

Superior Gel & Particle Removal from Photoresist & Ancillary Chemicals

LifeASSURE™ PSN series nylon filter capsules are highly retentive membrane filter elements designed to meet the exacting requirements of photoresist and ancillary chemical applications at point-of-use (POU). Utilizing Advanced Pleat Technology (APT), LifeASSURE PSN series combines superior flow characteristics with minimal pressure drop, while maintaining filter efficiency. The resultant decrease in processing time provides lower total filtration costs — reduced energy consumption, pump wear and labor.

The native characteristics of photoresists, ancillary chemicals, and filters vary greatly from one manufacturer to the next. A filtration solution individually matched to the unique requirements of the material being filtered is critical for peak performance. When choosing the appropriate filter, important characteristics to consider include membrane wettability, pore size, pressure drop, retention efficiency, and fluid viscosity.

The LifeASSURE PSN series capsule's naturally hydrophilic Nylon 6,6 pleated membrane with all polypropylene capsule construction, provides increased filter life, and superior removal of gel and hard particles when compared to other membrane capsules. LifeASSURE PSN series nylon filter capsules are ideally suited for photoresist and ancillary chemical applications where high efficiency contaminant removal at 0.04 µm, 0.1 µm, or 0.2 µm is required.



Point-of-Use (POU) Applications	
157 nm Photoresists	Alcohols
193 nm Photoresists	Bases
248 nm Photoresists	Developers
I-line Photoresists	Etchants / Strippers
G-line Photoresists	Solvents

Features & Benefits

Advanced Pleat Technology

- Provides both low operating and differential pressure across the filter which minimizes outgassing, microbubble formation, and wear on the dispense system
- Increased lifetime and filter throughput which lowers cost-of-ownership
- Superior removal of gel particles for reduced defectivity

Naturally Hydrophilic Nylon 6,6 Membrane

- No IPA pre-wetting and system flushing required — eliminates a potential source of contamination and chemical interaction, while reducing hazardous waste disposal
- Reduces potential for microbubble formation by not dewetting in outgassing fluids unlike naturally hydrophobic membranes such as Polypropylene, UPE and PTFE
- Reduces downtime and increases overall equipment effectiveness (OEE)
- Economic alternative to UPE and PTFE

Low Cartridge Extractables

- No change to photospeed, viscosity, and molecular weight, unlike other filter materials which can extract ionic, organic and metallic contaminants

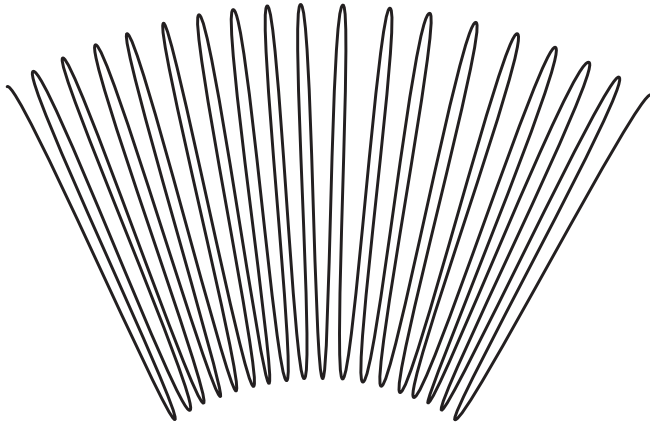


Figure 1. Conventional Pleating

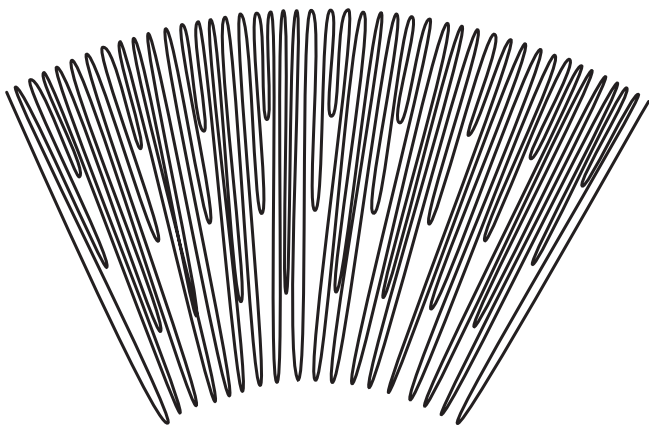
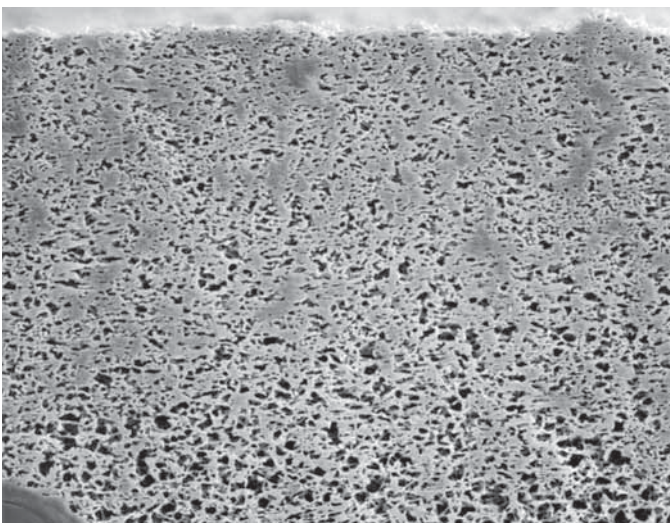


Figure 2. Advanced Pleat Technology

Figure 3. SEM Nylon 6,6 Membrane



Superior Gel Removal provided by APT

Normally a small amount of gel particles can be found in photoresists. Gels can form during the manufacturing and storage of photoresists. Their removal from photoresists is highly dependent on differential pressure across the filtration system. Since these gels are deformable, they can extrude through a filter at high differential pressures. At low differential pressures, the forces that would deform gels are correspondingly lower and the gels are retained by the membrane media. 3M Purification has been able to maximize filtration surface area, which assures both a low inlet pressure to the pump, and low differential pressure, which is optimal for gel removal. The increase in filtration surface area is achieved by using Advanced Pleat Technology.

The service life of a pleated capsule filter is often dictated by the accessible surface area. Conventional pleated filters may offer a large gross surface area, but when the media is packed into the capsule, only part of the surface area is used resulting in both flow restrictions and limited contaminant holding capacity. The “blind” or unused area commonly occurs near the inside diameter (Figure 1) where the pleats are most tightly compressed. The LifeASSURE™ PSN series capsule filter is manufactured using a staggered and stepped configuration (Figure 2), which reduces open space between the outside pleats. This novel technology maximizes capacity by increasing the open area which allows for greater particle loading at the inside diameter, while the shorter stepped pleats take advantage of existing open space closer to the outside diameter of the capsule. The result is a fully used surface area that provides superior filter life.

LifeASSURE™ PSN Series Capsule Construction

LifeASSURE PSN series filter capsules are constructed of high efficiency naturally hydrophilic Nylon 6,6 membrane (Figure 3). The membrane supports are made from high density polyethylene (HDPE). All capsule components are made of polypropylene and vent o-rings are available in fluorocarbon and EPR. No adhesives, binders, or surfactants are used in the manufacturing process. Capsules are manufactured and double-bagged in a clean environment under ISO certified quality systems using the most advanced non-contact thermoplastic welding techniques to ensure superior downstream cleanliness out of the package. All LifeASSURE PSN series filter capsules are integrity tested.

LifeASSURE™ PSN Series Nylon Filter Capsules

LifeASSURE™ PSN Series Capsule Extractables

The filters Nylon 6,6, HDPE, and polypropylene materials of construction ensure that ionic, organic, and metallic contaminants are not being added back into the process chemical. Ionic, organic, and metallic contaminants can extract from other filter materials, which may change the photospeed, viscosity, or molecular weight of the process chemical.

LifeASSURE PSN Series Cartridge Flow Rates

Figures 4 and 5 depict typical flow rates for the two style capsules available for 1 cp fluids at 25 °C.

Figure 4. Typical 1.5" Sanitary Capsule Fluid Flow

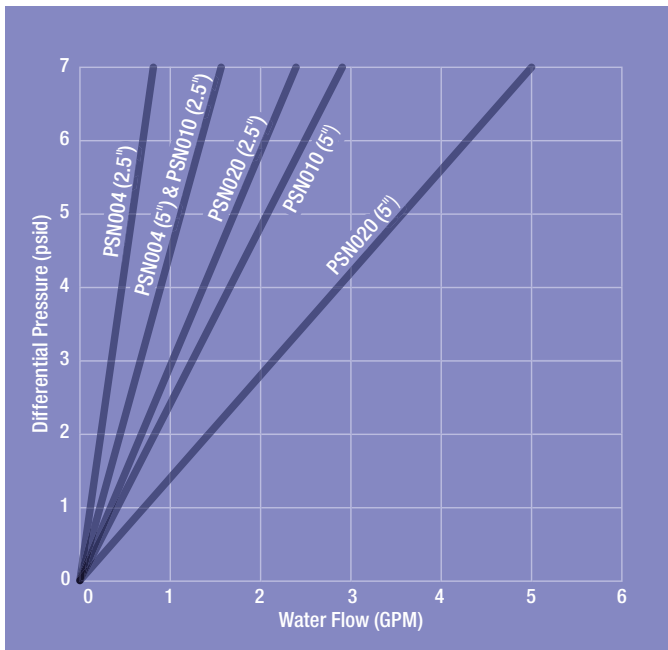
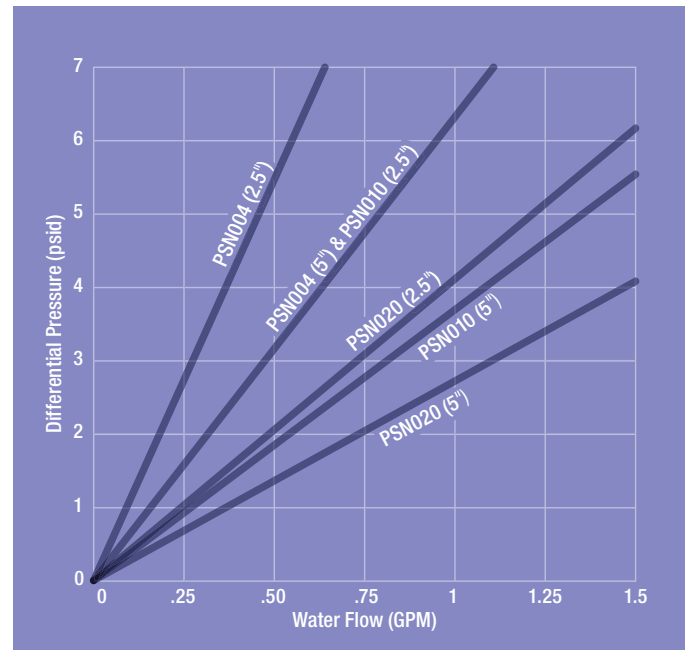


Table 1. Typical Metals Analysis*

Metal	Detection Limit (ppb)	24 Hour Extraction	120 Hour Extraction
Ca	0.9	< D.L	< D.L
Cr	0.3	< D.L	< D.L
Cu	0.9	< D.L	< D.L
Fe	0.9	< D.L	< D.L
K	0.9	< D.L	< D.L
Na	3.0	< D.L	< D.L

* Analysis using Graphite Furnace Atomic Absorption, extraction using PGMEA.

Figure 5. Typical .25" MNPT Capsule Fluid Flow



Operating Parameters & Specifications

Materials of Construction				
Membrane	Naturally Hydrophilic Nylon 6,6			
Membrane support layers	High Density Polyethylene (HDPE)			
Inner core, outer cage, end cap adapters	Polypropylene			
Dimensions	2.5" End Modification A	2.5" End Modification C	5" End Modification A	5" End Modification C
Filtration surface area	1.72 ft ² (.16 m ²)	3.62 ft ² (.33 m ²)	1.72 ft ² (.16 m ²)	3.62 ft ² (.33 m ²)
Outside Diameter (nominal)	3.0" (7.6 cm)			
Length (nominal)	5.1" (13.0 cm)	5.0" (12.7 cm)	7.6" (19.3 cm)	7.5" (19.1 cm)
Operating Conditions				
Maximum operating pressure	75 psid (5.2 bar) @ 104 °F (40 °C)			
Maximum operating temperature	104 °F (40 °C)			
Maximum forward differential pressure	60 psid (4.2 bar) @ 104 °F (40 °C)			
Recommended change-out differential pressure	35 psid (2.4 bar)			

LifeASSURE™ PSN Series Filter Capsule Ordering Guide

Grade Designation	Configuration	Length (Inches)	End Modification	O-Ring Material	Packaging
PSN004 (0.04 μm) PSN010 (0.1 μm) PSN020 (0.2 μm)	C	01 - 2.5 02 - 5.0	A - 1.5" Sanitary flange C - .25" MNPT	B - Fluorocarbon C - EPR	01 - Single pack 02 - 3 Pack

Figure 6. Dimensions of A style end modification

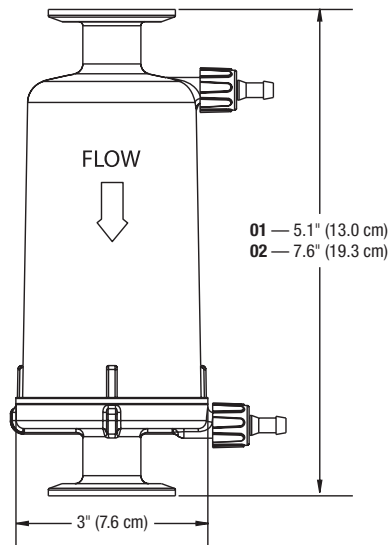
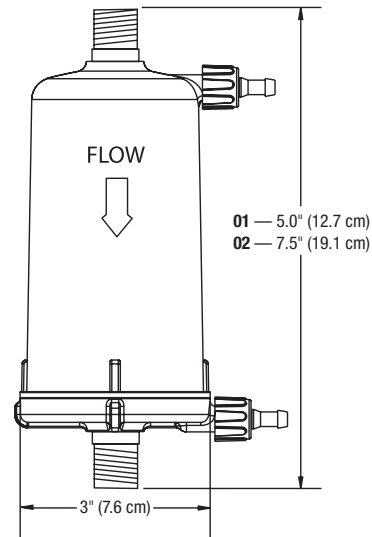


Figure 7. Dimensions of C style end modification



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3M Purification Inc.
400 Research Parkway
Meriden, CT 06450 U.S.A.
(800) 243-6894
(203) 237-5541
Fax (203) 630-4530
www.3Mpurification.com

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