

Beta-Klean® Z2 Series Absolute Rated Rigid Filter Cartridge



CUNO Z2 Series White Beta-Klean filter is the next level in resin bonded filtration technology. The best is now better!

Z2 Series white Beta-Klean is a range of food grade filter cartridges that provide consistent quality and performance at absolute ratings from 10 - 60 µm.

Consistent Performance

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

Significant Life Advantage

Beta-Klean's rigid graded density grooved structure provides a significant life advantage over the competition!

CUNO provides quality solutions worldwide for the most challenging filtration applications. CUNO 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 Beta-Klean?

Z2 Series Beta-Klean is a rigid, graded-density filter cartridge constructed primarily of cellulose fibers, glass

fibers, and a chemically resistant thermosetting resin. The proprietary manufacturing process results in more fibers towards the center core region creating a graded-density structure. The thermosetting resin "bonds" the fibers into a permanent rigid matrix. Beta-Klean cartridges are grooved to significantly increase the surface area and extend the service life.

Z2 Series Beta-Klean cartridges are constructed using materials listed in the Code of Federal Regulations (CFR), Title 21, or commonly used in food contact applications. Z2 Series Beta-Klean is available with various end fittings to provide compatibility with a wide range of filter housings (see ordering guide).

Absolute Beta-Klean

Absolute Beta-Klean removal ratings are determined for the entire cartridge life using a filter performance test developed by CUNO that complies with the general procedure 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%. Beta Ratio (β_x) is defined by the following equation:

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

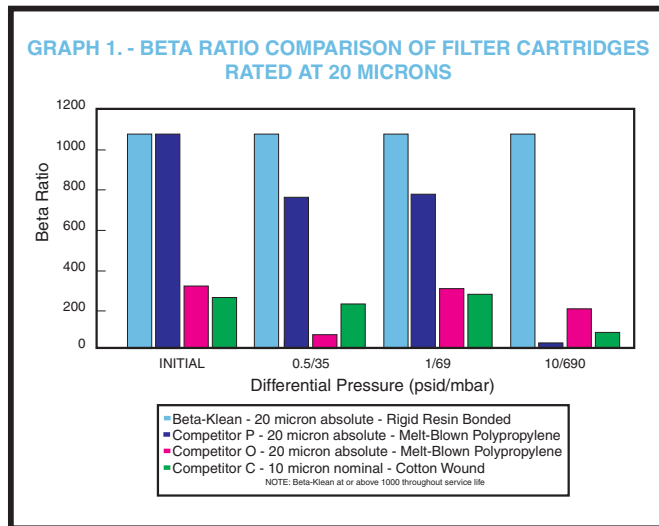
Beta-Klean filters achieve a minimum Beta_x (β_x) value of 1000 at the specified ratings seen in Table 1.

TABLE 1. - BETA-KLEAN Z2 SERIES RATINGS	
GRADE DESIGNATION	$\beta_x = 1000$ (X = ABSOLUTE MICRON RATING)
Z2 100	10
Z2 200	20
Z2 300	30
Z2 400	40
Z2 600	60

Feature	Advantage	Benefit
♦ Absolute-rated, depth cartridge filters from 10 - 60 microns	♦ Distinct particle size cutoff at the specified removal rating	♦ Reproducible effluent quality throughout the filter's life
♦ Beta 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 optimized yields
♦ No metal or plastic cores	♦ Reduced disposal costs	♦ Easy disposal, suitable for incineration or shredding
♦ Available with integral spring end-cap	♦ Eliminates spring & seal assemblies	♦ User friendly design provides positive seal

Beta-Klean - Consistent Performance

The initial Beta Ratio for all grades of Beta-Klean 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 Beta-Klean's absolute filtration performance. The Beta Ratio vs. Differential Pressure Graph 1 illustrates how competitive filters do not achieve the consistent performance of Beta-Klean. 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.



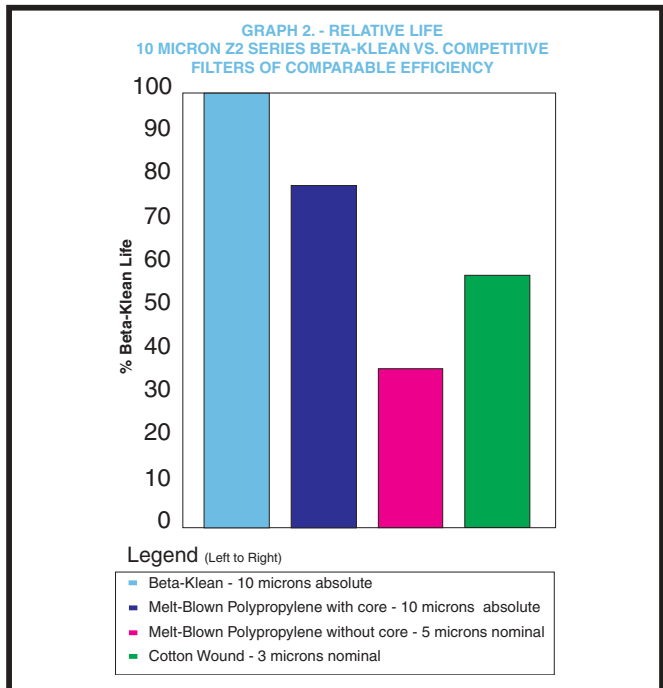
As illustrated in Graph 1, the performance of melt-blown polypropylene (Competitor P) degrades rapidly after a small (0.5 psi) increase in differential pressure, indicating contaminant unloading and a loss of filtration efficiency typical of a compressible structure. Competitor O's melt-blown never approaches 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.

Significant Life Advantage

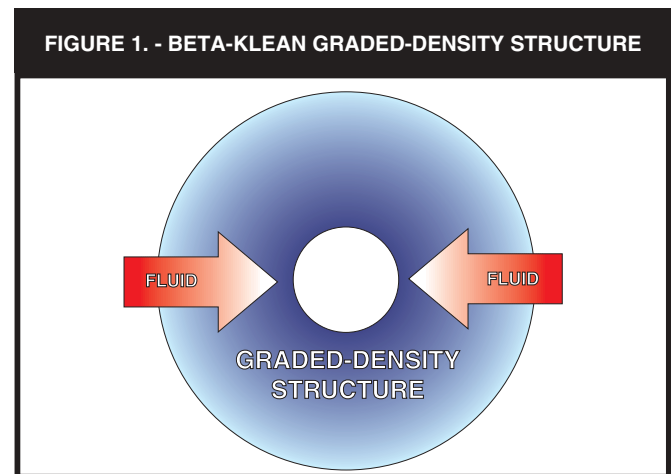
The data in graph 2 was developed through extensive filter performance testing. The "CUNO Life Advantage" data are based on contaminant added values comparing filter elements of comparable particle removal efficiencies. **Beta-Klean exhibits consistent Beta Ratios at all differential pressures.**

Rigid Graded-Density Beta-Klean

Beta-Klean filter cartridges are manufactured using an exclusive process to achieve a true graded-density structure. A proprietary CUNO manufacturing process results in progressively more fibers towards the center core region creating a graded-density structure. Each fiber 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

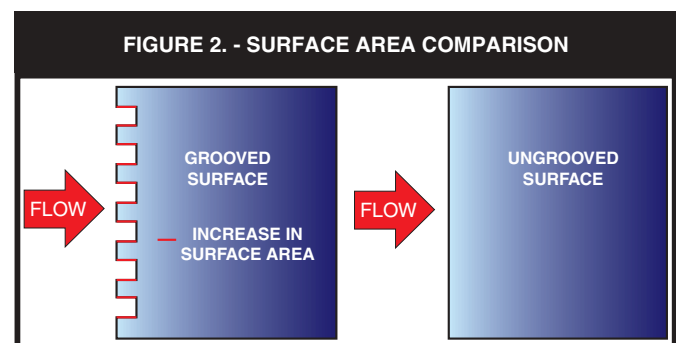


is to greatly improve cartridge service life by retaining particles and deformable contaminants in decreasing particle size ranges as the contaminant particles progress through the cartridge.



High Surface Area Beta-Klean

Beta-Klean cartridges also feature an optimized 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 utilization of the depth structure. Maximum surface area with a true graded-density structure means that Beta-Klean can provide significantly greater service life than competitive filter cartridges. Extensive laboratory testing demonstrates that Beta-Klean can provide up to 5 times greater life than competitive filters of comparable efficiency.

Beta-Klean Applications

Beta-Klean provides consistent reproducible filtration performance and longer life while meeting or exceeding quality specifications in a wide variety of industrial processing applications. Beta-Klean is particularly well suited for high viscosity fluids and differential pressures to 70 psid (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**
- ◆ **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**
- ◆ **Food & Beverage Applications - CUNO recommends that Beta-Klean filters employed in food & beverage applications should only be used in accordance with 21CFR 177.2260 and that operating temperatures for use should not exceed 75°F (24°C). CUNO recommends testing of the product in actual application conditions before use.**

Reproducible Cost Effective Filtration

Beta-Klean is manufactured to rigid specifications and subjected to stringent process and quality controls to provide consistency in filtration performance and, ultimately, end-user process consistency - run after manufacturing run.

Z2 Series Beta-Klean Product Specifications

TABLE 2. - BETA-KLEAN Z2 SERIES PRODUCT SPECIFICATIONS			
ABSOLUTE RATING (microns)	GRADE	FIBER	RESIN
10	Z2 100	Cellulose/Glass	Melamine
20	Z2 200		
30	Z2 300		
40	Z2 400	Cellulose	
60	Z2 600		
Operating Parameters			
Maximum Operating Temperature*		Standard (Media Only)	250°F (121°C)
		Polyethylene Foam Gasket	200°F (93°C)
		Polypropylene end Fitting	180°F (82°C)
Maximum Differential Pressure	70 psid (4.8 bar) @ 68°F (20°C)		
Recommended Change-out Differential Pressure	35 psid (2.4 bar)		
Dimensions			
Inside Diameter	1 1/16" (26.9 mm)		
Outside Diameter	2 19/32" (65.9 mm)		
Cartridge Length	9 3/4" through 40" (248 - 1016 mm)		

* Beta-Klean filters used in Food & Beverage applications should not exceed 75°F (24°C).

Beta-Klean Flow Rates

Flow information for Beta-Klean in aqueous fluids is located in table 3.

TABLE 3. - Z2 SERIES BETA-KLEAN FLOW RATES					
GRADE	ABSOLUTE RATING (µm)	SPECIFIC Δ p / 10" CARTRIDGE ¹		RECOMMENDED MAXIMUM AQUEOUS FLOW RATE ² PER 10" CARTRIDGE	
		psi/gpm	mbar/lpm	gpm	lpm
Z2 100	10	0.35	6.37	4	15.1
Z2 200	20	0.19	3.46	4	15.1
Z2 300	30	0.11	2.00	5	18.9
Z2 400	40	0.10	1.82	5	18.9
Z2 600	60	0.09	1.64	6	22.7

1 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.

2 Optimal efficiency and life is achieved at aqueous flow rates less than the maximum flow indicated.

For liquids other than water, use the following formula 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.

Z2 Series Beta-Klean Chemical Compatibility

Table 3 shows Beta-Klean's wide range of chemical compatibility. Beta-Klean exhibits excellent resistance to water, organic solvents, and petroleum products.

TABLE 4. - Z2 SERIES BETA-KLEAN CHEMICAL COMPATIBILITY		
CATEGORY	FLUID	
	EXAMPLE	RATING
Water	Process	R - 212°F
	Pre-RO	R - 212°F
	Boiler Feed	R - 212°F
	Waste Water	R - 212°F
Fatty Acids - Oils	Detergents	R - 200°F
	Mineral Oil	R - 212°F
	Industrial Vegetable Oils	R
	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 - 140°F
	Hydrochloric (Muriatic) Acid 5%	N
	Sulfuric 50%	N
	Sulfuric 5%	R - 100°F
Brines and Aqueous Salt Solutions	Nitric 10%	R - 70°F
	Sodium Chloride 10%	R
	Sodium Sulfate	R
	Sodium Nitrate 5%	R
Bases	Sodium Hydroxide - 5%	R
	Calcium Hydroxide	R - 100°F
	Ammonium Hydroxide 30%	R - 100°F
Oxidizers	Hydrogen Peroxide 90%	N

R = Generally Recommended up to 250°F (121°C) unless otherwise noted.
 N = Not Recommended
 L = Likely Compatible, test before use.

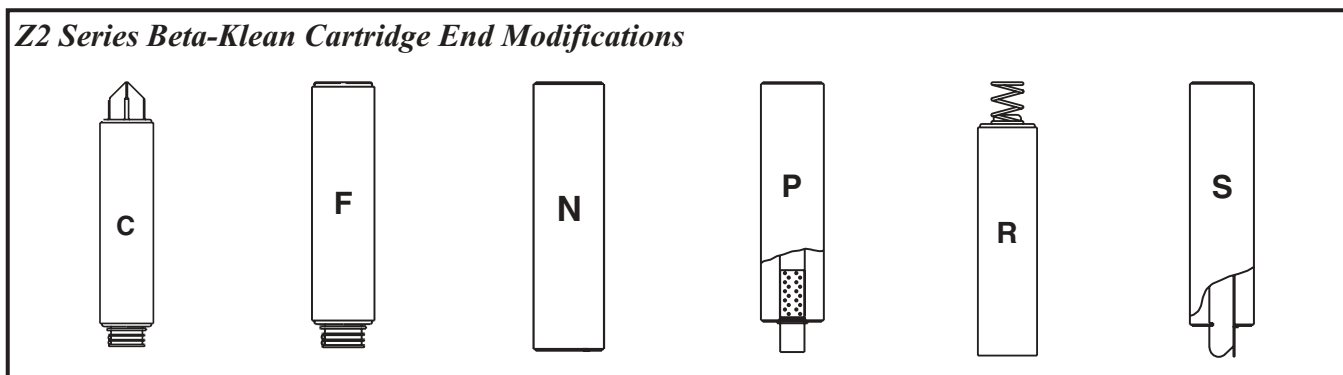
The data presented in Table 4 is for general guidance only. Testing under specific application conditions is recommended. For various end modifications and multi-length cartridges, consult your local distributor or CUNO.

Z2 Series Beta-Klean Ordering Guide

CTG. TYPE	LENGTH*	GRADE	SURFACE	PACKAGING	TEMPERATURE OPTION	END MODIFICATION	GASKET/O-RING
BK - BETA-KLEAN	09 - 9 3/4" 10 - 10" 19 - 19 1/2" 20 - 20" 29 - 29 1/4" 30 - 30" 39 - 39" 40 - 40"	Z2 100 Z2 200 Z2 300 Z2 400 Z2 600	G - GROOVED U - UNGROOVED	1 - STANDARD SHRINK WRAP 2 - BULK PACK	S - STANDARD	C - 222 O-RING & SPEAR F - 222 O-RING & FLAT CAP N - NONE P - POLYPROPYLENE CORE EXTENDER Q - SAME AS "R" WITHOUT SPRING R - END CAP WITH STAINLESS SPRING S - SS CORE EXTENDER	A - SILICONE B - FLUOROCARBON C - EPR D - NITRILE G - VOLARA GASKET ** N - NONE **

* Lengths are multiples of either 9 3/4" or 10". ** Available in N,P,Q,R, and S end modifications.

Z2 Series Beta-Klean Cartridge End Modifications



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.

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