

Zeta Plus™ Activated Carbon

Cartridges & Capsules

Zeta Plus™ Activated Carbon Filter Media: The efficient way to decolorize your process liquids

Zeta Plus Activated Carbon media incorporates the latest activated carbon technology to decolorize and remove contaminants from your process streams. Zeta Plus Activated Carbon media can be used in any application where bulk activated carbon is used.

Zeta Plus Principle

High surface area activated carbon particles integrally combined with cellulose fibers and a positively charged resin to form Zeta Plus Activated Carbon media. Figure 1 shows activated carbon and Zeta Plus Activated Carbon media.

3M Purification incorporates five standard types of activated carbon to cover a broad range of applications. These have been specifically selected for their properties to meet industry requirements. Zeta Plus Activated Carbon media is also available in different porosities so that solutions with different viscosities can be processed.

Flow Rate Influence

Adsorption of molecules by activated carbon relies on van der Waals forces. As those interactions are of short range, contact time between the solution and the filter media is critical. Graph 1 shows the influence of the flux on the adsorption capacity of the filter media. It shows that when the flux increases the adsorption capacity of filter media decreases.

Features & Benefits

Immobilized activated carbon in a cellulose-resin binder matrix.

- Eliminates the handling of bulk powdered carbon, eliminates equipment and solvent contamination with carbon dust and improves worker safety.

Variety of activated carbon types available.

- Provides a product portfolio that enables maximum process economy, fewer unit operations and less re-work of off spec material.

Totally enclosed, sanitary or industrial design filter cartridge housing.

- Significantly reduces time required for cleaning between batches and reduces operator exposure to potentially harmful solvent fumes.

Easy to install filter cartridges.

- Easy to use, reduces labor costs, positive sealing mechanism.

Full range of cartridge and capsule configurations.

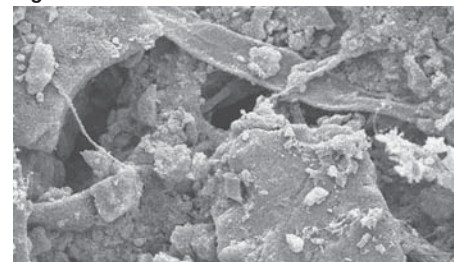
- Full range of scalable configurations from bench top to production.

FDA Drug Master File, Biological Safety, Regulatory Support File & Certificate of Quality.

- Eases validation and regulatory submissions from bench top to production.



Figure 1: Zeta Plus™ Filter Medium



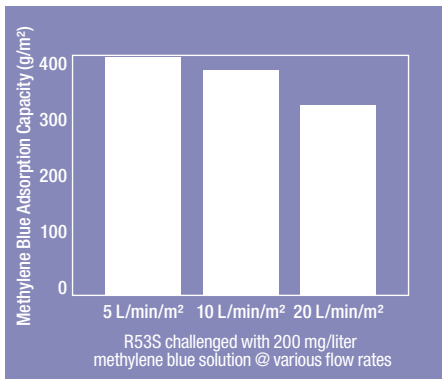
Applications

- | | |
|----------------------------|---|
| Pharmaceuticals | <ul style="list-style-type: none">▪ Decolorization in production of vitamins, antibodies, dextrose, & gelatin enzymes▪ Parenterals▪ Blood fractionation: albumin decolorization, pKa reduction, biliverdine removal▪ Removal of trace organic contaminants from X-Ray contrast media▪ Catalyst removal from API |
| Chemicals | <ul style="list-style-type: none">▪ Catalyst removal▪ Bulk pharmaceutical actives & intermediates▪ Decolorization of solvents▪ Decolorization of fine chemicals▪ Removal of organic contaminants |
| Cosmetics | <ul style="list-style-type: none">▪ Alcohol deodorization▪ Decolorization of perfumes |
| Food & Beverage | <ul style="list-style-type: none">▪ Removal of trace organic contaminants from gelatin, pectin, juices, oils▪ Decolorization of wine & cider▪ Decolorization of sugar▪ Spirit purification▪ Fatty haze removal▪ Decolorization of silicone oil |

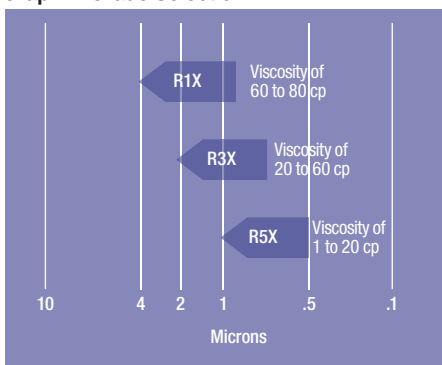
Figure 2: Zeta Plus™ BC Capsule Filters



Graph 1: Adsorption Capacity at Various Flow Rates



Graph 2: Grade Selection



Evaluation and Scaling-up

3M Purification offers a range of Zeta Plus™ products for laboratory-scale filtration, for process development scale-up work, and for small lot production runs all the way to full scale.

Zeta Plus BC25, 1000 and 2000 disposable devices (Figure 2) have surface areas of 25 cm² through to 1700 cm² enabling development to scale-up. BC units are available in three sizes (see ordering guide) to offer a high degree of application flexibility. In addition Zeta Plus discs (47 mm and 90 mm) are available.

Zeta Plus products are often scaled using a fixed value of filter flux (fluid flow rate per effective filtration area). It is recommended that the Zeta Plus Activated Carbon filter media be evaluated initially at a recommended flux of 3 L/min/m² (0.07 gpm/ft²). However, there are some successful applications where flux is much higher than this recommended value, while maintaining high adsorption efficiency.

Grades of Zeta Plus™ Activated Carbon Filter Media

All Zeta Plus Activated Carbon grades are available in 3 different porosity ratings that provide different resistance to flow. Graph 2 can be used as a guide for optimum filter selection. These porosity ratings are usually matched with the fluid viscosity, with the porosity rating of “1” recommended for fluids of higher viscosity (60 cp or greater), the porosity rating of “3” for fluids of intermediate viscosity (20 – 60 cp), and the porosity rating of “5” for fluids of low viscosity (0 – 20 cp).

Cartridge Construction

Pre-tensioned cartridge construction, utilizing 316 stainless steel, ensures integrity in severe environments including *in-situ* steam sterilization and hot water sanitation. The unique edge seal design provides durable cell construction that maintains its integrity even under the most demanding process conditions.

Quality and Reliability

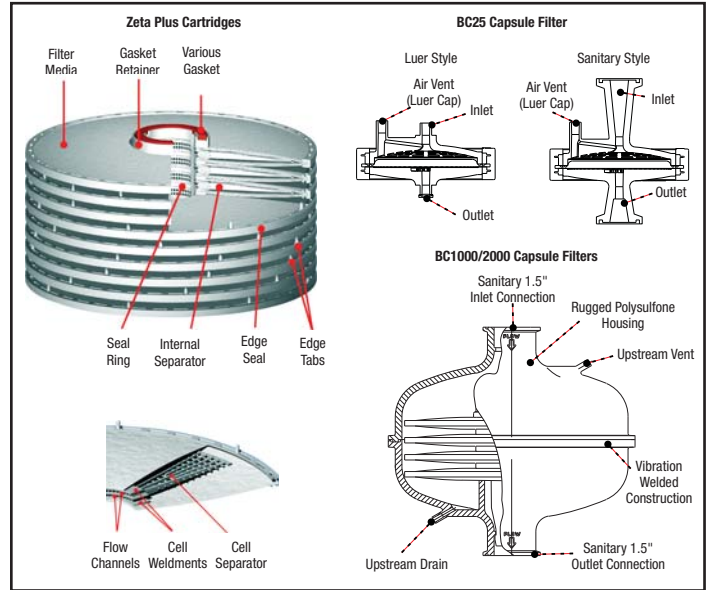
Zeta Plus filters are manufactured in accordance with an ISO 9001:2008 Registered Quality Management System. All materials of construction are 21 CFR compliant and cartridge and capsule filter components have been tested in accordance with United States Pharmacopoeia (USP) Class VI Biological Reactivity tests. All Zeta Plus cartridge and capsule filters are shipped with a Certificate of Quality affirming compliance with rigid manufacturing quality specifications. Supporting Drug Master File (DMF) documentation is on file with the United States Food and Drug Administration (FDA). A complete Zeta Plus Regulatory Support File is available upon request (70-0201-8830-9).

Table 1: Recommended Operating Parameters

Maximum Operating Temperature	BC25 Capsules: 40°C (104°F) BC1000/2000 Series Capsules: 60°C (140°F) Cartridge: 80°C (176°F)
Maximum Differential Pressure	BC25 Capsules: 2.4 bar (35 psid) BC1000/2000 Capsules: 2.4 bar (35 psid) Cartridge: 2.4 bar (35 psid)
Recommended Rinse Volume	54 l/m ² of medium (1.25 gal/ft ²)
Recommended Flow Rate	3 liters/minute/m ² of medium (0.07 gpm/ ft ²)
Steam Sterilization	Cartridge: 1 cycle at 121°C (250°F) for 30 min. BC: Autoclave only

Table 2: Applications of Zeta Plus Activated Carbon

Application	Recommended Grade
Decolorization in production of vitamins, antibodies, dextrose, and gelatin enzymes	R33S, R53S, R35S, R55S
Vaccine purification	R33S, R53S
Catalyst removal from API	R53S, R54S
Alcohol decolorization	R31S, R51S
Removal of organic contaminants	R31S, R51S, R34S, R54S
Removal of trace organic contaminants from X-Ray contrast media	R33S, R53S
Blood fractionation: albumin decolorization, pKa reduction, biliverdine removal	R33S, R53S
Removal of trace organic contaminants from gelatin, pectin, juices, oils	R31S, R51S
Decolorization of silicone oil	R11S, R14S



Zeta Plus™ Activated Carbon Capsule & Cartridge Ordering Guide

Zeta Plus BC Capsule Filters — Use Ordering Guide ID to place order.

Catalog Number	Cartridge Design Effective Filter Area	Connection Type (0025)	Grade	Quality Grade
BC	0025 - Capsule, 25 cm ²	L = Luer lock S = Sanitary Flange*	R11, R12, R13, R14, R15, R31, R32, R33, R34, R35, R51, R52, R53, R54, R55	SP
BC	1000 - Capsule 650 cm ² (0.7 ft ²) 2000 - Capsule 1300 cm ² (1.4 ft ²)	A = single filter B = 3 filter pack		

For BC Series Capsule Filters, use the Ordering Guide ID / Catalog Number when ordering.

8" Diameter Cartridges — Use 3M ID# to place order.

Catalog Number	Cartridge Design Effective Filter area	Gasket Material	Grade	Quality Grade
C08	D = 8" x 7" cell DOE* w/stainless steel bands - 0.23 m ² (2.5 ft ²)	A = Silicone E = PTFE	R11, R12, R13, R14, R15, R31, R32, R33, R34, R35, R51, R52, R53, R54, R55	SP

Ordering Guide ID	3M ID#	Ordering Guide ID	3M ID#	Ordering Guide ID	3M ID#
C08DER32SP	70-0202-9933-8	C08DER35SP	70-0202-9935-3	C08DER53SP	70-0202-9937-9
C08DER33SP	70-0202-9934-6	C08DER52SP	70-0202-9936-1	C08DER55SP	70-0202-9938-7

For common 8", 12" and 16" cartridge filter part number combinations, use the 3M ID# listed in the table below each section when ordering.

For other combinations, contact your local 3M Purification representative or distributor for further support and information. Flat sheets and discs are also available upon request.

*Double Open End

Zeta Plus™ Activated Carbon Cartridge Ordering Guide

12" Diameter Cartridges — Use 3M ID# to place order.

Catalog Number	Cartridge Design Effective Filter area	Gasket Material	Grade	Quality Grade
C12	C = 12" x 9" cell DOE* w/stainless steel bands - 0.9 m ² (9.2 ft ²) D = 12" x 13" cell DOE* w/stainless steel bands - 1.2 m ² (13.3 ft ²)	A = Silicone B = Fluorocarbon C = EPDM D = Nitrile E = PTFE	R11, R12, R13, R14, R15, R31, R32, R33, R34, R35, R51, R52, R53, R54, R55	SP

Ordering Guide ID	3M ID#	Ordering Guide ID	3M ID#	Ordering Guide ID	3M ID#
C12CAR32SP	70-0202-9858-7	C12DAR32SP	70-0202-9840-5	C12DER32SP	70-0202-9852-0
C12CAR33SP	70-0202-9859-5	C12DAR33SP	70-0202-9841-3	C12DER33SP	70-0202-9853-8
C12CAR35SP	70-0202-9860-3	C12DAR35SP	70-0202-9842-1	C12DER35SP	70-0202-9854-6
C12CAR52SP	70-0202-9861-1	C12DAR52SP	70-0202-9843-9	C12DER52SP	70-0202-9855-3
C12CAR53SP	70-0202-9862-9	C12DAR53SP	70-0202-9844-7	C12DER53SP	70-0202-9856-1
C12CAR55SP	70-0202-9863-7	C12DAR55SP	70-0202-9845-4	C12DER55SP	70-0202-9857-9

16" Diameter Cartridges — Use 3M ID# to place order.

Catalog Number	Cartridge Design Effective Filter area	Gasket Material	Grade	Quality Grade
C16	M = 16" x 13" cell, DOE* w/stainless steel bands - 3.0 m ² (32.2 ft ²) R = 16" x 13" cell, DOE* w/Hastelloy® bands - 3.0 m ² (32.2 ft ²)	A = Silicone B = Fluorocarbon C = EPDM D = Nitrile E = PTFE	R11, R12, R13, R14, R15, R31, R32, R33, R34, R35, R51, R52, R53, R54, R55	SP

Ordering Guide ID	3M ID#	Ordering Guide ID	3M ID#	Ordering Guide ID	3M ID#
C16MAR32SP	70-0202-9787-8	C16MER32SP	70-0202-9793-6	C16RER32SP	70-0202-9805-8
C16MAR33SP	70-0202-9788-6	C16MER33SP	70-0202-9794-4	C16RER33SP	70-0202-9806-6
C16MAR35SP	70-0202-9789-4	C16MER35SP	70-0202-9795-1	C16RER35SP	70-0202-9807-4
C16MAR52SP	70-0202-9790-2	C16MER52SP	70-0202-9796-9	C16RER52SP	70-0202-9808-2
C16MAR53SP	70-0202-9791-0	C16MER53SP	70-0202-9797-7	C16RER53SP	70-0202-9809-0
C16MAR55SP	70-0202-9792-8	C16MER55SP	70-0202-9798-5	C16RER55SP	70-0202-9810-8

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*Double Open End

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 INC. BE RESPONSIBLE FOR DAMAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OF OR RELIANCE UPON INFORMATION.

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