

3M Purification

Betapure™ NT-T Series Filter Cartridge



The Next Generation in Depth Filter Technology

Betapure™ NT-T Series filter cartridges are 3M Purification 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 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.

Applications

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

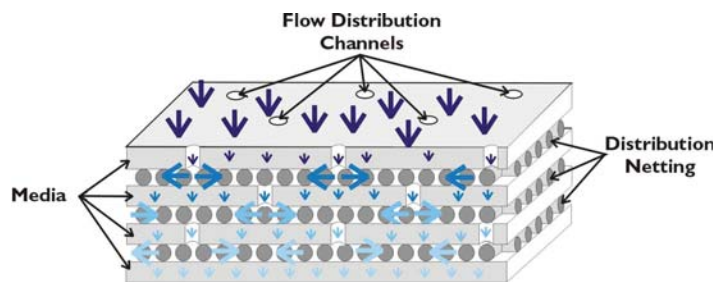


Figure 1: Betapure™ NT-T Series Media Sections. Note that the actual filter sections contain multiple layers of media.

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.





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

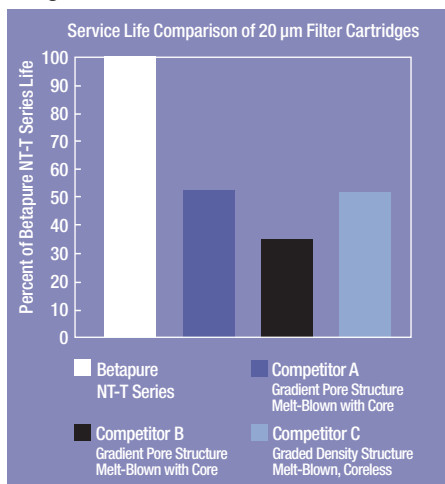
Flow channels appear in the outer and middle sections of the filter matrix, as seen in the cartridge cut-away. The size, number, and location of the flow channels combined with the fluid distribution netting ensure that a uniform amount of contaminant is distributed to each layer within these two sections, 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 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 416 lpm System

	Betapure NT-T Series Filters	Pall Profile	Pall Nexis	Osmonics Selex
Flow (lpm) / 10" cartridge @ 1 psid	11.8	3.8	6.8	0.8
Number of filters for a 416 lpm 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 416 lpm 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 to comply with the general procedures outlines in ASTM STP 975. 3M Purification defines absolute rating as the particle size (x) providing an initial Beta Ratio (Bx) = 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

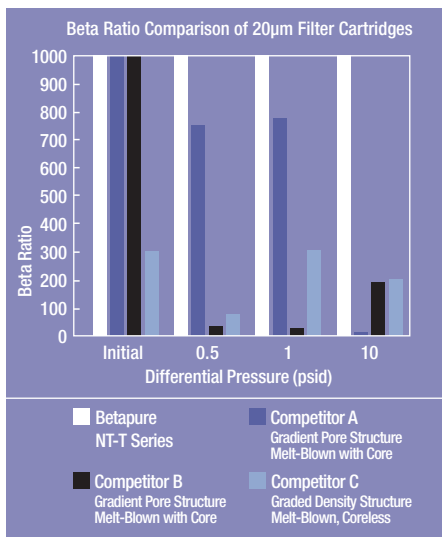


Table 2: Betapure NT-T Series Filter Ratings

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





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	82°C
Maximum Differential Pressure	340 kPa (49 psi) at 30°C 200 kPa (29 psi) at 55°C 100 kPa (14.5 psi) at 82°C
Recommended Change-Out Differential Pressure	240 kPa (35 psi) 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
		mbar/lpm/cps
T005	0.5	81.9
T010	1	45.5
T020	2	15.9
T030	3	8.0
T050	5	5.9
T100	10	2.5
T200	20	1.2
T300	30	0.91
T400	40	0.76
T500	50	0.52
T700	70	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.

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

NOTE: 100 mbar = 10 kpa

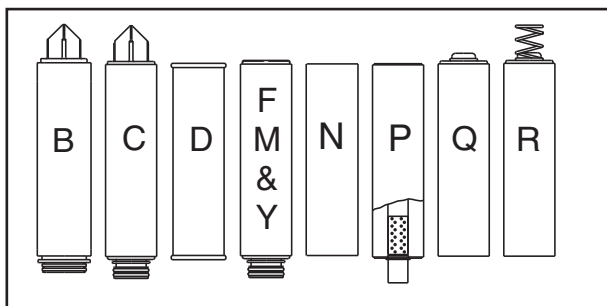
Betapure™ NT-T Series Ordering Guide


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

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 BE RESPONSIBLE FOR DAMAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OF OR RELIANCE UPON INFORMATION.

It is your responsibility to determine if additional testing or information is required and if this product is fit for a particular purpose and suitable in your specific application.

Limitation of Liability

3M Purification Pty Limited will not be liable, to the extent permitted by law, for any loss or damage from the use of the Product(s), whether direct, indirect, special, or consequential, regardless of the legal theory asserted, included warranty, contract, negligence or strict liability.



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