

The background is a collage of three images: a white Zeta Plus BioCap filter capsule on the left, a close-up of several white filter capsules in the center, and a scientist wearing safety glasses and holding a molecular model on the right.

# Zeta Plus<sup>®</sup> BioCap<sup>™</sup>

## Disposable Filter Capsules

### for the Biotechnology & Pharmaceutical Industries

*LENNTECH*

info@lennotech.com Tel. +31-152-610-900  
www.lennotech.com Fax. +31-152-616-289



# Zeta Plus® BioCap™



**Totally Disposable Capsule Depth Filters for laboratory, process development, scale-up or small lot production.**

*The new Zeta Plus BioCap\* Series is a range of completely encapsulated disposable depth filter assemblies, designed for small volume biological, bioprocess and pharmaceutical filtration.*

*BioCap units are available in three sizes with a wide range of industry-leading Zeta Plus depth filter media to provide a high degree of application flexibility.*

## **Bioprocessing:**

- Clarification of cell culture process fluids (cell separation)
- Removal of contaminating host cell DNA
- Clarification of cell lysates
- Lipid removal upstream of chromatography columns (column guard)
- Prefiltration / protection of downstream processes including UF, sterile membrane filters and chromatography columns
- Prefiltration of fermentation feed streams
- Clarification of sera, reagents and buffers

## **Biologicals:**

- Clarification of plasma-derived biologicals (blood fractionation)
- Purification of serum and cell culture media feeds
- Clarification of toxoid broths for vaccine manufacturing
- Clarification and purification of allergenic extracts

## **Pharmaceutical:**

- Small volume parenteral (SVP) prefiltration
- Decolourisation of antibiotic solutions
- Reduction of bacterial endotoxins (pyrogens)
- Clarification of oral liquid pharmaceuticals

\* USA Patent

# BioCap™ Features & Benefits

|                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Totally-Disposable</li> </ul>                                                                          | <ul style="list-style-type: none"> <li>• No housings to purchase</li> <li>• Easy-to-use, quick set-up, and easy disposal</li> <li>• No housing cleaning protocols simplify validation processes</li> <li>• Eliminates potential for product cross-contamination</li> </ul>                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>• Three capsule sizes available for Scale-up, process Development and Small Volume Filtration</li> </ul> | <ul style="list-style-type: none"> <li>• Flexibility for flow rate and batch volume requirements</li> <li>• Same Zeta Plus filter media used in larger diameter cartridges enables linear and predictable scaleup to manufacturing scale</li> </ul>                                                                                                                                                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>• Self-Contained Filter Assemblies</li> </ul>                                                            | <ul style="list-style-type: none"> <li>• Minimises operator contact with process fluid to ensure operator safety</li> <li>• Minimal set-up time</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>• Zeta Plus Depth Filter Media</li> </ul>                                                                | <ul style="list-style-type: none"> <li>• Economical, efficient removal of negatively charged contaminants such as bacterial endotoxin, bacteria, DNA and particulates</li> <li>• FDA Drug Master Files (DMF) to assist manufacturers with regulatory submissions</li> </ul>                                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• Sanitary Design</li> </ul>                                                                             | <ul style="list-style-type: none"> <li>• Sanitary quick fit-up to plant process lines</li> <li>• Upstream vent and drain valves for easy process control</li> <li>• Designed for autoclave sterilization</li> <li>• Optional tripod support stand can be utilised for laboratory-bench operations</li> </ul>                                                                                                                                                                                                                                               |
| <ul style="list-style-type: none"> <li>• Quality and Safe Operation</li> </ul>                                                                  | <ul style="list-style-type: none"> <li>• 100% pressure tested before shipment to ensure pressure and temperature ratings</li> <li>• Broad chemical compatibility with pharmaceutical process fluids</li> <li>• Manufactured in an ISO-9002-registered world-class manufacturing facility for quality assurance and product consistency</li> <li>• No adhesives, surfactants or resins used in manufacturing process for very low filter extractables</li> <li>• Component part compliant with USP Class VI Biological Safety Tests for Plastics</li> </ul> |

Zeta Plus filter media are widely accepted as the depth filters that meet more criteria of excellence than any other of their type. Their widespread use is a reflection of their versatility and consistent filtration performance.

Hundreds of 3M CUNO Zeta Plus process systems are in operation worldwide providing reliable and cost effective filtration at pharmaceutical, biotechnology, vaccine, veterinary, diagnostic and other process facilities.

With the Zeta Plus BioCap Disposable Capsule Series, 3M CUNO now offers the widest range of depth filters for biological, bioprocess and pharmaceutical filtration.

# Zeta Plus® BioCap™

## ***Unparalleled Filtration Performance and Safety in a Totally-Disposable Capsule Depth Filter.***

### **What is Zeta Plus® ?**



Zeta Plus is a family of advanced cellulose-based patented 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.

In solution, cells and cellular debris, endotoxin and contaminating DNA carry a negative charge. 3M CUNO's proprietary application of positive zeta potential to Zeta Plus filter media creates a filter matrix that enhances the capture of negatively charged contaminant for maximum filtration performance.

### **Zeta Plus® Generation 2 Filter Systems**

#### ***The Most Complete Range of Depth Filtration Products Available***

Since its introduction over three decades ago, Zeta Plus has been the industry standard in depth filtration for pharmaceutical and biologicals filtration. 3M CUNO has consistently raised depth filtration to higher levels of quality and performance with numerous technological breakthroughs such as low extractable media, large surface area 16-inch diameter Zeta Plus cartridges and Clean-In-Place (CIP) systems.

Zeta Plus Generation 2 products offer scalability from BioCap laboratory capsules (BioCap 25) to pilot-scale BioCap capsules (BioCap 1000 / 2000) to full manufacturing scale cartridge systems, to meet any flow or batch size requirement.

Zeta Plus BioCap disposable depth filter capsules, continue 3M CUNO's tradition of technical innovations and new fluid clarification products to support and advance the pharmaceutical, biological and bioprocessing industries.



*The BioCap 25 capsule, smallest of the BioCap units, is ideal for laboratory and small volume filtration*

# Zeta Plus® Media Matrix for Pharmaceutical, Biological and Bioprocessing Applications

| Zeta Plus Formulation                            | Filter Media                                           | Filter Aids                                            | Pharmaceutical Grades                                                  | Primary Applications                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A Grade</b>                                   | Cellulose & Glass Microfibres                          | None                                                   | 01AP                                                                   | <ul style="list-style-type: none"> <li>Coarse prefiltration</li> <li>Front end of blood plasma fractionation</li> </ul>                                                                                                                                                                                        |
| <b>C Grade</b>                                   | Cellulose                                              | Diatomaceous earth (D.E.), perlite                     | 10CP, 30CP, 50CP, 60CP, 70CP                                           | <ul style="list-style-type: none"> <li>Blood plasma fractionation</li> <li>Haze removal</li> <li>Endotoxin reduction</li> </ul>                                                                                                                                                                                |
| <b>S Grade</b>                                   | Cellulose                                              | Diatomaceous earth (D.E.), perlite                     | 05SP, 10SP, 30SP, 50SP, 60SP, 90SP                                     | <ul style="list-style-type: none"> <li>Final sterile membrane protection</li> <li>Buffer/solvent prefiltration</li> <li>Chromatography column protection</li> <li>Post-fermenter clarification/Cell separation</li> <li>Reduction of contaminating DNA</li> <li>Endotoxin reduction</li> </ul>                 |
| <b>LA/CA/SA Low Aluminium Grades<sup>1</sup></b> | Cellulose                                              | Pre-extracted (acid washed) Diatomaceous earth (D.E.)  | 30LA, 60LA, 90LA, 10CA, 30CA, 50CA, 60CA, 70CA, 30SA, 50SA, 60SA, 90SA | <ul style="list-style-type: none"> <li>Blood plasma fractionation</li> <li>Endotoxin reduction</li> <li>Critical applications requiring ultra-low levels of extractables</li> <li>Membrane protection</li> <li>Post fermenter clarification/Cell separation</li> <li>Reduction of contaminating DNA</li> </ul> |
| <b>LP Grade</b>                                  | Cellulose (optimised grade for low pyrogenic response) | Diatomaceous earth (D.E.), Perlite                     | 30LP, 60LP, 90LP                                                       | <ul style="list-style-type: none"> <li>Blood fractionation</li> <li>Membrane protection</li> <li>Endotoxin reduction</li> </ul>                                                                                                                                                                                |
| <b>ZA Grade</b>                                  | Cellulose                                              | Pre-extracted (acid washed) Diatomaceous earth (D.E.), | 30ZA, 60ZA, 90ZA                                                       | <ul style="list-style-type: none"> <li>Endotoxin reduction in high purity pharmaceutical water systems</li> </ul>                                                                                                                                                                                              |
| <b>ZetaCarbon™</b>                               | Cellulose                                              | Activated Carbon                                       | R11SP, R12SP, R31SP, R32SP, R51SP, R52SP                               | <ul style="list-style-type: none"> <li>Decolourisation of antibiotic solutions, chemical intermediates, large volume parenteral solution and blood plasma fractions</li> <li>Endotoxin reduction</li> </ul>                                                                                                    |
| <b>Delipid</b>                                   | Cellulose                                              | Precipitated silica, perlite                           | DEL 1                                                                  | <ul style="list-style-type: none"> <li>Lipid reduction from blood plasma fractions</li> <li>Pre-chromatography column lipid reduction</li> </ul>                                                                                                                                                               |

## NOTE :

<sup>1</sup> LA/CA/SA grades are specially developed media which are optimised for extremely low extractable levels (ultra-low aluminium ion extractables). LA is the low aluminium version of LP, CA is the low aluminium version of CP, and SA is the low aluminium version of SP. All LA/CA/SA media is manufactured and tested as pharmaceutical grade media.

# The Zeta Plus® Scale-up Progression

***BioCap disposable capsules are ideal for scale-up evaluation as process volumes move from the laboratory (bench-scale) to pilot plant scale to manufacturing scale operations.***

BioCap filtration performance is directly scaleable to production or cGMP manufacturing scale operations with Zeta Plus 12-inch and 16-inch diameter cartridge systems, designed to fit 3M CUNO's range of sanitary design stainless steel cartridge housings. BioCap disposable capsules utilize the same Zeta Plus filter media offered in 12 and 16-inch diameter filter cartridges enabling linear and predictable scale-up as batch volumes increase.

| Filtration Unit                                                             | Filtration Area             |
|-----------------------------------------------------------------------------|-----------------------------|
| Zeta Plus BioCap 25 Disposable Capsule                                      | 25 cm <sup>2</sup>          |
| Zeta Plus BioCap 1000 Disposable Capsule                                    | 850 cm <sup>2</sup>         |
| Zeta Plus BioCap 2000 Disposable Capsule                                    | 1700 cm <sup>2</sup>        |
| Zeta Plus 8" diameter cartridge<br>(fits 8ZP sanitary stainless housings)   | 0.35 to 1.30 m <sup>2</sup> |
| Zeta Plus 12" diameter cartridge<br>(fits 12ZP sanitary stainless housings) | 1.35 to 7.60 m <sup>2</sup> |
| Zeta Plus 16" diameter cartridge<br>(fits 16ZP sanitary stainless housings) | 4.19 to 14 m <sup>2</sup>   |

Note: Zeta Plus 8, 12 and 16 inch cartridges can be stacked up to 4 cartridges per housing to obtain additional surface area in a single housing for manufacturing flexibility.

Numerous biotechnology companies worldwide have scale-up directly and predictably from small surface area Zeta Plus benchtop development to successful large surface area Zeta Plus filtration systems. Zeta Plus cartridge systems are currently installed in cGMP cell culture manufacturing operations for cell separation at the 16.0 litre scale. Studies\* (request 3M CUNO literature LITTDSCS1) have confirmed the ability to accurately predict the requirements for largescale Zeta Plus filtration using small-scale Zeta Plus data.

## Scientific Applications Support Services (SASS)

The cornerstone of 3M CUNO's philosophy is service to customers, not only in product quality and prompt delivery, but also in application support, validation and in the sharing of scientific information.



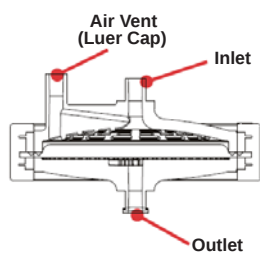
3M CUNO is ready to support your on-site testing needs. 3M CUNO's **Scientific Applications Support Services (SASS)** works closely with customers to solve difficult separations problems and to recommend the most efficient, economical filter systems. SASS specialists are skilled in performing scale-up evaluations with actual process fluids and relating test results to full manufacturing scale operations.

3M CUNO's SASS group is comprised of highly qualified scientists and engineers, supported by state-of-the-art laboratory facilities. SASS teams are located worldwide for prompt on-site response to your filtration needs.

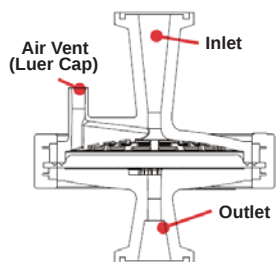


# Technical Specifications

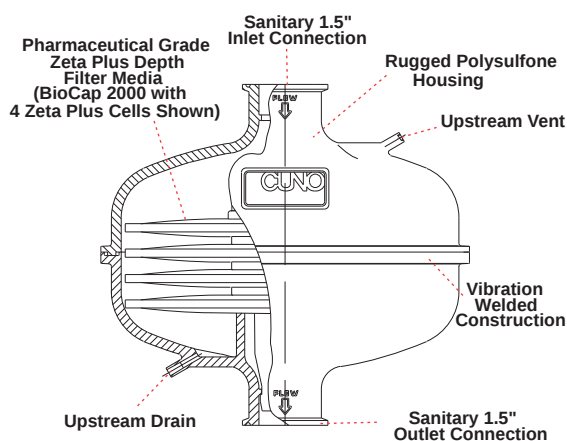
## BioCap™ 25



**Luer Style**



**Sanitary Style**



## BioCap™ 1000/2000

### BioCap 25 Series Disposable Capsules

|                          |                    |
|--------------------------|--------------------|
| Capsule Outer Shell      | Polypropylene      |
| Filter Media             | See Ordering Guide |
| Effective Filter Area    | 25 cm <sup>2</sup> |
| Dimensions (approximate) | Diameter: 6.7 cm   |
|                          | Height: 3.8 cm     |

### Process Parameters

|                           |                                                                                                 |
|---------------------------|-------------------------------------------------------------------------------------------------|
| Inlet/Outlet Connections  | Female luer lock or 19 mm sanitary flange                                                       |
| Luer Cap/Adaptor Material | Polypropylene                                                                                   |
| Maximum Inlet Pressure    | 2,75 bar                                                                                        |
| Operating Temperature     | 38°C                                                                                            |
| Recommended Flow**        | Maximum 115 ml min <sup>-1</sup>                                                                |
| Autoclave Sterilisation*  | 121°C for 1 cycle                                                                               |
| Biological Safety         | All materials of construction are in compliance with USP Class VI Biological Tests for Plastics |

### BioCap 1000 / 2000 Series Disposable Capsules

|                                                 |                                    |
|-------------------------------------------------|------------------------------------|
| Capsule Outer Shell                             | Polysulphone                       |
| Filter Media                                    | See Ordering Guide                 |
| Internal Cartridge Support Components/Luer Caps | Polypropylene                      |
| Effective Filter Area                           | BioCap 1000 -850 cm <sup>2</sup>   |
|                                                 | BioCap 2000 - 1700 cm <sup>2</sup> |
| Dimensions (approximate)                        | Diameter 21.6 cm                   |
|                                                 | Height : 20.3 cm                   |
| Weight                                          | BC 1000 : 1134 grams               |
|                                                 | BC 2000 : 1327 grams               |

### Process Parameters

|                          |                                                                                                 |
|--------------------------|-------------------------------------------------------------------------------------------------|
| Inlet/Outlet Connections | 38 mm Sanitary Flange Fittings                                                                  |
| Vent / Drain connections | Female Luer Lock                                                                                |
| Maximum Inlet Pressure   | 5.5 bar @ 25°C,<br>2.75 bar @ 60°C                                                              |
| Operating Temperature    | 60°C                                                                                            |
| Recommended Flow**       | Maximum 42 l min <sup>-1</sup> m <sup>-2</sup> of media                                         |
| Autoclave Sterilisation* | 121°C for 30 minutes,<br>up to 3 autoclave cycles                                               |
| Biological Safety        | All materials of construction are in compliance with USP Class VI Biological Tests for Plastics |

\* BioCap assemblies are not designed for in situ steam sterilization.

\*\* Filter media used and fluid being processed dictate the ideal flow rate. Testing is recommended to determine optimum flow.

# BioCap™ Ordering Guide

## BioCap™ Series 25 Disposable Capsules

| Cartridge Designation | Nominal Filter Area          | Inlet/Outlet Options                 | Zeta Plus Media*                                                                                                                                                                                                                                                        |
|-----------------------|------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BC<br>= BioCap        | 0025<br>= 25 cm <sup>2</sup> | L = Luer Lock<br>S = Sanitary Flange | 01AP<br>10CP, 30CP, 50CP, 60CP, 70CP<br>05SP, 10SP, 30SP, 50SP, 60SP, 90SP<br>30LA, 60LA, 90LA, 10CA, 30CA, 50CA, 60CA<br>70CA, 30SA, 50SA, 60SA, 90SA<br>30LP, 60LP, 90LP<br>30ZA, 60ZA, 90ZA<br>R11SP, R12SP, R31SP, R32SP, R51SP, R52SP,<br>R53SP, R54SP...<br>DEL 1 |

\* Non-exhaustive list, for more options refer to individual media brochures

## BioCap™ Series 1000/2000 Disposable Capsules

| Cartridge Designation | Nominal Filter Area                                                 | Inlet/Outlet Options                                                                                             | Zeta Plus Media**                                                                                                                                                                                                                                                       |
|-----------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BC<br>= BioCap        | 1000<br>= 850 cm <sup>2</sup><br><br>2000<br>= 1700 cm <sup>2</sup> | A = Single Pack<br>B = 3 Pack<br>(3 identical per package)<br>C = 3 Pack<br>(1 capsule each of 10SP, 30SP, 90SP) | 01AP<br>10CP, 30CP, 50CP, 60CP, 70CP<br>05SP, 10SP, 30SP, 50SP, 60SP, 90SP<br>30LA, 60LA, 90LA, 10CA, 30CA, 50CA, 60CA<br>70CA, 30SA, 50SA, 60SA, 90SA<br>30LP, 60LP, 90LP<br>30ZA, 60ZA, 90ZA<br>R11SP, R12SP, R31SP, R32SP, R51SP, R52SP,<br>R53SP, R54SP...<br>DEL 1 |

\* Non-exhaustive list, for more options refer to individual media brochures

\*\* Not Required for packaging option C



**LENNTECH**

info@lennotech.com Tel. +31-152-610-900  
www.lennotech.com Fax. +31-152-616-289

For more contact addresses visit our website [www.3m.eu/filtration](http://www.3m.eu/filtration) or [www.cuno.com/international](http://www.cuno.com/international).

Data may be subject to change without further notice.

© 3M 2007. All rights reserved.

LITZPBC1.E