



3M Science.
Applied to Life.™

Separation and Purification Sciences Division

**Hollow fiber membrane
nano-technology:
Applied to purifying the
chemistries for state of the
art semiconductor devices.**

NanoSHIELD™ Series Cartridges and Capsules

High Flow Rates, Low Pressure Drop, and Long Filter Lifetime

NanoSHIELD™ hollow fiber series filters have been engineered to combine a high level of particle retention with high flow rates and low pressure drop for the most demanding applications in the latest technology node.

Peak Performance Provided by Hollow Fiber Technology (HFT)

NanoSHIELD hollow fiber series filter cartridges with HFT provide up to 2 times more surface area and higher flow rates when compared to pleated membrane cartridges. This increase to flow and decrease to pressure drop allows a typical 10" NanoSHIELD hollow fiber series filter cartridge to perform similarly to a 20" pleated filter cartridge. This significant advantage allows for the use of smaller and less costly filter housings which reduce hold-up volume, filter change-out times, and total cost-of-ownership for the life of the process. In addition, Hollow Fiber Technology offers a membrane that is up to 2 times thicker than flat sheet membranes typically used in the lithography industry which in turn maximizes the depth of filtration and particle removal efficiency.

NanoSHIELD™ Hollow Fiber Series Cartridge Construction

The Hollow Fiber membrane is available in polypropylene, polyethylene and nylon construction. This provides low metallic/ionic contamination and excellent resistance to many chemicals. Metallic or ionic contaminants can extract from surface modified and improperly manufactured filters, which may reduce shelf life and or change the photo-speed, viscosity, or

molecular weight of advanced chemicals. For this reason, all NanoSHIELD hollow fiber series filters are critically cleaned and integrity tested to provide low extractables and process repeatability out of the box. The compact design of NanoSHIELD hollow fiber series filter cartridges and capsules make them ideally suited for critical applications requiring low hold-up volume with superior flow rates and high particle retention from 100 nm down to 5 nm.

Applications

ARC, BARC, TARC

Polyimide

Solvents

Developers

Etchants / Strippers

Features & Benefits

Hollow Fiber Technology.

- Up to 2 times more surface area as compared to equivalent sized pleated filters.
- Increased depth up to (2x thicker) of filtration results in improved particle retention.

Large Surface Area

- Higher flow rates when compared to pleated cartridges.
- Increased lifetime, throughput, and overall equipment effectiveness.

Compact Design.

- Allows for smaller, less costly filter housings.
- Reduces hold-up volume, exposure, and waste of expensive chemicals.

5nm to 100 nm Retention Ratings.

- Superior removal of particles, gels, and micro-bubbles.
- Reduced micro-bridge and wafer level defects.

Quality Manufacturing.

- Manufactured in a cleanroom to reduce particle adders and extractables.
- Filters are critically cleaned and tested for process repeatability.



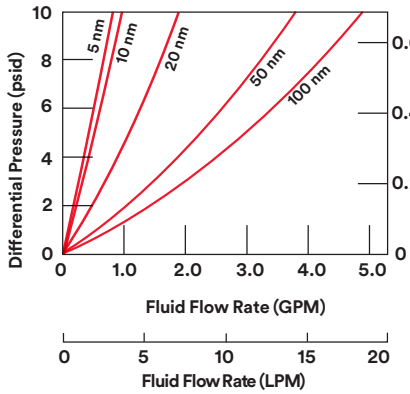
NanoSHIELD™

Hollow Fiber Series Filter Cartridges

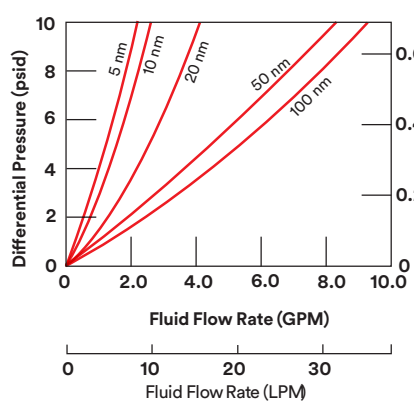
Typical Cartridge Flow vs. Differential Pressure (1cps @ 25°C)

Polypropylene

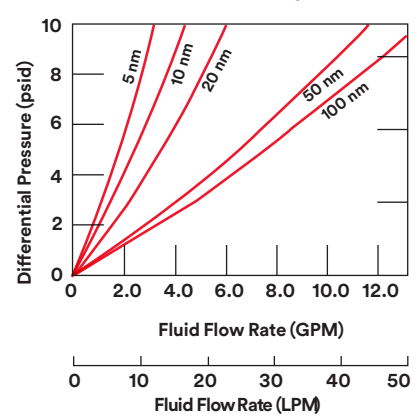
Graph 1: Typical Fluid Flow Rates @ 25° C
(5" NanoSHIELD™ Cartridge - 222 connector)



Graph 2: Typical Fluid Flow Rates @ 25° C
(10" NanoSHIELD™ Cartridge - 222 connector)

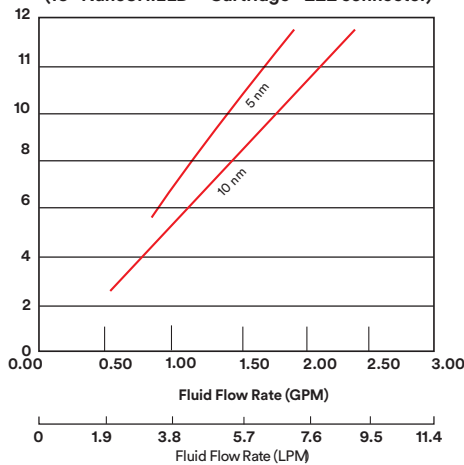


Graph 3: Typical Fluid Flow Rates @ 25° C
(20" NanoSHIELD™ Cartridge - 222 connector)



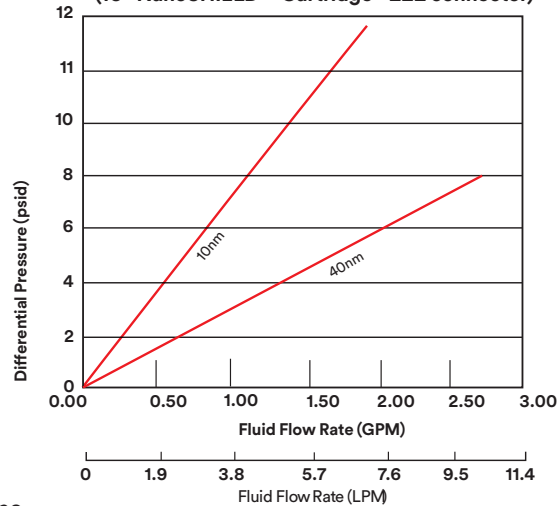
Polyethylene

Graph 4: Typical Fluid Flow Rates @ 25° C
(10" NanoSHIELD™ Cartridge - 222 connector)



Nylon

Graph 5: Typical Fluid Flow Rates @ 25° C
(10" NanoSHIELD™ Cartridge - 222 connector)



NanoSHIELD™ Hollow Fiber Series Cartridge Specifications

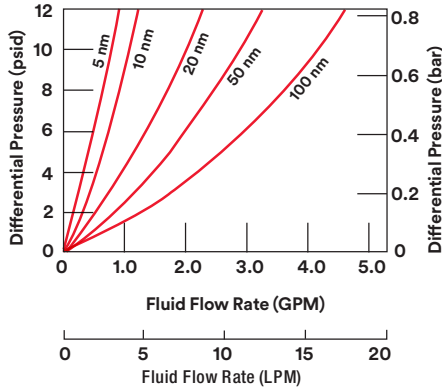
Membrane Material	Polypropylene	Polyethylene	Nylon
Cage and End Caps	Polyethylene		
Potting Material	Polyethylene		
Filtration Surface Area	5" Cartridge – 10.8 ft ² (1 m ²) 10" Cartridge – 23.7 ft ² (2.2 m ²) 20" Cartridge – 47.4 ft ² (4.4 m ²)	10" Cartridge – 16.1 ft ² (1.5 m ²) 20" Cartridge – 34.5 ft ² (3.2 m ²)	10" Cartridge – 21.5 ft ² (2 m ²) 20" Cartridge – 43.1 ft ² (4 m ²)
Cartridge Outside Diameter	2.75" (7 cm) nominal		
Length	Nominal 5, 10, and 20" (12.7, 25.4, and 50.8 cm)	Nominal 10 and 20" (25.4cm and 50.8 cm)	
Maximum Operating Pressure	58 psig @ 77°F (4 bar @ 25°C)		
Maximum Differential Pressure	28 psid @ 77°F (1.9 bar @ 25°C)		
Maximum Operating Temperature	104°F (40°C)		
Absolute Removal Ratings (nm)	5, 10, 20, 50, and 100	5, 10	10, 40
Filter Cartridge Integrity	All Filters are Tested prior to release		

NanoSHIELD™ LDC Series Capsules

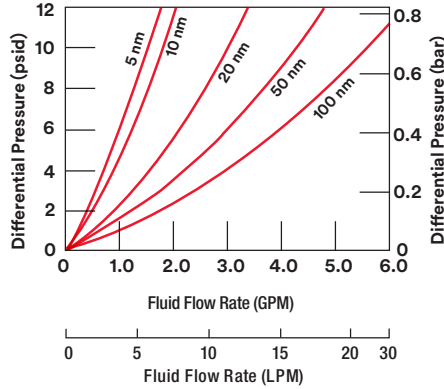
Typical Cartridge Flow vs. Differential Pressure (1cps @ 25°C)

Polypropylene

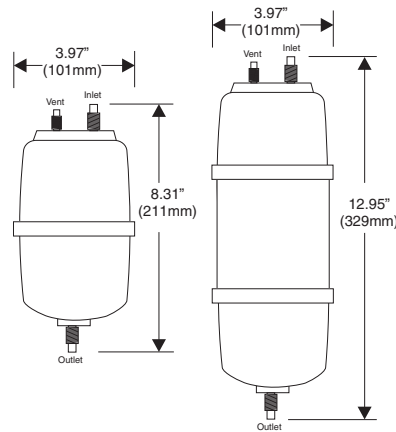
Graph 1: Typical Fluid Flow Rates @ 25° C
(5" NanoSHIELD™ LDC with 1/2" Flowell Connections)



Graph 2: Typical Fluid Flow Rates @ 25° C
(10" NanoSHIELD LDC™ with 1/2" Flowell Connections)



Dimensions



NanoSHIELD™ LDC Series Hollow Fiber Filter Capsules Specifications

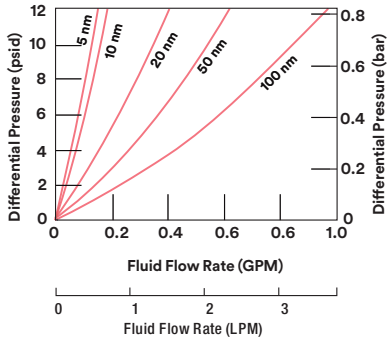
Membrane Material	Polypropylene	Polyethylene
Capsule Body	Polypropylene	
O-ring Material	Fluorocarbon Encapsulated PTFE	
Potting Material	Polyethylene	
Filtration Surface Area	5" Capsule – 10.8 ft ² (1 m ²)	5" Capsule – 8.1 ft ² (0.7 m ²)
	10" Capsule – 23.7 ft ² (2.2 m ²)	10" Capsule – 16.1 ft ² (1.5 m ²)
Maximum Operating Pressure	58 psig @ 77°F (4 bar @ 25°C)	
Maximum Operating Temperature	104°F (40°C)	
Absolute Removal Ratings (nm)	5, 10, 20, 50, and 100	5 and 10
Maximum Differential Pressure	28 psid @ 77°F (1.9 bar @ 25°C)	
Filter Capsule Integrity	All Filters are Tested prior to release	

NanoSHIELD™ MDC Series Capsules

Typical Cartridge Flow vs. Differential Pressure (1cps @ 25°C)

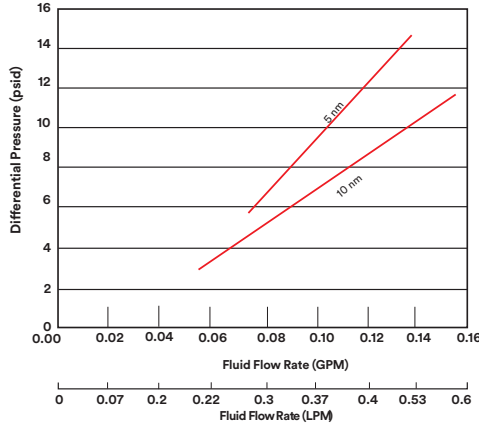
Polypropylene

Graph 1: Typical Fluid Flow Rates @ 25° C
(3" NanoSHIELD™ MDC with 1/4" Swagelok Connections)

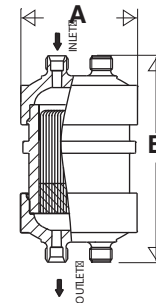


Polyethylene

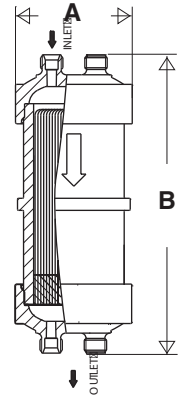
Graph 3: Typical Fluid Flow Rates @ 25° C
(3" NanoSHIELD™ MDC with 1/4" Swagelok Connections)



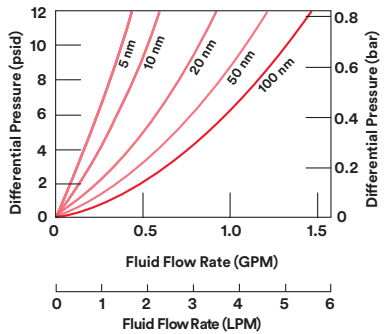
Dimensions 3 inch MDC



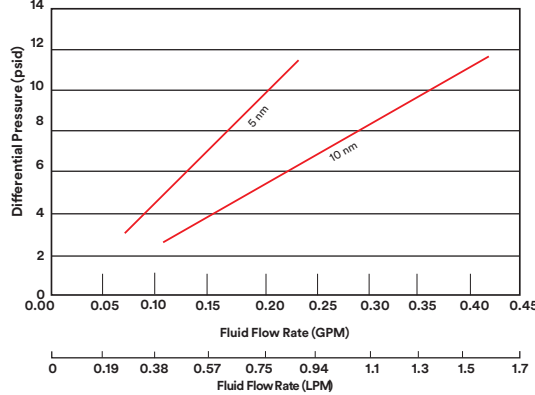
5 inch MDC



Graph 2: Typical Fluid Flow Rates @ 25° C
(5" NanoSHIELD™ MDC™ with 1/4" Swagelok Connections)

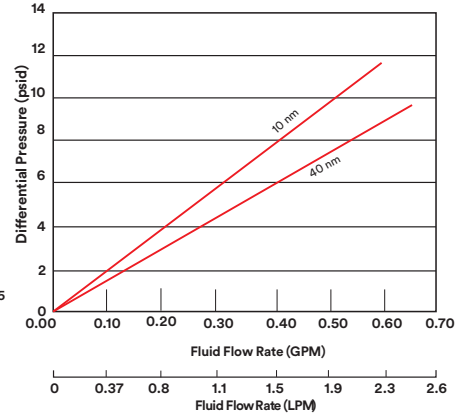


Graph 4: Typical Fluid Flow Rates @ 25° C
(5" NanoSHIELD™ MDC with 1/4" Swagelok Connections)



Nylon

Graph 5: Typical Fluid Flow Rates @ 25° C
(5" NanoSHIELD™ MDC with 1/4" Swagelok Connections)



NanoSHIELD™ MDC Series Hollow Fiber Filter Capsules Specifications

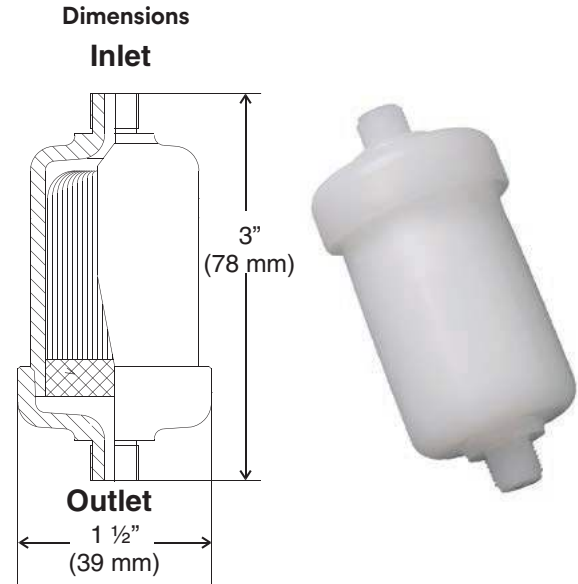
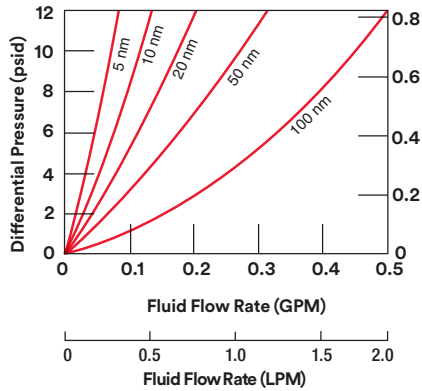
Membrane Material	Polypropylene	Nylon	Polyethylene
Capsule Body	Polyethylene		
Potting Material	Polyethylene		
Filtration Surface Area	5" MDC – 4.1 ft ² (0.38 m ²) 3" MDC – 1.8 ft ² (0.17 m ²)	5" MDC – 4.8 ft ² (0.45 m ²)	5" MDC – 3.8 ft ² (0.38 m ²)
Maximum Operating Pressure	58 psig @ 77°F (4 bar @ 25°C)		
Maximum Operating Temperature	104°F (40°C)		
Absolute Removal Ratings (nm)	5, 10, 20, 50, and 100	10 and 40	5 and 10
Maximum Differential Pressure	28 psid @ 77°F (1.9 bar @ 25°C)		
Filter Capsule Integrity	All Filters are Tested prior to release		

End Fitting	5" MDC		3" MDC	
	A	B	A	B
Swagelok	2.28"	5.81" (147.6 mm)	2.28"	3.88" (98.5 mm)
Flowell	(58 mm)	7.08" (180 mm)	(58 mm)	5.15" (130.8 mm)

NanoSHIELD™ SDC Series Capsules

Typical Cartridge Flow vs. Differential Pressure (1cps @ 25°C)

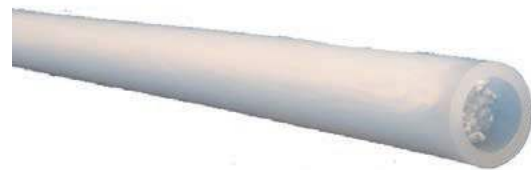
Graph 1: Typical Fluid Flow Rates @ 25° C
(2" NanoSHIELD™ SDC with 1/8" MNPT Connections)



NanoSHIELD™ SDC Series Hollow Fiber Filter Capsules Specifications

Membrane Material	Hollow Fiber Polypropylene
Capsule Body	Polyethylene
Potting Material	Polyethylene
Filtration Surface Area	1.0 ft ² (0.09 m ²)
Maximum Operating Pressure	58 psig @ 77°F (4 bar @ 25°C)
Maximum Operating Temperature	104°F (40°C)
Absolute Removal Ratings (nm)	5, 10, 20, 50, and 100
Maximum Differential Pressure	28 psid @ 77°F (1.9 bar @ 25°C)
Filter Capsule Integrity	All Filters are Tested prior to release

NanoSHIELD™ LHV Series Tubes



Tubes

NanoSHIELD™ LHV Series Hollow Fiber Filter Tube Specifications

Membrane Material	Polypropylene	Polyethylene
Tubing Material	Polyethylene	
Potting Material	Polyethylene	
Filtration Surface Area – 3/8" tube (Nominal)	17 in ² (110 cm ²)	
Outside Diameter (nominal)	3/8" (9.5 mm)	
Length (nominal)	4.1" (10.5 cm)	
Maximum Operating Pressure	58 psig @ 77°F (4 bar @ 25°C)	
Maximum Operating Temperature	104°F (40°C)	
Absolute Removal Ratings (nm)	5, 10, 20, 50, and 100	5, 10
Maximum Differential Pressure	28 psid @ 77°F (1.9 bar @ 25°C)	
Filter Integrity	All Filters are Tested prior to release	

NanoSHIELD™ Series Hollow Fiber Filters and Capsules Ordering Guide

NanoSHIELD™ Cartridges

	Removal Rating (nm)	Configuration	Length (inches)	End Connection	O-ring
NSP ⁴ - polypropylene fiber	05N -5 nm	H-cartridge	50 ³ - 5"	F - 222 o-ring & flat cap	K - Fluorocarbon encapsulated PTFE (FEP)
NSN ¹ - nylon fiber	001 -10 nm		01 - 10"		
NSE ² - polyethylene fiber	002 -20 nm		02 - 20"		
	004 -40 nm				
	005 -50 nm				
	010 -100 nm				

¹NSN configuration only available in 10 nm and 40 nm removal rating.

²NSE configuration only available in 5 nm and 10 nm removal rating.

³NSP configuration only. ⁴NSP not available in 40 nm.

(Example - 5 nm polypropylene 10" cartridge, 222 O-ring (FEP) is part number NSP05NH01FK.)

NanoSHIELD™ LDC Capsules

	Removal Rating (nm)	Configuration	Length (inches)	End Connection
NSP - polypropylene fiber	05N -5 nm	S - LDC capsule	50 - 5"	KH - 1/2" flowell 60 inlet & outlet with 1/4" flowell 60 vent
NSE ¹ - polyethylene fiber	001 -10 nm		01 - 10"	
	002 -20 nm			
	005 -50 nm			
	010 -100 nm			

¹NSE configuration only available in 5 nm and 10 nm removal rating.

(Example - 5 nm polypropylene 10" cartridge, Flowell® 60 Inlet/Outlet Fitting is part number NSP05NS01KH.)

NanoSHIELD™ MDC Capsules

	Removal Rating (nm)	Configuration	Length (inches)	End Connection
NSP ⁵ - polypropylene fiber	05N -5 nm	P - MDC capsule	30 ³ - 3"	F - 1/4" Swagelok F1 - 1/4" Swagelok fitting ⁴ G - 1/4" Flowell Series 60 fitting
NSN ¹ - nylon fiber	001 -10 nm		50 - 5"	
NSE ² - polyethylene fiber	002 -20 nm			
	004 -40 nm			
	005 -50 nm			
	010 -100 nm			

¹NSN configuration only available in 10 nm and 40 nm removal rating.

²NSE configuration only available in 5 nm and 10 nm removal rating.

³NSP configuration only.

⁴F1 fitting available on NSN, NSE and select 5nm, 10nm, NSP and MDC capsules. See ordering guide. ⁵NSP not available in 40 nm.

(Example - 50 nm polypropylene 5"capsule, Swagelok® Fitting is part number NSP005P50F.)

NanoSHIELD™ SDC Capsules

	Removal Rating (nm)	Configuration	Length (inches)	End Connection
NSP - polypropylene fiber	05N -5 nm	N - SDC capsule	20 - 2"	J - 1/8" M-NPT
	001 -10 nm			
	002 -20 nm			
	005 -50 nm			
	010 -100 nm			

(Example - 5 nm polypropylene 2"capsule, NPT Fitting is part number NSP05N20J.)

NanoSHIELD™ LHV Tubes

	Removal Rating (nm)	Configuration	Diameter (inches)	Quantity
NSP - polypropylene fiber	05N -5 nm	T - tube	2 - 3/8"	5 - 5 tubes per package
NSE ¹ - polyethylene fiber	001 -10 nm			
	002 -20 nm			
	005 -50 nm			
	010 -100 nm			

¹NSE configuration only available in 5 nm and 10 nm removal rating.

(Example - 50 nm polypropylene 0.375 in. x 4 in. tube, is part number NSP005T25.)

Intended Use: 3M™ NanoSHIELD™ Series products are intended for use in industrial filtration applications of aqueous fluids in accordance with the applicable product instructions and specifications. 3M NanoSHIELD Series products are also intended for use with non-aqueous fluids where materials of construction are compatible. Since there are many factors that can affect a product's use, the customer and user remain responsible for determining whether the 3M product is suitable and appropriate for the user's specific application, including user conducting an appropriate risk assessment and evaluating the 3M product in user's application.

Restrictions on Use: 3M advises against the use of these 3M products in any application other than the stated intended use(s) since other applications have not been evaluated by 3M and may result in an unsafe or unintended condition. Do not use in any manner whereby the 3M product, or any extractable or leachable from the 3M product, may become part of or remains in a medical device, drug, cosmetic, supplement, infant formula; or in applications involving life-sustaining medical applications or prolonged contact with internal bodily fluids or tissues. 3M NanoSHIELD Series products are not for use in food contact applications.

Technical Information: The technical information, guidance, and other statements contained in this document or otherwise provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.

Product Selection and Use: Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (e.g., OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.

Warranty, Limited Remedy, and Disclaimer: Unless a different warranty is specifically stated on the applicable 3M product packaging or product literature (in which case such warranty governs), 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ARISING OUT OF A COURSE OF DEALING, CUSTOM, OR USAGE OF TRADE. If a 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

Limitation of Liability: Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.



Your local distributor:

**3M Purification Inc.
3M Separation and Purification Sciences Division
400 Research Parkway
Meriden, CT 06450 USA**

**Phone 1-800-243-6894
1-203-237-5541
Web 3MPurification.com**

3M and NanoSHIELD are trademarks of 3M Company. All other trademarks are the property of their respective owners.
Please recycle. Printed in USA
© 2023 3M Company. All rights reserved.
70020345081 REV 0423