# LifeASSURE™ PSN Series

## Nylon Filter Cartridges

LifeASSURE™ PSN series nylon filter cartridges are highly retentive membrane filter elements designed to meet the exacting requirements of photoresist and ancillary chemical applications. Utilizing 3M Purification Inc. Advanced Pleat Technology (APT), LifeASSURE PSN series nylon filter cartridges provide maximum flow rates with minimal pressure drop, which benefits recirculation time. By increasing the rate of recirculation, particle specifications are achieved more rapidly, throughput is maximized, and cost-of-ownership is lowered.

The naturally hydrophilic Nylon 6,6 pleated membrane in an all high density polyethylene (HDPE) construction, provides low extractables, increased filter life, and superior reduction of gel and hard particles when compared to other membrane cartridges. LifeASSURE PSN series nylon filter cartridges are ideally suited for photoresist and ancillary chemical applications where high efficiency contaminant reduction at 0.04µm, 0.1µm or 0.2µm is required.

## Features & Benefits

**Advanced Pleat Technology**

- Maximum flow in a compact design reduces the number of filter elements
- Provides a low operating and differential pressure across the filter which minimizes outgassing and microbubble formation
- A lower pressure drop increases the rate of recirculation which allows particle counts to be achieved more rapidly while reducing energy and wear on the pumps
- Increased throughput and filter lifetime which lowers cost-of-ownership
- Superior reduction of gel particles for reduced defectivity

**Naturally Hydrophilic Nylon 6,6 Membrane**

- No need to pre-wet cartridge with IPA and flush, which reduces chemical interaction and a potential source of contamination
- Reduces chemical usage since no prewetting or flushing is required
- 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 membranes

**Low Cartridge Extractables**

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

## Applications

- 157nm Photoresists
- 193nm Photoresists
- 248nm Photoresists
- I-line Photoresists
- G-line Photoresists
- Alcohols
- Bases
- Developers
- Etchants/Strippers
- Solvents

## Advanced Pleat Technology Provides Maximum Gel Reduction

A small amount of gel particles can normally be found in photoresists. These gels can form during the manufacturing and storage of photoresists. Their reduction 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 Inc. has been able to maximize filtration surface area, which provides both a low inlet pressure to the pump, and low differential pressure, which is optimal for gel reduction. The increase in filtration surface area is achieved by using Advanced Pleat Technology.

The lifetime of a pleated cartridge 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 cartridge, 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 nylon filter cartridges are 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 cartridge. The result is a fully used surface area that provides superior filter life.

**Figure 1. Conventional Pleating**

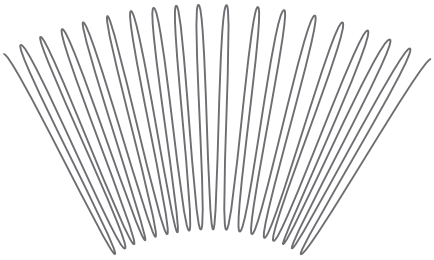


**Figure 2. Advanced Pleat Technology**

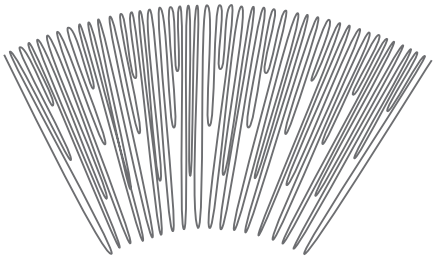
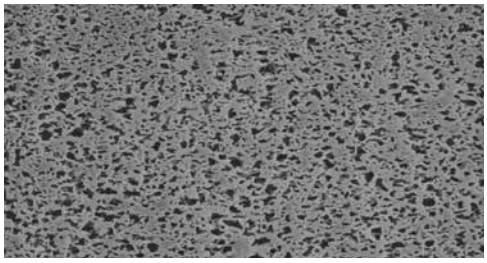


**Figure 3. SEM Nylon 6,6 Media**



## LifeASSURE™ PSN Series Nylon Filter Cartridge Construction

LifeASSURE PSN series nylon filter cartridges are constructed of high efficiency naturally hydrophilic Nylon 6,6 membrane (Figure 3) that does not need to be pre-wet with IPA and flushed. By reducing those process steps IPA chemical usage, hazardous waste disposal, and system downtime are reduced. The outer cage, inner core, end cap adapters and membrane supports are made of high-density polyethylene (HDPE) which has low extractables. No adhesives, binders, or surfactants are used in the manufacturing process. Cartridges are manufactured and double-bagged in a clean room environment under ISO certified quality systems using the most advanced non-contact thermoplastic welding techniques which ensure filter integrity and superior downstream cleanliness out of the package. All LifeASSURE PSN series nylon filter cartridges are integrity tested in both membrane subassembly and final cartridge forms, unlike some filter manufacturers who only integrity test the membrane subassembly.

| Cartridge Component | Material of Construction |
|---|---|
| **Outer Cage, Inner Core, End Cap Adapters and Membrane Support Layers** | High Density Polyethylene (HDPE) |
| **Membrane** | Naturally Hydrophilic Nylon 6,6 |
| **Cartridge Dimensions** | Dimension (see ordering guide) |
| **Filtration Surface Area** | 11.22 ft.$^2$ (1.04m$^2$) |
| **Outside Diameter (Nominal)** | 2.75 in. (7cm) |
| **Overall Length (Nominal)** | 10 in. (25.4cm), 20 in. (50.8cm), 30 in. (76.2cm) |

| Operating Parameters | Specification |
|---|---|
| **Max. Operation Temperature** | 122°F (50°C) |
| **Max. Forward Differential Pressure** | 60 psid @ 77°F (4.1 bar @ 25°C) |
| **Reduction Ratings** | 0.04µm, 0.1µm, 0.2µm |

**Table 1: Typical Metals Analysis***

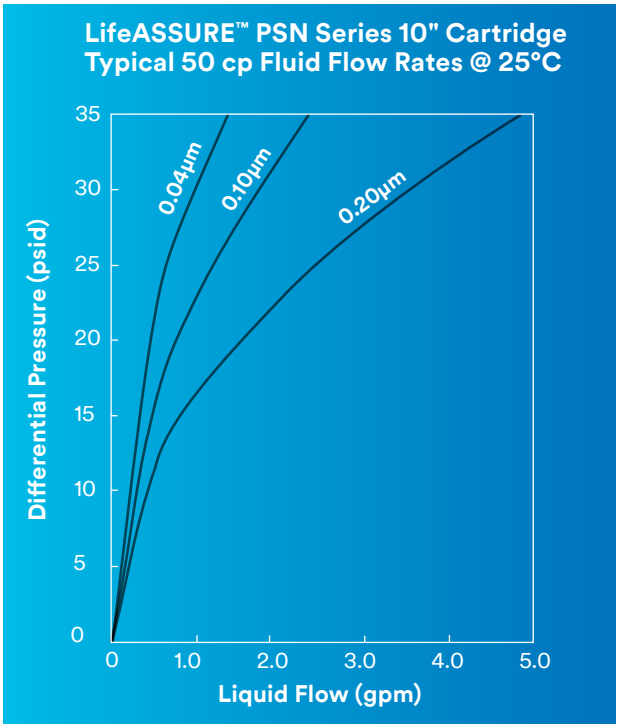
| Metal | Detection Limit (ppb) | 24 Hour Extraction | 120 Hour Extraction Material of construction |
|---|---|---|---|
| **Ca** | 0.9 | < DL | < DL |
| **Cr** | 0.3 | < DL | < DL |
| **Cu** | 0.9 | < DL | < DL |
| **Fe** | 0.9 | < DL | < DL |
| **K** | 0.9 | < DL | < DL |
| **Na** | 3.0 | < DL | < DL |

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

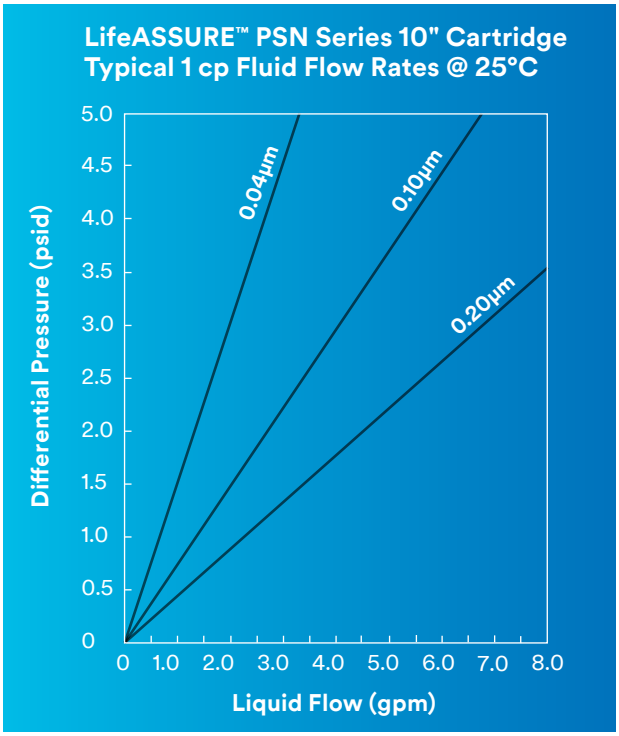
## Cartridge Extractables

The filters Nylon 6,6 and HDPE 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 photo speed, viscosity, or molecular weight of the process chemical.

**Typical Pressure Drop vs. Liquid Flow at 50 cp**




**Typical Pressure Drop vs. Liquid Flow at 1 cp**




## LifeASSURE™ PSN Series Nylon Filter Cartridge Compatibility Guide

This listing is intended as a guide for selecting the appropriate 3M Purification Inc. filter based on compatibility with most common chemicals. This information is based on technical publications, laboratory experiments, data from material suppliers, and field tests. It is recommended that compatibility of the filter with these chemicals be established in the specific chemical application because actual performance may differ as a result of variations in temperature, concentration, exposure time, or other factors. Consideration must also be given in selection of a suitable gasket material to assure complete compatibility.

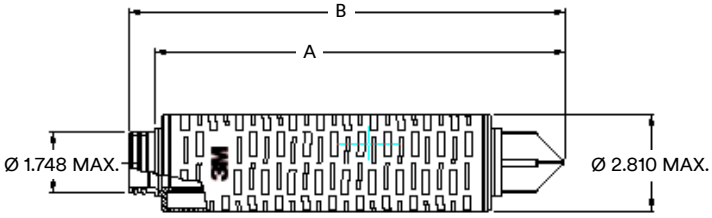
| Products Chemical | LifeASSURE™ PSN Nylon | Chemical | LifeASSURE™ PSN Nylon |
|---|---|---|---|
| **Acetone** | R | Glycerol | R |
| **Ammonium Fluoride (40%)** | R | 2 – Heptanone | LR |
| **Ammonium Hydroxide (conc)** | LR | 2 –Hexanone | LR |
| **Anisole** | R | Isobutanol | R |
| **Aquatar®** | R | IPA | R |
| **Aquatar 2** | N | Methanol | R |
| **Butanol** | R | MAK® | R |
| **Butyl Acetate** | R | MEK | N |
| **Butyl Alcohol** | R | MMP® | R |
| **BOE®** | R | NMP® | R |
| **Cyclohexanone** | LR | NOE | R |
| **Cyclopentanone** | LR | P-Etch | N |
| **DIGLYME** | R | PEGMEA | R |
| **Dimethylsulfoxide (DMSO)** | R | PGMEA | R |
| **DMC** | R | Piranha® | N |
| **DMF** | R | Potassium Hydroxide (conc) | LR |
| **Ethanol** | R | Propylene Glycol | R |
| **ECA** | R | RCA Etch | N |
| **EGMEA** | R | SC1 | N |
| **Ethyl Acetate** | R | SC-2® | N |
| **Ethyl Lactate** | R | Silicone Oils | R |
| **Ethyl Pyruvate** | R | Soduim Hydroxide (conc) | LR |
| **Ethyl 3 – Ethoxy Propionate** | R | TMAH (5%) | LR |
| **Ethylene Glycol** | R | Xylene | N |

R = Recommended N = Not Recommended LR = Limited Recommendation*
*Please consult your 3M Purification Inc. Sales Specialist or 3M Purification Inc. Technical Support for specific concentrations.

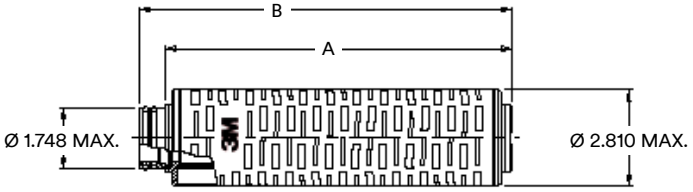
# LifeASSURE™ PSN Series Ordering Guide

| Cartridge | Reduction Rating | Configuration | Length | End-modification | Gasket/O-ring Material |
|---|---|---|---|---|---|
| **PSN** | **004** – 0.04µm<br>**010** – 0.1µm<br>**020** – 0.2µm | **F** | **01** – 10"<br>**02** – 20"<br>**03** – 30" | **C** – 222 O-ring & Spear<br>**F** – 222 O-ring & Flat Cap | **C** – EPR<br>**K** – PTFE-encapsulated fluorocarbon |

**Dimensions of C style end modification**




**Dimensions of F style end modification**




| | Overall Nominal Cartridge Length (Inches) | | |
|---|---|---|---|
| **Dimension** | -01 | -02 | -03 |
| **A** | 11.8 | 21.6 | 31.3 |
| **B** | 12.6 | 22.3 | 32.0 |

| | Overall Nominal Cartridge Length (Inches) | | |
|---|---|---|---|
| **Dimension** | -01 | -02 | -03 |
| **A** | 10.0 | 19.7 | 29.5 |
| **B** | 10.8 | 20.5 | 30.2 |

**PLEASE NOTE: The Ordering Guide above is for reference only. Not all combinations are available.**
**Please consult with your 3M Representative to determine the appropriate part number for your application.**



**Your local distributor:**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