

Betapure® Rigid Filter Media Cartridges and Capsules

The Betapure Filter Advantage

- Precise Contaminant Removal
- Improved Effluent Quality
- Reduced Operating Costs



Designed for Optimum Filtration Quality



Betapure filter cartridges and capsules set the standard for filtration performance. Offering more grades with absolute removal ratings than competitive filters, the controlled pore size of the Betapure filter matrix allow for absolute distinction between cartridge grades to provide the most accurate and consistent filtration. The Betapure filter provides:

- Precise Contaminant Removal
- Consistent Effluent Quality
- Superior On-stream Service Life

Betapure filters, available in 18 distinct grades with absolute ratings from 2 to 190 microns to tailor the exact selection of performance characteristics for the greatest filtration economy by providing distinct removal cut-off points by particle size. Betapure filter manufacturing combines advanced incoming material quality assurance, exacting in-process controls, and extensive final product testing and verification. The result is a filter product that provides consistent filtration lot-to-lot, filter-to-filter.

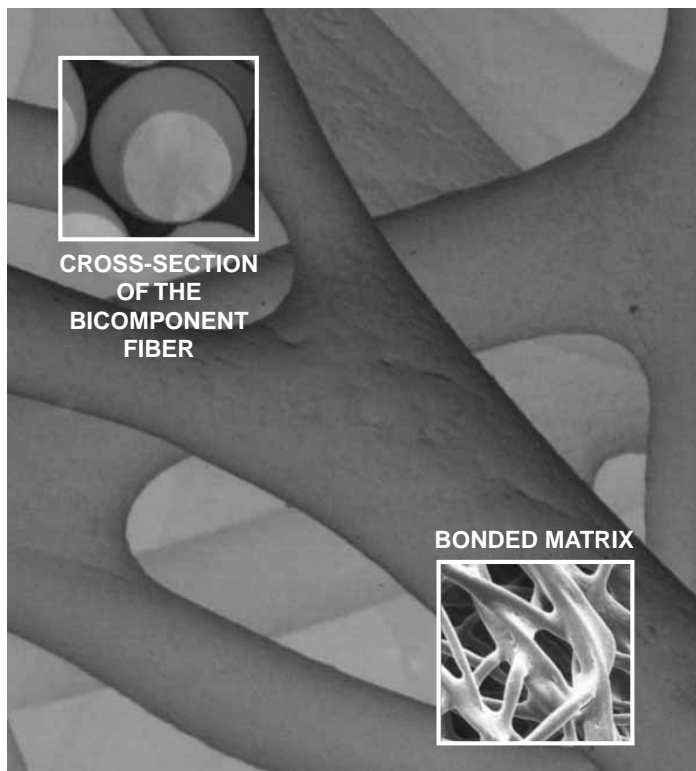
Applications

- Coatings - Magnetic Media, High Quality Paint, Film Coatings, Resins, and Ink
- Food & Beverage - Bottled Water, Pre RO, Blend Water, Wash Water
- General Industrial - Desalination, Plating, Machine Tool Coolant, Process Water
- Pharmaceutical - Water, Solvents, Chemicals, Pre RO, Antibiotic Intermediate Production
- Electronics - Pre RO, Wafer Slurries, Ceramic Slurries, Chemical Mechanical Polishing, Cathode Ray Tube Production, Disc Cleaning
- Chemical / Petro-Chemical - Process Water, Pre RO, Amine, Fine Chemicals, and MTBE

The Rigid Construction Advantage

Features	Benefit	Advantage
<ul style="list-style-type: none"> ■ Absolute Ratings 	<ul style="list-style-type: none"> ■ Consistent and reproducible contaminant removal 	<ul style="list-style-type: none"> ■ To meet demanding filtration quality standards in today's market, absolute ratings will provide product consistency, and improve product yields.
<ul style="list-style-type: none"> ■ Rigid structure 	<ul style="list-style-type: none"> ■ Eliminates cartridge by-pass and unloading to provide consistent filtration from start to finish 	<ul style="list-style-type: none"> ■ The rigid filter structure retains consistent pore size even under severe process conditions. Changes such as those caused by pump fluctuations, stopping and restarting the system, or high differential pressure will have minimal, if any effect on product consistency.
<ul style="list-style-type: none"> ■ Depth filtration 	<ul style="list-style-type: none"> ■ Excellent removal of deformable contaminants for consistent effluent 	<ul style="list-style-type: none"> ■ Depth filtration removes deformable contaminants to reduce or totally eliminate rework or product quality rejection.
<ul style="list-style-type: none"> ■ Gasket design 	<ul style="list-style-type: none"> ■ Eliminates by-pass from poor or damaged seals 	<ul style="list-style-type: none"> ■ Critical to any filtration process is the elimination of filter by-pass. A closed cell polyethylene foam gasket ensures proper cartridge sealing when using knife-edge housing systems.
<ul style="list-style-type: none"> ■ Lower pressure drop 	<ul style="list-style-type: none"> ■ Provides long service life while using smaller filter housings 	<ul style="list-style-type: none"> ■ Minimizing flow restriction dramatically reduces filtration cost! Lower pressure drops mean increased filter life, product throughput, and permit the use of fewer filters to achieve a given flow vs. differential pressure.
<ul style="list-style-type: none"> ■ Available in standard cartridge and disposable capsules 	<ul style="list-style-type: none"> ■ Wide range of filter sizes allows more appropriate filter sizing for batch and continuous processes 	<ul style="list-style-type: none"> ■ Filters appropriately sized for a specific application reduces total filtration costs including purchase, installation, and disposal.

Performance Construction for Precision Filtration



Betapure filter manufacturing utilizes state-of-the-art technology to produce a clean, rigid, filter structure with consistent and reproducible filtration characteristics. The filter matrix is constructed using long bicomponent fibers, each fiber having an inner core and an outer sheath (see picture above). Betapure filters are available in two bicomponent fiber structures, polypropylene/polyethylene or polyester/co-polyester, to provide the greatest range of process compatibility.

The bicomponent fibers of the filter matrix are thermally bonded by utilizing the difference in melt temperatures of the two fiber components. Heating the matrix to the melt temperature of the polyethylene sheath, but below that of the polypropylene core, causes the fiber-to-fiber bond at every contact point. **The high degree of fiber-to-fiber bonding provides a rigid structure that eliminates the need for a core support and any possibility of media migration.**

The Betapure filter ensures that the unwanted particles are removed because:

- The rigid structure maintains its porosity throughout the filter life.
- The depth structure removes more difficult deformable contaminants.

With 18 distinct grades with absolute ratings from 2 to 190 microns to permit the exact filter performance selection, Betapure filters provide the greatest filtration economy available.

Enhanced Effluent Consistency

The sole purpose of filtration is to remove contaminants or materials that compromise product quality - throughout the entire service life of the filter. A non-rigid filter's pore structure changes as the system differential pressure increases. The result is changing filtration efficiency and inconsistent performance during the filter service life. This can only be corrected by a filter that retains its pore structure. Betapure filters are manufactured with precise control of the filter porosity coupled with the rigid Betapure structure to maintain its porosity throughout its service life. The result is consistent filtrate quality that is reproducible time after time, week after week, year after year.

Removal Ratings

CUNO uses a Multiple Parameter Characterization (MPC) that, unlike single point evaluations, determines a removal rating over a range of particle sizes (multi-value) and the filter's service life (multi-point). The parameters measured include particle counts, turbidimetric efficiencies, and removal efficiencies.

Table 1. - Polyolefin Betapure Ratings

Grade	Rating (mm)		Grade	Rating (mm)	
	Absolute	Nominal		Absolute	Nominal
Z13 - 020	2	0.2	B11	20	5
Z13 - 030	3	0.3	C11	30	10
Z13 - 050	5	0.5	E11	40	20
Z11 - 060	6	0.6	G11	70	30
Z11 - 070	7	0.7	L11	90	50
Z11 - 080	8	0.8	Q11	100	75
Z11 - 100	10	0.9	V11	140	100
Z11 - 120	12	1	W11	160	150
Z11 - 150	15	3	X11	190	175

Table 2. - Polyester Betapure Ratings

Grade	Rating (mm)	
	Absolute	Nominal
A12	8	3
B12	20	5
C12	30	10
E12	40	20
G12	70	30

Filtration Advantage - Rigid Construction

Comparing Filtration Characteristics

The structure of the BETAPURE cartridge provides filtration characteristics that are more consistent than competitive filter cartridges.

The following curves show the filtration characteristics of the BETAPURE cartridge compared to other polyolefin cartridges, and typical polypropylene melt-blown and string-wound cartridges **of equivalent removal rating**.

Scientific Applications Support Services



The cornerstone of CUNO's philosophy is service to customers, not only in product quality and prompt delivery, but also in validation, application support and in the sharing of scientific information.

How these tests were conducted...

CUNO uses a Multiple Parameter Characterization (MPC) that, unlike single point evaluations, determines a removal rating over a range of particle sizes (multi-value) and the filter's service life (multi-point). The parameters measured include particle counts, turbidimetric efficiencies, and removal efficiencies.

Conditions of Test	
Flow:	3 gpm
Fluid:	Water

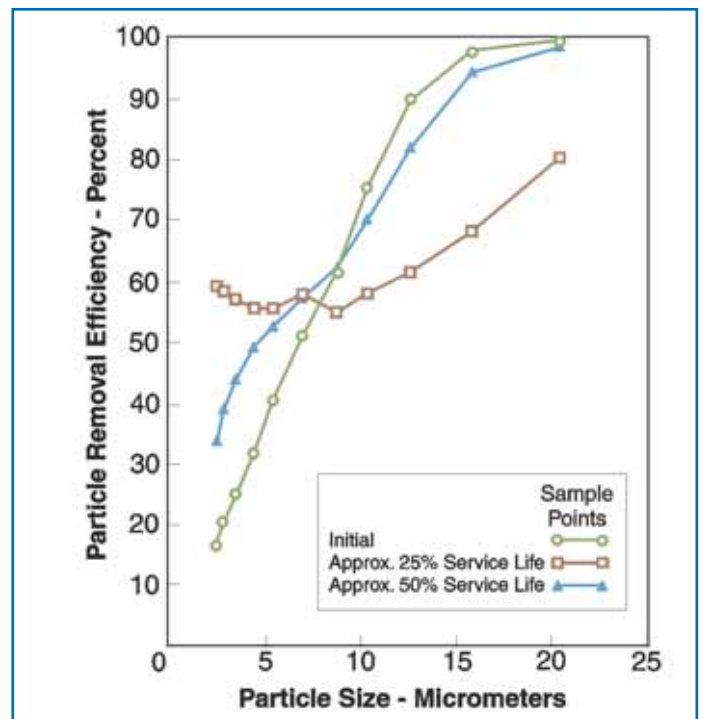
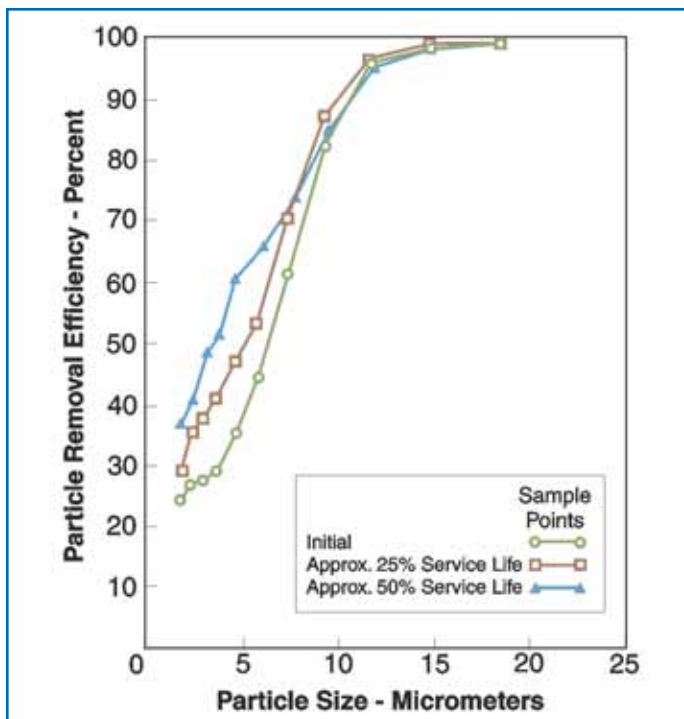
CUNO's Scientific Applications Support Services (SASS) works closely with customers to solve difficult filtration challenges and to recommend the most efficient, economical filter systems. SASS specialists can perform on-site testing and utilize filtration applications expertise to partner with customers. CUNO resolves filtration problems promptly and efficiently in a cost-effective, confidential manner with a commercial support group consisting of CUNO's in-house customer service staff, application specialists, and engineering services. CUNO's broad distributor base and sales offices provide worldwide customer service, local inventory, and field support in virtually every major center of manufacturing.

Betapure Filter

Note that the Betapure filter exhibits excellent filtration capability during its service life. This is evident by the close proximity of the curves to one another. From start to finish, the filter performance does not vary. The rigid Betapure filter structure resists deformation, particle unloading or filter by-pass, and provides consistently high particle removal efficiency.

Other Polyolefin Bicomponent Filters

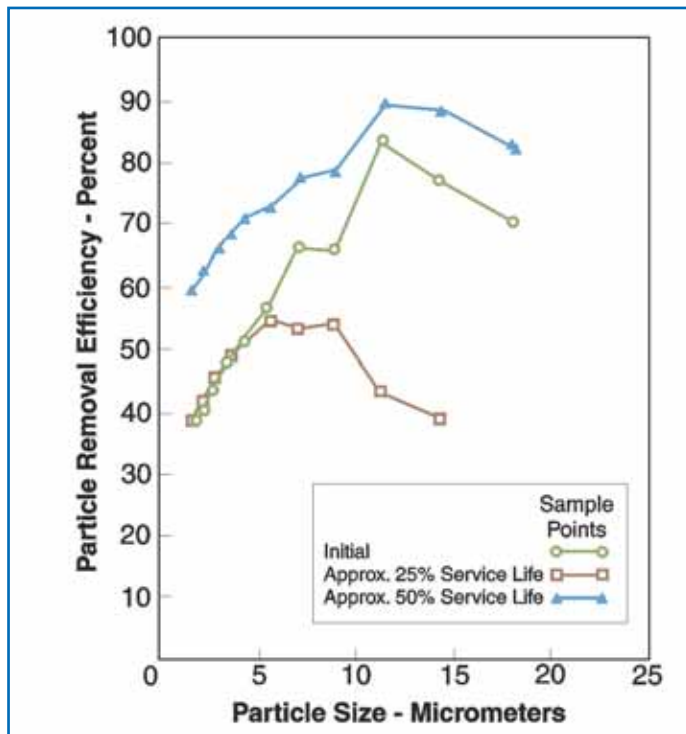
Other bicomponent filters may look like Betapure cartridges, but they can't match the performance. Note that immediately after the filter is put into service, the efficiency drops but then recovers to the initial efficiency. The inconsistent efficiency exhibited during the service life is reflected in poor effluent and is not reliable enough to satisfy the demand for exceptional product quality.



Filtration Advantage - Rigid Construction

String-Wound Filter

The competitive cartridge exhibits erratic filtration characteristics that dramatically fluctuate in response to increasing differential pressures.

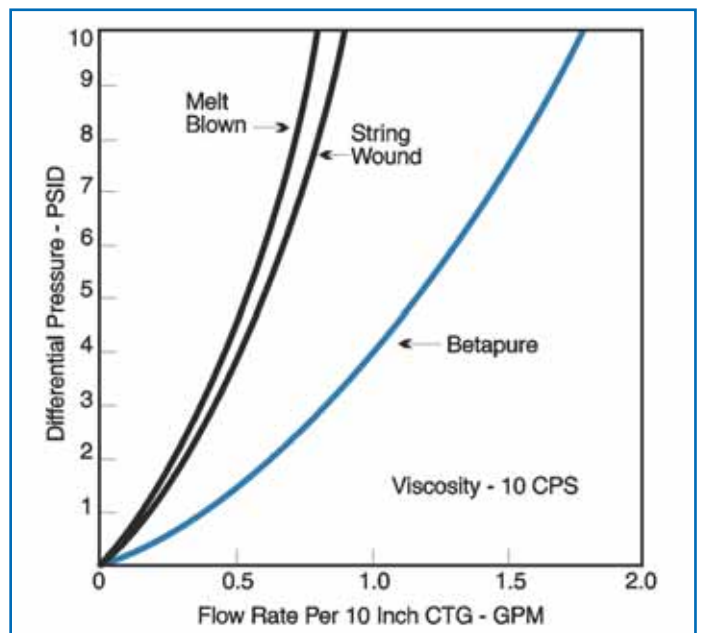


Flow Characteristics

BETAPURE exhibits superior flow characteristics for the same removal rating as other polyolefin fiber based cartridges.

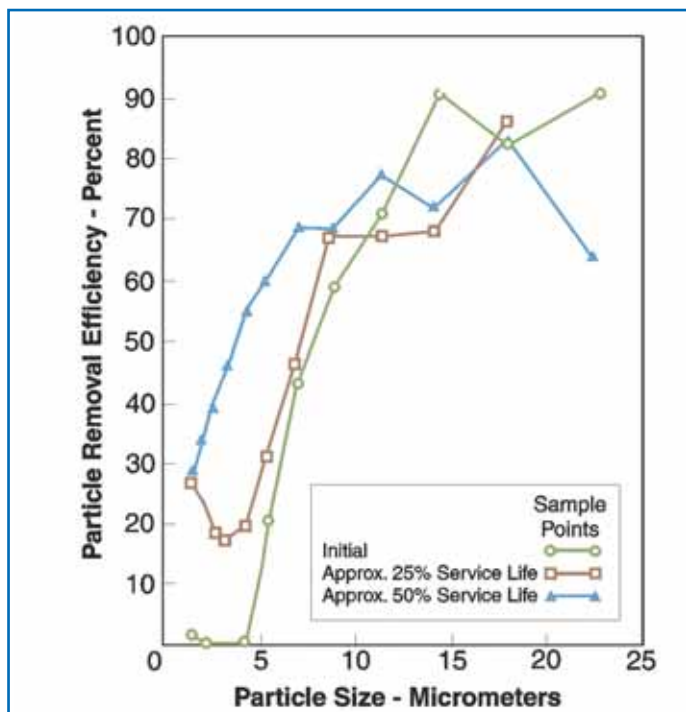
The curve shows that at a given flow rate the pressure drop across BETAPURE is considerably lower than competitive products. The benefits of lower pressure drops are:

- Longer cartridge life
- Higher through puts
- Smaller housing requirements
- Lower overall costs



Melt-Blown Filter

The compressible structure of a melt-blown filter exhibits wide fluctuations in performance efficiency as the system pressure changes. Such filtration characteristics lead to inconsistent and unpredictable product quality.



Chemical Compatibility

Betapure filters are composed of a bicomponent fibers, either polypropylene / polyethylene or polyester / copolyester, both offering broad chemical compatibility. Note that compatibility is always a function of exposure time, operating temperature, and chemical concentration. If compatibility is in question, Cuno recommends that the filter be tested. For more general information about Betapure filter chemical compatibility, contact your local distributor and ask for LITBPG01.

Regulatory Compliance

Standard Betapure filters (polypropylene / polypropylene) comply with FDA regulations (CFR 21) for food and beverage applications. Betapure filters have also been USP XXI Class VI (Safety Test for Plastics) tested and have been deemed suitable for pharmaceutical application. Detailed information about application compatibility and samples for testing are available by contacting your local Cuno representative.

Operating Data

Operating Parameter	Description
Polyolefin Betapure	
Maximum Operating Temperature	175°F (80°C)
Maximum Differential Pressure*	80 psid (5.5 bar) @ 68°F (20°C)
Polyester Betapure	
Maximum Operating Temperature *	250°F (120°C)
Maximum Differential Pressure*	80 psid (5.5 bar) @ 68°F (20°C)
* Betapure's rigid structure will tolerate up to 80 psid. Normally Cuno recommends the use of the lowest possible flow rate and filter re-placement at 35 psid to enhance both filter life and filtration efficiency.	

Disposal

Betapure filter cartridges can be incinerated, shredded or crushed after use to reduce the overall disposal costs. For more information about Betapure disposal, ask your local Cuno distributor for LITGFTD2.

Cartridge Configurations

All Betapure cartridges are available in continuous multiple lengths up to 60 inches long, with various end treatments to fit your current housing (see ordering guide).

Table 3. - Betapure Cartridge Parameters	
Parameter	Description
Length*	9 3/4" to 60" (24.8 - 152.4 cm)
Inside Diameter	1.0" (2.54 cm)
Outside Diameter	2.5" (6.35 cm)
* Other sizes available on request, consult factory	

Special Configurations

Betapure is available in special configurations upon request. The length, inside and outside diameters can be modified for your specific needs. Consult your local Cuno distributors for more information.

Table 4. - Betapure filter flow information			
Grade	Absolute Rating (mm)	Specific Pressure Drop per 10" Cartridge*	
		psid/gpm	mbar/lpm
Polyolefin Betapure Filters			
B11	20	0.28	5.1
C11	30	0.12	2.18
E11	40	0.05	0.89
G11	70	0.03	0.55
L11	90	0.02	0.36
Q11	100	0.01	0.18
V11	140	0.007	0.127
W11	160	0.005	0.091
X11	190	0.004	0.074
Polyester Betapure Filters			
A12	8	0.14	2.55
B12	20	0.11	2.00
C12	30	0.08	1.44
E12	40	0.03	0.55
G12	70	0.02	0.36
Z Series Betapure Filters			
Z13-020	2	0.88	16.0
Z13-030	3	0.47	8.6
Z13-050	5	0.29	5.3
Z11-060	6	0.31	5.6
Z11-070	7	0.29	5.3
Z11-080	8	0.28	5.1
Z11-100	10	0.27	4.9
Z11-120	12	0.22	4.0
Z11-150	15	0.19	3.5
* For multiple cartridge lengths, divide total flow by the number of single length equivalents.			

How to Determine Cartridge Flow Rates/Pressure Drop Sizing

Betapure exhibits superior flow characteristics for the same micron rating compared to other fiber based cartridges. This allows for longer cartridge life, higher throughput, and smaller housing requirements. Table 4 provides flow information for Betapure filters in aqueous fluids.

The specific pressure drop values (psid/gpm) per 10" cartridge at 1 centipoise are provided for each filter grade. For fluids other than water, multiply the specific pressure drop value by the viscosity in centipoise. The specific pressure drop values may be effectively used when three of the four variables (viscosity, flow, differential pressure, and cartridge grade) are set.

Example 1: Determine the initial pressure drop for water flowing at 15 gpm per 30" (C11) 30 µm cartridge.

Fluid = Water (1 centipoise)

Flow = 15 gpm

Flow per 10" cartridge = $15 \div 3 = 5$ gpm

Specific pressure drop from column 3 of Table 4 = 0.12

Calculate: $0.12 \times 5 = 0.6$ psi initial pressure drop (30" cartridge)

Example 2: Determine the oil flow rate at an initial pressure drop of 2.0 psi per 10" (E11) 40 µm cartridge.

Fluid = 100 centipoise oil

Initial differential pressure = 2.0 psi

Specific pressure drop from column 3 of Table 4 = 0.05

Multiply psi/gpm x viscosity in centipoise = $0.05 \times 100 = 5$

Calculate: 2.0 (psi) \times 5 (psi/gpm per 10" ctg) = 0.4 gpm (10" ctg)

Betapure Capsules

The Betapure capsule is a polypropylene encapsulated filter that eliminates the need for a separate filter vessel. Available in a wide range of configurations (see ordering guide) including sanitary flange and hose barb connections, the 2.5" and 5" capsules are ideal for small batch and filter test applications. The following are typical water flow rates for Betapure capsules with 1 1/2" sanitary flange connections. Other end connections will affect maximum flow rates (see table at right). Consult factory representative for flow rates using optional end connections, request LITTDPCFL, or visit www.cuno.com.



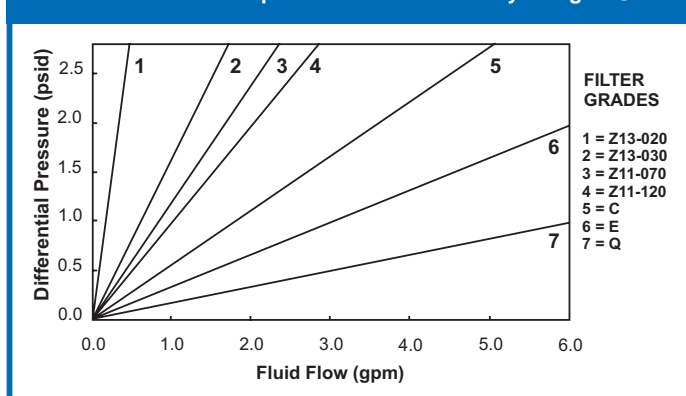
Betapure Capsule - Materials of Construction

All Betapure Filter Media	Bi-component polypropylene / polyethylene fibers
Z11 Filter Media	Includes a polypropylene insert
Z13 Filter Media	Includes a glass paper insert
Capsule Body	PolyPropylene
Vent/drain O-rings	See ordering guide

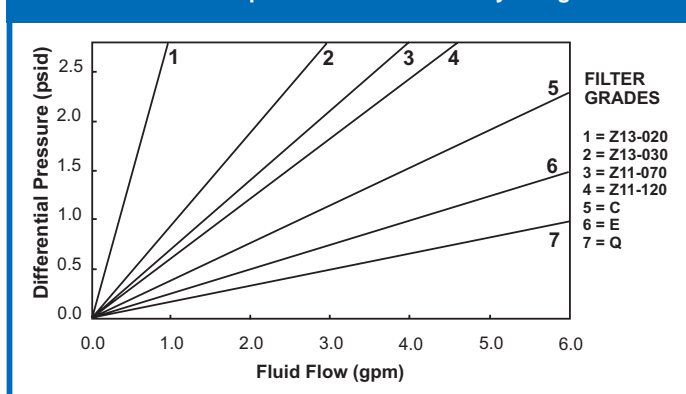
Betapure Capsule - Maximum Recommended Flow by Configuration

End Connection	Maximum Flow Rate (gpm)	Housing Pressure Loss (psid)
1 1/2" Sanitary Flange	6.00	1.00
3/4" FNPT	6.00	1.00
1/2" Hose Barb	3.00	1.50
1/4" MNPT	1.50	2.40
Tapered Hose Barb	0.50	2.20

Flow Rates for 2 1/2" Capsules with 1 1/2" Sanitary Flanges @ 20°C

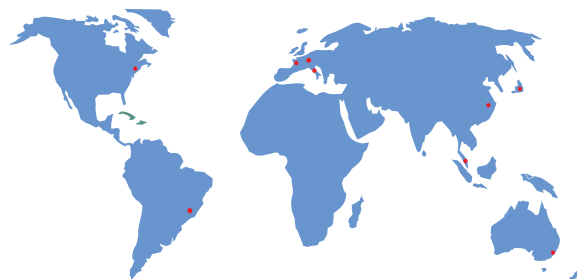


Flow Rates for 5" Capsules with 1 1/2" Sanitary Flanges @ 20°C



Service Worldwide

CUNO is a U.S. based multinational, high technology company with worldwide distribution and manufacturing facilities. The majority of CUNO's manufacturing sites have ISO 9002 registered quality systems. Global manufacturing sites together with trained stocking distributors and state-of-the-art laboratory support bring quality solutions to challenging filtration applications.



Filter Systems

CUNO manufactures a full line of Betapure compatible filter housings and a wide variety of industrial filter media to meet most application requirements. Housing Models are available for both air and liquid applications in a wide range of construction materials, from plastics to ASME Code Design 316L stainless steel, to suit a variety of application needs. For more information about CUNO filter housings and other filter media, consult your local CUNO distributor.

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 the 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.

Betapure Cartridge Ordering Guide

Cartridge Type	Length	Grade / Rating (µm)	Media	End Modification	Gasket Or O-Ring Material
AU	09 - 9 3/4"	A* / 8	11 - Polyolefin	A - Millipore**	A - Silicone
	10 - 10"	B / 20	12 - Polyester	B - Code 7 Bayonet Lock	B - Fluorocarbon
	19 - 19 1/2"	C / 30		C - Code 8 Double O-ring	C - EPR
	20 - 20"	E / 40		D - Double Open End W/Hard Cap 10" Nom. Length	D - Nitrile
	29 - 29 3/4"	G / 70		E - Double Open End W/Hard Cap 9 3/4" Nom. Length	
	30 - 30"	L** / 90		F - Code 3 Double O-ring	
	39 - 39"	Q** / 100		K - Code 3 Single O-ring W/Polypropylene Snap Ring	
	40 - 40"	V** / 140		H - Gelman Internal O-ring**	
		W** / 160		N - No End Modification	G - Polyethylene**
		X** / 190			N - None

* Available in polyester only, requires end modification **Available in polyolefin only

Betapure Z Grade Cartridge Ordering Guide*

Cartridge Type	Length	Grade Designation	End Modification	Gasket Or O-Ring Material	Removal Rating
AU	09 - 9 3/4"	Z11 - Polypropylene insert	A - Millipore	A - Silicone	Z13 MATERIAL ONLY
	10 - 10"	Z13 - Glass Paper insert	B - Code 7 Bayonet Lock	B - Fluorocarbon	020 - 2µm Abs.
	19 - 19 1/2"		C - Code 8 Double O-ring	C - EPR	030 - 3µm Abs.
	20 - 20"		D - Double Open End W/Hard Cap 10" Nom. Length	D - Nitrile	050 - 5µm Abs.
	29 - 29 3/4"		E - Double Open End W/Hard Cap 9 3/4" Nom. Length		Z11 MATERIAL ONLY
	30 - 30"		F - Code 3 Double O-ring		060 - 6µm Abs.
	39 - 39"		K - Code 3 Single O-ring W/Snap Ring		070 - 7µm Abs.
	40 - 40"		H - Gelman Internal O-ring		080 - 8µm Abs.
			N - No End Modification	G - Polyethylene	100 - 10µm Abs.
					120 - 12µm Abs.
				150 - 15µm Abs.	

Betapure Filter Capsule Ordering Guide

Cartridge Type	Grade		Configuration	Nominal Length	End Connection	Vent O-ring Option	Packaging Option
	Code*	Rating (µm)					
AU	Z13020	2	C = Capsule	01 = 2 1/2"	A = 1 1/2" sanitary flange	A = Silicone	01 = single pack
	Z13030	3		02 = 5"	B = 1/2" (14mm) hose barb	B = Fluorocarbon	03 = 3 pack
	Z13050	5			C = 1/2" MNPT	C = EPR	20 = 20 pack
	Z11060	6			D = 3/8" FNPT		
	Z11070	7			E = 1/4" - 3/8" - 3/8" tapered hose barb		
	Z11080	8					
	Z11100	10					
	Z11120	12					
	Z11150	15					
	B11	20					
	C11	30					
	E11	40					
	G11	70					
	L11	90					
	Q11	100					
	V11	140					
	W11	160					
X11	190						

* Grades Z13020 through Z13050 employ a glass paper insert, grades Z11060 through Z11150 employ a polypropylene insert.



a 3M company

CUNO Incorporated

400 Research Parkway
Meriden, CT 06450, U.S.A.
Tel: (800) 243-6894
(203) 237-5541
Fax: (203) 630-4530
www.cuno.com