



BETAPURE™ PN Filter Cartridges

the next generation
in depth filter technology



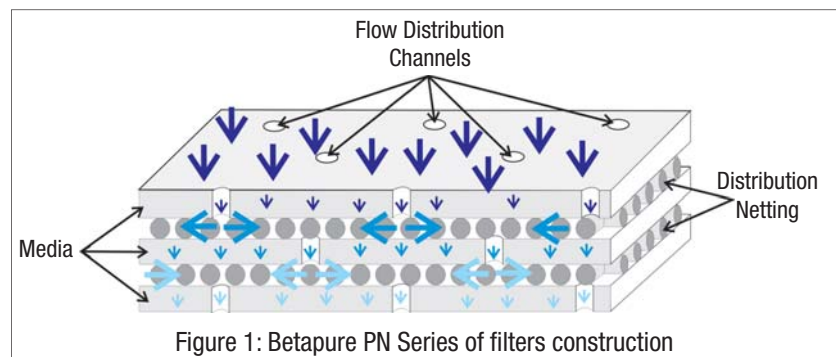
The Next Generation In Depth Filter Technology

Betapure PN 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 PN Series filter cartridges - the new leader in filtration performance.

Betapure PN Series Construction

CUNO designed the Betapure PN Series cartridge to provide significantly superior service life while maintaining a consistent filtration efficiency. Betapure PN 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 PN 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.



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 suits a wide range of applications.
- Absolute-Rated Performance allows for consistent filtration quality.
- Superior Particle Retention exhibits superior particle retention under increasing differential pressure.

* US Patent 6,391,200



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

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

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 PN Series filters. The result is significantly shorter service life, and unpredictable filtration efficiencies. Betapure PN 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 PN Series cartridge allow for significantly lower pressure drops compared to equivalently rated melt-blown depth filters. Based on published data, a Betapure PN Series filter system with a given flow would use up to 75% fewer cartridges than Competitor O, 68% fewer than Competitor P, and 42% fewer than Competitor F. To underscore the Betapure PN Series filter cost benefit, use the example in Table 1 below as a guideline.

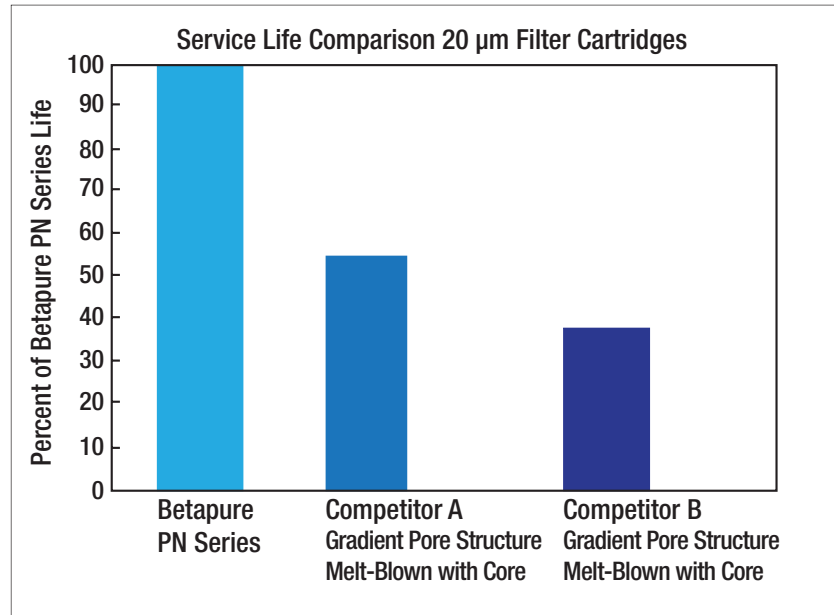
| | Betapure PN Series Filters | Competitor F | Competitor P | Competitor O |
|---|----------------------------|--------------------|---------------------|--------------------|
| Flow (gpm) / 10" Cartridge @ 69 mbar (1 psid) | 3.1 | 1.8 | 1.0 | 0.8 |
| Number of Filters for a 416 l/min (110 gpm) Flow 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 (110 gpm) system using Betapure PN Series filters require significantly fewer cartridges. This results in lower capital investment for the filter housing and fewer cartridges to purchase.

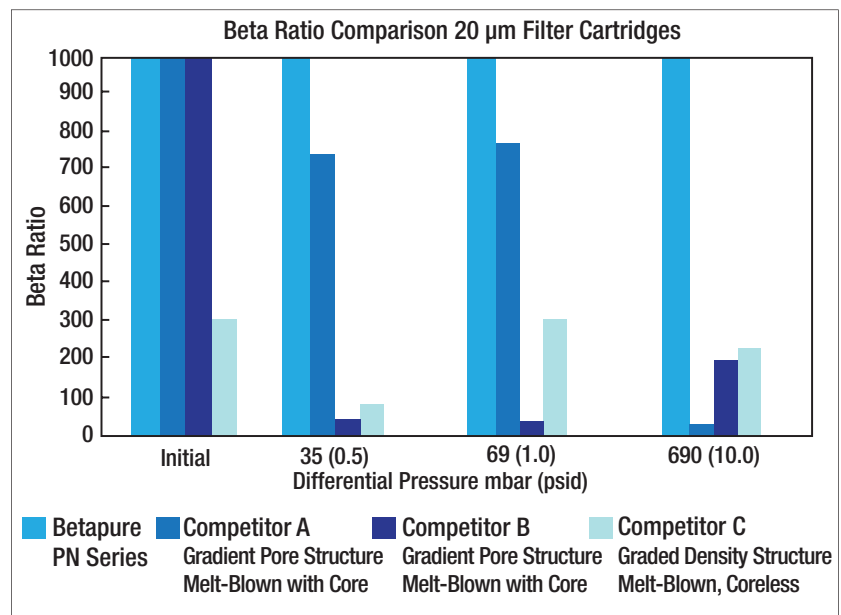


The Confidence of Consistency

Betapure PN 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 PN 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 PN Series filters deliver longer service life



Graph 2: Beta Ratios demonstrate the Betapure PN Series filter's ability to perform consistently throughout its life

Table 2: Betapure PN Food & Beverage Series Filter Ratings

| Grade designation | Absolute rating in micron |
|-------------------|---------------------------|
| B005 | 0.5* |
| B010 | 1 |
| B020 | 2 |
| B030 | 3 |
| B050 | 4 |
| B100 | 5 |
| B200 | 10 |
| B300 | 20 |
| B400 | 30 |
| B500 | 40 |
| B700 | 70 |

* extrapolated

Absolute Betapure PN Series Filter Cartridges

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

Your Benefit - Total Filtration Cost Reduction

The Betapure PN 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 PN Series cartridge cartridges - providing performance and value.

Applications

Betapure PN'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.

Food & Beverage

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





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.

NSL Series Filter Housing

The NSL Series filter housing is a durable high volume filter housing constructed from 316L stainless. With a cartridge capacity from 12 to 480 equivalent lengths (standard range), the NSL filter can accommodate a wide range of flow requirements. For more information or special housings, ask your local CUNO 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 CUNO representative.

DC Filter Housings

DC filter housings offer a cost effective alternative for low volume filtration. Constructed from reliable 304L stainless steel or 316L stainless steel, systems are available for a wide range of flow rates and applications. For more information, ask your local CUNO representative.

Betapure PN Series 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 | 82 °C (180 °F) 3.4 bar at 30 °C (50 psid at 86 °F) |
| Maximum Differential Pressure | 2.0 bar at 55 °C (30 psid at 131 °F) 1.0 bar at 82 °C (15 psid at 180 °F) |
| Recommended Change-Out Differential Pressure | 2.4 bar at 30 °C (35 psid at 86 °F) |
| Cartridge Dimensions | |
| Inside Diameter | 1 3/32" nominal (28 mm) |
| Outside Diameter | 2 1/2" nominal (64 mm) |
| Length | 9 3/4", 10", 19 1/2", 20", 29 1/4", 30", 39" and 40" |
| * All materials are FDA compliant per 21 CFR | |

Table 3 : Betapure PN Food & Beverage Series Flow Rates

| Grade | Absolute Rating (µm) | Specific Pressure Drop per 10" Cartridge* | |
|-------|----------------------|---|--------------|
| | | psid/gpm/cps | mbar/lpm/cps |
| B005 | 0,5 | 4.5 | 81.9 |
| B010 | 1 | 2.5 | 45.5 |
| B020 | 2 | 0.87 | 15.9 |
| B030 | 3 | 0.44 | 8.0 |
| B050 | 5 | 0.32 | 5.9 |
| B100 | 10 | 0.14 | 2.5 |
| B200 | 20 | 0.065 | 1.2 |
| B300 | 30 | 0.05 | 0.91 |
| B400 | 40 | 0.042 | 0.76 |
| B500 | 50 | 0.029 | 0.52 |
| B700 | 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 centipose.

Flow Rates

Flow vs. differential pressure in water is depicted for each Betapure PN 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 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.

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

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.

Scientific Application Support Services (SASS)

Dedicated technical support teams comprised of CUNO 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 CUNO's advanced laboratories, the SASS staff frequently performs on-site testing at customer's facilities. Contact your CUNO representative for additional information.





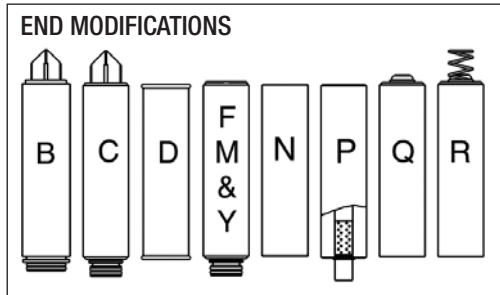
Betapure PN Food & Beverage Series Ordering Guide


| Cartridge Type | Length | Grade | | Packaging Option | Support Ring Option | End Modification | Gasket/O-ring Material |
|----------------------------------|------------|-------|-------------|------------------|--|--|---|
| | | Code | Rating (µm) | | | | |
| PN = Betapure PN Series | 06 = 5"¹ | B005 | 0,5 | 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 |
| | 09 = 9 ¾" | B010 | 1 | | | | |
| | 10 = 10" | B020 | 2 | | | | |
| | 19 = 19 ½" | B030 | 3 | | | | |
| | 20 = 20" | B050 | 5 | | | | |
| | 29 = 29 ¼" | B100 | 10 | | | | |
| | 30 = 30" | B200 | 20 | | | | |
| | 39 = 39" | B300 | 30 | | | | |
| | 40 = 40" | B400 | 40 | | | | |
| | | B500 | 50 | | | | |
| | B700 | 70 | | | | | |

¹ 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 PN 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 25 L per day (6.6 gallons 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 or 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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