

## Acrodisc® PSF Syringe Filters

**Ideal for HPLC and UHPLC automated sample processing and sample clarification, the automation certified Acrodisc PSF syringe filter is more retentive than standard 25 mm devices and is available with single-layer membranes or with multi-layer glass fiber prefilters.**

- Superior HPLC column protection and better retention efficiency helps extend column life as much as 46 times.
- GxF multi-layer prefilter provides two to four times the throughput of standard glass fiber prefilter devices, allowing for quick and easy filtration of your most difficult-to-filter samples.
- Filter housing has been designed to withstand high operating pressures to avoid filter burst during use.
- Available with GHP hydrophilic polypropylene membrane for maximum chemical compatibility,



fast flow rates, low protein binding, and low levels of UV-absorbing extractables.

- Designed to be fully compatible and reliable for use with the SOTAX AT 70<sup>®</sup> and AT 70smart<sup>™</sup> dissolution systems.

### Certifications



#### Automation Certification

Pall's Acrodisc PSF syringe filters are the only syringe filters to receive Caliper<sup>®</sup> Life Sciences' Automation Certified guarantee. This certification is granted to syringe filters that meet the stringent requirements for automated dispensing, robotic handling, and fit and operation in the Caliper TPW,

APW, and Multi-Dose<sup>®</sup> systems. Acrodisc PSF syringe filters are fully compatible for use with Caliper automated workstations and facilitate smooth operation and worry-free performance 24 hours a day.

#### HPLC Certified

Pall Life Sciences certifies Acrodisc PSF syringe filters to be low in UV absorbing extractables. They have been tested for compatibility with common HPLC solvents (water, acetonitrile, and methanol) using established

HPLC procedures. Filtrate from a statistical sampling of Acrodisc PSF syringe filters was collected and run under gradient mobile phase conditions at three common wavelengths. The chromatograms of the solvent blanks and samples were compared. Samples from each production lot were also compared to a standard to determine if any extraneous peaks were present. (Note: HT Tuffryn<sup>®</sup> and Versapor<sup>®</sup> membrane are excluded from claim.)

#### Ion Chromatography Certified

Pall Life Sciences certifies that the following Ion Chromatography (IC) Acrodisc PSF syringe filters have been tested using a highly sensitive ion chromatography technique: PN AP-4585, AP-4587, and AP-4785.

To monitor inorganic extractables, samples from each lot are tested. 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.

### Specifications

#### Materials of Construction

Filter Media:

GH Polypro (GHP): Hydrophilic polypropylene

Nylon: Hydrophilic nylon

PVDF: Hydrophilic polyvinylidene fluoride

PTFE: Hydrophobic polytetrafluoroethylene

IC and Supor<sup>®</sup>: Hydrophilic polyethersulfone

HT Tuffryn: Polysulfone

Versapor: Hydrophilic acrylic copolymer on a non-woven support

GxF Prefilter: Borosilicate glass

Housings: Polypropylene

#### Effective Filtration Area

3.9 cm<sup>2</sup>

#### Sample Volume

< 150 mL

#### Inlet/Outlet Connections

Female threaded luer inlet, male slip luer outlet

**Specifications** (continued)

<b>Part Number</b>	<b>Description</b>	<b>Pore Size</b>	<b>Typical Hold-up Volume (w/air purge)</b>	<b>Maximum Operating Temperature</b>	<b>Maximum Operating Pressure</b>	<b>Typical Water Flow Rate</b>
AP-4305 AP-4307 AP-4306	GxF/GHP	0.2 µm	< 200 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	175 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4557 AP-4559 AP-4558	GxF/GHP	0.45 µm	< 200 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	195 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4527 AP-4523 AP-4529	GxF/Glass	1 µm	< 125 µL	82 °C (180 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	795 mL/min at 1.0 bar (100 kPa, 15 psi)
AP-4548 AP-4549 AP-4528	GxF/Nylon	0.45 µm	< 150 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	215 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4301 AP-4303 AP-4302	GxF/PTFE	0.45 µm	< 125 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	395 mL/min at 1.0 bar (100 kPa, 15 psi) (MeOH)
AP-4309 AP-4310 AP-4308	GxF/PVDF	0.45 µm	< 200 µL	82 °C (180 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	144 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4424 AP-4425 AP-4426	GxF/Supor®	0.45 µm	< 200 µL	100 °C (212 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	360 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4364 AP-4564 AP-4566	GHP	0.2 µm	< 125 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	215 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4357 AP-4560 AP-4562	GHP	0.45 µm	< 125 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	300 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4498 AP-4497 AP-4784	HT Tuffryn®	0.45 µm	< 125 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	390 mL/min at 3.1 bar (310 kPa, 45 psi)
AP-4587 AP-4585 AP-4785	IC (PES)	0.45 µm	< 125 µL	100 °C (212 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	420 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4437 AP-4436 AP-4522	Nylon	0.2 µm	< 125 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	115 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4517 AP-4438 AP-4502	Nylon	0.45 µm	< 125 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	245 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4520 AP-4225 AP-4521	PTFE	0.2 µm	< 125 µL	100 °C (212 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	245 mL/min at 1.0 bar (100 kPa, 15 psi) (MeOH)
AP-4518 AP-4219 AP-4501	PTFE	0.45 µm	< 125 µL	100 °C (212 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	510 mL/min at 1.0 bar (100 kPa, 15 psi) (MeOH)
AP-4519 AP-4408 AP-4500	PVDF	0.45 µm	< 125 µL	82 °C (180 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	144 mL/min at 2.1 bar (210 kPa, 30 psi)
AP-4190 AP-4189 AP-4568	Versapor®	0.8 µm	< 125 µL	55 °C (131 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	905 mL/min at 3.1 bar (310 kPa, 45 psi)
AP-4000 AP-4001 AP-4002	Versapor	10 µm	< 125 µL	82 °C (180 °F) at 2.1 bar (210 kPa, 30 psi)	4.1 bar (410 kPa, 60 psi) at 21-24 °C (70-75 °F)	1182 mL/min at 1.0 bar (100 kPa, 15 psi)

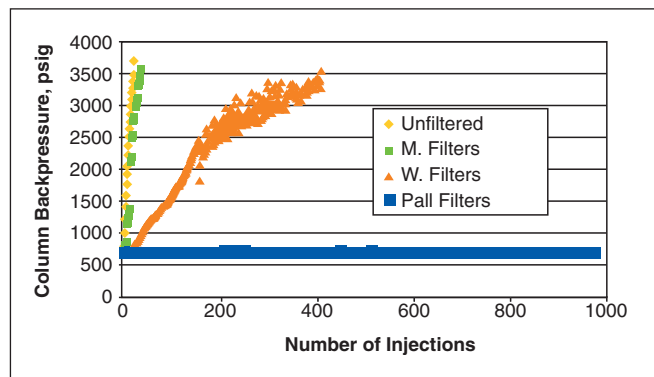
## Performance

### Retention Efficiency

The Acrodisc PSF filter's retention efficiency can directly increase the life of your HPLC column. More retentive filters will also remove smaller non-dissolved particles that may rest on the head of your HPLC column and affect your analytical results as they dissolve during an analysis. The graph below demonstrates that the life of an HPLC column can be extended up to 46 times by filtering samples prior to injection. For the complete study, request PN 33312, "Syringe Filter Efficiency and the Effect of Filtration on HPLC Column Life."

**Figure 1**

*Effects of Filters on HPLC Column Life*

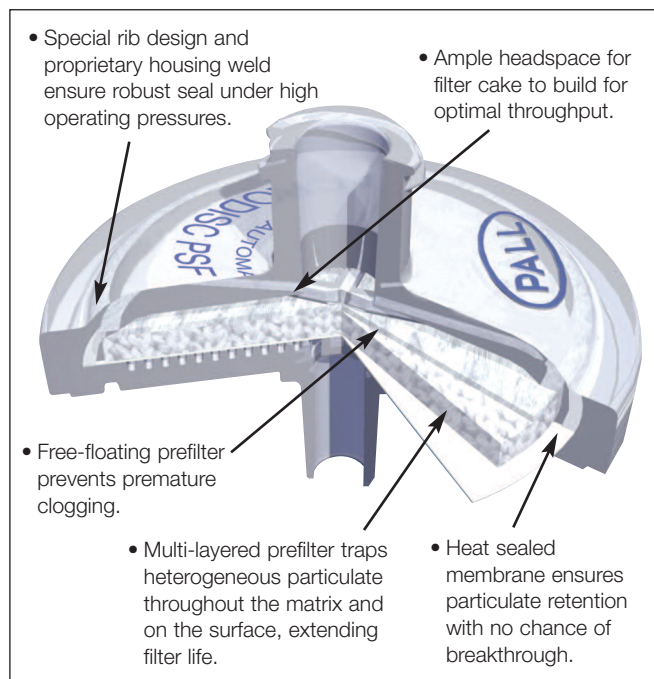


### Prefiltration

The GxP Acrodisc PSF syringe filter has a serial glass fiber prefilter to allow for maximum throughput and faster flow rates than standard glass fiber prefilter devices. The multi-layered prefilter traps particulate rated from > 40 to 1  $\mu\text{m}$ .

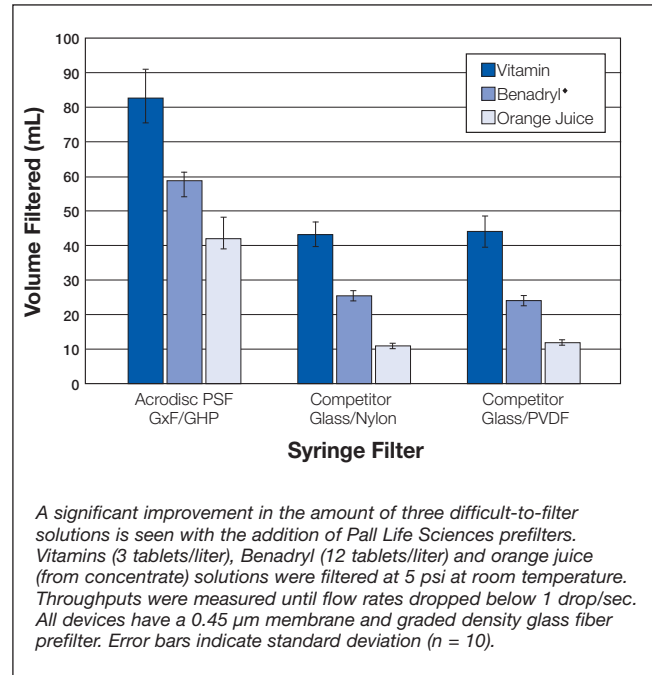
**Figure 2**

*The Acrodisc PSF Syringe Filter*



**Figure 3**

*Comparison of Syringe Filters*



A significant improvement in the amount of three difficult-to-filter solutions is seen with the addition of Pall Life Sciences prefilters. Vitamins (3 tablets/liter), Benadryl (12 tablets/liter) and orange juice (from concentrate) solutions were filtered at 5 psi at room temperature. Throughputs were measured until flow rates dropped below 1 drop/sec. All devices have a 0.45  $\mu\text{m}$  membrane and graded density glass fiber prefilter. Error bars indicate standard deviation (n = 10).

### Automation



Acrodisc PSF syringe filters are designed specifically to meet the exacting requirements of automation systems and to demonstrate critical criteria including smooth filter-to-filter release, consistent turret advancement, exceptional housing strength, and a strict outside filter geometry to ensure proper alignment and consistent operation.

Pall's Acrodisc PSF syringe filters are manufactured to the critical tolerances

necessary to ensure accurate and reliable performance. These filters have been engineered to specific dimensions to provide uniform housing and optimized inlet and outlet designs. Stringent adherence to such critical dimensions is vital in ensuring consistent filter delivery, positioning, and operation of each and every filter that passes through our automated workstations.

For a copy of the automation certification report, visit our Literature Library at [www.pall.com/lab](http://www.pall.com/lab). Look under the Technical Articles, for "Certification of Pall Acrodisc PSF Syringe Filters for Use with Zymark® Workstations."

### Exceptional Housing Strength

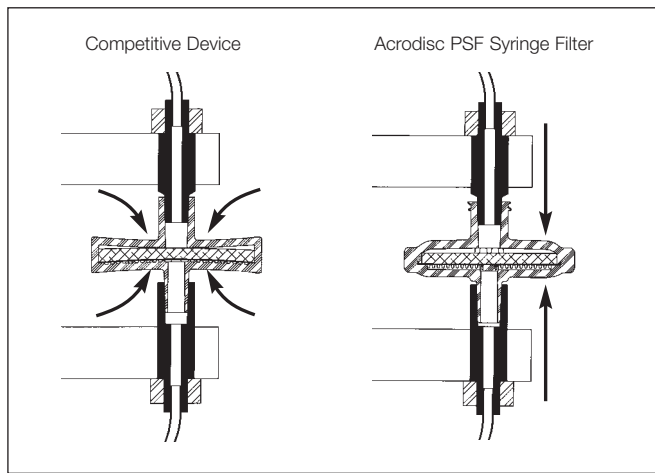
Filter flex or squeeze occurs when the workstation's filter holder compresses soft or weak filter housings. This squeezing effect reduces effective filtration area and can result in early clogging of the membrane. This clogging can potentially result in one of three situations:

- 1) A leak between the filter and the workstation's filter holder seal.
- 2) An increase in back pressure resulting in operation shutdown.
- 3) The filter housing bursts.

Filter squeeze is not a problem for the Acrodisc PSF syringe filter. The specially designed support ribbing, thick walls, and proprietary housing weld ensure a robust seal and a filter housing that can withstand excessive force both internally and externally.

### Figure 4

*Filter Squeeze, Competitive Device vs. Acrodisc PSF Syringe Filter*

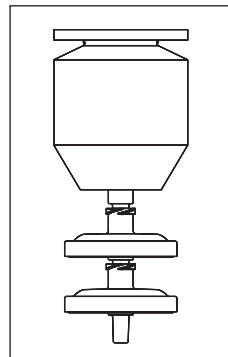


### Smooth Filter-to-Filter Release

Filter sticking occurs when the filters do not easily release from one another, from the workstation's filter holder luer at the filtration station, or from the filter weight. (The filter weight seats the filter in the dispenser hole.) If the filter does not release from the weight or the next filter in the dispensing area, the turret will jam. The workstation's sensor will indicate that a filter has not advanced into place and the system will "error" or shutdown.

The Acrodisc PSF syringe filter has been designed so the filters cannot be forced too tightly together or to the automation components, allowing a smooth release while still meeting ANSI/ISO filter luer standards.

**Figure 5**  
*Smooth Filter-to-Filter Release*

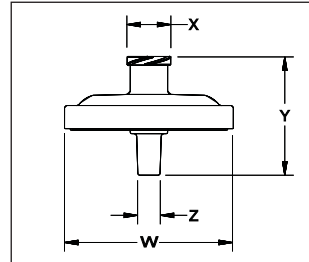


### Strict "Outside Filter Geometry"

Consistent filter dimensions are critical for smooth operation in automated equipment. The Acrodisc PSF syringe filter has strict dimensional specifications in height and width to ensure proper alignment and filter luer-to-instrument placement.

### Figure 6

*Consistent Filter Dimensions*



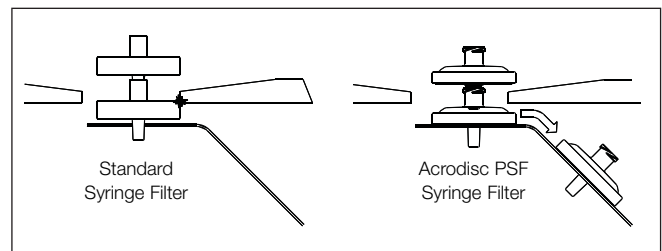
### Consistent Turret Advancement

As the turret or carousel in systems such as the Caliper Life Sciences TPW, APW, and Multi-Dose systems turns to dispense a filter, the bottom filter on a stack drops into the filter separator area and a wedge mechanism separates the filter from the filter stack. If the filters are pressed too tightly together, the turret does not exert enough force to pull the filters apart. Occasionally when this happens, the filter stack will "jump" in the dispenser as the turret attempts to turn and the square-top shoulder on a syringe filter will snag on the edge of the separator wedge. When the turret freezes and a filter is not dispensed, the system errors and shuts down.

The Acrodisc PSF syringe filter's quick-releasing filter luers separate easily. The slightly rounded upper shoulder on the device allows the filter to consistently slide under the wedge for trouble-free separation from the filter stack and smooth filter advancement along the workstation track.

### Figure 7

*Consistent Turret Advancement*



## Chemical Compatibility Guide for Acrodisc PSF Syringe Filters

Solvent	GxF/GHP, GxF/PTFE, GxF Glass, GHP, PTFE	HT Tuffryn	Versapor	GxF/Nylon, Nylon	IC, Supor (PES)	GxF/ PVDF, PVDF
Acetone	R	NR	NR	R**	NR*	NR
Acetonitrile	R	NR	NR	R**	R	R
Acetic acid, glacial	R	R	NR	NR*	R	R
n-Butanol	R	R	R	R*	R	R
Chloroform	R	NR	NR	R*	NR	R
Dimethyl formamide	R	NR	NR	R**	NR	NR
Dimethyl sulfoxide	R	NR	NR	R**	NR	NR
Ethanol	R	R	R	R*	R	R
Ethyl acetate	R	NR	R	R**	NR	R
Ethyl ether	R	NR	R	R*	R	R
Freon TF	R	•	•	R*	LR	R
Hydrochloric acid (1N)	R	R	•	NR	R	R
Hexane, dry	R	R	R	R	LR	R
Methanol	R	LR	R	R*	R	R
Methylene chloride	R	NR	NR	R*	NR	R
Methyl ethyl ketone	R	NR	NR	NR**	NR	NR
N-Methyl pyrrolidone	R	•	•	R*	NR	R
Isopropanol	R	R	R	R*	R	R
Sodium hydroxide (3N)	LR	R	R	R	R	NR
Tetrahydrofuran	R	NR	NR	R*	NR	NR
Tetrahydrofuran/water (50/50)	R	•	•	R*	•	R
Toluene	R	NR	R	R**	R	R
Water	R	R	R	R*	R	R

**R = RESISTANT.** No significant change was observed in flow rate or bubble point.

**LR = LIMITED RESISTANCE.** Moderate changes in physical properties of the membrane were observed.

**NR = NOT RESISTANT.** The membrane is basically unstable. In most cases, extensive shrinkage or swelling occurs.

• = Insufficient data

\* = UV absorbance was set at 254 nm

\*\* = UV absorbance was set at 365 nm

## Ordering Information

### Acrodisc PSF Syringe Filters

Part Number	Description	Pkg	Part Number	Description	Pkg
AP-4305	GxF/0.2 µm with GHP membrane, AutoPack™ tubes	25/pkg 200/cs	AP-4548	GxF/0.45 µm with Nylon membrane, AutoPack tubes	25/pkg 200/cs
AP-4307	GxF/0.2 µm with GHP membrane	50/pkg 200/cs	AP-4549	GxF/0.45 µm with Nylon membrane	50/pkg 200/cs
AP-4306	GxF/0.2 µm with GHP membrane	1000/pkg	AP-4528	GxF/0.45 µm with Nylon membrane	1000/pkg
AP-4557	GxF/0.45 µm with GHP membrane, AutoPack tubes	25/pkg 200/cs	AP-4301	GxF/0.45 µm with PTFE membrane, AutoPack tubes	25/pkg 200/cs
AP-4559	GxF/0.45 µm with GHP membrane	50/pkg 200/cs	AP-4303	GxF/0.45 µm with PTFE membrane	50/pkg 200/cs
AP-4558	GxF/0.45 µm with GHP membrane	1000/pkg	AP-4302	GxF/0.45 µm with PTFE membrane	1000/pkg
AP-4527	GxF/Glass, AutoPack tubes	25/pkg 200/cs	AP-4309	GxF/0.45 µm with PVDF membrane, AutoPack tubes	25/pkg 200/cs
AP-4523	GxF/Glass	50/pkg 200/cs	AP-4310	GxF/0.45 µm with PVDF membrane	50/pkg 200/cs
AP-4529	GxF/Glass	1000/pkg	AP-4308	GxF/0.45 µm with PVDF membrane	1000/pkg

## Ordering Information (continued)

Part Number	Description	Pkg	Part Number	Description	Pkg
AP-4424	GxF/0.45 µm with Supor membrane, AutoPack tubes	25/pkg 200/cs	AP-4438	0.45 µm with Nylon membrane	50/pkg 200/cs
AP-4425	GxF/0.45 µm with Supor membrane	50/pkg 200/cs	AP-4502	0.45 µm with Nylon membrane	1000/pkg
AP-4426	GxF/0.45 µm with Supor membrane	1000/pkg	AP-4520	0.2 µm with PTFE membrane, AutoPack tubes	25/pkg 200/cs
AP-4364	0.2 µm with GHP membrane, AutoPack tubes	25/pkg 200/cs	AP-4225	0.2 µm with PTFE membrane	50/pkg 200/cs
AP-4564	0.2 µm with GHP membrane	50/pkg 200/cs	AP-4521	0.2 µm with PTFE membrane	1000/pkg
AP-4566	0.2 µm with GHP membrane	1000/pkg	AP-4518	0.45 µm with PTFE membrane, AutoPack tubes	25/pkg 200/cs
AP-4357	0.45 µm with GHP membrane, AutoPack tubes	25/pkg 200/cs	AP-4219	0.45 µm with PTFE membrane	50/pkg 200/cs
AP-4560	0.45 µm with GHP membrane	50/pkg 200/cs	AP-4501	0.45 µm with PTFE membrane	1000/pkg
AP-4562	0.45 µm with GHP membrane	1000/pkg	AP-4519	0.45 µm with PVDF membrane, AutoPack tubes	25/pkg 200/cs
AP-4498	0.45 µm with HT Tuffryn membrane, AutoPack tubes	25/pkg 200/cs	AP-4408	0.45 µm with PVDF membrane	50/pkg 200/cs
AP-4497	0.45 µm with HT Tuffryn membrane	50/pkg 200/cs	AP-4500	0.45 µm with PVDF membrane	1000/pkg
AP-4784	0.45 µm with HT Tuffryn membrane	1000/pkg	AP-4190	0.8 µm with Versapor membrane, AutoPack tubes	25/pkg 200/cs
AP-4587	0.45 µm with IC (PES) membrane, AutoPack tubes	25/pkg 200/cs	AP-4189	0.8 µm with Versapor membrane	50/pkg 200/cs
AP-4585	0.45 µm with IC (PES) membrane	50/pkg 200/cs	AP-4568	0.8 µm with Versapor membrane	1000/pkg
AP-4785	0.45 µm with IC (PES) membrane	1000/pkg	AP-4000	10 µm with Versapor membrane, AutoPack tubes	25/pkg 200/cs
AP-4437	0.2 µm with Nylon membrane, AutoPack tubes	25/pkg 200/cs	AP-4001	10 µm with Versapor membrane	50/pkg 200/cs
AP-4436	0.2 µm with Nylon membrane	50/pkg 200/cs	AP-4002	10 µm with Versapor membrane	1000/pkg
AP-4522	0.2 µm with Nylon membrane	1000/pkg			
AP-4517	0.45 µm with Nylon membrane, AutoPack tubes	25/pkg 200/cs			

Note: AutoPack packaging can be placed directly onto Caliper Life Sciences and SOTAX workstations to decrease handling.



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