

# Zeta Plus™ MH Series

Dual Zone Depth Filter Cartridges & Capsules

Zeta Plus™ MH Series are a family of advanced, dual zone depth filters designed to provide optimal clarification and prefiltration in Food & Beverage applications. The Zeta Plus MH Series filter design consists of two distinct layers, or “zones” of filter media with the upstream zone more open than the downstream zone. This structure enhances the contaminant holding capacity of the filter media, since larger particles are trapped in the upper zone of the filter media and smaller particles are trapped in the lower zone, reducing premature plugging and extending service life. The two filter zones can be independently selected and combined to optimize performance.

## Superior Particle Removal

Zeta Plus MH Series filter medium offers unique advantages in contaminant removal by combining mechanical entrapment with electrokinetic adsorption. Larger particulate and hazes are mechanically entrapped in the depth of the media, while negatively charged particles, such as bacteria, yeast, and submicronic hazes, are adsorbed to the positively charged Zeta Plus MH Series filter media.

## Features & Benefits

### MH Series dual-zone filter media construction.

- Higher throughput, lower processing costs, smaller filter assemblies.
- Potential to condense two stages of filtration into one.

### Wide range of upstream/downstream combinations.

- Customizable to meet product needs.

### High tensile strength media.

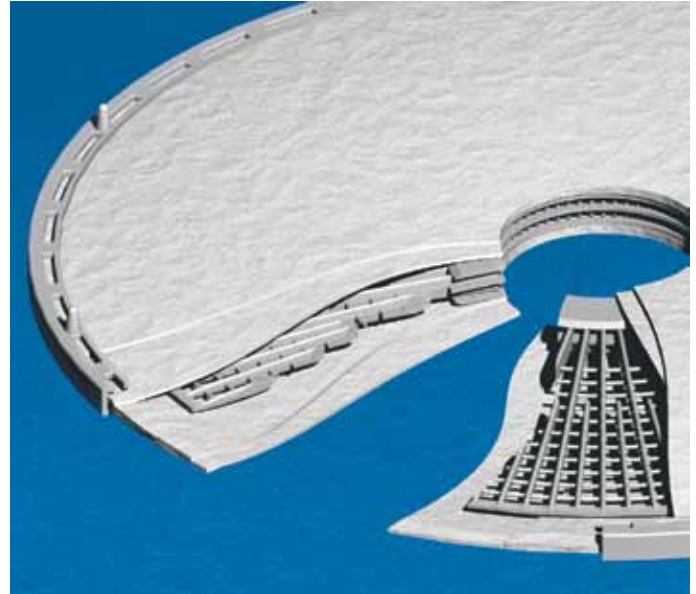
- Withstands the rigors of hot water, steam, and chemicals for longer service life.

### Full range of cartridge and capsule configurations.

- Scalable from laboratory to full production.

### Totally enclosed system.

- Eliminates leakage and external contamination common with filter sheets.



## Applications

The Zeta Plus MH series is ideally suited for clarification and prefiltration in food and beverage, cosmetic, and general applications where the exceptional high wet-tensile strength media, combined with the innovative dual-zone design, provides extended service life. These include aqueous, alcoholic, proteinaceous, and acidic solutions.

Beer	Wine	Spirits	Syrups
Edible Oils	Flavor Concentrates	High Fructose Corn Syrup	Nutraceuticals

Product	Compatibility
Acetic Acid up to 20%	Satisfactory
Ethanol up to 98%	Satisfactory
Hypochlorite	Not recommended
Hydrogen Peroxide*	Satisfactory
Nitric Acid	Not recommended
Peracetic Acid*	Satisfactory
Sodium Hydroxide 2%	Not recommended
Sugar solution 10%	Satisfactory
Water up to 90°C	Satisfactory

\*As found in commonly used sanitizing agents. Contact your local 3M Purification Inc. representative for advice on maximum recommended concentration.

### Flow vs. Differential Pressure

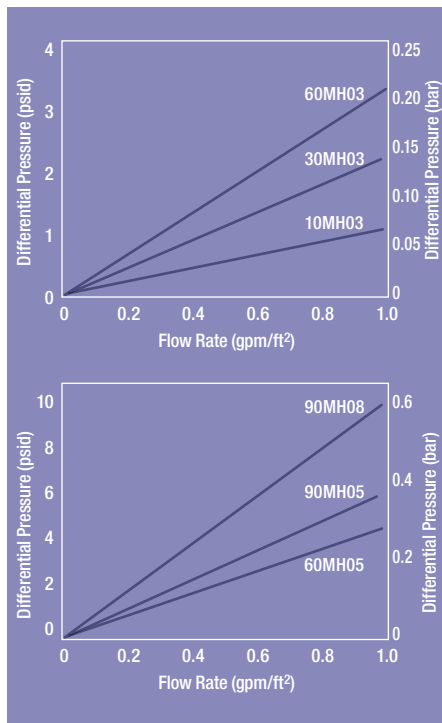
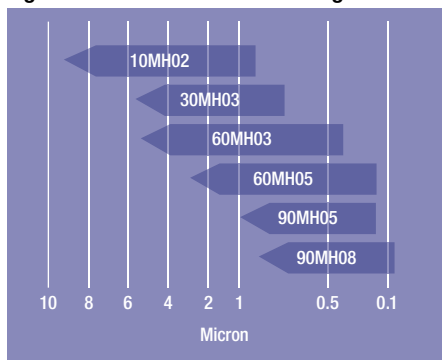


Figure 4: Nominal Retention Ratings



### Chemical Compatibility

Compatibility with various chemicals is indicated in the table at left. It is recommended that Zeta Plus MH Series filter media be tested in the product under standard process conditions to confirm compatibility prior to use. All tests have been carried out at ambient temperature (20°C) unless otherwise indicated.

### Cartridge Construction

Zeta Plus MH Series cartridges are designed for use with Zeta Plus sanitary style stainless steel filter housings. Cartridges are constructed from individual cells of Zeta Plus MH Series filter medium assembled together with polypropylene separators 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 the 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. All components are listed in 21CFR as safe for food contact.

### Flow Rates

The graphs below display flow rates obtained with 20°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 in beer and 0.5 gpm/ft² (20 lpm/m²) in wine or similar beverage for best performance. Lower flux rates often result in longer service life, greater throughputs and superior system economics.

### Grade Selection

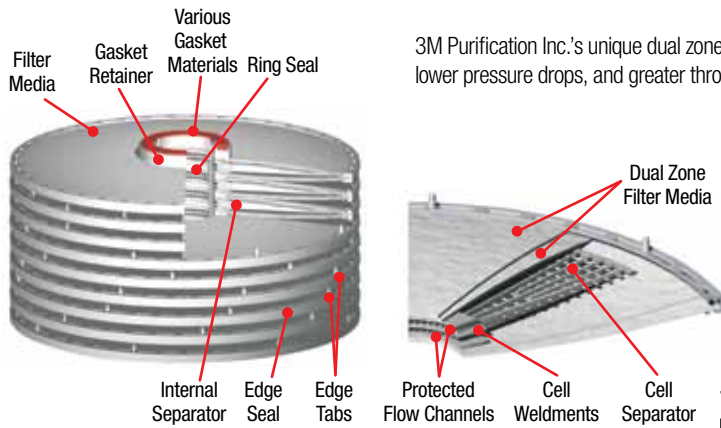
Zeta Plus MH Series filter media are available in nine standard grade combinations. The chart below is provided as a guide to correct grade selection based on nominal retention ratings and can be used in conjunction with the recommendations in Table 1 to determine the appropriate filter grade for your application. Operating conditions and the fluid being filtered impact retention performance. Small-scale pilot runs with Zeta Plus BC capsule filters can be performed to confirm grade selection prior to scale-up. 3M Purification's Scientific Applications Support Services (SASS) staff can assist in grade selection as well as assist with on-site evaluations. Filter system optimization can also be conducted at 3M Purification's laboratory facilities.

Table 3 references the nominal effective filtration area of Zeta Plus MH Series capsules and cartridges. For scale-up evaluations, it is strongly recommended that customers contact 3M Purification Inc. Scientific Application Support Services (SASS) for assistance.

Table 1: Application Recommendations

Application	Recommended Grades
Rough clarification (particles, haze)	10MH01, 10MH02
Rough clarification (yeast, haze)	30MH02, 30MH03
Polishing clarification/membrane prefiltration (yeast, haze, bacteria)	60MH03, 60MH05
Bioburden removal (haze, bacteria)	70MH05, 90MH05, 90MH08

Table 1 is intended as a guide. Grade selection and performance should be confirmed with small-scale pilot trials.



3M Purification Inc.'s unique dual zone filter media and cell separator ensure fast flow rates, lower pressure drops, and greater throughputs.

**Table 2: Recommended Operating Parameters**

Maximum Temperature	176°F (80°C)
Hot Water Sanitization	194°F (90°C)
Change-out Differential Pressure	35 psid (2.4 bar)
Recommended Flow Rate*	0.25 - 0.5 gpm/ft. <sup>2</sup> (10 - 20 lpm/m <sup>2</sup> )
Maximum Flow Rate	1.0 gpm/ft. <sup>2</sup> (40 lpm/m <sup>2</sup> )
Rinse Volume	1.25 gallons/ft. <sup>2</sup> (50 liters/m <sup>2</sup> )

\*Consult 3M Purification Inc. for the best flow rate for your application.

**Table 3: Nominal Effective Filtration Area**

Cartridge Configuration	Surface Area
BC0030A (Single Filter)	3.7 in. <sup>2</sup> (24 cm <sup>2</sup> )
BC1000A (Single Filter)	0.7 ft. <sup>2</sup> (650 cm <sup>2</sup> )
BC2000A (Single Filter)	1.4 ft. <sup>2</sup> (1300 cm <sup>2</sup> )
45109 (8" diameter, 8 cell)	2.8 ft. <sup>2</sup> (0.26 m <sup>2</sup> )
45167 (8" diameter, 7 cell O-ring plug-in)	2.5 ft. <sup>2</sup> (0.23 m <sup>2</sup> )
45244 (12" diameter, 9-cell)	9.2 ft. <sup>2</sup> (0.90 m <sup>2</sup> )
45237 (12" diameter, 12-cell)	12.3 ft. <sup>2</sup> (1.1 m <sup>2</sup> )
45245 (12" diameter, 16-cell)	16.4 ft. <sup>2</sup> (1.5 m <sup>2</sup> )
Z16P (16" diameter, 14-cell)	34.7 ft. <sup>2</sup> (3.2 m <sup>2</sup> )
Z16H (16" diameter, 16/17 cell) see ** page 4	39.7/42.2 ft. <sup>2</sup> (3.7/3.9 m <sup>2</sup> )

## Sanitary Filter Housings

3M Purification Inc. provides a wide array of standard and custom designed sanitary filter housings to accommodate Zeta Plus MH Series filter cartridges. All housings are designed with the food and beverage 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. Custom design skid systems incorporating Zeta Plus and membrane cartridge filter housings, together with process piping, flow control and complete validation documentation (IQ, OQ), are also available.



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

# Zeta Plus™ MH Series Ordering Guide

## BC Capsules

Catalog Number	Grade
BC0025L (Luer)	10MH01 60MH05
BC0025S (Sanitary)	10MH02 70MH05
BC1000A (Single Filter)	30MH02 90MH05
BC1000B (3 Filter Pak)	30MH03 90MH08
BC2000A (Single Filter)	60MH03
BC2000B (3 Filter Pak)	

## 8" Diameter Cartridges

Catalog Number	Gasket Material	Grade
45109 (8" 8-cell)	11 - Nitrile 13 - Fluorocarbon 14 - EPR 22 - Silicone 23 - PTFE	10MH01 10MH02 30MH02 30MH03 60MH03 60MH05 70MH05 90MH05 90MH08
45167 (8" 7-cell, O-ring plug-in)	01 - Nitrile 02 - EPR 03 - Fluorocarbon 04 - Silicone 09 - PTFE Encapsulated Fluorocarbon	10MH01 10MH02 30MH02 30MH03 60MH03 60MH05 70MH05 90MH05 90MH08

## 12" Diameter Cartridges

Catalog Number	Geometric Variation	Gasket Material	Grade
45237 (12" 12-cell) 45244 (12" 9-cell) 45245 (12" 16-cell)	01 - Standard polypropylene	A - Silicone B - Fluorocarbon C - EPR D - Nitrile E - PTFE	10MH01 10MH02 30MH02 30MH03 60MH03 60MH05 70MH05 90MH05 90MH08

## 16" Diameter Cartridges

Catalog Number	Gasket Material	Grade	Opt. Lifting Handle*
Z16P (16" 14-cell)	A - Silicone B - Fluorocarbon C - EPR D - Nitrile E - PTFE	10MH01 10MH02 30MH02 30MH03 60MH03 60MH05 70MH05 90MH05 90MH08	H
Z16H** (16" 16/17-cell)			

\*Omit "H" from part number if lifting handle is not required.

\*\*Z16H design contains 17 cells for 90MH08, 90MH05, 70MH05, and 60MH05, and 16 cells for 60MH03, 30MH03 and 30MH02. 10MH02 and 10MH01 are available only in 14 cell configuration.

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70-0201-8864-8  
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