or other biological responses. Either *in vivo* or *in vitro* test methods may be employed. Tests like the "United States Pharmacopoeia (USP) Biological Reactivity Test, *In Vivo* <88>" ensure that the filters can be exposed to the test solutions without causing an adverse reaction.

Pyrogenicity is the tendency of a substance to raise body temperature when injected into the body. Filtration materials that come in contact with injectable liquids must meet pyrogenicity standards and be classified as non-pyrogenic. Pyrogenicity can be determined by such standard tests as the Limulus Amoebocyte Lysate (LAL) test.

Bubble Point is a measure of the air pressure required to force liquid from the largest wetted pore of a membrane. It serves as an indication of pore size and rates the filter's ability to serve as a particle barrier. The bubble point is dependent on the liquid used to wet the membrane. For a given pore size, the bubble point will be higher in a liquid with a higher surface tension (such as water) than in a liquid with a lower surface tension (such as isopropyl alcohol). The bubble point rating is determined when the largest pore yields a bubble; the larger the pore, the less pressure required to form the bubble. This measurement is expressed in units of pounds per square inch (psi) or bar for membranes (ASTM:F316-03, Standard Test Methods for Pore Size Characteristics).



Water Breakthrough is a measure of the amount of pressure required to transmit water through the largest pore of a dry hydrophobic filter. It serves as an indication of pore size for a hydrophobic membrane, and rates a filter's ability to serve as an aqueous barrier. The larger the pore size, the less pressure is required to push water through the pore. This measurement is expressed in the filtration industry in units of pounds per square inch (psi) or bar.



DOP Test is a measure of the efficiency of a filter for the removal of particulate from air, based on the retention of 0.3 µm Dioctyl Phthalate (DOP) aerosol droplets, and usually expressed as a percentage. A High Efficiency Particulate Air (HEPA) filter must retain at least 99.97% of 0.3 µm DOP droplets (ASTM:D2986-95A). The 0.3 µm size was chosen because particles of this size are the most difficult to retain in many air filters.

Filter Efficiency measures the percentage of particles which are removed from the fluid by the filter. In filtration of liquids, filter efficiency is given on the basis of particles at or above a certain diameter in size. In gas filtration, efficiency is stated as including all particles, including those at the most penetrating particle size. See the DOP Test for a test of efficiency in air filtration. Some filter manufacturers will report efficiency in terms of the percentage removal of the particles by weight, which does not reveal the number of particles that may pass through the filter. This is a type of nominal filter rating. For high-efficiency filters, this is often replaced by a beta rating. Efficiency can be calculated from a beta value as follows:

$$\% \text{ Efficiency } (\eta) = \frac{\beta - 1}{\beta} \times 100$$

Filters rated as one micron or finer are often rated using titer reduction values or log reduction values.

Filter Life is a measure of how long a filter will last before requiring replacement or cleaning. It can be stated either in terms of time (e.g., 30 days between changes) or volume of fluid filtered (e.g.,10,000 liters processed between filter changes). A filter's actual life will depend on what particulates and conditions it is exposed to in actual usage, so filter life ratings from lab testing with standard contaminants can be used for comparison but do not necessarily predict actual service life. To predict actual life, testing with the actual application fluid under actual operating conditions is required.

Typically, the useful life of a filter can be determined by a two-to-four fold increase of differential pressure in a constant flow system or a drop in flow rate of 50 to 80% in a constant pressure system. See Throughput, page 285.

As you use this catalog, you will find more helpful hints for selecting the proper filter media, devices, and hardware for your applications. If you have additional questions, or just want to talk more about your application, please contact our Technical Service Department – we'd like to hear from you! (See the inside back cover for contact information.)

Understanding Product Terminology

The following information is provided to define terms typically used in product specifications. For our complete glossary of terms, visit www.pall.com/lab.

Adsorption

Retention of gas, liquid, solid, or a dissolved substance on a surface due to positive interaction (attraction) between the surface and the molecules of the adsorbed material. The interactive forces can be electrostatic (coulombic) or non-electrostatic (dipole-dipole and hydrophobic). Adsorption to a membrane or filter device can occur in a specific manner (affinity) or non-specifically.

Autoclave(ing)

A chamber for sterilizing filters or equipment with saturated steam by using constant high temperature and pressure (commonly 121° C, 15 psi). Many materials requiring sterilization (such as cell culture media and injectable drugs) are degraded by the heat of an autoclave and must be sterilized by other means such as filtration.

Binding Constant

Defined as the concentration of a ligand that saturates the binding of half of the available binding sites. It is a combination of the available target (receptor) and the affinity of the ligand. Also known as the dissociation constant Kd.

Coefficient of Variation (CV)

A measure of the variation that can occur between samples during a binding assay. Variation can result from liquid transfer, non-specific binding, improper washing, and anomalies with the plate. Studies indicate that the AcroWell™ plate has low CVs making it useful for binding assays.

Counts Per Second (CPS)

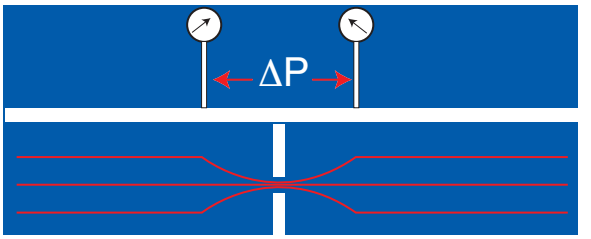
Relates to the number of photons detected that are given off by the scintillant or as a result of a fluorescence emission. CPS is measured by a scintillation counter (radioactivity) or multilabel counter (fluorescence).

Cytotoxicity Test

A test designed to determine the biological reactivity of mammalian cell cultures following contact with the plastic or membrane with specific extracts prepared from the material under test. The procedure allows for extraction of the material at physiological to non-physiological temperatures for varying intervals.

Differential Pressure

Differential Pressure (∅P) is the difference between the pressure in the system before the fluid reaches the filter (upstream pressure) and the system pressure after the fluid flows through the filter (downstream pressure) in a constant flow situation. As the filter begins to clog, differential pressure increases.



Effective Filtration Area (EFA)

EFA is the filter area that is available for filtration. For a given membrane, the larger the filter area, the higher the flow rate at a given initial differential pressure. Filter media and devices are available in a wide range of sizes with different EFAs.

Endotoxin

A complex molecule (lipopolysaccharide) which forms an integral part of gram negative bacterial cell walls and is released when the integrity of the wall is disturbed, (i.e., cell division, growth, and death). Endotoxins may be released during biosynthesis of a recombinant DNA product, thus necessitating purification steps to ensure their removal.

Extractables

Substances present in the composition of the filter media or the filter manufacturing process that may be leached into the fluid as it is filtered, thereby affecting its purity. Extractables may include manufacturing debris, surfactants, and adhesives. The type and amount of extractables will vary with the type of liquid being filtered. Extractable components which can end up as contaminants may be minimized with sufficient preflushing.

Fluorescence

Light emitted from a fluorophore (fluorescent molecule) as a result of excitation. The excitation wavelength (color) is different than the emission wavelength. The difference between these wavelengths is known as the stokes shift. The emitted light is detected in a specialized detector such as the Victor♦ multi-label counter. Most fluorophores give a simple emission that is about 1 picosecond after excitation while in time-resolved fluorescence the emission occurs after a microsecond lag.

Good Manufacturing Practices (GMPs)
Regulations promulgated by the Food and Drug Administration governing the manufacture of drugs (Ref. Code of Federal Regulation 21 CFR 210 and 211), medical devices (21 CFR 820), and Large Volume Parenterals (21 CFR 212 proposed). cGMPs are the current accepted standards of operation in a regulated industry.

Hold-Up Volume
Volume of fluid retained in a filter and/or housing after purging the assembly with air or suitable gas. Hold-up volume is usually considered to be lost volume.

Integrity Test
A test to ensure that a sterilizing-grade filter is intact and will function as intended. Recommended integrity tests are the Forward Flow test, Bubble Point test, and the Pressure Hold test. Integrity tests on sterilizing-grade filters are correlated with bacterial challenge data.

Limulus Amoebocyte Lysate (LAL) Test
An LAL gel clot test prescribed by the United States Pharmacopeia (USP) to detect and determine the level of bacterial endotoxins in a substance. The reagent is made from the circulating blood cells (amoebocytes) of limulus polyphemus, the horseshoe crab.

Luminescence
The emission and detection of light produced by chemical reactions, or bioluminescence, due directly to the enzyme light production. These enzymes can be used as labels to trace a molecule of interest. It does not require laser excitation like fluorescence because it is a result of a chemical reaction. Luminescence reactions can be carried out on membranes (blots), in a plate, or in solution. If the reaction is being done in a 96-well form, the use of a white plate enhances the recovery of photons.

Molecular Weight Cut-Off (MWCO)
Nominal rating system for ultrafiltration and nanofiltration membranes. MWCO is defined as the molecular weight of solute of which the membrane retains 90%. Often defined by the molecular weight of dextran particles retained.

Operating Limits
Minimum and maximum parameters set for validation and processing pressures and temperatures.

Permeability
The degree to which a fluid will pass through a permeable substance under specified conditions. The space or void volume between molecules allowing fluid flow.

pH
The pH value of an aqueous solution is a number describing its acidity or alkalinity. A pH is the negative logarithm (base 10) of the concentration of hydrogen ions (equivalents per liter). The pH value of a neutral solution is 7. An acidic solution has a pH less than 7 while a basic solution has a pH greater than 7 and up to 14.

Recovery
Ability of a filter to retain bacteria, DNA or other biomolecules from a solution. Percentage of a chemical or organism population that can be recovered after processing.

Retention
Ability of a filter to retain particles (total number or those of a specific size) suspended in a gas or liquid. In the case of ultrafiltration, refers to the ability to concentrate molecules in solution. Retension is expressed as percent of particles or molecules originally present.

Sanitization, Sanitize
To make clean by removing dirt and other extraneous materials with soap and general disinfectant so as to reduce possibility of growth and spread of pathogenic organisms. A common sanitization agent is 70% ethanol. Bleach is also commonly used.

Sterile, Sterility, Sterilization
To make or be free of any viable microorganisms. Demonstrated by testing to show the absence of growth of microorganisms. If a high bioburden level was present prior to sterilization, pyrogens may still be present afterward.

Thickness
Thickness is typically measured with a gauge called a micrometer and is usually expressed as microns or mils. A micron is a unit of length equal to one millionth of a meter and a mil is a unit of length equal to one thousandth of an inch or 0.0254 millimeter.

Throughput
The amount of solution that will pass through a filter prior to clogging.

Toxicity Standards
Test to indicate adverse reactions or lethality to drugs or drug components, also used to assess biosafety of filters. Tests include appropriate combinations of direct injection, extraction, and implantation. Generally known as USP biological Reactivity Test, *In Vivo* <88>.

Vacuum
Depression of pressure below atmospheric pressure. The maximum vacuum possible is about 63.5 cm (25 in.) of Hg.

Chemical Compatibility

Media Materials

	Acids											Alcohols						Bases					Esters	
	Acetic acid, glacial	Acetic acid, 90%	Acetic acid, 30%	Acetic acid, 10%	Hydrochloric acid, conc. (35%)	Hydrochloric acid, 6N (20%)	Hydrochloric acid, 1N (3.3%)	Nitric acid, conc. (67%)	Nitric acid, 6N (27%)	Sulfuric acid, conc. (96%)	Sulfuric acid, 6N (16%)	Amyl alcohol	Benzyl alcohol	Butanol	Ethanol	Isopropanol	Methanol	Ammonium hydroxide, 3N (5.7%)	Ammonium hydroxide, 6N (11.4%)	Potassium hydroxide, 3N (15%)	Sodium hydroxide, 3N (11%)	Sodium hydroxide, 6N (22%)	Amyl acetate	Butyl acetate
Biodyne® Membrane	N	N	N	N	N	N	N	N	N	N	N	R	N	R	R	R	R	L	L	N	L	N	R	R
Bio-Inert® (Nylon) Membrane	N	N	N	N	N	N	N	N	N	N	N	R	R	R	R	R	R	L	L	N	L	N	R	R
BioTrace™ NT Membrane	N	-	-	-	N	-	-	N	-	N	-	R	N	L	N	R	N	-	-	N	-	-	N	N
BioTrace PVDF Membrane	R	R	R	R	R	R	R	R	R	N	-	R	R	R	R	R	R	-	N	N	N	N	R	R
Emflon® II (PVDF) Membrane	R	R	R	R	R	R	R	R	R	N	-	R	R	R	R	R	R	-	N	N	N	N	R	R
Fluorodyne® II (PVDF) Membrane	R	R	R	R	R	R	R	R	R	N	-	R	R	R	R	R	R	N	N	N	N	N	R	R
FluoroTrans® W (PVDF) Membrane	R	R	R	R	R	R	R	R	R	N	-	R	R	R	R	R	R	-	N	N	N	N	R	R
FP Vericel™ (PVDF) Membrane	R	R	R	R	R	R	R	R	R	N	-	R	R	R	R	R	R	-	N	N	N	N	R	R
GH Polypro (GHP) (PP) Membrane	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
GLA-5000 (PVC) Membrane	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	N	N
Glass Fiber Media	R	R	R	R	R	R	R	L	-	R	R	R	N	R	R	R	R	R	R	N	-	-	R	R
GN Metricel® (MCE) Membrane	N	-	-	-	N	-	-	N	-	N	-	R	N	L	N	R	N	-	-	N	-	-	N	N
HT Tuffryn® Membrane	R	R	R	R	R	R	R	N	-	N	-	N	N	R	R	R	R	R	R	R	R	R	R	R
Metricel Black Membrane	R	R	R	R	R	R	-	N	-	N	N	R	R	R	R	R	R	R	R	R	R	R	R	R
Metricel Polypro Membrane	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Mustang® E Membrane*	R	R	R	R	R	R	R	N	-	N	-	N	N	R	R	R	R	R	R	R	R	R	R	R
Mustang Q Membrane*	R	R	R	R	R	R	R	N	-	N	-	N	N	R	R	R	R	R	R	R	R	R	R	R
Mustang S Membrane*	R	R	R	R	R	R	R	N	-	N	-	N	N	R	R	R	R	R	R	R	R	R	R	R
Nylaflo™ (Nylon) Membrane	N	N	L	R	R	R	R	N	L	N	L	L	N	L	R	L	L	R	L	R	R	L	L	R
Posidyne® Nylon Membrane*	R	R	R	R	R	R	R	N	-	N	-	N	N	R	R	R	R	R	R	R	R	R	R	R
Supor®, Supor EKV (PES) Membrane	R	R	R	R	R	R	R	N	-	N	-	N	N	R	R	R	R	R	R	R	R	R	R	R
Teflo, TF (PTFE) Membrane	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Ultipor® N66 Membrane	N	N	N	N	N	N	N	N	N	N	N	R	N	R	R	N	R	L	L	N	L	N	R	R
Versapor® Membrane	N	-	-	-	N	-	L	N	-	N	-	R	R	R	R	R	R	R	R	R	R	R	R	L
Zefluor™, Zylon™ Membrane	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

Test Methods

The data presented in this chart is a compilation of testing by Pall Corporation with certain chemicals, manufacturer's data, or compatibility recommendations from the *Compass Corrosion Guide* by Kenneth M. Pruett. This data is intended to provide expected results when filtration devices are exposed to chemicals under static conditions for 48 hours at 25 °C (77 °F), unless otherwise noted. Membrane integrity for syringe filters was tested by bubble point.

This chart is intended only as a guide. Accuracy cannot be guaranteed. Users should verify chemical compatibility with a specific filter under actual use conditions. Because chemical compatibility is affected by many variables (including temperature, pressure, concentration, and purity), various chemical combinations prevent complete accuracy.

**Chemical compatibility refers to the base membrane. The effect of various chemicals on the surface chemistry has not been tested.*

Esters				Ethers			Glycols			Aromatic Hydrocarbons			Halogenated Hydrocarbons					Ketones				Oils		Miscellaneous								
Cellosolve acetate	Ethyl acetate	Isopropyl acetate	Methyl acetate	Ethyl ether	Tetrahydrofuran	Tetrahydrofuran/water (50/50,v/v)	Ethylene glycol	Glycerol	Propylene glycol	Benzene	Toluene	Xylene	Carbon tetrachloride	Chloroform	Ethylene dichloride	Methylene chloride	Tetrachloroethylene	Acetone	Cyclohexanone	Methyl ethyl ketone (MEK)	Methyl isobutyl ketone	Cottonseed	Peanut	Acetonitrile	Dimethyl formamide (DMF)	Dimethyl sulfoxide (DMSO)	Formaldehyde, 37%	Formaldehyde, 4%	Hexane, dry	Kerosene	Pyridine	18 Megohm water
R	R	R	R	R	R	R	N	R	L	L	L	L	L	L	L	L	L	R	N	R	R	R	R	R	R	R	R	R	R	R	L	R
R	R	R	R	R	R	R	N	R	L	L	L	L	L	L	L	L	L	R	N	R	R	R	R	R	R	R	R	R	R	R	L	R
N	N	N	N	N	N	-	N	R	R	R	R	R	R	R	R	N	R	N	N	N	N	R	R	N	N	N	N	-	R	R	N	R
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L	R	R	R	R	N	-	R	R	R	R	R	R	R	R	R	R	R	N	L	N	N	R	R	R	N	N	R	R	R	R	N	R
L	R	R	R	R	N	-	R	R	R	R	R	R	R	R	R	R	R	N	L	N	N	R	R	R	N	N	R	R	R	R	N	R
L	R	R	R	R	N	-	R	R	R	R	R	R	R	R	R	R	R	N	L	N	N	R	R	R	N	N	R	R	R	R	N	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
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R	R	R	R	R	N	-	R	R	R	R	R	R	N	N	N	N	R	N	N	N	L	L	R	N	N	N	R	R	R	R	L	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

Caution

Alcohol residues that are allowed to dry on a filter may cause stress cracks. Pall Corporation recommends that filters used in alcohol processing should remain alcohol wet or should be flushed with copious quantities of water to remove residuals prior to drying and subsequent reuse.

R = Resistant
No significant change was observed in flow rate or bubble point of the membrane. No visible indication of chemical attack was detected.

L = Limited Resistance
Moderate changes in physical properties or dimensions of the membrane were observed. The filter may be suitable for short term, non-critical use. Hardware or housing may be suitable for short-term exposure at low pressures and ambient temperatures.

N = Not Resistant
The membrane or housing is basically unstable and is not recommended for use.

- = Insufficient Data
Information is not available. Trial testing is recommended.

Chemical Compatibility (continued)

Housing Materials

	Acids											Alcohols						Bases					Esters	
	Acetic acid, glacial	Acetic acid, 90%	Acetic acid, 30%	Acetic acid, 10%	Hydrochloric acid, conc. (35%)	Hydrochloric acid, 6N (20%)	Hydrochloric acid, 1N (3.3%)	Nitric acid, conc. (67%)	Nitric acid, 6N (27%)	Sulfuric acid, conc. (96%)	Sulfuric acid, 6N (16%)	Amyl alcohol	Benzyl alcohol	Butanol	Ethanol	Isopropanol	Methanol	Ammonium hydroxide, 3N (5.7%)	Ammonium hydroxide, 6N (11.4%)	Potassium hydroxide, 3N (15%)	Sodium hydroxide, 3N (11%)	Sodium hydroxide, 6N (22%)	Amyl acetate	Butyl acetate
Acetal Copolymer, Celcon♦ and Delrin♦	N	N	L	L	L	L	-	N	N	-	N	R	R	R	R	R	R	L	L	R	R	R	R	R
Acrylonitrile-Butadiene-Styrene (ABS)	N	N	L	L	R	R	R	L	L	-	L	R	N	R	L	-	N	L	L	R	R	R	N	-
Aluminum	L	L	L	L	N	N	N	N	N	N	N	L	L	L	L	L	R	L	L	N	N	N	R	R
Borosilicate Glass	L	-	-	-	R	R	R	-	R	-	R	-	-	-	R	R	R	-	-	N	N	N	-	-
Brass	N	N	N	N	N	N	N	N	N	-	-	R	-	R	R	-	R	N	N	N	L	N	R	R
Buna♦-N	L	L	R	R	L	L	-	N	N	N	L	R	N	L	L	R	R	N	N	R	R	R	N	N
Ethylene Propylene	-	L	R	R	L	L	-	N	N	L	L	R	L	R	R	R	R	R	R	R	R	R	L	L
Modified Acrylic	N	N	-	-	L	R	R	L	L	L	R	N	N	R	L	L	L	L	N	N	R	L	N	-
Nylon Adapter	-	R	R	R	N	N	-	N	N	N	N	R	R	R	R	R	R	R	R	R	R	R	R	R
Polycarbonate	L	L	L	R	N	N	L	L	L	N	L	L	N	R	L	R	L	N	N	N	R	L	N	N
Polyphenylsulfone	-	-	-	R	-	R	-	-	R	-	R	-	-	-	-	-	R	R	-	-	R	R	-	-
Polypropylene	R	R	R	R	R	R	-	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Polystyrene	N	-	-	-	R	R	R	N	N	N	R	N	-	-	R	-	R	R	R	R	R	R	-	-
Polysulfone	R	R	R	R	R	R	-	R	R	N	R	R	N	R	R	R	N	R	R	R	R	R	L	L
PTFE	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
PVC (Polyvinyl Chloride)	N	N	N	N	L	R	R	L	R	N	R	R	N	R	L	R	R	R	R	R	R	R	N	N
Silicone Rubber	R	L	R	L	N	N	-	L	L	N	N	N	L	L	L	R	R	R	R	N	L	L	R	R
Tygon♦	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	N	N
Type 304 Stainless Steel	N	N	L	L	N	N	N	R	R	N	N	R	L	R	R	L	R	R	R	L	L	L	R	L
Type 316 Stainless Steel	R	L	L	R	N	N	N	R	R	N	N	R	R	R	R	R	R	R	R	R	R	R	R	R
Viton♦	N	N	L	L	R	R	R	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R	N	N

Test Methods

The data presented in this chart is a compilation of testing by Pall Corporation with certain chemicals, manufacturer's data, or compatibility recommendations from the *Compass Corrosion Guide* by Kenneth M. Pruett. This data is intended to provide expected results when filtration devices are exposed to chemicals under static conditions for 48 hours at 25 °C (77 °F), unless otherwise noted. Membrane integrity for syringe filters was tested by bubble point.

This chart is intended only as a guide. Accuracy cannot be guaranteed. Users should verify chemical compatibility with a specific filter under actual use conditions. Because chemical compatibility is affected by many variables (including temperature, pressure, concentration, and purity), various chemical combinations prevent complete accuracy.

Cellosolve acetate	Ethyl acetate	Isopropyl acetate	Methyl acetate	Ethyl ether	Tetrahydrofuran	Tetrahydrofuran/water (50/50, v/v)	Ethylene glycol	Glycerol	Propylene glycol	Benzene	Toluene	Xylene	Carbon tetrachloride	Chloroform	Ethylene dichloride	Methylene chloride	Tetrachloroethylene	Acetone	Cyclohexanone	Methyl ethyl ketone (MEK)	Methyl isobutyl ketone	Cottonseed	Peanut	Acetonitrile	Dimethyl formamide (DMF)	Dimethyl sulfoxide (DMSO)	Formaldehyde, 37%	Formaldehyde, 4%	Hexane, dry	Kerosene	Pyridine	18 Megohm water
Esters					**Ethers**			**Glycols**			**Aromatic Hydrocarbons**			**Halogenated Hydrocarbons**					**Ketones**				**Oils**		**Miscellaneous**								
R	R	N	R	R	R	-	R	R	R	R	L	R	R	R	R	R	R	R	R	L	R	R	R	R	N	-	R	R	R	R	L	R
-	N	-	N	N	-	-	R	-	L	N	N	N	N	N	N	N	-	N	N	N	N	R	-	-	N	N	R	R	N	N	-	R
R	R	N	R	R	-	-	R	R	R	L	R	R	N	L	R	L	R	R	R	R	R	R	R	-	R	-	R	R	R	R	L	R
-	R	-	-	-	R	-	R	-	-	R	R	R	-	R	-	R	-	R	-	R	-	-	-	R	R	R	R	R	R	-	-	R
L	L	-	R	L	-	-	L	-	-	-	R	R	L	L	R	R	-	R	-	R	-	R	-	-	-	-	R	R	R	R	L	R
N	N	N	N	N	N	-	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	R	R	N	N	N	R	R	R	R	N	R
L	R	L	L	N	N	-	R	R	R	N	N	N	N	N	L	N	N	R	L	R	R	R	R	R	R	R	R	R	N	N	L	R
-	N	-	N	N	N	-	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	L	L	L	N	N	R	R	L	R	N	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
N	N	N	N	N	N	-	R	R	L	N	N	N	N	N	N	N	N	N	N	N	N	-	-	N	N	N	R	R	N	N	N	R
-	-	-	-	-	-	-	-	-	-	-	N	-	-	N	-	N	-	-	-	N	-	-	-	-	-	-	-	-	-	R	-	R
R	R	R	R	R	L	-	R	R	R	L	L	L	L	L	N	L	R	R	R	R	R	R	R	R	R	R	R	R	L	R	R	R
-	N	-	-	N	-	-	R	R	-	N	N	-	N	-	-	-	-	N	-	N	-	-	-	-	N	-	R	R	-	-	-	R
N	N	L	N	R	N	-	R	R	R	N	N	N	L	N	L	N	R	N	N	N	N	R	R	N	N	N	R	R	R	R	N	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
N	N	N	N	N	N	-	R	-	N	N	N	N	N	N	N	N	N	N	N	N	N	L	R	-	N	N	R	R	L	R	N	R
R	L	L	-	N	N	-	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	R	R	N	N	N	L	R	N	N	N	R
N	N	N	N	N	N	-	R	R	R	N	N	N	N	N	N	N	N	L	L	L	L	L	-	L	R	L	L	-	N	N	L	R
L	L	N	R	L	R	R	L	-	L	L	R	L	L	R	L	R	-	R	R	R	L	R	R	-	R	R	R	R	R	R	R	R
R	R	R	R	R	R	-	R	R	R	R	R	R	L	R	L	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
N	N	N	N	N	N	N	R	R	R	R	R	R	R	R	R	L	R	N	N	N	N	R	R	R	L	N	R	R	R	R	N	R

Caution

Alcohol residues that are allowed to dry on a filter may cause stress cracks. Pall Corporation recommends that filters used in alcohol processing should remain alcohol wet or should be flushed with copious quantities of water to remove residuals prior to drying and subsequent reuse.

R = Resistant

No significant change was observed in flow rate or bubble point of the membrane. No visible indication of chemical attack was detected.

L = Limited Resistance

Moderate changes in physical properties or dimensions of the membrane were observed. The filter may be suitable for short term, non-critical use. Hardware or housing may be suitable for short-term exposure at low pressures and ambient temperatures.

N = Not Resistant

The membrane or housing is basically unstable and is not recommended for use.

- = Insufficient Data

Information is not available. Trial testing is recommended.

Chemical Compatibility (continued)

Centrifugal and TFF Devices

	Acetic acid (10%)	Citric acid (1%)	Formic acid (1N)	Hydrochloric acid (1 N) (0.1N, 50 °C)	Lactic acid (5%)	Nitric acid (1%)	Oxalic acid (1%)	Phosphoric acid (1N) (0.1N, 25 °C)	Sulfuric acid (1N)	Butanol (70%)	Butyl cellosolve (10%)	Ethanol (70%)	Isopropanol (25%)	Mercaptoethanol (10%)	Methanol (70%) (25%)	Propanol (70%)	Ammonium hydroxide (1 N)	Sodium hydroxide (1 N)	Isopropyl acetate (1%)	Ethyl acetate (10%)	Ethyl acetate (100%)	Glycerol	Polyethylene glycol (0.1%)	Chloroform (0.8%)	Chloroform (100%)
	Acids									Alcohols							Bases		Esters			Glycols		HH*	
Centrifugal Devices																									
Nanosep® Device	R	-	R	R	-	-	-	R	R	R	R	R	-	-	R	R	R	R	-	-	N	R	R	R	-
Microsep™ Advance Device	R	-	R	R	-	-	-	R	R	R	R	R	-	-	R	R	R	R	-	-	N	R	R	R	-
Macrosep® Advance Device	R	-	R	R	-	-	-	R	R	R	R	R	-	-	R	R	R	R	-	N	N	R	R	R	-
Jumbosep™ Device	R	-	R	R	-	-	-	R	R	R	R	R	-	-	R	R	R	R	-	N	N	R	R	R	N
TFF Devices																									
Minimate™ Device	R	R	R	R	R	R	R	R	-	-	-	R	R	R	R	-	-	R	R	R	-	-	-	R	-
Ultrasette™ Device	R	-	R	R	-	-	-	R	R	R	R	R	-	-	R	R	R	R	-	N	-	R	R	R	N
T-Series TFF Cassettes	-	R	-	R	-	-	-	R	-	-	-	R	-	-	-	-	N	-	-	-	-	-	-	-	-
*HH = Halogenated Hydrocarbons																									
Cassettes																									
Centramate™ Cassettes	-	R	R	R	R	R	R	R	-	-	-	R	R	-	-	-	-	R	R	-	-	-	-	R	-

Ultrafiltration Membrane

	Acetic acid (5%)	Acetic acid (25.5%)	Citric acid (1%)	Formic acid (5%)	Hydrochloric acid (0.1N at 25 °C)	Hydrochloric acid (0.1N at 50 °C)	Hydrochloric acid (1N at 50 °C)	Lactic acid (5%)	Nitric acid (< 1%)	Oxalic acid (1%)	Phosphoric acid (1N)	Sulfuric acid (1%)	Butanol (70%)	Butyl cellosolve (10%)	Ethanol (70%)	Isopropyl alcohol (25%)	Mercaptoethanol (0.1%)	Methyl alcohol (25%)	Amines	Ammonium hydroxide (5%)	Sodium hydroxide (0.1N at 25 °C)	Sodium hydroxide (0.1N at 50 °C)	Sodium hydroxide (0.5N at 25 °C)	Sodium hydroxide (1N at 25 °C)	Sodium hydroxide (1N at 50 °C)	Aliphatic & aromatic esters	Butyl acetate (40%)	Ethyl acetate (< 30%)	Isopropyl acetate (1%)
	Acids												Alcohols						Bases							Esters			
Omega™ Membrane	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R	R	R	N	N	R	R	R	R	R	N	R	R	R

*AH = Aromatic Hydrocarbons
**HH = Halogenated Hydrocarbons

Test Methods

This data is a compilation of testing by Pall Corporation with the listed chemicals. Chemical compatibility was determined with discs. Flux rates and solute retention was determined before and after a two-hour exposure to the indicated chemical. If membrane integrity was unchanged, the chemical was deemed compatible. Membrane integrity for syringe filters was tested by bubble point.

This chart is intended only as a guide. Accuracy cannot be guaranteed. Users should verify chemical compatibility with a specific filter under actual use conditions. Because chemical compatibility is affected by many variables (including temperature, pressure, concentration, and purity), various chemical combinations prevent complete accuracy.

Our ultrafiltration membranes have been evaluated for compatibility with many common laboratory buffers and solvents over a wide pH range.

Acetone (10%)	Acetone (20%)	Methyl ethyl ketone (MEK) (10%)	Phenol (0.5%)	Acetonitrile (20%)	Alconox® (1%)	Ammonium chloride (1%)	Ammonium sulfate	Calcium chloride (5%)	Dimethyl formamide (DMF) (< 5%)	Dimethyl formamide (20%)	Dimethyl formamide (100%)	Dimethyl sulfoxide (DMSO) (< 5%)	Dimethyl sulfoxide (20%)	Dimethyl sulfoxide (100%)	Disodium salt of EDTA (10%)	Formaldehyde (1%)	Formaldehyde (5%)	Glutaldehyde (0.5%)	Glycerine (50%)	Guanidine HCl (6M)	Hydrogen peroxide (10%)	Phosphate buffer	Sodium azide (1%)	Sodium chloride (5%, 50C)	Sodium deoxycholate (5%)	Sodium dodecyl sulfate (0.01M)	Sodium hypochlorite (0.05%)	Sodium hypochlorite (0.1%)	Sodium nitrate	Terg-a-zyme® (1%)	Tris buffer (1M)	Ultrasil 11 (2%)	Urea (6M)
Ketones																				Miscellaneous												
-	R	R	-	R	-	-	R	-	-	R	-	-	R	-	-	-	R	-	-	R	R	R	-	-	-	R	R	-	-	R	R	R	R
-	R	R	-	R	-	-	R	-	-	R	-	-	R	-	-	-	R	-	-	R	R	R	-	-	-	R	R	-		R	R	R	R
-	R	R	-	R	-	-	R	-	-	R	N	-	R	N	-	-	R	-	-	R	R	R	-	-	-	R	R	-	-	R	R	R	R
-	R	R	-	R	-	-	R	-	-	R	N	-	R	N	-	-	R	-	-	R	R	R	-	-	-	R	R	N	-	R	R	R	R
R	-	-	R	R	R	R	-	R	R	-	-	R	-	-	R	R	-	R	R	R	R	R	R	R	R	R	R	-	R	R	R	R	R
R	-	R	-	R	-	-	R	-	-	R	N	-	R	N	-	-	R	-	-	R	R	R	-	-	-	R	R	N	-	R	R	R	R
-	-	-	-	-	R	-	-	-	-	-	-	-	-	-	-	R	-	-	R	R	-	-	-	-	-	R	R	-	-	R	-	-	-
R	-	-	R	R	R	R	-	R	R	-	-	R	-	-	R	R	-	R	R	R	-	-	R	R	R	R	R	-	R	R	R	-	-

Ethers	Tetrahydrofuran (5%)	Toluene (1%)	Aromatic & chlorinated hydrocarbons	Chloroform (0.8%)	Methylene chloride (MEK) (1%)	Acetone (< 30%)	Ketone	Methyl ethyl ketone (1%)	Phenol (0.5%)	Acetonitrile (< 40%)	Ammonium chloride (1%)	Alconox® (1%)	Calcium chloride (5%)	Dimethyl acetamide (DMAC) (< 40%)	Dimethyl formamide (DMF) (< 40%)	Dimethyl sulfoxide (DMSO) (< 40%)	Disodium salt of EDTA (10%)	Formaldehyde (1%)	Glutaraldehyde (0.5%)	Glycerine (50%)	Guanidine HCl (6M)	Hydrogen peroxide (1%)	N-Methyl pyrrolidone (1%)	Phosphate buffer (1M) (pH 8.2)	Sodium azide (1%)	Sodium chloride (5%) (50 °C)	Sodium deoxycholate (5%)	Sodium dodecyl sulfate (0.01M)	Sodium hypochlorite (0.005%)	Sodium hypochlorite (0.02%)	Sodium hypochlorite (0.1%)	Sodium nitrate	Terg-a-zyme® (1%)	Tris buffer (1M) (pH 8.2)	Triton X-100 (0.002M)	Urea (25%)	Ultrasil 11 (1%)
Ethers	AH*	HH**				Ketones											Miscellaneous																				
N	R	R	N	R	R	R	N	R	R	R	R	R	N	N	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R	R	R	R	R	R

Caution

Alcohol residues that are allowed to dry on a filter may cause stress cracks. Pall Corporation recommends that filters used in alcohol processing should remain alcohol wet, or should be flushed with copious quantities of water to remove residuals prior to drying and subsequent reuse.

Compatibility with Omega™ membrane cassettes should be used only as a guide. Cassettes should be tested in the appropriate solvent and product under actual operating conditions and for an appropriate time to determine compatibility for the specific application.

R = Resistant

No significant change was observed in flow rate or bubble point of the membrane. No visible indication of chemical attack was detected.

L = Limited Resistance

Moderate changes in physical properties or dimensions of the membrane were observed. The filter may be suitable for short term, non-critical use. Hardware or housing may be suitable for short-term exposure at low pressures and ambient temperatures.

N = Not Resistant

The membrane or housing is basically unstable and is not recommended for use.

- = Insufficient Data

Information is not available. Trial testing is recommended.

Part Number Index – VWR Numbers

Part Number Index (continued) – VWR Numbers

Part Number Index – Pall Numbers

Part Number Index (continued) – Pall Numbers

*The X's represents MWCO/ pore size

Product Name and Subject Index

Product Name and Subject Index (continued)

I

J

L

M

N

O

P

Q

R

S

T

U

V

W

Z

Notes

Notes

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