3M Purification Inc.

Betafine™ XL Series
Absolute Rated Pleated Polypropylene Filter Cartridges

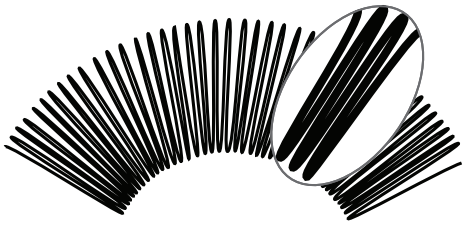
Providing Reduced Total Filtration Costs & Consistent Filtration Performance

Betafine™ XL series filter cartridges represent a major advance in pleated filter technology. Building on 3M Purification Inc.'s history of filter design innovation, this absolute-rated, 100% polypropylene, pleated cartridge features Advanced Pleat Technology (APT) that increases the usable filtration surface area while maintaining standard industrial cartridge dimensions. The result is a filter cartridge that has dramatically enhanced service life.

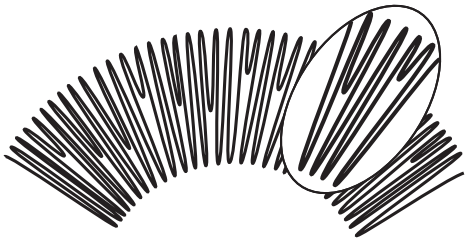
Advanced Pleat Technology (APT)

The service life of a pleated cartridge is often dictated by the accessible surface area. Conventional pleated filters may offer a large gross surface area, but when the media is packed too tightly into the cartridge, only part of the surface area is usable resulting in both flow restrictions and limited contaminant holding capacity. The "blind" or unusable area commonly occurs near the inside diameter (see figures below) where the pleats are packed most tightly. The Betafine XL series filter cartridge is manufactured using a staggered pleat configuration that, when combined with a novel support material, provides more open space between the pleats.

The APT staggered pleats with increased open area allow for greater contaminant loading between pleats at the inside diameter, while the reduced length pleats take advantage of existing open space closer to the cartridge's outside diameter. The result is a fully used surface area that provides superior service life.



Conventional pleat designs, with full-depth densely packed pleats, fill the upstream pleat surface with contaminant that quickly constrict flow at the pleat's inside diameter.



The Betafine™ XL series filter cartridge's Advanced Pleat Technology utilizes a configuration designed to increase the accessible surface area for significantly greater filter media use.

Features & Benefits

Reduced Total Filtration Costs

- Helps reduce cartridges used, change-out frequency, reduced downtime, product waste and labor and disposal costs

Consistent Filtration Performance

- Helps reduce quality checks, product rejects and rework, thereby helping to add productivity and plant capacity

Applications

Betafine™ XL series filter cartridges are ideal for a wide array of applications. Contact 3M Purification or your local distributor for assistance with your specific applications.

Paint & Coatings	Film and paper coatings, photographic film, lens coatings and magnetic media, can coatings, high quality paints and ink.
Industrial Process	Machine tool lubrication, detergents, process and waste water, plating baths and chemicals, pulp, paper and textiles.
Pharmaceutical, Biological & Bioprocessing	Utility water systems, solvent and fermentation feed streams, reagents and buffers, bulk pharmaceutical chemicals and intermediates, air prefiltration, toiletries and cosmetics, orals and topicals.
Electronics	CD and DVD media, printed circuit boards, video displays, DI water.
Food & Beverage	Bottled water particulate and turbidity reduction, reverse osmosis membrane and spray nozzle protection, diatomaceous earth or carbon fines trap, beverage blending, rinsing, or wash water.
Petrochemical & Chemical Processing	Clarification of high purity chemicals, organic and inorganic chemical intermediates, and various acids and bases, production of petrochemicals from feed-stocks and intermediates, solvents, polymer solutions, process water for quench and flushing.

Superior Service Life

Extensive testing has demonstrated that the Betafine™ XL series filter cartridge provides service life superior to competitive pleated filters of equivalent reduction ratings when subjected to the same contaminant load. The result of using filters with significantly longer service life is substantially reduced filtration costs. Betafine XL series filter cartridges provide a service life improvement of up to 4.4 times greater than competitive products. See Graph 1 below.

Superior on-line service life provides significant total filtration cost reductions. From fewer filter cartridges used to a reduction in labor costs by decreasing filter change-out frequency, Betafine XL series filter cartridges provide the ultimate in cost effective pleated filter technology.

The Impact of Service Life on Total Filtration Costs

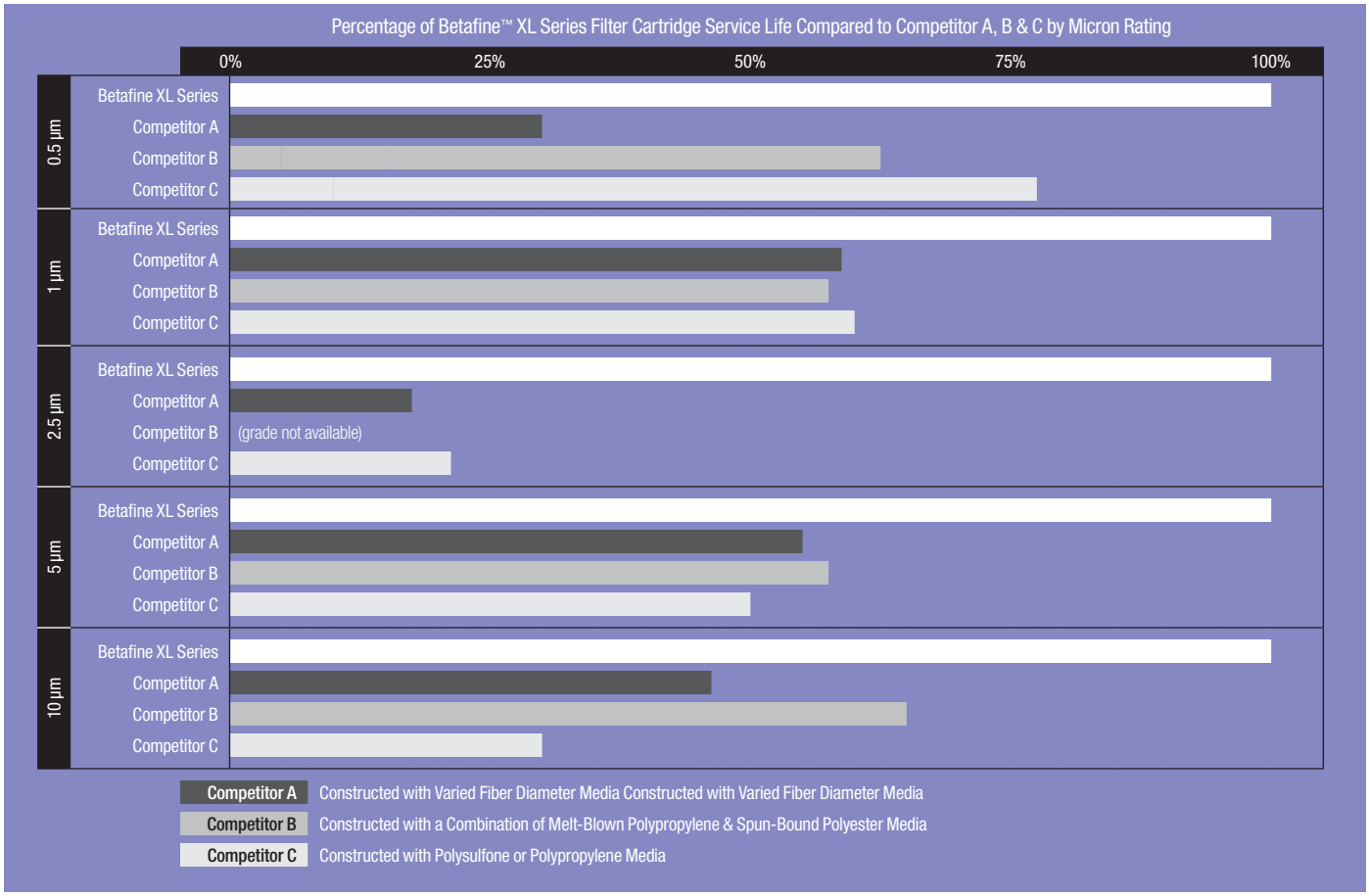
The service life of a filter has a direct impact on total annual filtration costs. To illustrate how great an impact can occur, see Table 1 below.

Table 1. Total Filtration Costs Model Based On a System with a Flow Rate of 250 gpm Using 18 (30" long) Filter Cartridges with a Change-out Frequency of One Week

Process Requirements*	A Filter with 50% of Betafine™ XL Series Filter Cartridge Service Life		Betafine™ XL Series Filter Cartridge	
	Units	Estimated Cost	Units	Estimated Cost
Estimated Filter Usage (annual, based on $75 per cartridge U.S.)	936	$70,200	468	$35,100
Required Labor (1 hour per filter change-out at $40/hr U.S.)	52 hours	$2,080	26 hours	$1,040
Estimated Disposal (56 cartridges per drum at $50/drum U.S.)	17 drums	$850	9 drums	$450
Process Downtime	52 hours	?	26 hours	?
Total Annual Filtration Cost	$73,130		$36,590	

*** NOTE**: These estimates are based on industry interviews and conditions as noted. Your savings may vary depending on your actual costs.

Graph 1. Betafine™ XL Filter Cartridges Provide Significantly Prolonged Service Life When Compared to Conventional Pleated Filters of Like Published Reduction Ratings



Absolute Ratings

The consistency of reproducible contaminant reduction can best be provided by the use of absolute-rated filters. Betafine™ XL series filter cartridges are absolute rated to β1000 (99.9% efficiency at its rating) and are available in nine distinct ratings from 0.2 to 70 micron. This provides a complete choice of ratings to meet the exacting filtration requirements for the most critical applications. See Table 2 below.

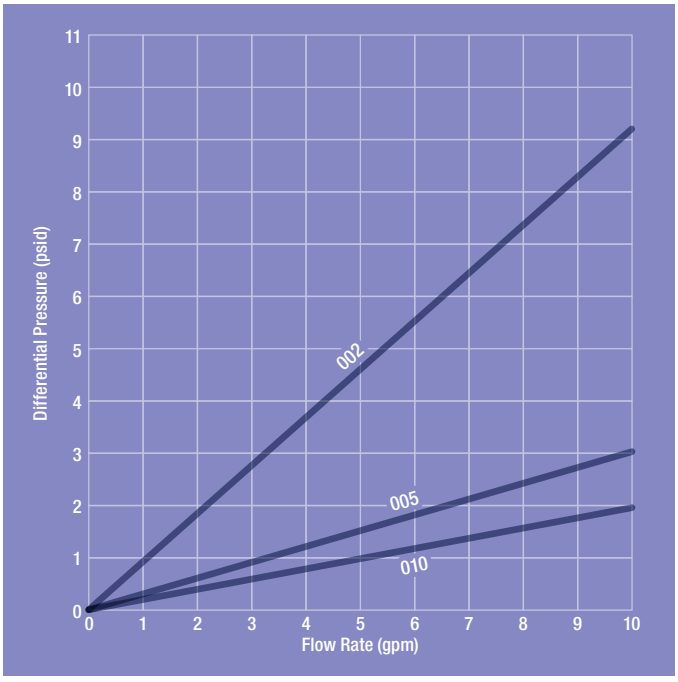
Table 2. Betafine™ XL Series Filter Cartridge Absolute Ratings

Grade	Rating*
002	0.2 µm
005	0.5 µm
010	1 µm
025	2.5 µm
050	5 µm
100	10 µm
200	20 µm
400	40 µm
700	70 µm

* At maximum recommended flow rate

Flow Characteristics & Sizing Options

Flow vs. differential pressure for water is depicted in Graphs 2 and 3 for each Betafine XL series filter cartridge grade. A typical filter system is often sized for an initial differential pressure of 0.5 to 1 psi (0.04 to 0.07 bar). Low flow rates further extend the life of the filter.



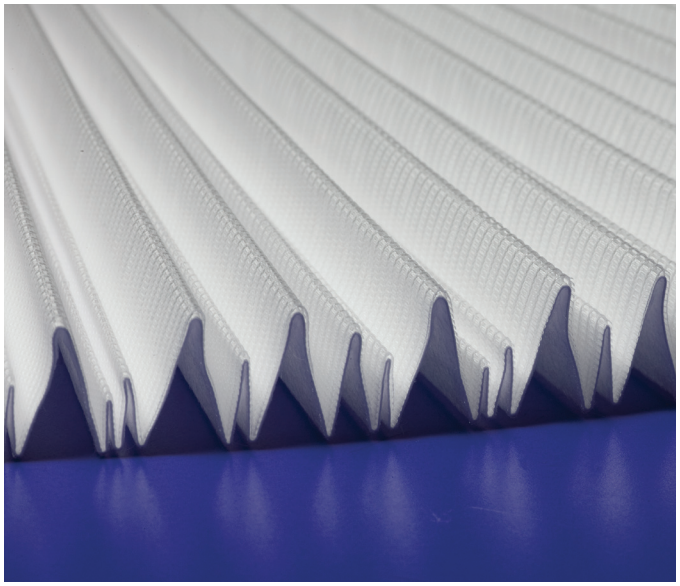
Graph 2. Water Flow Rates for Grades 002, 005 & 010 Betafine™ XL Series 10" Filter Cartridges.

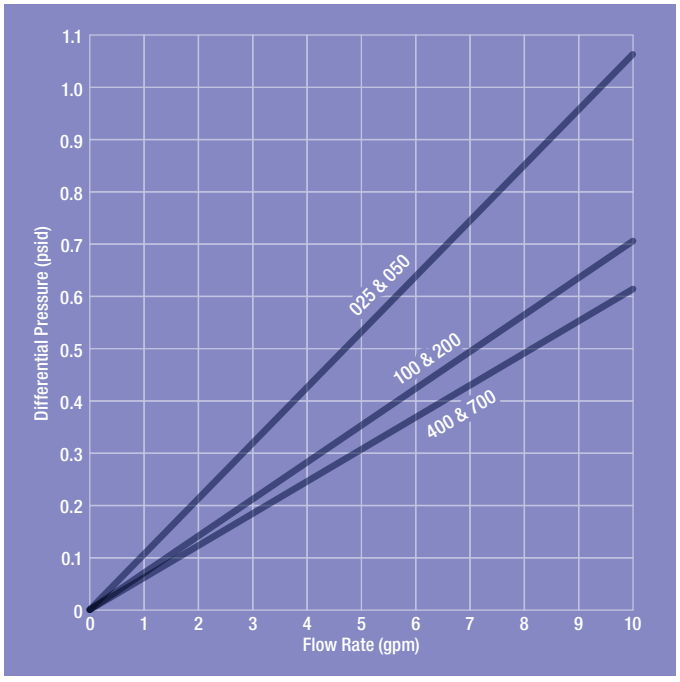
Reduced Cartridge Change-out Frequency

For a given process flow rate, the increased accessible surface area decreases filter cartridge change-out frequency by 30 to 50 percent or more depending on the application.

Reduced Filter Housing Costs

For new applications, the low pressure drops of the Betafine XL series filter cartridge allow smaller or fewer housings to be required. Fewer filter cartridges and smaller housings help provide lower capital and operating costs, year after year.

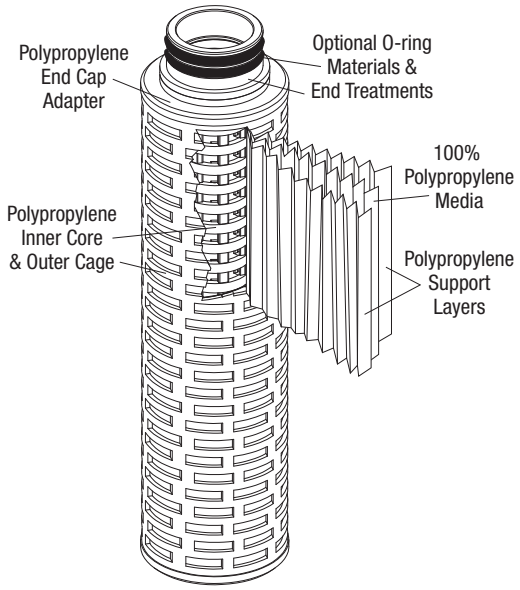




Graph 3. Water Flow Rates for Grades 025, 050, 100, 200, 400 & 700 Betafine™ XL Series 10" Filter Cartridges.

Filter Cartridge Construction

Betafine™ XL series filter cartridges are constructed of 100% polypropylene and help provide excellent chemical and thermal compatibility. The filter media is constructed from continuous micro-fibers that are precisely controlled to provide a uniform matrix and consistent effluent quality. Betafine XL series filter cartridges incorporate a polypropylene support upstream and downstream of the media to provide optimum flow characteristics and long service life. The all-polypropylene cartridge components are thermally bonded — no resin or binder compounds are used. All materials used in the manufacture of Betafine XL series filter cartridges comply with the requirements of the Food and Drug Administration's (FDA) Code of Federal Regulations (CFR), Title 21 parts 170-199 for contact with food. Available in nine distinct micron ratings and integral lengths from 9.75" to 40" with a wide selection of end treatments to fit common filter housing designs, Betafine XL series filter cartridges are ideal for a wide variety of applications.



Cartridge

Chemical Compatibility

The 100% polypropylene construction helps provide excellent chemical compatibility in many demanding process fluid applications. Listed in Table 3 below are commonly requested compatibilities. Compatibility for specific fluids may vary and is influenced by operating conditions. Consult 3M Purification Inc. or your local distributor for more information.

Table 3. Chemical Compatibility of Betafine™ XL Series Filter Cartridges

Chemical	Temperature
Acetic Acid 20%	175 °F (80 °C)
Ammonia 10%	140 °F (60 °C)
Bleach 5.5%	70 °F (21 °C)
Ethylene Glycol	140 °F (60 °C)
Alkanolamines	140 °F (60 °C)
Hydrogen Peroxide	100 °F (38 °C)
Methyl Ethyl Ketone	70 °F (21 °C)
Mineral Oil	70 °F (21 °C)
Nitric Acid 20%	100 °F (38 °C)
Potassium Hydroxide	140 °F (60 °C)
Sodium Carbonate	100 °F (38 °C)
Sodium Hydroxide 70%	140 °F (60 °C)
Sulfuric Acid 20%	140 °F (60 °C)
Sulfuric Acid 70%	100 °F (38 °C)
Urea	140 °F (60 °C)

3M™ Filter Housings

3M Purification Inc. manufactures a wide range of filter housings. Housings that accommodate from a single filter element, to many hundreds, are available in a broad choice of materials. 3M Purification Inc. filter housings offer flexibility of design and can help provide a filter housing to suit your needs. The housings provide easy access for filter change-out and the reliability that Betafine™ XL series filter cartridges are seated securely, thus reducing the possibility of fluid bypass. For other style housings, contact your local 3M Purification Inc. Distributor.

3M™ ES Series Filter Housing

The ES Series filter housing is a durable high flow filter housing constructed from 316L stainless or carbon steel. With a cartridge capacity from 12 to 480 equivalent lengths, the ES filter housing can accommodate a wide range of flow requirements. For more information, ask your local 3M Purification Inc. distributor for brochure 70-0201-8711-1.

3M™ CTG-Klean Filter Housing

The CTG-Klean Filter Housing design provides a totally enclosed system using a filter pack to isolate process fluid from the housing. Use of this system reduces the costs involved with filter change-out while helping to reduce operator exposure to process fluids. For more information, ask your local 3M Purification Inc. distributor for brochure 70-0201-8693-1.

3M™ DC & SS Filter Housings

DC and SS filter housings offer a cost effective alternative for low volume filtration. Constructed from reliable 304L stainless steel (Model DC) or 316L stainless steel (Model SS), systems are available for a wide range of flow rates and applications. For more information, ask for literature 70-0201-8757-4 and 70-0202-2106-8.

Scientific Application Support Services (SASS)

Dedicated technical support teams comprised of 3M Purification Inc. scientists and engineers are available to provide application specific recommendations for the most effective and economical filtration system. In addition to comprehensive testing and analysis conducted at 3M Purification's advanced laboratories, the SASS staff frequently performs on-site testing at customer's facilities. Contact your 3M Purification representative for additional information.

Operating Parameters & Specifications

	Cartridges							
Filter Rating	0.2 – 70 µm							
	Dimensions							
Nominal Length (see ordering guide)	9.75"	10"	19.5"	20"	29.25"	30"	39"	40"
Diameter, Outer (nominal)	2.62"							
	Materials of Construction							
Filter Media	Polypropylene							
Support Layers								
Inner Core & Outer Cage								
End Cap Adapters								
Flat Gasket & O-ring Options	Silicone, Fluorocarbon, Ethylene Propylene (EPR), FEP/PFA-encapsulated Fluorocarbon, Polyethylene & Nitrile							
	Operating Conditions							
Maximum Forward Differential Pressure	60 psid @ 77 °F (4 bar at 25 °C)							
Maximum Reverse Differential Pressure	40 psid @ 77 °F (2.6 bar at 25 °C)							
Maximum Operating Temperature	175 °F (80 °C)							
Cleaning Considerations	Can be autoclaved, steamed in place or hot water sanitized (for cartridges with 222 or 226 O-ring end modifications, order option with reinforcing ring).							
	Regulatory Status							
CFR 21 Compliant	Filter components are constructed from materials that comply with the requirements of the Food and Drug Administration's (FDA) Code of Federal Regulations (CFR), Title 21 parts 170-199 for contact with food.							

This Betafine™ XL Series filter cartridge is tested and certified by WQA against NSF/ANSI Standard 61 for material requirements only.*

* For gasket/O-rings G, H, K & L, please consult factory.

Cold Water Only

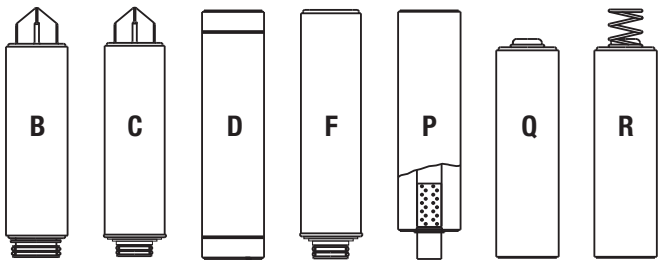
Install this product in accordance with the instructions provided by the housing manufacturer.

Betafine™ XL Series Filters Ordering Guide

Cartridges

Cartridge Code	Nominal Length Code	Filter Media Code	Grade Code & Rating	End Modification Code	Gasket/O-ring Material Code
XL	**09**[1] 9.75"	**PP** Polypropylene	**002** (0.2 µm)	**B0** — 226 O-ring & Spear, No Reinforcing Ring	**A** — Silicone
	10 10"		**005** (0.5 µm)	**B1** — 226 O-ring & Spear, Polysulfone Ring	**B** — Fluorocarbon
	19[1] 19.5"		**010** (1 µm)	**B2** — 226 O-ring & Spear, Stainless Steel Ring	**C** — EPR
	20 20"		**025** (2.5 µm)	**C0** — 222 O-ring & Spear, No Reinforcing Ring	**D** — Nitrile
	29[1] 29.25"		**050** (5 µm)	**C1** — 222 O-ring & Spear, Polysulfone Ring	**G**[3] — Polyethylene
	30 30"		**100** (10 µm)	**C2** — 222 O-ring & Spear, Stainless Steel Ring	**H**[4] — Clear Silicone
	39[1] 39"		**200** (20 µm)	**D** — Double Open End (DOE)	**K**[4] — FEP/PFA-encapsulated Fluorocarbon
	40 40"		**400** (40 µm)	**F0** — 222 O-ring & Flat Cap, No Reinforcing Ring	**L**[4] — FEP/PFA-encapsulated Silicone
			700 (70 µm)	**F1** — 222 O-ring & Flat Cap, Polysulfone Ring	
				F2 — 222 O-ring & Flat Cap, Stainless Steel Ring	
				P — DOE w/ Polypropylene Core Extender	
				Q[2] — Single Open End (SOE)	
				R — SOE w/ Stainless Steel Spring	
				U — 222 O-ring & Flat Cap, No Reinforcing Ring (1-high only, shorter cartridge retrofits Entegris / Millipore Code 0)	

1 Not available in B, C, F, Q, R and U end modifications.
2 Can be used a replacement cartridge with R end modification.
3 Available in end modifications D, P, Q & R only.
4 O-rings only.



Important Notice

The information described in this literature is accurate to the best of our knowledge. A variety of factors, however, can affect the performance of the Product(s) in a particular application, some of which are uniquely within your knowledge and control. **INFORMATION IS SUPPLIED UPON THE CONDITION THAT THE PERSONS RECEIVING THE SAME WILL MAKE THEIR OWN DETERMINATION AS TO ITS SUITABILITY FOR THEIR USE. IN NO EVENT WILL 3M PURIFICATION INC. BE RESPONSIBLE FOR DAMAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OF OR RELIANCE UPON INFORMATION.**

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