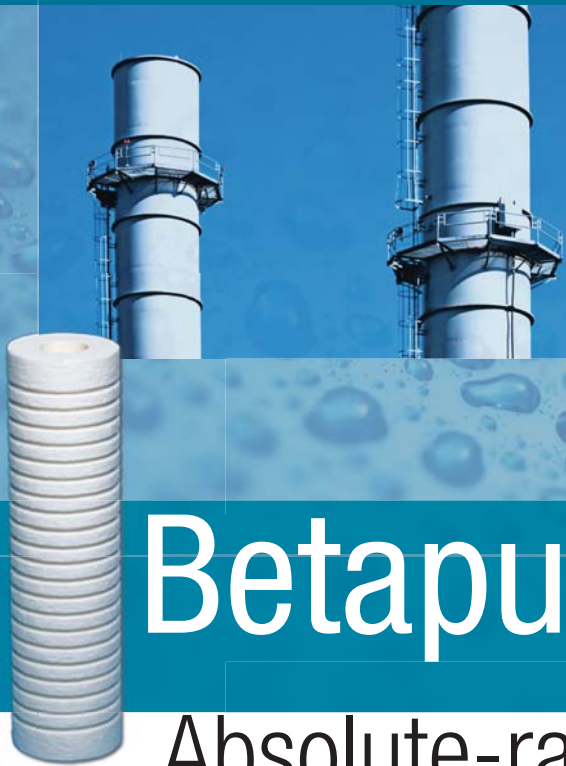


3M Purification

Product Brochure



# Betapure™ BK-Z2 Series

Absolute-rated rigid filter cartridges

- ☑ New name for CUNO Beta-Klean Z2
- ☑ Consistent performance
- ☑ Significant life advantage

**3M**

## Features and benefits

### Absolute-rated, depth cartridge

- Distinct particle size cut off at the specified removal rating.
- Reproducible effluent quality throughout the filter's life

### Beta Ratio 1000 rated throughout the cartridge life

- No bypass or unloading at high differential pressure
- Consistent product quality throughout the filter's life

### Grooved surface with true graded-density structure

- Significantly longer life
- Dramatic cost savings with optimised yields

### No metal or plastic cores

- Reduced disposal costs
- Easy disposal, suitable for incineration or shredding

### Available with integral spring end-cap

- Eliminates spring and seal assemblies
- User friendly design ensure positive seal

**Table 1: Betapure™ BK-Z2 Series absolute ratings**

Grade designation	$\beta x = 1000$ (x = Absolute micron rating)
Z2 100	10 $\mu\text{m}$
Z2 200	20 $\mu\text{m}$
Z2 300	30 $\mu\text{m}$
Z2 400	40 $\mu\text{m}$
Z2 600	60 $\mu\text{m}$

## 3M Purification's white Betapure™ BK-Z2 Series is the next level in resin bonded filtration technology. The best is now better.

The white Betapure™ BK-Z2 Series, formerly known as Beta-Klean Z2, is a range of filter cartridges that provide consistent quality and performance at absolute ratings from 10 to 60  $\mu\text{m}$ .

### Consistent performance

Absolute rated rigid structure Betapure BK-Z2 provides consistent performance. Unlike many competitors, Betapure BK-Z2 does not unload or lose filtration efficiency throughout its usable life.

### Significant life advantage

Betapure BK-Z2 rigid graded density grooved structure provides a significant life advantage over the competition.

3M Purification provides quality solutions worldwide for the most challenging filtration applications. 3M Purification filtration systems include clarifying filters, pre-filters, final filters, stainless steel housings and engineered skid-mounted systems designed and sized for specific applications.

### What is Betapure BK-Z2?

Betapure BK-Z2 Series is a rigid, graded-density filter cartridge constructed primarily of cellulose fibres, glass fibres and a chemically resistant thermosetting resin. The manufacturing process results in more fibres towards the centre core region creating a graded-density structure. The thermosetting resin "bonds" the fibres into a permanent rigid matrix. Betapure BK-Z2 cartridges are grooved to significantly increase the surface area and extend the service life.

Betapure BK-Z2 Series is available with various end fittings to ensure compatibility with a wide range of filter housings (see ordering guide).

### Absolute Betapure BK-Z2?

Absolute Betapure BK-Z2 removal ratings are determined for the entire cartridge life using a filter performance test developed by 3M Purification that complies with the general procedure outlined in ASTM STP 975.

3M Purification defines Absolute Rating as "the particle size (x) providing an initial Beta Ratio ( $\beta x$ ) = 1000. At this Beta Ratio the removal efficiency is equal to 99.9%. Beta Ratio ( $\beta x$ ) is defined by the equation:

$$\beta x = \frac{\text{Cumulative Number of Particles Larger than x in the Influent Challenge}}{\text{Cumulative Number of Particles Larger than x in the Effluent}}$$

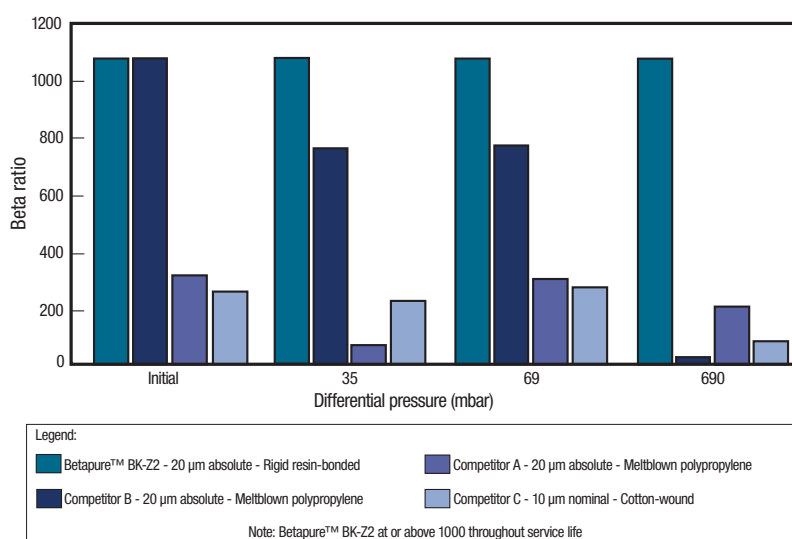
Betapure BK-Z2 filters achieve a minimum Beta x ( $\beta x$ ) value of 1000 at the specified ratings seen in Table 1.

## Betapure BK-Z2: Consistent performance

The initial Beta ratio for all grades of Betapure™ BK-Z2 filter cartridges is equal to or greater than 1000 and each cartridge performs at or above this initial value throughout its usable (all the way to plugging) life. This defines Betapure BK-Z2's absolute filtration performance. The Beta Ratio vs. Differential Pressure Graph 1 illustrates how competitive filters do not achieve the consistent performance of Betapure BK-Z2. Filters that show a decrease in Beta Ratio as the differential pressure increases are exhibiting either unloading of previously held contaminants or a loss of filtration efficiency. This inconsistent performance results in a reduction in finished product quality, product yield and an increase in total filtration cost.



Graph 1: Beta ratio comparison of filter cartridges rated at 20 microns



As illustrates Graph 1, the performance of melt-blown polypropylene (Competitor B) degrades rapidly after a small (34.5 mbar) increase in differential pressure, indicating contaminant unloading and a loss of filtration efficiency typical of a compressible structure. Competitor A's melt-blown never approaches a Beta Ratio of 1000 and it shows a decreasing Beta Ratio at high differential pressure. The generic cotton wound, Competitor C, exhibits erratic performance caused by media movement under increasing pressure. Betapure BK-Z2 exhibits consistent Beta Ratios at all differential pressures.

## Scientific Applications Support Services (SASS)

The cornerstone of 3M Purification's philosophy is service to customers, not only in product quality and prompt delivery, but also in problem solving, application support and in the sharing of scientific information. 3M Purification's Scientific Applications Support Services (SASS) group is market-focused group of scientists and engineers who work closely with customers to provide solutions to challenging filtration applications and aid in the selection of the most efficient and economical filter systems. SASS provides a vital link between 3M Purification and users of 3M Purification filter systems.

SASS specialists are skilled in performing on-site testing (pilot or lab bench scale) and are able to relate field test results to full manufacturing scale operations. SASS projects can also be performed in 3M Purification's extensive in-house laboratory facilities. 3M Purification's vast experience with fluid processing operations worldwide provides the knowledge and insight to resolve separation problems promptly and efficiently in a cost-effective, confidential manner.

Figure 1: Betapure™ BK-Z2 graded-density structure

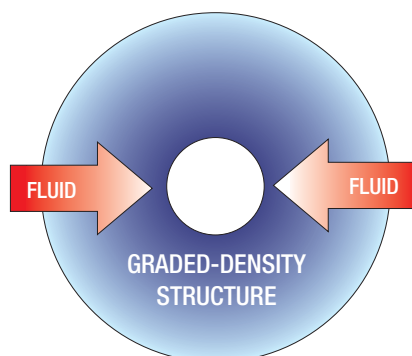
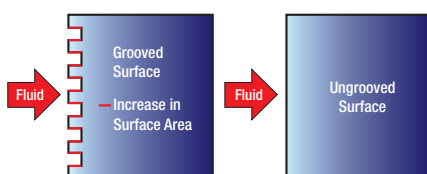


Figure 2: Surface area comparison



## Applications

Betapure™ BK-Z2 provides consistent reproducible filtration performance and longer life while meeting or exceeding quality specifications in a wide variety of industrial processing applications. Betapure™ BK-Z2 is particularly well suited for high viscosity fluids and differential pressures to 4.8 bar.

Applications include:

### Chemicals

- high purity, electronic, organic, inorganic, monomers, polymers, resins and catalysts

### Water

- process, pre-RO, boiler feed, cooling tower and waste water

### Pharmaceutical

- solvent clarification/prefiltration

### Coatings

- paint, varnish, lacquer, inks, adhesives and wood preservatives

### General Industrial

- heating and cooling fluids, brines, detergents, fuel oils, lube oils, cutting oils and agricultural fluids

## Rigid graded-density Betapure BK-Z2

Betapure™ BK-Z2 filter cartridges are manufactured using an exclusive process to achieve a true graded-density structure. The 3M Purification manufacturing process results in progressively more fibres towards the centre core region creating a graded-density structure. Each fibre is locked in place by a thermosetting resin binder to create a rigid depth filter matrix that traps larger particles near the outer surface and smaller particles near the cartridge's inside diameter. The overall effect is to greatly improve cartridge service life by retaining particles and deformable contaminants in decreasing particle size ranges as the contaminant particles progress through the cartridge.

## High surface area Betapure BK-Z2

Betapure BK-Z2 cartridges also feature an optimised groove pattern to increase the surface area by over 65% when compared to ungrooved cylindrical cartridges. The grooved surface prevents premature blinding of the outer surface by large particles and allows full utilisation of the depth structure. Maximum surface area with a true graded-density structure means that Betapure BK-Z2 can provide significantly greater service life than competitive filter cartridges. Extensive laboratory testing demonstrates that Betapure BK-Z2 can provide up to 5 times greater life than competitive filters of comparable efficiency.

## Reproducible cost-effective filtration

Betapure BK-Z2 is manufactured to rigid specifications and subjected to stringent process and quality controls to ensure consistency in filtration performance and, ultimately, end-user process consistency - run after manufacturing run.

## Betapure BK-Z2 Series product specifications

Operating parameters		
Maximum operating temperature	Standard (media only)	121 °C
	Polyethylene foam gasket	93 °C
	Polypropylene end fitting	82 °C
Maximum differential pressure	4.8 bar at 20 °C	
Recommended change-out Differential pressure	2.4 bar	

Dimensions	
Inside diameter	26.9 mm (1 1/16")
Outside diameter	65.9 mm (2 19/32")
Cartridge length	9 3/4" through to 40" (248 - 1016 mm)

Table 2: Betapure BK-Z2 Series Product Specifications

Absolute Rating (µm)	Grade	Fibre	Resin
10 µm	Z2 100	Cellulose/glass	Melamine
20 µm	Z2 200		
30 µm	Z2 300	Cellulose	
40 µm	Z2 400		
60 µm	Z2 600		

## Betapure™ BK-Z2: Providing superior performance and significant life advantage

The data in graphs 2 and 3 were developed through extensive filter performance testing. The 3M Purification Life Advantage data are based on contaminant added values comparing filter elements of comparable particle removal efficiencies.

### Betapure BK-Z2 flow rates

Flow information for Betapure™ BK-Z2 in aqueous fluids is located in table 3.

Grade	Absolute Rating (µm)	Specific Δp/ 10" cartridge <sup>(1)</sup> in mbar per lpm	Recommended maximum aqueous flow rate <sup>(2)</sup> per 10" cartridge in lpm
Z2 100	10	6.37	15.1
Z2 200	20	3.46	15.1
Z2 300	30	2.00	18.9
Z2 400	40	1.82	18.9
Z2 600	60	1.64	22.7

<sup>(1)</sup> Specific aqueous pressure drop at ambient temperature for a single equivalent 10" cartridge. For multiple cartridge lengths, divide total flow by the number of single length equivalents.

<sup>(2)</sup> Optimal efficiency and life is achieved at aqueous flow rates less than the maximum flow indicated.

For liquids other than water, use the formula below in conjunction with the values from column 3 of 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.

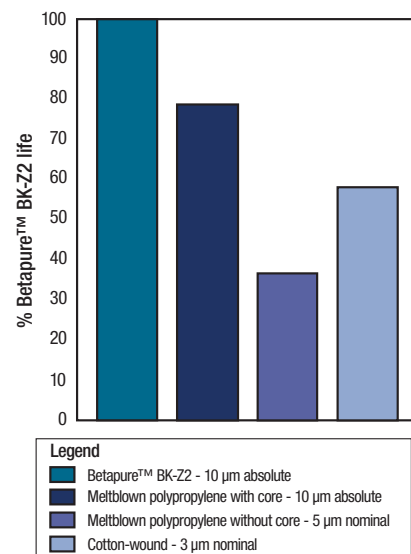
$$\text{Clean } \Delta p \text{ (mbar)} = \frac{(\text{Total system (lpm)}) (\text{Viscosity in Cp}) (\text{Value from table})}{(\text{Number of equivalent single-length cartridges in housing})}$$

### Example of flow calculation

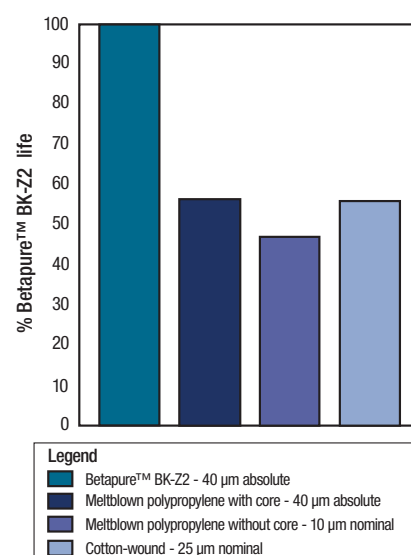
Determine pressure drop for water at (56.8 lpm) per 30" Z2300 (30 µm) Betapure BK-Z2 Series cartridge.

Fluid: water (1 cp)  
 Flow per 10" cartridge: 56.8 (l/min) ÷ 3 (30" cartridge) = 18.9 l/min  
 Specific pressure drop (table 3): (2.00 mbar/l per min)  
 Calculation: (2.00 x 18.9 = 37.8 mbar)

Graph 2: Relative life 10 micron Betapure™ BK-Z2 Series vs. competitive filters of comparable efficiency.



Graph 3: Relative life 40 micron Betapure™ BK-Z2 Series vs. competitive filters of comparable efficiency.





## Betapure™ BK-Z2: Ease of use

### Betapure BK-Z2 Series chemical compatibility

Table 4 shows Betapure™ BK-Z2's wide range of chemical compatibility. Betapure BK-Z2 exhibits excellent resistance to water, organic solvents and petroleum products. The data presented in table 4 is for general guidance only. Testing under specific application conditions is recommended.

For various end modifications and multi-cartridges, consult your local distributor or 3M Purification representative.

Table 4: Betapure™ BK-Z2 Series chemical compatibility		
Fluid		
Category	Example	Rating
Water	Process	R - 100 °C
	Pre-RO	R - 100 °C
	Boiler feed	R - 100 °C
	Waste water	R - 100 °C
Fatty acids - oils	Detergents	R - 93 °C
	Mineral oil	R - 100 °C
	Silicone oils	L
Organic solvents	MEK	R
	Benzene	R
	Toluene	R
	Xylene	R
	Alcohols	R
	Dimethyl formamide (DMF)	R
Petroleum	Lube oil	R
	Fuel oil	R
	Waxes	R
Acids	Acetic (100%)	N
	Tannic 10%	R - 60 °C
	Hydrochloric (muriatic) acid 5%	N
	Sulphuric 50%	N
	Sulphuric 5%	R - 38 °C
	Nitric 10%	R - 20 °C
Brines and aqueous salt solutions	Sodium chloride 10%	R
	Sodium sulphate	R
	Sodium nitrate 5%	R
Bases	Sodium hydroxide - 5%	R
	Calcium hydroxide	R - 38 °C
	Ammonium hydroxide 30%	R - 38 °C
Oxidisers	Hydrogen peroxide 90%	N
R = Generally recommended up to (121°C) unless otherwise noted.		
N = Not recommended		
L = Likely compatible, test before use		

### Waste management

Betapure BK-Z2 filter cartridges contain no metal or plastic cores. They can be incinerated, shredded, or crushed after use to reduce overall disposal costs.



## Betapure™ BK-Z2 Series filter cartridges - Ordering guide

Cartridge Type	Length*	Grade	Surface	Packaging	Temperature Option	End Modification	Flat Gasket or O-ring material
BK = Betapure™ BK-Z2	09 = 9 3/4"	Z2 100	G = Grooved	1 = Standard shrink wrap	S = Standard	C = 222 O-ring and spear	A = Silicone (MVQ)**
	10 = 10"	Z2 200	U = Ungrooved	2 = Bulk pack		F = 222 O-ring and flat cap	B = Fluorocarbon (FPM)**
	19 = 19 1/2"	Z2 300				N = None	C = Ethylene Prop. (EPDM)**
	20 = 20"	Z2 400				R = End cap with stainless steel	D = Nitrile (NBR)**
	29 = 29 1/4"	Z2 600					G = Volare gasket***
	30 = 30"						N = None***
	39 = 39"						
	40 = 40"						

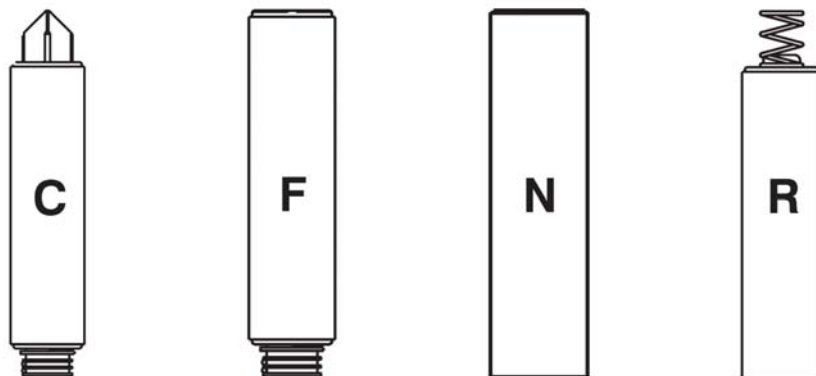
\* Length is multiple of either 9 3/4" or 10"

\*\* ISO designation

\*\*\* Available in N, R end modifications

**Note** Betapure BK-Z2 is the new name for CUNO Beta-Klean Z2.

## Betapure™ BK-Z2 Series cartridge end modifications



### 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.

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