

PhotoSHIELD™ Nylon Filter Cartridges

Superior Gel and Particle Removal from Photoresist and Ancillary Chemicals



PhotoSHIELD™ Nylon filter cartridges are highly retentive membrane filter elements designed to meet the exacting requirements of photoresist and ancillary chemical applications. Utilizing CUNO patented* Advanced Pleat Technology™ (APT), PhotoSHIELD filters provide superior flow characteristics with minimal pressure drop. Increasing flow while maintaining filter efficiency results in particle specifications being achieved in less time. This decrease in processing time results in lower total filtration costs – reduced energy consumption, pump wear, and labor.

The naturally hydrophilic Nylon 6,6 pleated membrane in an all high density polyethylene (HDPE) construction, provides low extractables, increased filter life, and superior removal of gel and hard particles when compared to other membrane cartridges. PhotoSHIELD Nylon filter cartridges 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.

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

Applications

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

Feature	Benefit
<ul style="list-style-type: none"> ■ Advanced Pleat Technology™ 	<ul style="list-style-type: none"> ■ Maximum flow in a compact design reduces the number of required filter elements ■ Provides both lower operating and differential pressure to minimize 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 removal of gel particles for reduced defectivity
<ul style="list-style-type: none"> ■ Naturally Hydrophilic Nylon 6,6 Membrane 	<ul style="list-style-type: none"> ■ 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 ■ Economic alternative to UPE and PTFE
<ul style="list-style-type: none"> ■ Low Cartridge Extractables 	<ul style="list-style-type: none"> ■ No change to photospeed, viscosity, and molecular weight, unlike other filter materials which can extract ionic, organic, and metallic contaminants

* US Patent 6,315,130

gels are correspondingly lower and the gels are retained by the membrane media. CUNO 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 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 PhotoSHIELD cartridge 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 cartridge. The result is a fully used surface area that provides superior filter life.

Figure 1. - Conventional Pleating

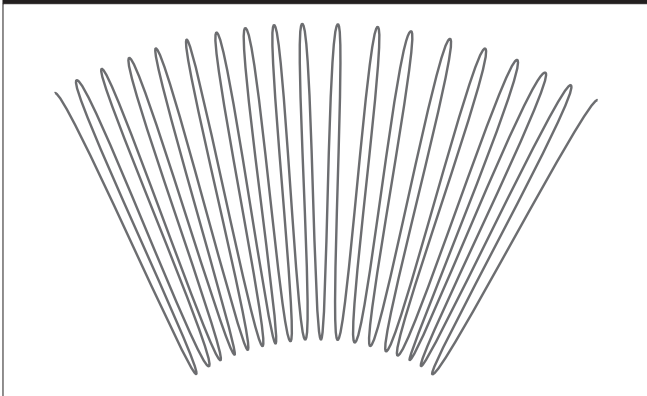
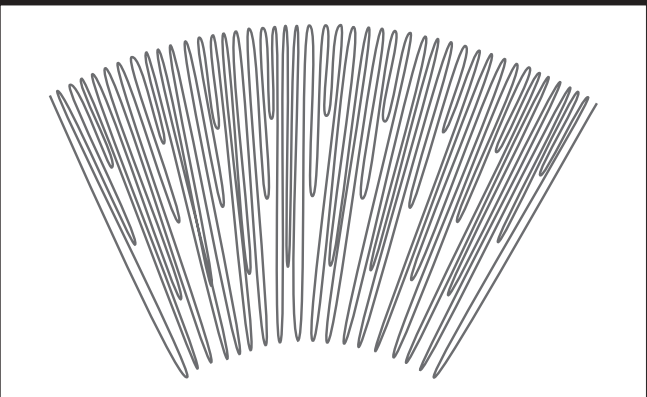


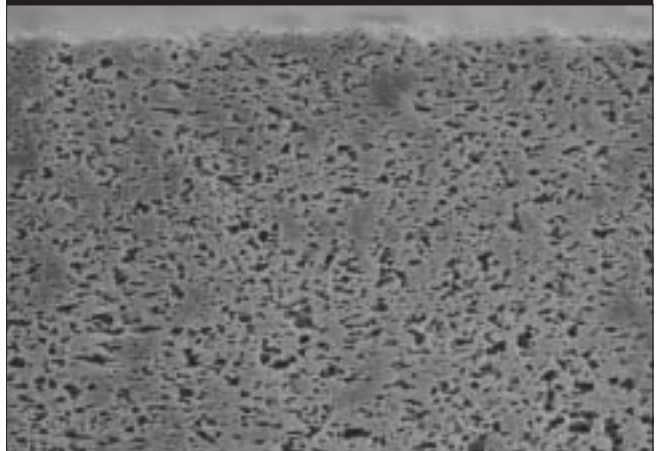
Figure 2. - Advanced Pleat Technology



PhotoSHIELD Cartridge Construction

PhotoSHIELD filter cartridges are constructed of high efficiency, naturally hydrophilic, Nylon 6,6 membrane (Figure 3). The cage, core, end cap 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 environment under an ISO certified quality system using the most advanced non-contact thermoplastic welding techniques which ensure filter integrity and superior downstream cleanliness out of the package. All PhotoSHIELD filters are integrity tested in both membrane subassembly and final cartridge forms, unlike other filter manufacturers who only integrity test the membrane subassembly.

Figure 3. - SEM of Nylon 6,6 Membrane



Cartridge Extractables

The filter's 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.

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.

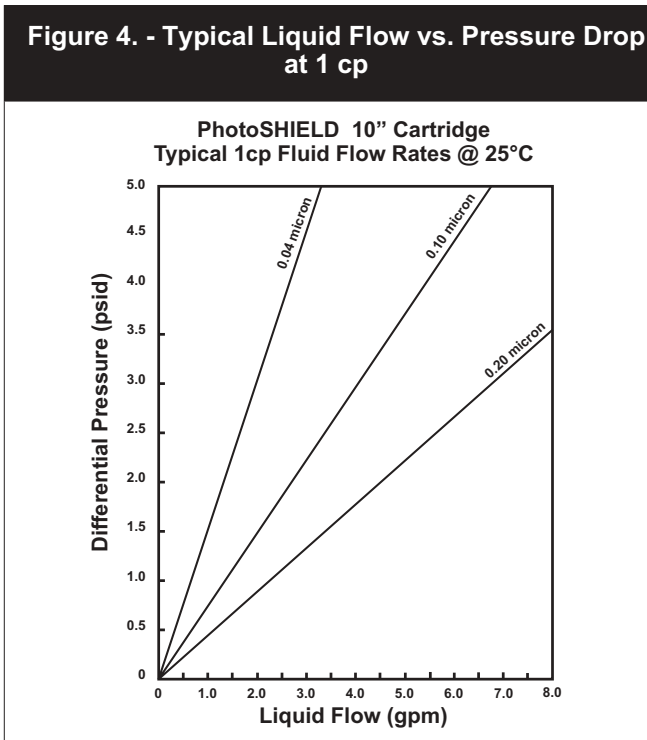
Cartridge Component	Material of construction
Cage, Core, End-Caps, and Membrane Support Layers	High Density Polyethylene (HDPE)
Membrane	Naturally Hydrophilic Nylon 6,6
Cartridge Dimensions	Dimension (see ordering guide)
Filtration Surface Area	11.2 ft ² (1.04 m ²)
Outside Diameter (Nominal)	2.75" (7 cm)
Length (Nominal)	10, 20, and 30 inches (25.4, 50.8, and 76.2 cm)
Operating Parameters	Specification
Max. Operating Temperature	122°F (50°C)
Max. Forward Differential Pressure	60 psid @ 77°F (4.1 bar @ 25°C)
Removal Ratings (µm)	0.04, 0.1, 0.2

PhotoSHIELD™ Compatibility Guide

This listing is intended as a guide for selecting the appropriate CUNO 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.

PhotoSHIELD™ Cartridge Flow Rates

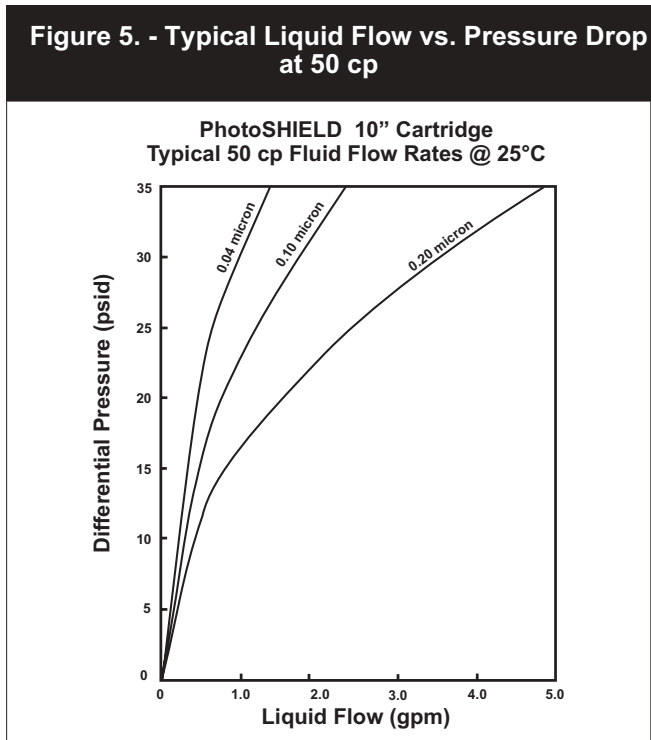
Figures 4 & 5 depict typical flow rates for 1 and 50 cp fluids at 25°C.



Chemical	PhotoSHIELD Nylon	Chemical	PhotoSHIELD 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	SC2	N
Ethyl Lactate	R	Silicone Oils	R
Ethyl Pyruvate	R	Sodium 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 CUNO Sales Specialist or Cuno Technical Support for specific concentrations.



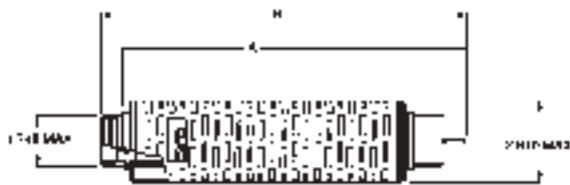
PhotoSHIELD™ Filter Cartridge Ordering Guide

Cartridge	Removal Rating (µm)	Configuration	Length (Inches)	End Modification	Gasket/O-ring Material
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PSN	004 - 0.04	F	01 - 10	C - 222 O-ring & Spear	C - EPR
	010 - 0.1		02 - 20	F - 222 O-ring & Flat Cap	K - Teflon® Encapsulated Viton® (TEV)
	020 - 0.2		03 - 30		

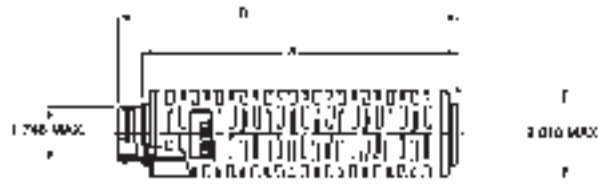
Teflon and Viton are registered trademarks of E.I. du Pont de Nemours and Company

Dimensions of C style end modification



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

Dimensions of F style end modification



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

WARRANTY

Seller warrants its equipment against defects in workmanship and material for a period of 12 months from date of shipment from the factory under normal use and service and otherwise when such equipment is used in accordance with instructions furnished by Seller and for purposes disclosed in writing at the time of purchase, if any. Any unauthorized alteration or modification of the equipment by Buyer will void this warranty. Seller's liability under this warranty shall be limited to the replacement or repair, F.O.B. point of manufacture, of any defective equipment or part which, having been returned to the factory, transportation charges prepaid, has been inspected and determined by the Seller to be defective. THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EITHER EXPRESSED OR IMPLIED, AS TO DESCRIPTION, QUALITY, MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR ANY OTHER MATTER. Under no circumstances shall Seller be liable to Buyer or any third party for any loss of profits or other direct or indirect costs, expenses, losses or consequential damages arising out of or as a result of any defects in or failure of its products or any part or parts thereof or arising out of or as a result of parts or components incorporated in Seller's equipment but not supplied by the Seller.

Your Local CUNO Distributor is:



a 3M company

CUNO Filtration Asia Pte Ltd
18 Tuas Link 1 (3rd Floor)
Singapore 638599

CUNO Pacific Pty Ltd
140 Sunnyholt Road
Blacktown, NSW 2148
Australia

CUNO Latina Ltda
Rua Amf Do Brasil 251
18120 Mairinque-Sp
Brazil

Cuno Incorporated

400 Research Parkway
Meriden, CT 06450, U.S.A.

Tel: (800) 243-6894
(203) 237-5541

Fax: (203) 630-4530
www.cuno.com

Cuno Filtration Shanghai Co, Ltd
No. 2 Xin Miao San Rd,
Xin Miao Town,
Song Jiang District,
Shanghai, China. 201612

CUNO K.K.
Hodogaya Station
Building 6F
1-7 Iwai-cho, Hodogaya-ku
Yokohama 240 Japan

CUNO Ltd
21 Woking Business Park
Albert Drive
Woking, Surrey GU215JY
United Kingdom