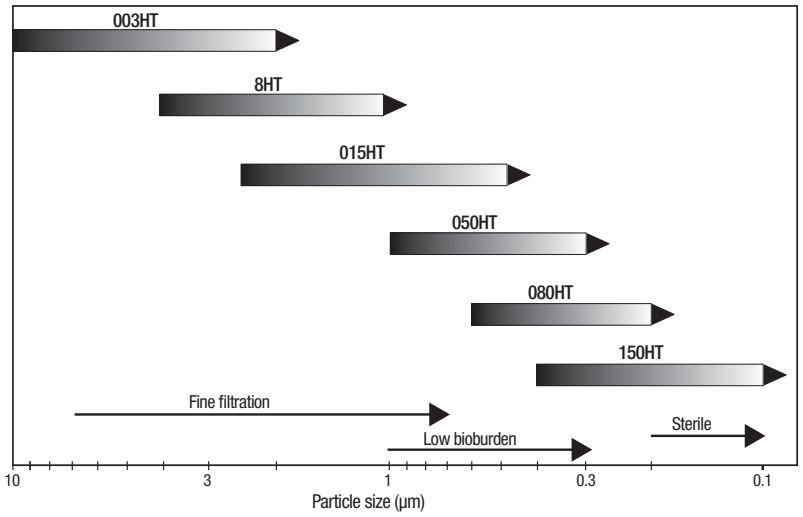
# Zeta Plus™ HT Series

Lenticular depth filter cartridges

The Zeta Plus™ HT Series filter cartridge is a charge-modified depth filter constructed with high-tensile strength media to perform efficiently even under operating conditions requiring elevated operating temperatures or repeated hot water sanitation cycles. Zeta Plus HT filter media is made from inorganic filter aids, refined cellulose and cationic resin.

## Grade selection

The Zeta Plus HT filter media are available in several grades, that meet the different filtration needs required by your applications. Nominal filtration ratings are given in the following table for the various grades. The optimal filtration system for your particular application can be determined by on-site testing or by sample evaluation by a member of our Scientific Application Support Services group (SASS).




**Graphic 1: Zeta Plus™ HT grade selection**

**Picture 1: Zeta Plus Family**

## Features and benefits

**More than three times the strength of competitive media to withstand multiple steaming and hot water sanitisation cycles**

- Extended filter life resulting in high throughputs, fewer cartridge change-outs and reduced operating costs

**Combined depth filtration and electro-kinetic adsorption**

- Efficient haze and particle removal at micron ratings smaller than the mechanical rating alone

**Easy-to-install cartridges for rapid change-out**

- Reduced labour cost

**Totally enclosed, sanitary systems and housings**

- Zero edge leakage and external contamination

**Variety of cartridge sizes and filtration surface areas**

- Flexible options for all flow requirements

**Approved for food contact use**

- Complies with European and US regulations

## Applications

**Food and beverages**

- Alcoholic beverages
- Syrups
- Dairy products
- Flavour concentrates
- Edible oils

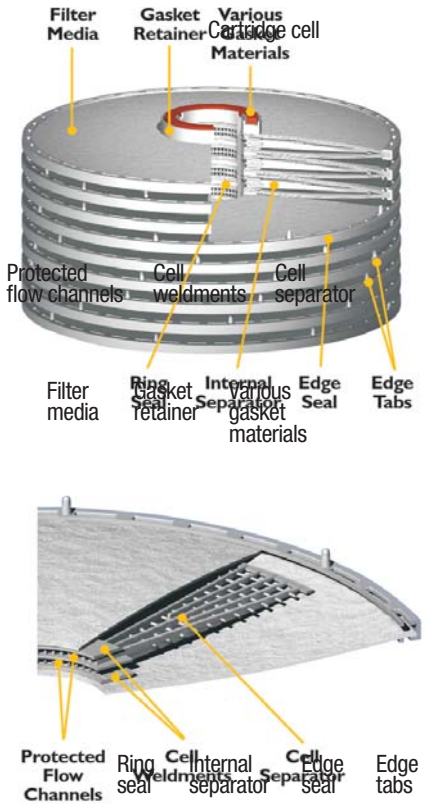
**Fine chemicals**

**Oral products**

**Cosmetics**

**Water treatment**

Figure 1: Zeta Plus™ cartridge construction




## Cartridge construction

Zeta Plus™ HT filter cartridges are constructed from individual cells. Each cell is constructed using polypropylene moulded edge seals and internal separators for high performance. The cells are made into a single unit by three 316 stainless steel bands in the core of the cartridge with polypropylene cell separators. Various gasket materials are available depending upon application. Filter cartridges are available in 8", 12" and 16" diameters.

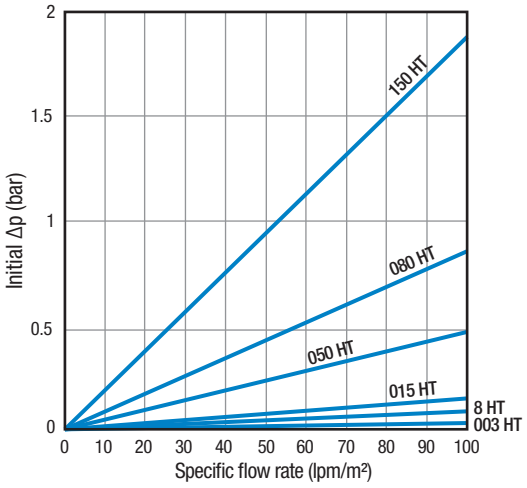
## Zeta Plus cartridge system vs. plate and frame filter economics

The Zeta Plus cartridge system has a number of advantages over conventional plate and frame filters. Since the cartridge system utilises a totally enclosed housing, there is no product leakage and no exposure of the filter media to external contamination allowing for effective use of the media, higher throughputs and low operating costs. The plate and frame filter press design is open to the environment making both filter media and product susceptible to external contamination. The "open" design requires more frequent media change-out cycles, typically every few days. This results in lower throughputs and higher operating costs.

Plate and frame filters are labour intensive, requiring two people four to eight hours to change out the media. Zeta Plus cartridges are easy to install and remove, usually taking about 15 minutes, resulting in significant labour cost reductions. Coupled with the floor space reduction of the vertical Zeta Plus housing design and a typical 50% or greater decrease in initial capital cost when compared to a comparable plate and frame filter, the savings become substantial.

## Flow rates characteristics

The graph shows initial Δp values for Zeta Plus HT filter media versus specific flow rates (lpm/m²), obtained with clean water.




**Graphic 2: Zeta Plus™ HT flow rate graph**
Differential pressure vs. flow rate water at 24 °C

## Quality control

The Zeta Plus HT filter cartridges are manufactured following an ISO quality certified assurance scheme. All the cartridges are labelled with a lot identification number to provide complete traceability. Moreover, each cartridge is graved with its lot number and grade assuring total traceability.

## Compatibility

The gaskets compatibility with different chemicals is indicated in table 1. It is advisable to test a product under service conditions simulating service conditions. *These recommendations are intended as a guide only.*

**Table 1: Zeta Plus™ HT chemical compatibility**

| Chemicals | HT | Gaskets | | | |
|---|---|---|---|---|---|
| | | Nitrile | Fluorocarbon | Ethylene propylene | Silicone |
| Acetic acid 5%-20% | G | G | G | G | G |
| Acetone 100% | G | P | G | G | G |
| Benzene | G | P | F | P | F |
| Carbon tetrachloride | G | F | G | P | F |
| Chlorothylene | G | P | G | P | F |
| Chloroform - dry | G | P | G | P | F |
| 1.4 - dioxane | G | P | P | P | P |
| Ethanol 10% and 50% | G | G | F | G | G |
| Ethyl acetate | G | P | P | P | F |
| n-heptane | G | G | G | P | F |
| Hexane | G | G | G | P | F |
| 1.1.1 - trichloroethane | G | P | G | P | F |
| Methanol | G | G | P | G | G |
| Methyl ethyl ketone (MEK) | G | P | P | G | G |
| Methyl isobutyl ketone (MIBK) | G | P | P | G | G |
| Sodium hydroxide 20% | F-P | F | G | G | G |
| Toluene | G | P | G | P | F |
| Water (25 °C and 82 °C) | G | G | G | G | G |

Explanation of ratings:
G = Satisfactory - to maximum 82°C (unless restriction is noted). F = Fair P = Not recommended

## Extractables

Table 2 gives as an example values for calcium and iron in 3 different extracting solutions due to soak testing. Moreover, specific rinsing procedures can be developed on-site for special applications.

**Table 2: Zeta Plus™ HT extractables**

| | | Grade | | | | |
|---|---|---|---|---|---|---|
| | | 8 HT | 015 HT | 050 HT | 080 HT | 150 HT |
| Deminer-alised water | Ca (ppm) | 0.18 | 0.09 | 0.12 | 0.13 | 0.15 |
| | Fe (ppb) | <5.0 | <5.0 | <5.0 | <5.0 | 5.27 |
| Ethanol 8% | Ca (ppm) | 0.26 | 0.09 | <0.08 | <0.08 | 0.09 |
| | Fe (ppb) | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Ethanol 50% | Ca (ppm) | 0.10 | <0.08 | <0.08 | <0.08 | <0.08 |
| | Fe (ppb) | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |

## Micro-organisms retention

Test conditions: specific flow rate: 635 l/h/m², initial micro-organism concentration: $10^8$ organisms/cm² of media. The results in table 3 show the retention efficiency of Zeta Plus™ HT series filter.

**Table 3: Micro-organisms retention**

| Zeta Plus™ HT | Microorganisms used for challenge | Retention efficiency (%) |
|---|---|---|
| 015 HT | *Saccharomyces cerevisae* (ATCC - 36026) | > 99.99 |
| 050 HT | | > 99.99 |
| 080 HT | | > 99.99 |
| 080 HT | *Œnococcus oeni* (ATCC - 23279) | > 99.99 |
| 150 HT | | > 99.99 |
| 080 HT | *Brevundimonas diminuta* (ATCC - 19146) | > 99.99 |
| 150 HT | | > 99.99 |

## Operating parameters

**Table 4: Recommended operating parameters**

| | Maximum operating pressure | Maximum operating temperature | Recommended flush | Sterilisation parameters | Maximum flow rate (flux) (in lpm/m²) |
|---|---|---|---|---|---|
| Standard and special pre-coat Zeta Plus™ cartridges | 2.4 bar | 82 °C | 54 l/m² at 20 lpm/m² | autoclave or *in situ* steam sterilisation for 1 hour at 121 °C | 1.2 to 12 |

## Regulatory compliance

Zeta Plus HT Series filter cartridges comply with the requirements of Regulation (EC) 1935/2004 for their intended food contact applications. All materials of construction comply with the requirements of the Food and Drug Administration's (FDA) Code of Federal Regulations (CFR), Title 21 parts 170-199 for contact with food. The filters meet the requirements of USP for the Biological Test for Plastics, Class VI. Contact 3M Purification for further information.

# Zeta Plus™ HT Series filter cartridges - Ordering guide

| Zeta Plus™ | Diameter (inch) | Cartridge design | Gasket type | Grade | Formulation |
|---|---|---|---|---|---|
| Z | 08 | **P** = Plug-in 7 cells (0.23 m²) | Standard<br>**A** = Silicone (MVQ)* | 003<br>8<br>015<br>050<br>080<br>150 | HT |
| | | **D** = Standard 8 cells (0.26 m²) | Standard<br>**D** = Nitrile (NBR)*<br><br>Options<br>**A** = Silicone (MVQ)*<br>**B** = Fluorocarbon (FPM)*<br>**C** = EPR (EPDM)* | | |
| | 12 | **C** = 9 cells / small (0.85 m²)<br>**B** = Special pre-coat 12 cells (1.1 m²)<br>**D** = Standard 16 cells (1.5 m²)<br>**S** = Special 7 cells (0.7 m²) | | | |
| | 16 | **M** = Standard diffusion netting 14 cells (3.2 m²)<br>**D** = Standard 15 cells (3.4 m²)<br>**S** = Special precoat 9 cells (2.1 m²) | * ISO Designation | | |



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Data may be subject to change without further notice.



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