

Zeta Plus™ S Series

Depth Filter Cartridges & Capsules

Zeta Plus S Series* filters are a family of advanced depth filters designed to provide optimal clarification of pharmaceutical, biological, bioprocess, cosmetic, and food and beverage fluids. Zeta Plus S Series filters are composed of inorganic filter aid, cellulose and a proprietary resin system that imparts a positive charge to the filter matrix, aiding its adsorption of negatively charged contaminants.

Pharmaceutical SP Grade Media

In addition to the features of the standard Zeta Plus S series, Zeta Plus SP Grade filters are manufactured to procedures prescribed in CUNO's Drug Master Files on record at the United States Food and Drug Administration (FDA). Zeta Plus SP Grade Filter Media is non-toxic in accordance with systemic injection testing. The characteristics and filtration mechanisms of the SP Grades are the same as the standard Zeta Plus S Series. In addition, all SP Grade Filter Media meets the strict requirements specified in the Drug Master Files. The SP Grade has complete product control and traceability as set forth in the Drug Master File.

Superior Particle Removal

Zeta Plus filters are advanced cellulose-based depth filtration media, designed to retain contaminants by both mechanical entrapment and electrokinetic adsorption. Zeta Plus filter media is composed of high surface area filter aids embedded in a cellulose fiber matrix. During the manufacturing process, molecules carrying a positive charge are chemically bonded to the filter matrix permanently forming an interconnected filtration structure with positively charged electrokinetic capture sites. The resulting porous depth filter is a tortuous network of charge-enhanced flow channels capable of removing bacteria, particulate, cellular debris and submicronic contaminants to a level which mechanical screening alone cannot achieve.

Features & Benefits

Depth filtration media designed to retain contaminants by mechanical entrapment and electrokinetic adsorption.

- High contaminant holding capacity for economical filtration and reliable particle removal.

Full range of scaleable capsule and cartridge filter configurations.

- Allows pilot testing and scale-up with the same materials that will be used in full-scale systems.

FDA Drug Master File and USP Class VI Biological Safety.

- Eases validation and regulatory submissions by providing vital documentation and traceability.

Self-contained, single-use disposable capsule and cartridge modules.

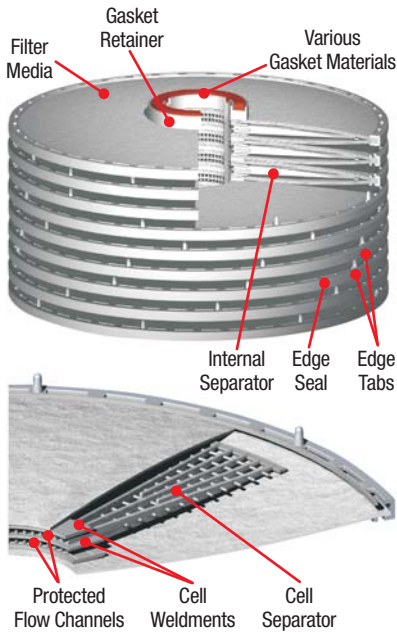
- Reduced labor time for changeouts and elimination of cleaning validation.



Applications

Zeta Plus S Series filters are optimized for clarification of pharmaceutical, biological, bioprocess, cosmetic, and food & beverage fluids. Examples of applications include:

Pharmaceuticals	Blood Products, Antibiotics, Cough Syrups, Intravenous Solutions, Growth Media, and Bioprocess Fluid
Beverages	Wine, Beer, Juices, Soft Drinks, and Cider
Distilled Spirits	Liquor, Cognac, Cordials
Food Products	Syrups, Brines, Broths, Vinegar, Edible Oils, and Sugars
Cosmetics	Perfumes, Lotions, Shampoos, Oils, Deodorants, and Colognes

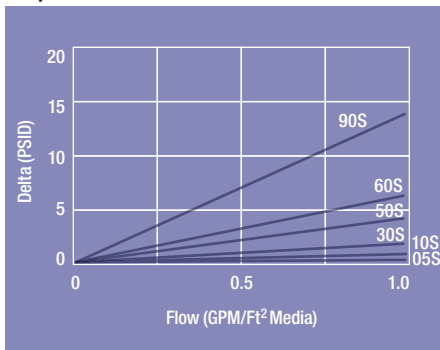


Above: Individual cells of Zeta Plus S Series filter medium are constructed using polypropylene molded edge seals and separators for high performance. Cell separator - U.S. Patent Number 4,783,262 Netting - U.S. Patent Numbers 4,881,313 and 5,055,192.



Above: Zeta Plus BC capsule filters are ideal for pilot scale and low volume applications.

Graph 1: Clean Water Flow Rate at 21°C



Cartridge Construction

Zeta Plus S Series cartridges are designed for use with CUNO Zeta Plus sanitary style stainless steel filter housings. Cartridges are constructed from individual cells of Zeta Plus S filter medium assembled together with polypropylene ring seals under predetermined compression and unitized by three, 316 stainless steel bands. Each cell is constructed using polypropylene molded edge seals and separators for high performance. Various gasket materials are available depending upon application. Filter cartridges are available in 8, 12 and 16-inch diameters, with surface area ranging from 0.7 ft² to 42.2 ft² per cartridge.

Capsule Construction

Zeta Plus S Series filters are available in ready to use, fully disposable BC capsules. The Zeta Plus BC Series capsules are completely encapsulated disposable filters for small volume biological, bioprocess and pharmaceutical filtration. BC capsules are autoclavable and available in three sizes (25, 650, 1300 cm² filtration area) to provide a high degree of application flexibility.

Flow Rates

Graph 1 displays flow rates obtained with 21°C clean water. Optimum flow rates vary by application, but in general, the flow rate per unit area (flux) should not exceed 0.25 gpm/ft² (10 lpm/m²) of filter media for best performance. Lower flux rates often result in longer service life, greater throughputs and superior system economics.

Grade Selection

The Zeta Plus S Series filters are available in a broad range of grades. Nominal removal rating is indicated in Table 1 and Chart 1 for each available grade. This information is intended for use as a guide to filter selection. Particles smaller than the rated pore size will be removed by Zeta Plus Filter Media due to electrokinetic adsorption. Actual operating conditions and the product to be filtered should be considered in grade selection. The optimal filtration system for your particular application can be determined by on-site test equipment or sample evaluation in our Applications Laboratory.

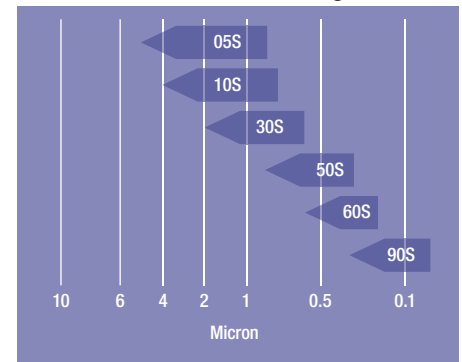
Table 1: Application Recommendations

Application	Recommended Grades	Nominal Micron Removal (in microns)
Coarse clarification	05S, 10S	5 to 0.5
Medium clarification	30S, 50S, 60S	2 to 0.2
Fine clarification	90S	0.2 to 0.05

Recommended Operating Parameters

Maximum Operating Pressure	BC25 Capsules: 40 psig maximum inlet pressure, 35 psi maximum capsule pressure drop BC1000/2000 Capsules: 80 psig @25°C, 40 psig @ 60°C maximum inlet pressure; 35 psid maximum capsule pressure drop. Standard Zeta Plus Cartridges: 35 psid maximum cartridge pressure drop
Maximum Operating Temperature	BC25 Capsules: 40°C BC1000/2000 Capsules: 60°C Standard Zeta Plus Cartridges: 82°C
Recommended Pre-use Rinse	1.3 gal/ft² at 0.5 gpm/ft², 50 l/m² at 20 lpm/m²
Sterilization Parameters	BC25 Capsules: autoclave, 30 minutes @ 121°C (1 cycle) BC1000/2000 Capsules: autoclave, 30 minutes @ 121°C (up to 3 cycles) Standard Zeta Plus Cartridges: autoclave or <i>in-situ</i> steam sterilization, 1 hour @ 121°C
Recommended Flow Rates	BC25 Capsules: 3-30 ml/min BC1000 Capsules: 0.1 gpm (0.4 lpm) BC2000 Capsules: 0.2 gpm (0.8 lpm) Standard Zeta Plus Cartridges: 0.25 gpm/ft² (10.2 lpm/m²)

Chart 1: Nominal Retention Rating



Zeta Plus S Series Specifications

Configuration	Capsule & Cartridge Materials of Construction	Effective Filtration Surface Area
BC25 Capsule	Polypropylene capsule shell, glass filled polypropylene over-mold	3.9 in² (25 cm²)
BC1000 Capsule	Polysulfone capsule shell, polypropylene cartridge support and vent cap	0.7 ft² (650 cm²)
BC2000 Capsule		1.4 ft² (1300 cm²)
45109 (8" diameter cartridge, 8-cell)	Polypropylene cartridge support and edge seal	2.8 ft² (0.26 m²)
45167 (8" diameter cartridge, 7-cell plug-in)		2.5 ft² (0.23 m²)
Z8FA2NPX2 (8" diameter, 2-cell plug-in)		0.7 ft² (650 cm²)
Z8FA4NPX2 (8" diameter, 4-cell plug-in)		1.4 ft² (1300 cm²)
45237 (12" diameter cartridge, 12-cell)		12.3 ft² (1.1 m²)
45245 (12" diameter cartridge, 16-cell)		16.4 ft² (1.5 m²)
Z16P (16" diameter cartridge, 14-cell)		34.7 ft² (3.2 m²)
Z16P (16" diameter cartridge, 16-cell)		39.7 ft² (3.7 m²)
Z16H (16" diameter cartridge, 17-cell)		42.2 ft² (3.9 m²)*

*60, 70 grades only

Sanitary Housings

CUNO provides a wide array of standard and specially designed sanitary filter housings to hold Zeta Plus S Series filter cartridges. All housings are designed with the pharmaceutical and bioprocessing industries in mind and feature 316L mirror-polished surfaces and easy-to-clean components, along with accessories such as CIP spray-balls and the innovative Zeta Plus Lifting Device.



Zeta Plus™ S Series Ordering Guide

8" Diameter Cartridges

Catalog Number	Gasket Material	Grade	Media
45109 (8" 8-cell DOE)	11 - Nitrile 12 - Neoprene 13 - Fluorocarbon 14 - EPR 22 - Silicone 23 - Teflon	05S 10S 30S 50S 60S 90S	P
45167 (8" 7-cell, plug-in)	01 - Nitrile 02 - EPR 03 - Fluorocarbon 04 - Silicone 09 - Teflon Encapsulated Viton		

Zeta Plus BC Capsule S Series

Catalog Number	Configuration	Grade	Media*
BC0025	L - Luer S - Sanitary	05S 10S 30S 50S 60S 90S	P - Pharmaceutical
BC1000 (8" 2 cell) BC2000 (8" 4 cell)	A - Single Pack B - 3 Pack		

Catalog Number	# of Cells	Configuration	Material	Gasket Material	Pkg. Code	Grade	Media*
Z8FA (8" plug-in)	2 (2 cell) 4 (4 cell)	N - None	P - Polypropylene	A - Silicone B - Fluorocarbon C - EPR D - Nitrile K - Teflon Encapsulated Viton	2 - Standard	10S 30S 50S 60S 70S	P - Pharmaceutical

12" Diameter Cartridges

Catalog Number	Material	Gasket	Grade	Media*
45237 (12" 12-cell DOE) 45244 (12" 9-cell DOE) 45245 (12" 16-cell DOE)	01 - Polypropylene 02 - Talc-filled Polypropylene 03 - Polypropylene, Hastelloy® bands	A - Silicone B - Fluorocarbon C - EPR D - Nitrile E - Teflon	10S 30S 50S 60S 70S	P - Pharmaceutical

16 Diameter Cartridges

Catalog Number	Configuration	Gasket	Grade	Media*	Opt. Lifting Handle
Z16	P - 14 cell H - High area*** R - 14 cell with Hastelloy® bands T - High area with Hastelloy® bands	A - Silicone B - Fluorocarbon C - EPR D - Nitrile E - Teflon	10S 30S 50S 60S 70S	P - Pharmaceutical	H - with Handle

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Limitation of Remedies and Liability

If the CUNO product is proved to be defective, THE EXCLUSIVE REMEDY, AT CUNO'S OPTION, SHALL BE TO REFUND THE PURCHASE PRICE OR TO REPAIR OR REPLACE THE DEFECTIVE PRODUCT. CUNO shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including, but not limited to, contract, negligence, warranty or strict liability.

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 of 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.

*Omit "P" from part number for standard S media. **Omit "H" from part number if lifting handle is not required. ***High Area Cell Count - 30S & 50S 16 cell; 60S & 90S 17 cell; Not available for 05S & 10S. Bodyfeed cartridge available, please order 45802 (16", 9 cell)



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