



BETA-KLEAN® Cartridges

the clear solution



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, high temperature processes, and differential pressures to 4.8 bar (70 psid).

Applications include :

Petroleum Products

- gasoline, kerosene, lube oil, fuel oil, wax

Chemical/Petrochemical

- acids, bases, organic solvents, catalysts, monomers, polymers, glycols

Water

- process water, produced water, boiler feed, demineralised feed, pre-reverse osmosis system, waste water

General Industrial

- paint, varnish, lacquer, inks, coatings, emulsions, magnetic media, resins, detergents, adhesives

Brines and aqueous salt solutions

CUNO continues an 90+ year tradition of innovative cost effective solutions to challenging industrial filtration applications with Beta-Klean. Beta-Klean is a truly absolute rated, rigid (non-compressible) resin bonded filter cartridge. Consistent quality and performance at absolute ratings from 5 to 70 µm make Beta-Klean the clear choice in the confusing world of indistinguishable „me-too“ cartridge filters.

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 skidmounted systems designed and sized for specific applications.

What is Beta-Klean ?

Beta-Klean is a rigid, graded-density filter cartridge constructed primarily of acrylic fibres, cellulose fibres, and a tough chemically resistant thermosetting resin. The proprietary 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. Beta-Klean cartridges are grooved to significantly increase the surface area and extend the service life. Beta-Klean is manufactured and tested to deliver quality, consistency, and absolute cost effective filtration performance. CUNO's in-process quality assurance provides the control that results in consistent cartridges with defined absolute ratings time-after-time-after-time.

Beta-Klean features and benefits

Absolute rated cartridge filters from 5 to 70 microns

- Absolute filtration efficiency at the specified removal rating
- Consistent production yields with absolute contaminant retention

Rigid resin bonded structure

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

Grooved surface with true graded-density internal structure

- Significantly longer life
- Cost effective filtration with optimised yields

149 °C (300 °F) high temperature option

- Choice of temperature compatible options
- Inventory one product for many applications

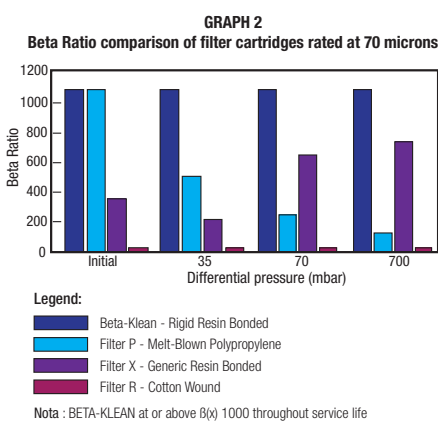
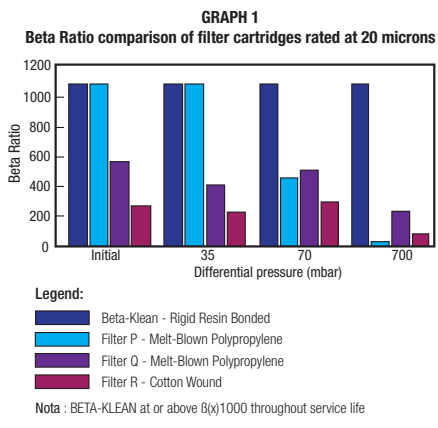
No metal or plastic cores

- Easy disposal, suitable for incineration or shredding
- Disposal cost reduction

Available with polypropylene or polyester end modifications

- Retrofit any industrial housing
- Usable in existing filter housings





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 Graphs 1 and 2 illustrate 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.

Comments

- As illustrated in Graphs 1 and 2, the performance of melt-blown polypropylene (Competitor P) degrades rapidly after a small (35 mbar or 0.5 psi) increase in differential pressure, indicating contaminant unloading and a loss of filtration efficiency typical of a compressible structure. In Graph 1, the generic cotton wound, Competitor R, exhibits erratic performance caused by media movement under increasing pressure, and, in Graph 2, it exhibits minimal ability to retain contaminant throughout the test.
- In Graph 1, melt-blown Competitor Q never approaches a Beta Ratio of 1000, and it shows a decreasing Beta Ratio at high differential pressure.
- Resin bonded Competitor X, as shown in Graph 2, exhibits very low Beta Ratios at low differential pressures indicating poor performance. Above 70 mbar (1.0 psid), the contaminant builds a cake which accounts for the subsequent increase in Beta Ratio.

Beta-Klean exhibits consistent Beta Ratios at all differential pressures.

Absolute Beta-Klean

Absolute Beta-Klean removal ratings are determined for the entire cartridge life using a new filter performance test developed by CUNO that complies with the general procedure outlined in ASTM 975. Test conditions available on request.

CUNO 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%.

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

Beta Ratio ($\beta(x)$) is defined by the following equation :

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

High Temperature Beta-Klean

Standard Beta-Klean provides consistent performance at temperatures to 120 °C (250 °F) and differential pressures to 4.8 bar (70 psid).

High temperature (HT) Beta-Klean extends the temperature rating to 149 °C (300 °F) for those processes that require service under extreme conditions.

NOT RECOMMENDED FOR HOT DI WATER. This HT version requires NYLON flat gasket (DOE) or polyester end cap. (SOE). Please see ordering guide.

Grade Designation	Absolute Rating μm Beta Ratio $\beta_x = 1000$
Z8 050	5 μm
Z8 070	7 μm (1)
Z8 100	10 μm
Z8 140	14 μm (2)
Z8 150	15 μm (3)
Z8 200	20 μm
Z8 300	30 μm
Z8 400	40 μm
Z8 500	50 μm
Z8 700	70 μm

(1) - Better flow rate than 5 μm
 (2) - Better flow rate than 15 μm
 (3) - Better life time than 14 μm

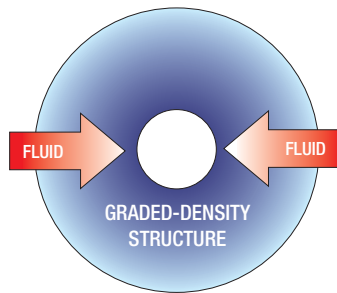


Figure 1 - Beta-Klean graded density structure

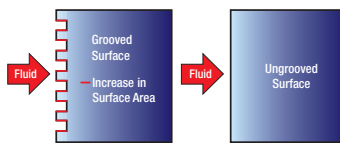


Figure 2 - Surface area comparison

Rigid graded density Beta-Klean

Beta-Klean filter cartridges are manufactured using an exclusive proprietary process that achieves a true „graded density“ fibre structure with a clean and smooth inside diameter. Each fibre is locked in this arrangement by a thermosetting resin binder to create a rigid structure, eliminating the need for a metal or plastic centre core. Larger particles are trapped in the outer area and finer particles towards the inner area.

Figure 1 illustrates how in a graded-density structure the overall effect is to clarify and retain particles by size as they progress through the cartridge.

Beta-Klean : High surface area

Beta-Klean cartridges also feature an optimised groove pattern that increases the surface area by over 65% when compared to smooth cylindrical cartridges (see Figure 2). 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 3 times or greater service life than competitive filter cartridges.

Reproducible cost effective filtration

Beta-Klean 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.

Beta-Klean Product Specifications

See Table 2

Absolute rating (µm)	Grade	Fibre	Resin
5	Z8050	Acrylic/ Glass/ Cellulose	Phenolic
7	Z8070		
10	Z8100		
14	Z8140		
15	Z8150		
20	Z8200	Acrylic/ Cellulose	Phenolic
30	Z8300		
40	Z8400		
50	Z8500		
70	Z8700		

Cartridge End Modifications

- Standard temperature : Polypropylene bonding with polypropylene end modifications
- High temperature : Thermoset epoxy bonding with polyester end modifications

Operating parameters

- Maximum operating temperature
 - 1. High temperature - 149 °C (DOE version)**
 - * With polyester end modifications - 120°C
 - 2. Standard - 120 °C (DOE version)**
 - * With polypropylene end modifications - 82 °C
 - * With polyethylene gasket - 93 °C
 - * With polyester end modifications - 120 °C
- Maximum differential pressure : 4.8 bar (70 psid) @ 20°C
- Recommended change-out differential pressure : 2.4 bar (35 psid)

Dimensions

- * Inside diameter : 26,9 mm (1 1/16“)
- * Outside diameter: 65,9 mm (2 19/32“)
- * Cartridge length: 9 3/4“ through 40“ (from 248 to 1016 mm)

Beta-Klean flow rates

Table 3 provides flow information for Beta-Klean in aqueous fluids.

For liquids other than water, multiply the specific pressure drop value (in column 3) 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.

Absolute rating (µm)	Grade	Specific pressure drop per 10" Cartridge * (mbar) for each liter/min	Recommended max. aqueous flow rate ** per 10" cartridge (lpm)
5	Z8050	13,6	11,4
7	Z8070	5,98	11,4
10	Z8100	3,64	15,1
14	Z8140	2,89	15,1
15	Z8150	4,88	15,1
20	Z8200	2,34	18,9
30	Z8300	1,44	18,9
40	Z8400	1,10	22,7
50	Z8500	0,89	26,5
70	Z8700	0,55	26,5

* 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.

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

Waste Management

Beta-Klean cartridges contain no metal or plastic cores. They can be incinerated, shredded, or crushed after use to reduce overall disposal costs.

Beta-Klean Chemical Compatibility

Table 4 shows Beta-Klean's wide range of chemical compatibility. Beta-Klean exhibits excellent resistance to petroleum products, organic solvents, water, acids, brines and aqueous salt solutions. Beta-Klean is not recommended for strong acids or bases at temperatures over 38 °C (100 °F). 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.

Category	Example	Rating*	Category	Example	Rating*
Petroleum	Gasoline - Kerosene - Diesel Fuel Lube Oil - Fuel Oil - Wax	R R	Inorganic Acids	Hydrochloric (Muriatic) Acid 5% Sulfuric 50% - Sulfurous 5-10% - Nitric	R R
Organic Solvents	MEK - Benzene - Toluene Xylene - Alcohols - Glycols Dimethyl Formamide (DMF) Amines (DEA, MDEA, MEA) (20% - 50% up to 160°F (71°C))	R	Brines and Aqueous Salt Solutions	Sodium Chloride	R
		R		Sodium Sulfate	R
		N	Sodium Nitrate	R	
Water	Process - Produced Boiler Feed - Demineralizer Feed Potable water - WFI	L	Weak Alkalis	Aluminium Hydroxide	R
		R		Ferric Hydroxide - Magnesium Hydroxide	R
		R	Fatty Acids Oil	Detergents - Mineral Oil Industrial Vegetable Oil - Silicone Oil	R R
Organic Acids	Acetic (100%) - Tannic (10%)	R	Oxidizers	Hydrogen Peroxide 90%	R

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

BETA-KLEAN ORDERING GUIDE

Range	Cartridge Length (1)	Absolute Micron rating Beta ratio = 1000	Finishing	Packaging (2)	Temperature	End Modification	Flat gasket or o-ring material
BK = Beta-Klean	09 = 9 3/4"	Z8050 = 5 µm	U = Grooved G = Ungrooved	1 = Standard shrink wrap 2 = bulk pack	S = Standard version H = High Temp version	DOE Length N = No end cap	N = no gasket G = with flat Polyethylene gasket (required for grade from 5 µm to 14 µm)
	10 = 10"	Z8070 = 7 µm					
	19 = 19 1/2"	Z8100 = 10 µm	DOE Length N = No end cap	N = no gasket G = with flat Polyethylene gasket			
	20 = 20"	Z8140 = 14 µm				SOE with Polyester end cap C = Code 8 (222 O-ring) with Spear F = Code 3 (222 O-ring) with flat cap	N = no gasket Y = with flat Nylon® gasket (required for grade from 5 µm to 14 µm) K = PTFE encap. viton X = PTFE encap. silicone
	29 = 29 1/4"	Z8150 = 15 µm	DOE Length N = No end cap	N = no gasket G = with flat Polyethylene gasket			
	28200 = 20 µm	SOE with Polyester end cap C = Code 8 (222 O-ring) with Spear F = Code 3 (222 O-ring) with flat cap				N = no gasket Y = with flat Nylon® gasket (required for grade from 5 µm to 14 µm) K = PTFE encap. viton X = PTFE encap. silicone	
	30 = 30"		Z8300 = 30 µm	DOE Length N = No end cap			N = no gasket G = with flat Polyethylene gasket
	39 = 39"	Z8400 = 40 µm	SOE with Polyester end cap C = Code 8 (222 O-ring) with Spear F = Code 3 (222 O-ring) with flat cap			N = no gasket Y = with flat Nylon® gasket (required for grade from 5 µm to 14 µm) K = PTFE encap. viton X = PTFE encap. silicone	
	40 = 40"	Z8500 = 50 µm		DOE Length N = No end cap			N = no gasket G = with flat Polyethylene gasket
	Z8700 = 70 µm	SOE with Polyester end cap C = Code 8 (222 O-ring) with Spear F = Code 3 (222 O-ring) with flat cap	N = no gasket Y = with flat Nylon® gasket (required for grade from 5 µm to 14 µm) K = PTFE encap. viton X = PTFE encap. silicone				

NOTES ON ORDERING

- Lengths are multiples of either 9 3/4" or 10".
- (option 1) Standard packaging is shrink wrapping for cartridge length from 9 3/4" to 30".
(For 40", only option 2 is available).
(option 2) Bulk pack polyethylene bagged with divider is available on request. (For cartridge length from 9 3/4" to 40").



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