CUNO
a 3M company

Betapure™ NT-T Series
Filter Cartridges

The Next Generation in Depth Filter Technology

Betapure™ NT-T Series filter cartridges are CUNO's latest advance in depth filtration technology. The all polypropylene filter is constructed using a patented* 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

CUNO 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 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.

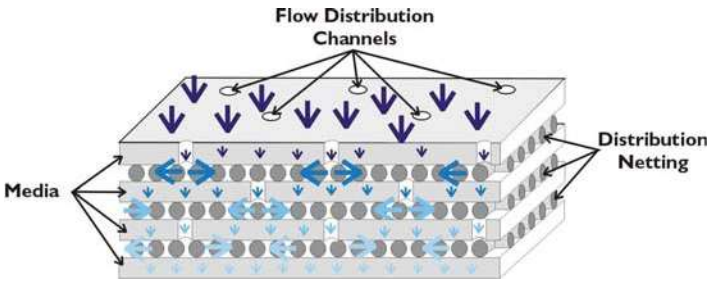

Figure 1: Betapure NT-T Series Media Sections. Note that the actual filter sections contain multiple layers of media.

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.

* US Patent 6,391,200

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 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, photo graphic 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

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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

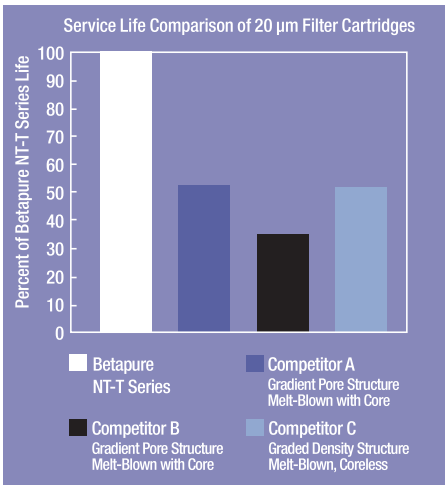
Flow channels appear in the outer and middle sections of the filter matrix, as seen in the cartridge cut-away. The size, number, and location of the flow channels combined with the fluid distribution netting ensure that a uniform amount of contaminant is distributed to each layer within these two sections, 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 CUNO 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 unique 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 CUNO to comply with the general procedures outlines in ASTM STP 975. CUNO 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

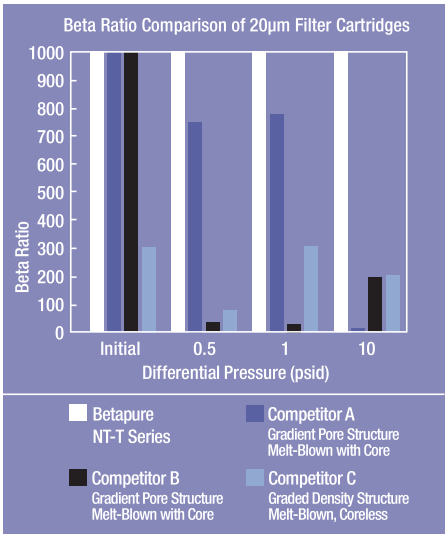


Table 2: Betapure NT-T Series Filter Ratings

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' unique patented 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 unique 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 unique 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 unique 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

CUNO Filter Housings

CUNO 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 CUNO 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 CUNO distributor for brochure LITCHSES1.

CTG Series 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 CUNO distributor for brochure LITCCK001.

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 LITHSDC1 and LITHSSS1.

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, Teflon® Encapsulated Viton®, 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.

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

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 CUNO SASS organization is a team of multi-disciplinary scientists and engineers that provide the vital link between CUNO's filtration knowledge base and customer needs. With complete access to CUNO 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 unique processing requirements are encountered, SASS is expertly equipped to identify filtration solutions using either the broad array of existing CUNO filter products or by working with CUNO R&D to design a custom solution for the application.

Service Worldwide

CUNO 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.

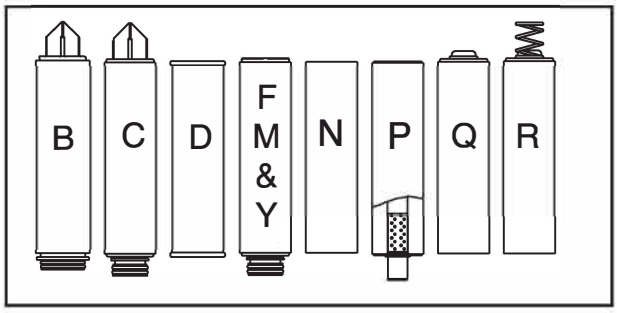
A Global, Diversified Technology Company

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 CUNO 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** - Teflon Encapsulated Viton O-Ring 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 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

CUNO 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 CUNO 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 CUNO product is fit for a particular purpose and suitable for user's method of application.

Warranty

Seller warrants its equipment against defects in workmanship and material for a period of 12 months from date of shipment from the factory under normal use and service and otherwise when such equipment is used in accordance with instructions furnished by Seller and for purposes disclosed in writing at the time of purchase, if any. Any unauthorized alteration of modification of the equipment by Buyer will void this warranty. Seller's liability under this warranty shall be limited to the replacement or repair, F.O.B., point of manufacture, of any defective equipment or part which, having been returned to the factory, transportation charges prepaid, has been inspected and determined by Seller to be defective. THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EITHER EXPRESSED OR IMPLIED, AS TO DESCRIPTION, QUALITY, MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR ANY OTHER MATTER. Under no circumstances shall Seller be liable to Buyer or any third party for any loss of profits or other direct or indirect costs, expenses, losses or consequential damages arising out of or as a result of any defects in or failure of its products or any part or parts thereof or arising out of or as a result of parts or components incorporated in Seller's equipment but not supplied by the Seller.

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Your Local CUNO Distributor:

Nordic Filtration

At www.nordicfiltration.com you will find a wide selection of filtration products ready for you to order.

Nordic Filtration offers a wide selection of filtration products for water treatment. We have stock in Denmark from where we distribute all of our products to Scandinavia and the the rest of the world.

You can buy our products on local websites or by contacting us by phone or e-mail. Information about our products as well as brochures and manuals can be found on our website (www.nordicfiltration.com).

We can adapt all of our filtration products to your needs, and we offer visits from our consultants in order to find the right solution for you.

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