

Zeta Plus™ EC Purifier Cartridges

Trace Metals Reduction from Critical Process Chemicals

Zeta Plus EC purifiers are high capacity purifiers designed to remove metallic ion contaminants such as Ca, Fe, and Na from photoresists, solvents, ink jet, and wastewater applications in a single pass. The purifiers offer unique advantages in contaminant reduction because of enhanced electro-kinetic properties. Since most suspended particles have a negative charge, the strong positive electro-kinetic charge of Zeta Plus EC enables the adsorption of contaminants that are too small for removal by mechanical straining.

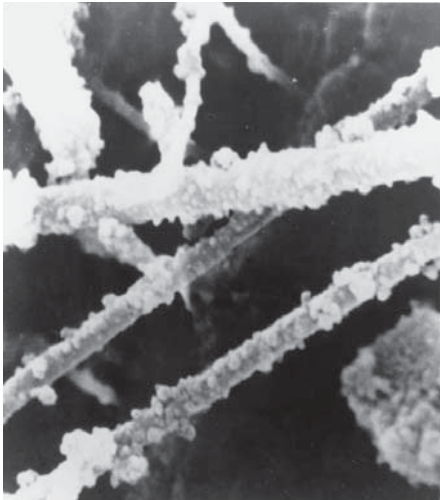


Figure 1: SEM Illustrates the enhanced particle removal mechanism

The Scanning Electron Micrograph (SEM) in Figure 1 illustrates the enhanced particle removal mechanism.



Features & Benefits

Zeta Plus EC Charged Media

- Reduction of trace metals to low digit ppb levels
- Superior metal reduction capacity, lower cost-of-ownership
- Reduced residence time compared to Ion Exchange Column

Graded Density Construction

- Large surface area increases contact time between the fluid and reactive sites of the purifier
- Increased Purifier lifetime

High Flow Rates

- Increased throughputs as compared to ion exchange columns.

Wide Range of Configurations

- Allows for the same purification media to be used during laboratory, pilot and full production scale-up
- Low hold-up volume disk filters allow material suppliers to perform testing in a rapid and cost-effective manner

Low Cartridge Extractables

- Excellent downstream cleanliness

Quality Manufacturing

- ISO 9001:2000 Quality Management System
- Repeatable and reliable performance.

Applications

Photoresists

Resins

Ancillary Chemicals

Wastewater

Solvents

Ink Jet

Table 1: Single Pass Metals Removal from PGMEA

Metal	Detection Limit (ppb)	Influent Level (ppb)	Effluent Level (ppb)
Ca	10	1160	< D.L.
Fe	10	838	< D.L.
Na	10	902	20

Table 2: Single Pass Metals Removal from ECA

Metal	Detection Limit (ppb)	Influent Level (ppb)	Effluent Level (ppb)
Ca	10	590	< D.L.
Fe	10	230	< D.L.
Na	10	850	< D.L.

Table 3: Extractable Metals Content of Zeta Plus EC in PGMEA

Metal	Detection Limit (ppb)	Effluent Level (ppb)
Ca	4.0	< D.L.
Cr	2.0	< D.L.
Cu	1.0	< D.L.
Fe	5.0	< D.L.
K	1.0	< D.L.
Na	5.0	< D.L.

Superior Metals Reduction Capacity Provided by Zeta Plus EC Filters

Zeta Plus EC Purifiers contain charge technology that captures trace metals (Tables 1 and 2) such as Ca, Fe, and Na to low parts per billion levels in single pass or recirculation mode applications. Unlike competitive purifiers that only contain purification technologies on the surface of the media, Zeta Plus EC Purifiers are able to capture ionic contaminants throughout the entire depth of the media. This patented design provides a more efficient means of purification per surface area while increasing flow and lifetime.

Zeta Plus EC Extractables

The purifier's clean materials of construction provide little to no contribution of ionic or organic contaminants to the process chemical. Ionic and organic contaminants can extract from other filter materials, which may change the photo-speed, viscosity, or molecular weight of the chemical. An extractable test was performed to determine the amount of contaminants extracted from PGMEA and the results were quantified using a Graphite Furnace Atomic Absorption Spectrometer (Table 3).

Zeta Plus EC Purifier Scale-Up

For laboratory and pilot scale testing, CUNO offers low hold-up volume Zeta Plus EC purifier disks (47 mm, 90 mm, 142 mm) and housings to allow end users to assess parameters such as material compatibility, photo-speed, and trace metals removal in a rapid and cost effective manner. The compact size allows for easy replacement and installation of purification media while reducing the waste of expensive chemicals. Zeta Plus EC purifier disks contain the same filter media as full size Zeta Plus EC purifier cartridges, ensuring repeatable and reliable performance throughout laboratory, pilot, and full production testing. This makes the scale-up process simple, linear, and predictable.

In full scale production, Zeta Plus EC is offered in cartridge diameter sizes of 8", 12", and 16" providing up to 37 ft² of surface area in a single cartridge. Zeta Plus Housings can vertically accommodate 1, 2, 3, or 4 Zeta Plus EC cartridges, allowing the end user to tailor the filtration system to their required flow rate.

Zeta Plus EC Purifier Lifetime

The lifetime of the purifier will vary based on the ionic contamination loading in the fluid, the batch or bath size, and the desired metal effluent specification. As a result, the purifier should be sized based on the desired flow rate for the application. CUNO recommends 0.25 gpm (0.95 lpm) flow rate per 1 ft² (0.09 m²) of Zeta Plus EC media for a 1cps fluid and 0.1 gpm (0.38 lpm) flow rate per 1 ft² (0.09 m²) of Zeta Plus EC media for 10 cps fluids. Table 4 provides the cartridge configurations, dimensions, surface area, and recommended flow rate for each Zeta Plus EC purifier cartridge.



Table 4: Recommended Flow Rate per Cartridge Configuration

Catalog Number	Maximum Flow Rate for 1 cps fluids		Maximum Flow Rate for 10 to 100 cps fluids	
	GPM	LPM	GPM	LPM
Z8F (8" - 2 cell)	0.23	0.87	0.09	0.34
45167 (8" - 7 cell)	0.78	2.9	0.310	1.17
45109 (8" - 8 cell)	0.88	3.3	0.35	1.32
45244-01 (12" - 9 cell)	2.3	8.5	0.90	3.41
45237-01 (12" - 12 cell)	3.0	11.4	1.2	4.54
45245-01 (12" - 16 cell)	4.0	15.1	1.6	6.06
Z16P (16" - 14 cell)	9.3	35.0	3.7	14.01

Table 6: Product Specifications

Catalog Number	Nominal Diameter		Height		Media Surface Area	
	Inches	mm	Inches	mm	Ft ²	m ²
Z8F (8" - 2 cell)	8	203	3 15/32	88	0.9	0.08
45167 (8" - 7 cell)	8	203	6 5/8	168	3.1	0.28
45109 (8" - 8 cell)	8	203	6 11/16	170	3.5	0.32
45244-01 (12" - 9 cell)	12	273	7 11/16	195	9.0	0.84
45237-01 (12" - 12 cell)	12	273	10 3/4	273	12.0	1.1
45245-01 (12" - 16 cell)	12	273	10 3/4	273	16.0	1.5
Z16P (16" - 14 cell)	16	406	10 3/4	273	37.0	3.4
Maximum Operating Temperature			180°F (80°C)			

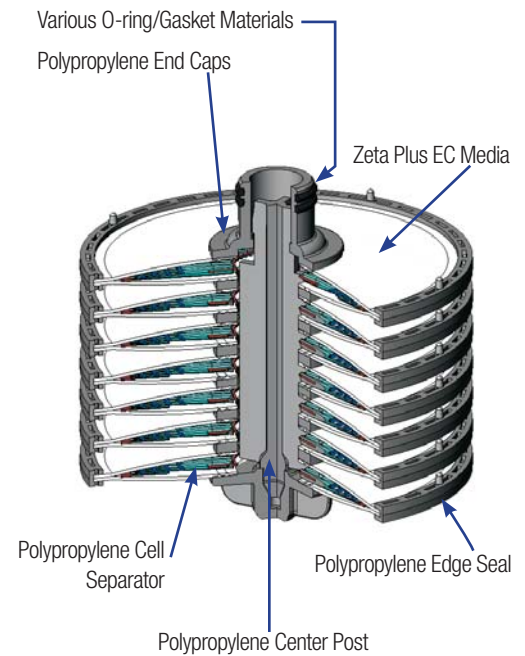


Figure 2: Zeta Plus EC Construction

Zeta Plus™ EC Purifier Cartridge Ordering Guide

Zeta Plus - SOE Cartridge	O-Ring Material	Packaging	Media Grade
Z8FAN2P (8" - 2 Cell Plug-in)	A - Silicone B - Fluorocarbon C - EPR D - Nitrile K - TEV	2 per pack	020EC - 0.2 µm 050EC - 0.5 µm 080EC - 0.8 µm 150EC - 1.5 µm

Zeta Plus - SOE Cartridge	O-Ring Material	Media Grade
45167-21 (8" - 7 cell)	A - Silicone B - Fluorocarbon C - EPR D - Nitrile K - TEV	020EC - 0.2 µm 050EC - 0.5 µm 080EC - 0.8 µm 150EC - 1.5 µm

Zeta Plus - DOE Cartridge	Gasket Material	Media Grade
45109-21 (8" - 8 cell)	A - Silicone B - Fluorocarbon C - EPR D - Nitrile E - PTFE	020EC - 0.2 µm 050EC - 0.5 µm 080EC - 0.8 µm 150EC - 1.5 µm

Zeta Plus DOE Cartridge	Gasket Material	Media Grade
45244-10 (12" - 9 cell) 45237-01 (12" - 12 cell) 45245-01 (12" - 16 cell) Z16P (16" - 14 cell)	A - Silicone B - Fluorocarbon C - EPR D - Nitrile E - PTFE	020EC - 0.2 µm 050EC - 0.5 µm 080EC - 0.8 µm 150EC - 1.5 µm

Zeta Plus EC Purifier Disk Ordering Guide

Configuration	Media Grade
B0204 (47 mm Disk)	020EC - 0.2 µm 050EC - 0.5 µm
B0406 (90 mm Disk)	080EC - 0.8 µm 150EC - 1.5 µm
B0611 (142 mm Disk)	080EC - 0.8 µm 150EC - 1.5 µm

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