

# Betapure™ NT-T Series Filter Cartridges

## The Next Generation in Depth Filter Technology

Betapure™ NT-T Series filter cartridges are 3M Purification Inc.'s latest advance in depth filtration technology. The all polypropylene filter is constructed using a design that utilizes flow enhancing filter media and an innovative flow pattern. The result is an absolute-rated filter with vastly superior on-stream life that provides more cost effective filtration than conventional melt-blown filter technologies. Betapure NT-T Series filter cartridges - the new leader in filtration performance.

## Betapure NT-T Series Filter Construction

3M Purification Inc. designed the Betapure NT-T Series cartridge to provide significantly superior service life while maintaining a consistent filtration efficiency. Betapure NT-T Series filters achieve this through an innovative cartridge design that allows uniform distribution of fluid flow and contaminant throughout the entire depth of the cartridge. Betapure NT-T Series filter construction combines a polypropylene media with fluid distribution netting to form multiple layers. Critically positioned media flow channels allow greater movement of fluid from layer to layer. Three distinct media sections, made from multiple media/netting layers, are combined to form the filter cartridge.

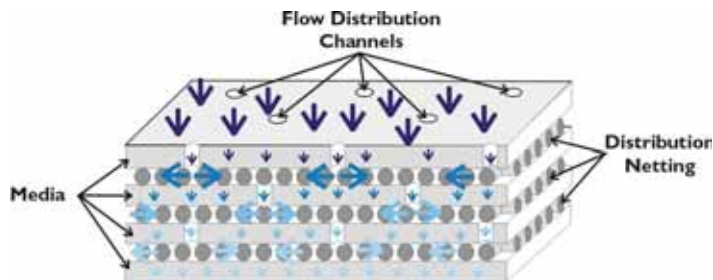


Figure 1: Betapure NT-T Series Media Sections. Note that the actual filter sections contain multiple layers of media.

## Features & Benefits

### Superior Service Life.

- As much as 3 times greater dirt holding capacity than competitive filters.

### All polypropylene depth filter cartridges.

- Allow for broad chemical and temperature compatibility.

### Ratings from 0.5 to 70 micron.

- Suit a wide range of applications.

### Absolute-Rated Performance.

- Allows for consistent filtration quality.

### Exhibits Superior Particle Retention Under Increasing Differential Pressure.



## Applications

<b>Chemical and Hydrocarbon Processing</b>	Acids, bleach (sodium hypochlorite), polyethylene & polypropylene manufacture, amine sweetening & water flood
<b>Food &amp; Beverage</b>	Bottled water particulate & turbidity reduction, reverse osmosis membrane & spray nozzle protection, diatomaceous earth or carbon fine trap & beverage blending, rinsing & wash water
<b>Fine Chemical and Electronics</b>	Pre-RO filtration of high silt density index incoming water, copper sulfate plating bath filtration in printed circuit board construction and color screen filtration for CRT production
<b>Coating</b>	Film & paper coatings, photographic film, lens coatings & can coatings, high quality paints & ink
<b>Industrial</b>	Machine tool lubrication, chemicals, detergents, and waste water, textiles, plating baths, pulp & paper, process water & ground water remediation



Cut-away of the Betapure NT-T Series filter cartridge showing the three sections of media layers and core

The outer and middle sections contain multiple layers of interleaved filter media and fluid distribution netting. Within each media layer a portion of the fluid travels through the media while the balance of the fluid is delivered directly to the next distribution layer through the flow channels. The fluid distribution netting provides longitudinal and latitudinal flow paths to evenly distribute fluid flow across the surface of each successive media layer.

### The Difference is Performance

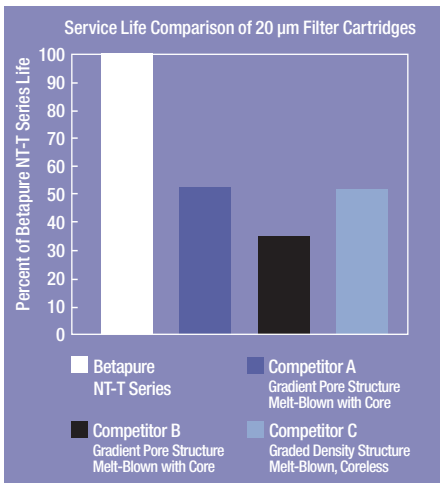
Flow channels appear in the outer and middle sections of the filter matrix, as seen in the cartridge cut-away. The size, number, and location of the flow channels combined with the fluid distribution netting ensure that a uniform amount of contaminant is distributed to each layer within these two sections, while maintaining a consistent flow.

The number of media flow channels decrease from the outer to middle sections to ensure even contaminant loading throughout the entire filter matrix. Extensive laboratory testing has demonstrated that 3M Purification Inc. has developed the optimal filter cartridge design.

The inner section, supported by a rigid polypropylene core and equal to approximately one third of the filter's depth, contains no flow channels and is the final qualifying section ensuring absolute rated performance.

The even distribution of contaminated fluid throughout the depth of the cartridge is the key to the Betapure NT-T Series filter's exceptionally long service life, low pressure drops, and increased cost effectiveness.

**Graph 1: Betapure NT-T Series filters deliver longer service life**



### The Result

#### Superior Filter Service Life

Extensive testing has demonstrated that competitive filters of equivalent removal ratings subjected to the same contaminant load plug more quickly than Betapure NT-T Series filters. The result is significantly shorter service life, and unpredictable filtration efficiencies. Betapure NT-T Series filters provide a service life improvement of up to 3 times greater than competitive products. (Graph 1)

#### Lower Pressure Drop

The design and construction of the Betapure NT-T Series cartridge allows for significantly lower pressure drops compared to equivalently rated polypropylene depth filters. Based on published data, a Betapure NT-T Series filter system with a given flow would use up to 75% fewer cartridges than Osmonics Selex, 68% fewer than Pall® Profile, and 42% fewer than Pall® Nexis. To underscore the Betapure NT-T Series filter cost benefit, use the example in Table 1 as a guideline.

**Table 1: Comparison of 5 Micron\* Filters in a 110 GPM System**

	Betapure NT-T Series Filters	Pall Profile	Pall Nexis	Osmonics Selex
Flow (gpm) / 10" cartridge @ 1 psid	3.1	1.0	1.8	0.8
Number of filters for a 110 gpm flow rate	12 / 30" cartridges	37 / 30" cartridges	21 / 30" cartridges	43 / 30" cartridges
* Based on the manufacturers published rating.				

For the same initial cartridge differential pressure, a 110 gpm system using Betapure NT-T Series filters require significantly fewer cartridges. This results in lower capital investment for the filter housing and fewer cartridges to purchase.

### The Confidence of Consistency

Betapure™ NT-T Series filters utilize advanced design and construction to achieve a level of filtration consistency unattainable by competitive filters. Combined with an exceptionally long service life, the Betapure NT-T Series filter’s consistent performance, as illustrated by comparative Beta-Ratio vs. Differential Pressure (Graph 2), provides predictable results throughout the filters’ usable life. Filters A, B, and C show a degradation in the Beta-Ratio as psid increases. These filters exhibit a pattern of either unloading previously held particles or a loss of filtration efficiency. The result of this inconsistent performance is a reduction in finished product quality, product yield, and an increase in total filtration cost.

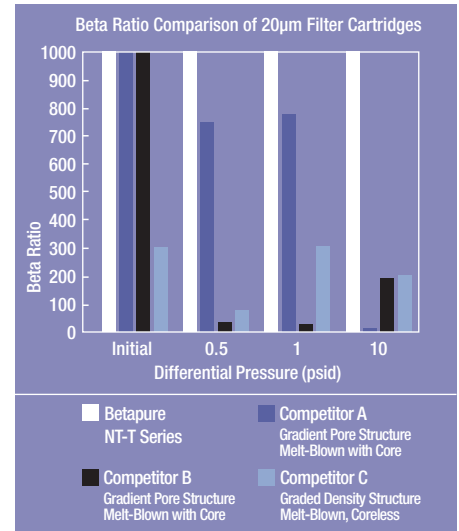
### Absolute Betapure NT-T Series

Consistent filtration performance, time after time, from start to finish - the goal of every filter user, the solution provided by Betapure NT-T Series filters. Absolute removal ratings for Betapure NT-T Series filters are determined using a filter performance test developed by 3M Purification Inc. to comply with the general procedures outlines in ASTM STP 975. 3M Purification Inc. defines absolute rating as the particle size (x) providing an initial Beta Ratio ( $B_x$ ) = 1000. At this Beta Ratio, the removal efficiency is equal to 99.9%. Betapure NT-T Series filter ratings are specified in Table 2.

### Your Benefit - Total Filtration Cost Reduction

The Betapure NT-T Series filter’s performance and superior life advantage allows direct cost savings by reducing the number of filters used. In addition, the resulting reduction in filter change-out frequency decreases direct labor and filter disposal costs. Betapure NT-T Series filter cartridges - providing performance and value.

**Graph 2: Beta Ratios demonstrate the Betapure NT-T Series filter’s ability to perform consistently throughout its life**



**Table 2: Betapure NT-T Series Filter Ratings**

Grade Designation	Absolute Rating (Micron)
T005	0.5*
T010	1
T020	2
T030	3
T050	5
T100	10
T200	20
T300	30
T400	40
T500	50
T700	70
* extrapolated	



## Betapure NT-T Series Filter Applications

Betapure NT-T Series' construction provides benefits to customers in a wide range of end-use filtration applications. High quality filtration along with total filtration cost reductions are very attractive benefits to customers in diverse industries.

### *Chemical and Hydrocarbon Processing*

Cost reduction is the most critical issue in the production of high quality chemicals, petrochemicals, and in hydrocarbon processing. Using Betapure NT-T Series filters in demanding applications that require absolute-rated performance provides long service life, the consistency demanded to attain quality standards, and a total Filtration Cost reduction.

Applications include:

- Acids, bleach (sodium hypochlorite)
- Polyethylene and polypropylene manufacture
- Amine sweetening and waterflood

### *Food & Beverage Applications*

Increased consumer emphasis on product quality, as well as increased government regulation, are driving today's food & beverage industry to ever-finer levels of filtration. Betapure NT-T Series filter cartridges meet this challenge throughout their entire service life. Typical applications include:

- Bottled water particulate and turbidity reduction
- Reverse osmosis membrane and spray nozzle protection
- Diatomaceous earth or carbon fine trap
- Beverage blending, rinsing and wash water

### *Fine Chemical and Electronics*

Betapure NT-T Series filters with their filter matrix are ideally suited for electronics applications where heavy contaminant loading is present and efficient long lasting filtration is required. The combination of all-polypropylene construction and the media provide the perfect filtration device for use in wafer manufacturing and semiconductor device fabrication. Applications include:

- Pre-RO filtration of high silt density index incoming water
- Copper sulfate plating bath filtration in printed circuit board construction
- Color screen filtration for CRT production

### *Coating*

Betapure NT-T Series filter cartridges are well suited for the filtration of high solid coatings where they provide superior life while selectively removing the large undesired particles from the coating and allowing the smaller desired particles to pass. Betapure NT-T Series applications include:

- Film & paper coatings
- Photographic film
- Lens coatings
- Can coatings, high quality paints & ink

### *Industrial*

Betapure NT-T Series filter cartridges are ideal for higher dirt loads because of the flow characteristics and long service life that provide reduced overall filtration costs. Betapure NT-T Series cartridges are used in a broad range of general industrial applications that include:

- Machine tool lubrication, chemicals, detergents, and waste water
- Textiles, plating baths
- Pulp & paper
- Process water & ground water remediation

### 3M Purification Inc. Filter Housings

3M Purification Inc. manufactures a wide range of filter housings. Housings that accommodate from a single filter element, to many hundreds, available in a broad choice of materials, and a flexibility of design ensure that 3M Purification Inc. has a filter housing to suit your needs.

#### *ES Series Filter Housing*

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

#### *CTG Series Filter Housing*

The CTG Series Filter design provides a totally enclosed system using separate pressure vessel and filter pack to isolate process fluid from the housing. This system virtually eliminates the costs involved with filter change-out while protecting the environment and operator from exposure to the process fluid. For more information, ask your local 3M Purification Inc. distributor for brochure 70-0201-8693-1.

#### *DC & SD 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.





**Table 2: Betapure NT-T Series Filter Specifications**

Materials of Construction*	
Filter Media, Netting, Core, End Connector	Polypropylene
Gaskets & O-ring Options (see ordering guide)	Silicone, Fluorocarbon, EPR, Nitrile, PTFE encapsulated fluorocarbon, and Polyethylene
Operating Conditions	
Maximum Operating Temperature	180°F (82°C)
Maximum Differential Pressure	50 psid at 86°F (3.4 bar at 30°C) 30 psid at 131°F (2.0 bar at 55°C) 15 psid at 180°F (1.0 bar at 82°C)
Recommended Change-Out Differential Pressure	35 psid at 86°F (2.4 bar at 30°C)
Cartridge Dimensions	
Inside Diameter	1 3/32" nominal
Outside Diameter	2 1/2" nominal
Length	5, 9 3/4, 10, 19 1/2, 20, 29 1/4, 30, 39, and 40 inches

\* All materials are FDA compliant per CFR 21



### Flow Rates

Detailed information for calculating flows for water and fluids with other viscosities is located in the following table. Use the formula in conjunction with the values from columns 3 or 4 in the table. The specific pressure drop values may be effectively used when three of the four variables (viscosity, flow, differential pressure, and cartridge grade) are set.

### Chemical Compatibility

**Table 3: Betapure NT-T Series Flow Rates**

Grade	Absolute Rating (µm)	Specific Pressure Drop per 10" Cartridge	
		psid/gpm/cps	mbar/lpm/cps
T005	0.5	4.5	81.9
T010	1	2.5	45.5
T020	2	0.87	15.9
T030	3	0.44	8.0
T050	5	0.32	5.9
T100	10	0.14	2.5
T200	20	0.065	1.2
T300	30	0.05	0.91
T400	40	0.042	0.76
T500	50	0.029	0.52
T700	70	0.025	0.45

\* Specific aqueous pressure drop at ambient temperature for a single length equivalent (10") cartridge. For multiple cartridge lengths, divide the total flow by the number of equivalent lengths. For liquids other than water, multiply the specific pressure drop value provided in the table by the viscosity in centipoise.

$$\Delta p = \frac{\text{Clean (Total System gpm [lpm]) (Viscosity in Cp) (Value From Table)}}{\text{psi (mbar) (Number of Equivalent Single Length Cartridges in Housing)}}$$

The 100% polypropylene construction provides excellent chemical compatibility in many demanding process fluid applications. Compatibility is influenced by process operating conditions: in critical applications, cartridges should be tested under actual conditions to ensure correct selection.

### Scientific Application Support Services (SASS)

Providing the key to customer collaboration, the global 3M Purification Inc. SASS organization is a team of multi-disciplinary scientists and engineers that provide the vital link between 3M Purification Inc.'s filtration knowledge base and customer needs. With complete access to 3M Purification Inc. technology and its research and development, members of the SASS group provide on-site bench-scale tests and assist with customer scale-up to the full manufacturing process. When processing requirements are encountered, SASS is expertly equipped to identify filtration solutions using either the broad array of existing 3M Purification Inc. filter products or by working with 3M Purification Inc. R&D to design a custom solution for the application.

### Service Worldwide

3M Purification Inc. is a U.S. based multinational company with distribution and manufacturing sites worldwide. Global manufacturing sites together with trained stocking distributors and state-of-the-art laboratory facilities bring quality solutions to challenging filtration applications.

### A Global, Diversified Technology Company

3M is fundamentally a science-based company. As a member of the 3M family, we create imaginative solutions, and we are a leading filtration provider in a wide range of markets, from the coarsest industrial filtration to the finest DNA separation. We provide the trusted solutions that our customers demand and expect. Our success is built on our ability to apply our technologies and expertise to an endless array of real-world customer needs. Virtually anywhere you go, 3M Purification Inc. technologies are at work – making life easier and better for people around the world.



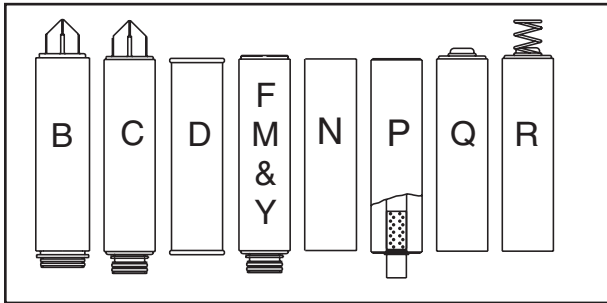
# Betapure™ NT-T Series Ordering Guide

Cartridge Type	Length (inches)	Grade Code Rating (µm)	Packaging Option	Support Ring Option	End Modification (see illustration below)	Gasket/O-ring Material
NT - Betapure NT-T Series	06* - 5 09 - 9 3/4 10 - 10 19 - 19 1/2 20 - 20 29 - 29 1/4* 30 - 30 39 - 39* 40 - 40	T005 0.5 T010 1 T020 2 T030 3 T050 5 T100 10 T200 20 T300 30 T400 40 T500 50 T700 70	S - Standard	For End Modification D, N, P, Q, & R 0 - None  For End Modification B, C, F, M, & Y 1 - Polysulfone 2 - Stainless Steel 0 - None	B - 226 O-Ring with Spear C - 222 O-Ring with Spear D - DOE with Polypropylene End Caps F - 222 O-Ring with Flat Cap M - 222 O-Ring with Flat Cap** N - Unmodified DOE P - Polypropylene Core Extender Q - SOE, End Cap without Spring R - SOE, End Cap with Spring Y - Single O-Ring (40" length only)	For End Modification B, C, D, F, M, Q, R & Y A - Silicone B - Fluorocarbon C - EPR D - Nitrile K - PTFE encapsulated fluorocarbon.  For End Modification N, P, Q & R G - Polyethylene

\* Requires N end modification for use in CT101 (PN 44860) only.

\* Applies to D, N, and P end modifications only.

\*\* For use with 1ZMP housing.



This Betapure NT-T Series filter is tested and certified by WQA against NSF/ANSI Standard 61 for material requirements only.\*

\*For O-Ring "K" please consult factory.

### Cold Water Only

Install this product in accordance with the instructions provided by the housing manufacturer. This product has a minimum flow rate requirement of 6.6 gallons per day (25L per day).

#### Important Notice

3M Purification Inc. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Since a variety of factors can affect the use and performance of a 3M Purification Inc. product in a particular application, some of which are uniquely within the user's knowledge and control, user is responsible for determining whether or not the product is fit for a particular purpose and suitable for user's method of application.

#### Limited Warranty

3M Purification Inc. warrants it this product to be free from defects in material and workmanship during normal use for a period of one (1) year from the date of shipment from the factory. If the Product(s) is (are) defective within this warranty period, your exclusive remedy and 3M Purification Inc.'s sold obligations shall be, at 3M Purification Inc.'s option, to replace or repair the Product(s) or refund the original purchase price of the Product(s) This warranty does not apply to failures that result from abuse, misuse, alternation or damage not caused by 3M Purification Inc. or failure to properly follow installation and use instructions.

#### Limitation of Liability

3M Purification Inc. will not be liable for any loss or damage arising from the use of the Product(s), whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you.

This warranty gives you specific legal rights and you may have other rights which vary from state to state, or country to country.

**Your Local 3M Purification Inc. Distributor:**



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