Membrane Filters

Membranes

Membrane filters or "membranes" are microporous plastic films with specific pore size ratings. Also known as screen, sieve or microporous filters, membranes retain particles or microorganisms larger than their pore size primarily by surface capture. Some particles smaller than the stated pore size may be retained by other mechanisms.

Advantec MFS membranes are produced by three different processes. Mixed Cellulose Esters, Cellulose Acetate, and Nylon are reverse phase solvent cast membranes, where controlled evaporation or removal of the complex solvent system forms the porous structure. Both hydrophilic and hydrophobic PTFE are made by a patented process where the membranes are stretched biaxially to form the porous structure. PCTE membranes are track etched.

Performance Characteristics of Advantec MFS Membranes

- **Strong:** Advantec MFS membranes are monitored for both burst (longitudinal) and tensile (lateral) strength. Supported Acetate and Nylon are the strongest reverse phase membranes available from Advantec MFS
- **Chemically and biologically clean:** As part of a comprehensive quality program, only high purity reagents and raw materials are used to produce Advantec MFS membranes. Once cast, the membranes are handled in a class 100 clean room to minimize ambient contamination. While some membranes require a small amount (0.1–3 weight %) of an aqueous wetting agent, Cellulose acetate has the lowest aqueous extractible (0.1 weight %) and Nylon, inherently hydrophilic, contains no added wetting agents or surfactants. All Advantec MFS membranes are Triton- and pyrogen-free (0.005 ng/cm^2 filter area)
- **Thin membranes with high porosity:** Uniformly thin membranes (typically 150 µm) with high porosity (about 80%) provide high gas and liquid flow per unit area. High porosity also provides high surface area for adsorption or binding
- **Thermostable:** All Advantec MFS membranes can be sterilized by autoclaving. Operating temperatures of up to 180°C can be achieved depending upon the membrane polymer (see individual membrane specifications for details). Advantec MFS membranes exhibit minimal shrinkage at elevated temperatures

Quick Guide to Selecting Membrane Filters

- **Determine** what liquid or gas will be filtered
- **Check** which membranes are chemically compatible (following and appendix)
- **Determine** the maximum pore size required to achieve the results you want
- **Check** the membrane specifications for any unusual process conditions that might otherwise limit your choice of membrane (e.g. temperature)

For more detailed information on how to design a filtration system see the appendix, page 110.

Properties of Membrane Filters

MEMBRANE COMPARISON

Membrane polymer	Sample applications	General compatibility	Hydrophilic	Hydrophobic	Pore size range available (µm) 0.1 0.2 0.45 0.8 1.0 3.0 5.0 8.0 10
Mixed cellulose esters (MCE)	General purpose Microbiology Particle Analysis	Aqueous solutions	✓		
Cellulose Acetate	General filtration Cytology Binding studies	Aqueous solutions	✓		
Coated Cellulose Acetate	Clarify solutions Prefilter	Aqueous solutions	✓		
Hydrophilic PTFE	HPLC solutions Clarify or sterilize aqueous/organic mixtures	Aqueous and organic solutions	✓		
Hydrophobic PTFE	Gas venting Clarify or sterilize strong acids or solvents	Non-aqueous solvents		✓	
Nylon	Filter sterilization Vacuum degassing HPLC solutions	Aqueous and organic solutions	✓		
Polycarbonate	Microscopy Beverage testing	Aqueous solutions	✓		
PVC	Particulate analysis Industrial hygiene	Aqueous solutions		✓	

ORDERING INFORMATION: MEMBRANE FILTER NOMENCLATURE

The membrane filter nomenclature specifies the required information for correctly ordering membranes. The nine digit code specifies type, pore size, surface/type, diameter and packaging as illustrated below.

A	020	A	293	C	EXAMPLE

Quantity per Package

A = 100	E = 5	R = 1 roll
B = 50	H = 25 with 60 mm center hole	Y = 200
C = 25	K = HE ind pack WG, 100	W = 1000
D = 10		

Diameter (mm)

13 = 013	47 = 047	90 = 090	142 = 142	
20 = 020	50 = 050	100 = 100	293 = 293	
25 = 025	82 = 082	102 = 102		
37 = 037	85 = 085	137 = 137		

Sheets/Rolls (cm)

15 x 15 = 154	33 x 56 = 356
15 x 9.2 = 159	30 x 30 = 304
20 x 20 = 204	33 cm x 3m = 330

Surface/Type

Packaging	Non-Sterile Packages		10x10-A Autoclavable		Pre-Sterilized Packages 10x10-S		Individually Wrapped Plain		Individually Wrapped Grid
Surface	Plain	Grid	Plain	Grid	Plain	Grid	No Pad	Pad	No Pad
White	A, X**	B	S	T	C	D	G	F	H
White HE*	J	K							
Black	N	P					Q	M	R
Green	U	V							W

*HE = Hydrophobic Edge **Opticlear MF

Membrane Pore Size (µm)

5.0 = 500	1.0 = 100	0.50 = 050	0.22 = 022
3.0 = 300	0.8 = 080	0.45 = 045	0.20 = 020
1.2 = 120	0.65 = 065	0.3 = 030	0.1 = 010

CMF (nominal µm)

10 = 100
2 = 020
0.8 = 008

Type of Filter

A = Mixed Cellulose Ester	H = Hydrophilic PTFE	K = Polycarbonate
B = Cellulose pads	J = Hydrophobic PTFE, polypropylene backing	N = Nylon, supported
C = Cellulose acetate		P = Polyvinylchloride
		Y = Coated cellulose acetate

Mixed Cellulose Esters (MCE)

- **Composition:** Mixed cellulose esters including cellulose nitrate and cellulose acetate, also known as nitrocellulose
- **High porosity** provides superior flow rates
- **High protein binding** can be blocked by pretreatment or utilized in applications
- **High purity:** Triton-free and non reactive to pyrogens
- **Autoclavable:** Withstands autoclaving temperatures up to 130°C without adversely affecting bubble point, flow rate or microbiological recovery
- **Rapid wetting time:** < 3 seconds to wet a 47 mm diameter disc with aqueous 1% methylene blue

APPLICATIONS

- Standard membranes for many laboratory applications including filter sterilizing biological fluids, microbiology, contamination analysis and air monitoring
- Can be transparentized to view collected particles
  - using compatible liquid (immersion oil, toluene),

    OR

  - select Opticlear membranes for the "hot block" acetone vapor method
- Gridded filters available for quantifying microbial growth
- Available non-sterile or sterilized by ethylene oxide (EtO)

SPECIFICATIONS FOR MIXED CELLULOSE ESTER (MCE), CODE A

Pore Size µm	Color	Surface	Bubble Point[1]		Flow Rate[2]		Porosity[3] %	Thickness µm
			MPa	psi	Water ml/min/cm²	Air L/min/cm²		
0.10	White	Plain	≥0.24	≥35.3	2.7	0.67	65	110
0.20	White	Plain	≥0.37	≥54.5	17.5	2.4	73	133
0.30	White	Plain	≥0.28	≥41.2	30	3.7	75	140
0.45	White	Plain	≥0.24	≥35.0	45	5.0	78	145
0.45	White	Grid	≥0.16	≥24.2	80	8.0	79	142
0.65	White	Plain	≥0.14	≥21.3	120	11.2	79	150
0.80	White	Plain	≥0.11	16.4	165	15.0	80	150
1.00	White	Plain	≥0.096	≥13.9	220	20.4	80	150
3.00	White	Plain	≥0.070	≥10.2	300	28.3	81	155
5.00	White	Plain	≥0.058	≥8.5	400	40.9	81	160
0.45	Black	Grid	≥0.22	≥32.7	50	5.0	78	135
0.80	Black	Grid	≥0.10	≥14.9	170	15	80	145
0.45	Green	Grid	≥0.22	≥32.7	50	5.0	78	135
0.80	Green	Grid	≥0.10	≥14.9	170	15	80	145

- Refractive index 1.50
- Maximum operating temperature 130°C

Definitions:

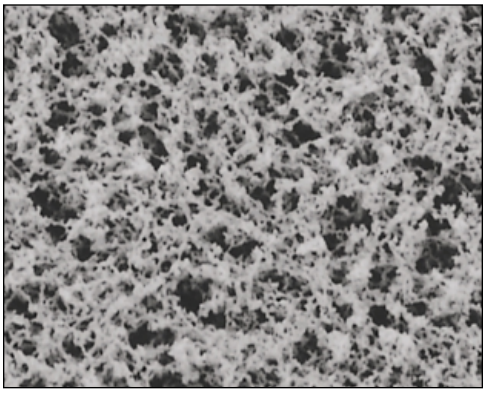
1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water (0.1 µm membranes prewet with isopropanol)
2. Flow Rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi
3. Porosity refers to the percent open area

Protein Binding of Membrane Filters

Membrane	Catalog code	Protein Adsorbed (µg/cm²)		
		Ovalbumin	γ-globulin	Total
Mixed Cellulose Esters, 0.2 µm	A020…	7.8	116.9	124.7
Cellulose Acetate, 0.2 µm	C020…	21.3	11.0	32.3

Ash Content of White Plain MCE Membrane Filters (ppm)

Al	<2.0	**K**	6.0	**Ni**	<5.0
Ca	140.0	**Li**	<1.0	**Pb**	<1.0
Cd	<0.5	**Mg**	10.0	**Si**	<20.0
Cr	8.0	**Mn**	<0.5	**Sn**	<5.0
Cu	<1.0	**Mo**	<1.0	**Ti**	<1.0
Fe	<5.0	**Na**	10.0	**Zn**	<1.0



Mixed Cellulose Esters

Ordering Information: Mixed Cellulose Ester – Nonsterile

Plain White, package of 100 disks

Pore Size (µm)	13 mm	25 mm	47 mm	50 mm
0.10	A010A013A	A010A025A	A010A047A	-
0.20	A020A013A	A020A025A	A020A047A	A020A050A
0.30	A030A013A	A030A025A	A030A047A	-
0.45	A045A013A	A045A025A	A045A047A	A045A050A
0.65	A065A013A	A065A025A	A065A047A	A065A050A
0.80	A080A013A	A080A025A	A080A047A	A080A050A
1.00	A100A013A	A100A025A	A100A047A	A100A050A
3.00	A300A013A	A300A025A	A300A047A	A300A050A
5.00	A500A013A	A500A025A	A500A047A	A500A050A

Plain White, package of 25 disks

Pore Size (µm)	90 mm	100 mm	102 mm	142 mm	293 mm	293/60 mm*
0.10	A010A090C	-	-	A010A142C	A010A293C	A010A293H
0.20	A020A090C	A020A100C	-	A020A142C	A020A293C	A020A293H
0.30	A030A090C	-	-	A030A142C	A030A293C	-
0.45	A045A090C	A045A100C	A045A102C	A045A142C	A045A293C	A045A293H
0.65	A065A090C	-	-	A065A142C	A065A293C	A065A293H
0.80	A080A090C	-	-	A080A142C	A080A293C	A080A293H
1.00	A100A090C	-	-	A100A142C	A100A293C	A100A293H
3.00	A300A090C	-	-	A300A142C	A300A293C	A300A293H
5.00	A500A090C	-	-	A500A142C	A500A293C	A500A293H

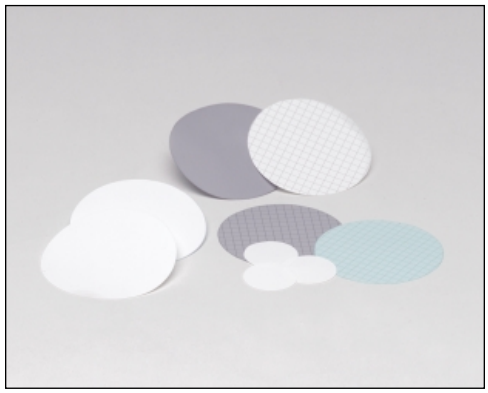
*60 mm center hole

Ordering Information (continued): Mixed Cellulose Ester – Nonsterile

Gridded White, package of 100 disks

Pore Size (µm)	13 mm	25 mm	37 mm	47 mm	50 mm
0.45	A045B013A	A045B025A	A045B037A	A045B047A	A045B050A
0.65	A065B013A	A065B025A	-	A065B047A	A065B050A
0.80	A080B013A	A080B025A	A080B037A	A080B047A	A080B050A

0.8 µm MF is green grid lines on white background, 0.45 and 0.65 µm have black grid lines.



MCE membrane assortment

Roll, Plain White

Pore Size (µm)	Qty/pkg	33 cm x 3 m
0.10	1	A010A330R

Sheets, Gridded White

Pore Size (µm)	Qty/pkg	30 mm x 30 mm
0.45	25	A045B304C

Hydrophobic Edge, 47 mm disks, package of 100 disks

Pore Size (µm)	Plain	Grid
0.20	A020J047A	A020K047A
0.45	A045J047A	A045K047A

Opticlear, package of 100 disks

Pore Size (µm)	25 mm	37 mm	47 mm
0.80	A080X025A	A080X037A	A080X047A

Black, package of 100 disks

Pore Size (µm)	Surface	13 mm	25 mm	37 mm	47 mm	137 mm (25/pkg)
0.45	Plain	A045N013A	A045N025A	A045N037A	A045N047A	-
0.45	Grid	A045P013A	A045P025A	A045P037A	A045P047A	A045P137C
0.80	Plain	A080N013A	A080N025A	-	A080N047A	-
0.80	Grid	A080P013A	A080P025A	-	A080P047A	-

0.45 µm 47 mm black grid membrane also available presterilized: A045P047S

Green, package of 100 disks

Pore Size (µm)	Surface	13 mm	25 mm	47 mm
0.45	Plain	A045U013A	A045U025A	A045U047A
0.45	Grid	A045V013A	A045V025A	A045V047A
0.80	Grid	-	-	A080V047A

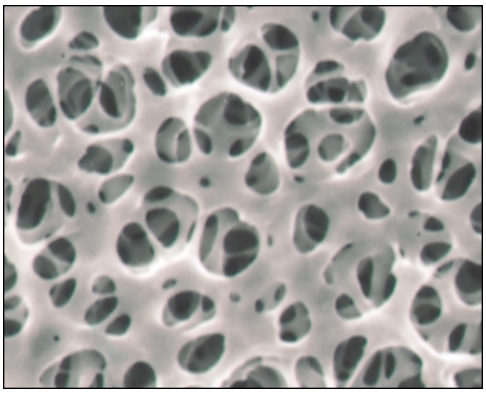
Additional sizes available by special order.
Also available in:

- Sterile packaging for microbiology.
- Disposable syringe units.

For Pure Nitrocellulose for Blotting, see page 35.
MSDS available for this product.

Cellulose Acetate

- **Composition:** Mixture of cellulose triacetate and diacetate
- **Characteristics:** Low static charge and high strength
- **Sterilizable:** May be repeatedly sterilized without loss of integrity or change in bubble point
- **Clean:** Lowest aqueous extractibles (0.1 wt%) of all Advantec MFS membranes
- Relative to MCE (Mixed Cellulose Ester, Nitrocellulose):
  - improved solvent resistance to low molecular weight alcohols
  - better heat resistance
  - lower protein binding (see page 4)



Cellulose Acetate

Applications

- Enhanced recovery of fastidious gram positive organisms
- Filtration of enzyme solutions
- Diagnostic cytology
- Receptor binding studies

Note: Should be prewet prior to loading into a holder and autoclaving.

Specifications: White Plain Cellulose Acetate, Code C

Pore Size (µm)	Bubble Point [1]		Flow Rate [2]		Porosity [3] (%)	Thickness [4] (µm)
	MPa	psi	Water (ml/min/cm²)	Air (L/min/cm²)		
0.20	≥0.25	≥37.1	16	2	66	125
0.45	≥0.17	≥25.9	35	4	68	125
0.80	≥0.068	≥10.0	160	14	72	125
3.00	≥0.034	≥5.0	500	54	78	135

- Wetting time: <3 seconds to wet a 47 mm diameter disc with aqueous 1% methylene blue
- Refractive index = 1.47
- Maximum Operating Temperature 180°

Definitions:

1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water
2. Flow Rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi
3. Porosity refers to the percent open area
4. Average thickness

Ash Content of White Plain Cellulose Acetate Membrane Filters (ppm)

Al	<5.0	**K**	2.0	**Ni**	<0.5
Ca	36.4	**Li**	<0.5	**Pb**	<0.5
Cd	<0.1	**Mg**	1.9	**Si**	7.8
Cr	2.2	**Mn**	<0.5	**Sn**	<0.5
Cu	1.2	**Mo**	<0.5	**Ti**	<5.0
Fe	1.6	**Na**	5.9	**Zn**	0.6

Ordering Information: Cellulose Acetate – Nonsterile

Plain White, package of 100 disks

Pore Size (µm)	13 mm	25 mm	47 mm	50 mm
0.20	C020A013A	C020A025A	C020A047A	-
0.45	C045A013A	C045A025A	C045A047A	C045A050A
0.80	C080A013A	C080A025A	C080A047A	-
3.00	C300A013A	C300A025A	C300A047A	C300A050A

Plain White, package of 25 disks

Pore Size (µm)	90 mm	142 mm	293 mm	293/60 mm*
0.20	C020A090C	C020A142C	C020A293C	C020A293H
0.45	C045A090C	C045A142C	C045A293C	C045A293H
0.80	C080A090C	C080A142C	C080A293C	C080A293H
3.00	C300A090C	C300A142C	C300A293C	C300A293H

*60 mm center hole

Rolls, Plain White, 33 cm x 3 m

Pore Size (µm)	Roll
0.20	C020A330R
0.45	C045A330R
0.80	C080A330R

Also available in:

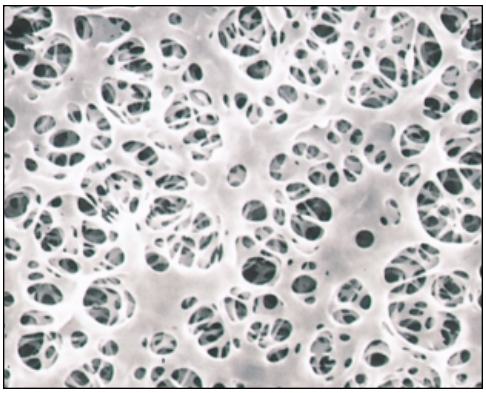
- Cartridge format
- Disposable syringe filter units

Coated Cellulose Acetate

- **Composition:** Cellulose acetate cast onto a non-woven polyester support
- **Characteristics:** Non-fiber releasing
- **Low protein binding** relative to nitrocellulose
- **Low static charge** matrix with enhanced chemical compatibility to low molecular weight alcohols

Application

- Use as a clarifying filter or prefilter



Coated Cellulose Acetate

Specifications: Coated Cellulose Acetate (CMF) Code Y

Nominal Rating (µm)	Bubble Point[1]		Flow Rate[2]		% Latex Particle Retention (particle size in µm)							
	MPa	psi	Water (ml/min/cm²)	Air (L/min/cm²)	0.48	0.65	0.80	1	2	3	5	10
0.80	≥0.088	≥12.8	100	10	99	99	>99.9	-	-	-	-	-
2.00	≥0.049	≥7.1	290	32	96	99	99	99	>99.9	-	-	-
10.00	≥0.017	≥2.6	750	80	-	-	-	-	98	99.9	99.9	>99.9

Definitions:

1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water.
2. Flow Rate indicates initial flow rate at 10 psi using a KGS 47 filter holder.
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi

Ordering Information: Coated Cellulose Acetate – Nonsterile

Plain White, package of 100 disks

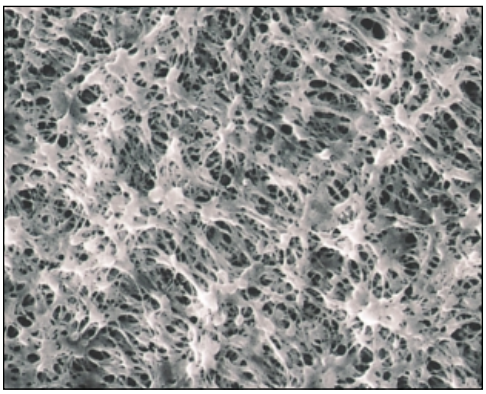
Nominal Rating (µm)	35 mm	47 mm	76 mm	90 mm	124 mm	142 mm	257 mm	293 mm
0.80	Y008A035A	Y008A047A	Y008A076A	Y008A090A	Y008A124A	Y008A142A	Y008A257A	Y008A293A
2.00	Y020A035A	Y020A047A	Y020A076A	Y020A090A	Y020A124A	Y020A142A	Y020A257A	Y020A293A
10.00	Y100A035A	Y100A047A	Y100A076A	Y100A090A	Y100A124A	Y100A142A	Y100A257A	Y100A293A

Also available in:

- Cartridge format (TCY and TCYE)

Hydrophilic PTFE

- **Characteristics:** Maximum chemical and pH resistance
- **High flow rates** with minimal aqueous extractables (<0.3 wt%)
- **Optically clear** when wet with water
- **Non-supported**


Hydrophilic PTFE

APPLICATION

- Ideal for HPLC and other mixtures of aqueous and organic solvents

Note: Autoclaving or allowing membrane to dry will render it hydrophobic.

SPECIFICATIONS: HYDROPHILIC PTFE MEMBRANE, CODE H

Pore Size (µm)	Bubble Point [1]		Flow Rates [2]		Porosity [3] (%)	Thickness (µm)	Maximum Operating Temperature (°C)
	MPa	psi	Water (ml/min/cm²)	Air (L/min/cm²)			
0.10	≥0.38	≥21.3	14	1.6	71	35	100
0.20	≥0.24	≥11.4	21	2.1	71	35	100
0.50	≥0.14	≥5.7	39	2.9	79	35	100
1.00	≥0.083	≥2.1	73	5.7	83	35	100

Definitions:
1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water
2. Flow rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi
3. Porosity refers to the percent open area

Trace Metal Content (ppm)

Al	15	**K**	8
Ca	13	**Mg**	1
Cr	<1	**Mn**	0.1
Cu	0.5	**Na**	20
Fe	<10	**Ni**	0.9

ORDERING INFORMATION: HYDROPHILIC PTFE – NONSTERILE

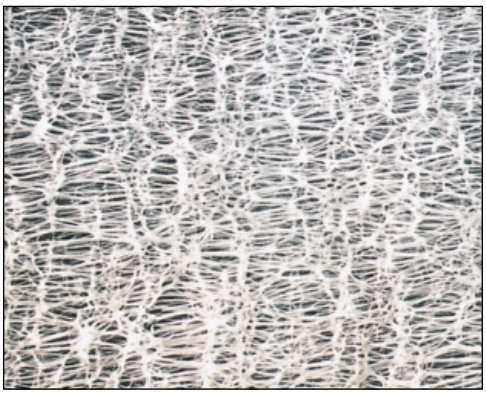
Plain White, package of 100 disks

Pore Size (µm)	13 mm	25 mm	47 mm	90 mm	142 mm	293 mm
	package of 100			package of 25		
0.10	H010A013A	H010A025A	H010A047A	H010A090C	H010A142C	H010A293C
0.20	H020A013A	H020A025A	H020A047A	H020A090C	H020A142C	H020A293C
0.50	H050A013A	H050A025A	H050A047A	H050A090C	H050A142C	H050A293C
1.00	H100A013A	H100A025A	H100A047A	H100A090C	H100A142C	H100A293C

Also available in:
- Cartridge format
- Capsule format
- Disposable syringe filter units

Hydrophobic PTFE

- **Properties:** Thin, highly porous, behaves as an absolute retentive membrane
- **Supported:** polypropylene laminated to one side to improve handling
- **Inert** to most chemically aggressive solvents, strong acids and bases
- **Thermostable:** can be used up to 100°C



Hydrophobic PTFE

Applications

- Sterilize gases: traps aqueous aerosols
- Air and gas venting: allows gases to pass freely while blocking aqueous liquids, protect vacuum pumps and critical samples
- Sterilize and clarify strong acids and many other solvents incompatible with other membrane

Specifications: Hydrophobic PTFE Membrane, Supported, Code J

Pore Size (µm)	Bubble Point [1]		Flow Rates [2]		Porosity [3] (%)	Maximum Operating Temperature (°C)	Water Break Through	
	MPa	psi	Acetone (ml/min/cm²)	Air (L/min/cm²)			MPa	psi
0.20	≥0.097	≥14.1	61.4	4.5	72	120	0.275	40.0
0.50	≥0.058	≥8.5	110	7.5	74	120	0.138	20.1
1.00	≥0.029	≥4.3	445	17	76	120	0.048	7.0

Definitions:

1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with methanol
2. Flow rates determined under constant vacuum 0.7 kg/cm² (10 psi)
3. Porosity refers to the percent open area

Ordering Information: Hydrophobic PTFE – Nonsterile

Plain White disks

Pore Size (µm)	13 mm	25 mm	47 mm	90 mm	142 mm	293 mm
	Package of 100			Package of 25		Package of 10
0.20	J020A013A	J020A025A	J020A047A	J020A090C	J020A142C	J020A293D
0.50	J050A013A	J050A025A	J050A047A	J050A090C	J050A142C	J050A293D
1.00	J100A013A	J100A025A	J100A047A	J100A090C	J100A142C	J100A293D

Also available in:

- Cartridge format
- Capsule format
- Disposable syringe filter units

Nylon

- **Composition:** Very strong, heat resistant membranes are manufactured by impregnating a polyester web with the nylon polymer
- **Inherently hydrophilic**
- **Compatible** with aqueous and alcoholic solutions and solvents
- **Pure:** negligible organic extractibles
- **Binds** proteins, DNA and RNA

APPLICATIONS

- Suitable for HPLC sample preparation
- Filter sterilize and clarify aqueous and organic solvent solutions including buffers, microbiological and tissue culture solutions
- Vacuum degassing

SPECIFICATIONS: NYLON MEMBRANE, CODE N

Pore Size (µm)	Bubble Point [1]		Flow Rates [2]	
	MPa	psi	Water (ml/min/cm²)	Air (L/min/cm²)
0.10	0.48	70	3.5	0.6
0.22	0.31	46	10	1.7
0.45	0.19	29	27	3.2
0.65	0.10	16	60	4.5
0.80	0.089	14	100	14
1.20	0.059	9	190	18
5.00	0.039	6	360	34

Wetting time: <3 seconds to wet a 47 mm diameter disc with aqueous 1% methylene blue
Maximum Operating Temperature = 180°C
Thickness: 110 mm

Definitions:
1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water
2. Flow rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi

ORDERING INFORMATION: NYLON – NONSTERILE

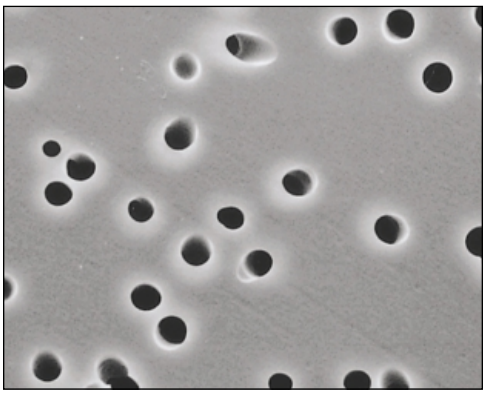
Plain White disks

Pore Size (µm)	Diameter (mm)					
	13 mm	25 mm	47 mm	90 mm	142 mm	293 mm
	100 per package			25 per package		
0.10	N010A013A	N010A025A	N010A047A	N010A090C	N010A142C	N010A293C
0.22	N022A013A	N022A025A	N022A047A	N022A090C	N022A142C	N022A293C
0.45	N045A013A	N045A025A	N045A047A	N045A090C	N045A142C	N045A293C
0.65	N065A013A	N065A025A	N065A047A	N065A090C	N065A142C	N065A293C
0.80	N080A013A	N080A025A	N080A047A	N080A090C	N080A142C	N080A293C
1.20	N120A013A	N120A025A	N120A047A	N120A090C	N120A142C	N120A293C
5.00	N500A013A	N500A025A	N500A047A	N500A090C	N500A142C	N500A293C

Also available in:
- Disposable syringe filter units

Polycarbonate

- **Characteristics:** Low non-specific binding and optically translucent, extremely uniform, cylindrical pores
- **Thin screen-type membranes** minimize entrapment within the filter structure; resulting in surface capture of particles on the membrane
- **Stable:** excellent chemical resistance, good thermal stability, non-hygroscopic and extremely weight stable



Polycarbonate

Applications

- Epifluorescence microscopy: available in black for this method
- Electron microscopy: smooth surface is ideal for observing captured particles
- Light microscopy: easily transparentized for optical illumination
- Beverage and sterility testing

Specifications: Polycarbonate Membrane, Code K

Pore Size (µm)	Bubble Point [1]		Flow Rates [2]		Nominal Thickness (µm)
	MPa	psi	Water (ml/min/cm²)	Air (L/min/cm²)	
0.10	≥0.22	>100	2	2	6
0.20	≥0.13	72	17	4	10
0.40	≥0.082	36	41	10	10
0.80	≥0.048	18	120	20	9
1.00	≥0.058	14	170	25	11
3.00	≥0.021	5	600	50	9
8.00	≥0.0048	>2	1300	40	7

Maximum operating temperature = 140°C

Definitions:
1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with isopropanol
2. Flow rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi

Ordering Information: Polycarbonate – Nonsterile

Plain White, package of 100 disks

Pore Size (µm)	13 mm	25 mm	47 mm
0.10	K010A013A	K010A025A	K010A047A
0.20	K020A013A	K020A025A	K020A047A
0.40	K040A013A	K040A025A	K040A047A
0.80	K080A013A	K080A025A	K080A047A
1.00	-	-	K100A047A
3.00	-	-	K300A047A
8.00	K800A013A	K800A025A	K800A047A

Plain Black, package of 100 disks

Pore Size (µm)	13 mm	25 mm	47 mm
0.20	-	K020N025A	K020N047A
0.40	-	K040N025A	K040N047A

Polyvinylchloride (PVC)

- **Composition:** prepared from homopolymer PVC (polyvinychloride)
- **Characteristics:** naturally hydrophobic, excellent weight stability
- **Pure:** silica-free, no additives or modifiers

Applications

- Suitable for particulate analysis
- Electron microscopy: smooth surface is ideal for observing captured particles
- Ideal for industrial hygiene monitoring

Ordering Information: Polyvinylchloride (PVC) Code P

Pore Size (µm)	Available in in these diameters:			8 x 10 inch sheets
	13 mm	25 mm	47 mm	
	50/pkg	100/pkg	50/pkg	10/pkg
0.50	P050A025A	-	-	-
0.80	P080A025A	P080A037A	P080A047A	P0808X10IN
5.00	P500A025A	P500A037A	P500A047A	P5008X10IN

Disposable Syringe Filter Units

- **Minimum sample hold-up:** Unit housings are specifically designed to maximize sample recovery
- **High purity:** Non-pigmented housing and integral filter sealing assure that filtrates will not be adulterated due to pigment, dye, or adhesives leaching into the filtrate
- **Convenient:** Each unit is clearly marked with an identifying code to denote pore size, membrane material and housing polymer
- **Sterile:** Units can be purchased presterilzed and individually packaged, or nonsterile in bulk pack (all polyproplyene can be autoclaved)

MFS 3, 13, 25, and 50 disposable syringe filter units.

Specifications

		MFS 3	MFS 13	MFS 25		MFS 50
Housing material	-	PP	PP	PP	Acrylic	PP
Housing Diameter	mm	3	13	25	25	50
Filtration Area	cm^2	0.06	0.9	4.0	4.0	19.6
Hold-up Volume	ml	<0.01	<0.03	<0.1	<0.1	<3.0
Suggested capacity per filter unit	ml	<2 ml	<10 ml	<100 ml	<100 ml	>100 ml
Pressure limit	kg/cm^2	5.3	4.0	4.0	5.3	3.5
	psi	75	56	56	75	50
Maximum Temperature	°C	60	60	60	45	60
	°F	140	140	140	113	140
Connections	-	inlet: female luer-lock outlet: male luer slip				7-13.5 mm hose barb

Mixed Cellulose Esters (MCE, Nitrocellulose)

- Properties: A hydrophilic membrane
- Higher protein binding than cellulose acetate for most proteins
- High porosity provides a high flow rate
- Autoclavable: stable to 121°C

Nylon

- Properties: Strong, hydrophilic membrane
- Compatible with aqueous and alcoholic solutions, as well as most HPLC solvents.
- Convenient: Prewetting not required
- Pure: Minimum extractibles
- High binding capacity for proteins, DNA and RNA
- Autoclavable: stable to 180°C

Cellulose Acetate (Acetate)

- Standard: A commonly used hydrophilic membrane
- Low protein binding, suitable for aqueous protein solutions
- Nitrate-free, suitable for groundwater filtration
- Housing material: polypropylene (3, 13, 50 mm) or styreneacrylonitrile (25 mm)

PTFE, hydrophilic

- Versatile: Good chemical resistance
- Compatible with many solvent mixtures used in HPLC, e.g. Acetonitrile/Water

PTFE, hydrophobic

- Application: use as vent

For ordering information, see page 16.

Ordering Information: Disposable Syringe Filter Units

Diam.	Membrane material	Pore size (µm)	Housing material	Quantity per package	Nonsterile	Sterile
3	Nylon	0.22	Polypropylene	200	03NP022AN	-
		0.45	Polypropylene	200	03NP045AN	-
		5.00	Polypropylene	100	03NP500AN	-
	Cellulose Acetate	0.20	Polypropylene	100	03CP020AN	03CP020AS
		0.45	Polypropylene	100	03CP045AN	03CP045AS
	PTFE, phobic	0.50	Polypropylene	100	03JP050AN	-

MFS 3

13	Nylon	0.22	Polypropylene	100	13NP022AN	-
		0.45	Polypropylene	100	13NP045AN	-
	Cellulose Acetate	0.20	Polypropylene	100	13CP020AN	13CP020AS
		0.45	Polypropylene	100	13CP045AN	13CP045AS
	PTFE, philic	0.20	Polypropylene	100	13HP020AN	-
		0.50	Polypropylene	100	13HP050AN	-
	PTFE, phobic	0.20	Polypropylene	100	13JP020AN	-
		0.50	Polypropylene	100	13JP050AN	-

MFS 13

25	MCE	0.20	Acrylic	50	25AS020AN	25AS020AS
		0.45	Acrylic	50	25AS045AN	25AS045AS
	Nylon	0.10	Polypropylene	100	25NP010AN	-
		0.10	Acrylic	50	25NS010AN	25NS010AS
		0.22	Polypropylene	100	25NP022AN	-
		0.22	Acrylic	100	-	25NS022AS
		0.45	Polypropylene	100	25NP045AN	-
		0.45	Acrylic	100	-	25NS045AS
		1.20	Polypropylene	100	25NP120AN	-
		1.20	Acrylic	50	-	25NS120AS
		5.00	Polypropylene	100	25NP500AN	-
	Cellulose Acetate	0.20	Acrylic	50	25CS020AN	25CS020AS
		0.45	Acrylic	50	25CS045AN	25CS045AS
		0.80	Acrylic	50	25CS080AN	25CS080AS
	PTFE, phobic	0.20	Polypropylene	50	25JP020AN	25JP020AS
		0.50	Polypropylene	50	25JP050AN	-

MFS 25 PP

MFS 25 Acrylic

50	Cellulose Acetate	0.20	Polypropylene	10	50CP020AN	50CP020AS
	PTFE, phobic	0.20	Polypropylene	10	50JP020AN	50JP020AS
		0.50	Polypropylene	10	50JP050AN	-

MFS 50

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