3M Purification
Product Brochure

Betapure™ NT-T Series
Industrial Grade Filters

the **next generation** in **depth filter** technology

The Next Generation In Depth Filter Technology

Betapure NT-T Series filter cartridges, formerly known as PolyNet Industrial, are 3M Purification's advance in depth filtration technology. The all polypropylene filter is constructed using a design that utilises 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 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 of filters achieve this through an innovative cartridge design that allows uniform distribution of fluid flow and contaminant throughout the entire depth of the cartridge (See Figure 1). Betapure NT-T Series filter construction combines a unique 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.

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.

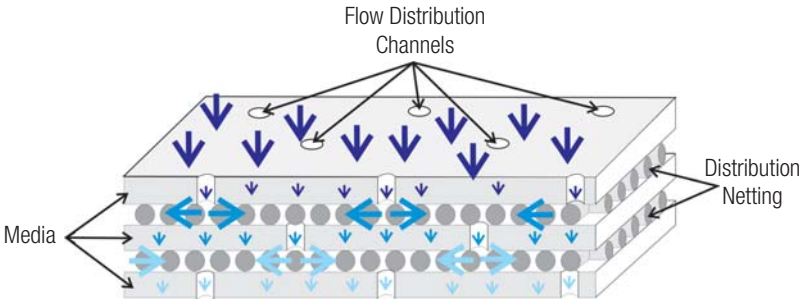


Figure 1: Betapure NT-T Series of filters construction

Features and Benefits

- Superior Service Life as much as 4 times greater contaminant holding capacity.
- All polypropylene depth filter cartridges allow for broad chemical and temperature compatibility.
- Ratings from 0.5 - 70 micron suit a wide range of applications.
- Absolute-Rated Performance allows for consistent filtration quality.
- Superior Particle Retention exhibits superior particle retention under increasing differential pressure.

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 Betapure NT-T Series filters exceptionally long service life, low pressure drop and increased cost effectiveness.

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

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 (see Graph 1 on following page).

Lower Pressure Drop

The unique design and construction of the Betapure NT-T Series cartridge allow for significantly lower pressure drops compared to equivalently rated melt-blown 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 Competitor C, 68% fewer than Competitor B, and 42% fewer than Competitor A. To underscore the Betapure NT-T Series filter cost benefit, use the example in Table 1 below as a guideline.

Table 1: Grade Comparison of 5 Micron* Filters in a 416 l/min (110 gpm) System

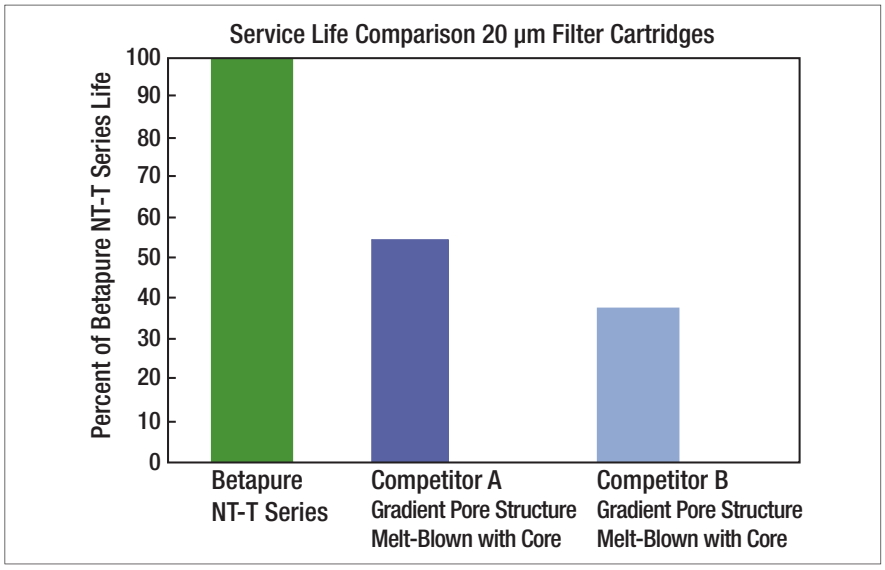
	Betapure NT-T Series Filters	Competitor A	Competitor B	Competitor C
Flow (l/min) / 10" Cartridge at 69 mbar	11.7	6.8	3.8	3.0
Number of Filters for a 416 l/min Flow Rate	12 - 30" Cartridges	21 -30" Cartridges	37 - 30" Cartridges	43 -30" Cartridges

* Based on the manufacturers published rating.

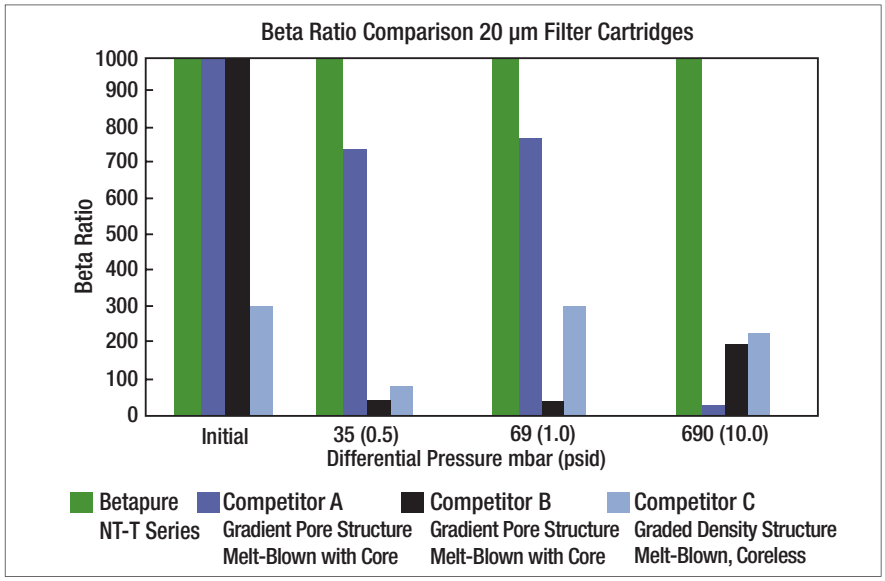
For the same initial cartridge differential pressure, a 416 l/min system using Betapure NT-T Series filters require significantly fewer cartridges. This results in lower capital investment for the filter housing and fewer cartridges to purchase.

The Confidence of Consistency

Betapure NT-T Series filters utilise 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 usable filter 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.



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



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

Your Benefit - Total Filtration Cost Reduction

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

Absolute Betapure NT-T Series Filter Cartridges

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 outlined in ASTM STP 975. 3M Purification defines absolute rating as the particle size (x) providing an initial Beta Ratio (ßx) = 1000. At this Beta Ratio, the removal efficiency is equal to 99.9%. Betapure NT-T Series filter ratings are specified in Table 2.

Table 2: Betapure NT-T Series Filter Ratings

Grade designation	Absolute rating in 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

Applications

Betapure NT-T's unique 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

- Acids
- Bleach (sodium hypochlorite)
- Polyethylene and polypropylene manufacture
- Amine sweetening
- Water flood

Fine Chemical and Electronics

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

Coatings

- Film & paper coatings
- Photographic film
- Lens coatings & magnetic media
- 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

3M Purification Filter Housings

3M Purification 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 has a filter housing to suit your needs.

CH Series Filter Housing

The CH Series filter housing is a durable high volume filter housing constructed from 304 or 316L stainless. With a cartridge capacity from 3 to 460 equivalent lengths (standard range), the CH filter can accommodate a wide range of flow requirements. For more information or special housings, ask your local 3M Purification representative.

CTG-Klean Filter Housing

A unique 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 representative.

DS Filter Housings

DS filter housings offer a cost effective alternative for low volume filtration. Constructed from 316L stainless steel, systems are available for a wide range of flow rates and applications. For more information, ask your local 3M Purification representative.

Table 3: Betapure NT-T Series Flow Rates

Grade	Absolute Rating (µm)	Specific Pressure Drop per 10" Cartridge* mbar/litre per min/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 centipoises.

Betapure NT-T Series Specifications

Materials of Construction*	
Filter Media, Netting, Core, End Connector	Polypropylene
Support Ring	Stainless Steel or Polysulfone
Gaskets & O-ring Options (see ordering guide)	Silicone, Fluorocarbon, EPR, Nitrile, Teflon Encapsulated Viton
Operating Conditions	
Maximum Operating Temperature	82 °C 3.4 bar at 30 °C
Maximum Differential Pressure	2.0 bar at 55 °C 1.0 bar at 82 °C
Recommended Change-Out Differential Pressure	2.4 bar at 30 °C
Cartridge Dimensions	
Inside Diameter	1 $^{3}/_{32}$" nominal (28 mm)
Outside Diameter	2 ½" nominal (64 mm)
Length	9 ¾", 10", 19 ½", 20", 29 ¼", 30", 39" and 40"
* All materials are FDA compliant per 21 CFR	

Flow Rates

Flow vs. differential pressure in water is depicted for each Betapure NT-T Series filter grade in the graph below. Detailed information for calculating flows for fluids with other viscosities is located in the following table. Use the formula at the right in conjunction with the values from columns 3 or 4 in table 3. The specific pressure drop values may be effectively used when three of the four variables (viscosity, flow, differential pressure and cartridge grade) are set.

$$\text{Clean } \Delta p \text{ in mbar (psi)} = \frac{\left(\text{Total system l/min (gpm)}\right)\left(\text{Viscosity in cP}\right)\left(\text{Value from table}\right)}{\left(\text{Number of Cartridges in housing}\right)\left(\text{Equivalent Single Length}\right)}$$

Chemical Compatibility

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.

Betapure NT-T Series Capsule Ordering Guide

Cartridge Type	Grade Code	Grade Rating (µm)	Configuration	Nominal Length	End Modification	Vent O-Ring Option	Packaging Option
NT-T - Betapure NT-T Series	**T005**	0,5	**C** - Capsule	**01** - 2 ½"	**A** - 1½" sanitary Flange	**A** - Silicone	**01** - Single Pack
	T010	1		**02** - 5"	**B** - 1/2" (14mm) Hose Barb	**B** - Fluorocarbon	**03** - 3-Pack
	T020	2			**C** - 1/4" MNPT	**C** - EPR	**20** - 20-Pack
	T030	3			**D** - 3/8" FNPT		
	T050	5			**E** - 1/4" - 5/16" - 3/8" Tampered Hose Barb		
	T100	10					
	T200	20					
	T300	30					
	T400	40					
	T500	50					
	T700	70					

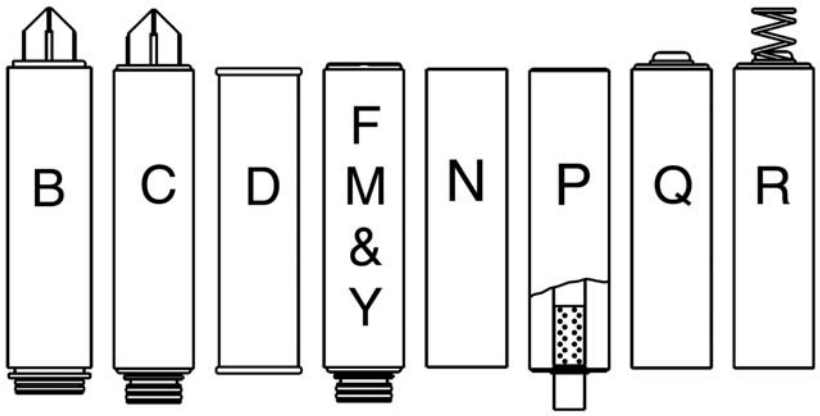
Note: Betapure NT-T is new name of PolyNet Industrial.

Betapure NT-T Industrial Cartridge Series Ordering Guide

Cartridge Type	Length	Grade Code	Grade Rating (µm)	Packaging Option	Support Ring Option	End Modification	Gasket/O-ring Material
NT-T = Betapure NT-T Series	**06** - 5"[1] **09** - 9 ¾* **10** - 10" **19** - 19½* **20** - 20 **29** - 29 ¼* **30** - 30" **39** - 39* **40** - 40"	**T005** **T010** **T020** **T030** **T050** **T100** **T200** **T300** **T400** **T500** **T700**	0,5 1 2 3 5 10 20 30 40 50 70	**S** = Standard	**For End Modification D, N, P, Q & R** **0** - None **For End Modification B, C, F, M & Y** **0** - None **1** - Polysulfone **2** - Stainless Steel	**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 Viton **For End Modification N, P, Q & R** **G** - Polyethylene

Note: Betapure NT-T is new name of PolyNet Industrial.

NT-T End Modifications



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