Data Sheet

Vitipore® II and Vitipore® II Plus Cartridge Filters

High throughput, low binding cartridge filters for the microbiological stabilization of beverages

For 50 years, EMD Millipore has provided solutions to beverage companies throughout the world for optimizing manufacturing operations and developing microbial management programs for monitoring and removing microorganisms. Building on this experience, we have designed Vitipore® II and Vitipore® II Plus cartridge filters for superior performance in the removal of particles and microorganisms in beverage processing applications. Constructed with Durapore® polyvinylidene fluoride (PVDF) membrane, Vitipore® II and Vitipore® II Plus filters are ideal for beverage applications where filtration costs, ease of cleaning, compatibility, durability and low extractables are essential.

Membrane filters are widely used in multiple industries to sterilize liquids that are sensitive to other sterilization methods. Applying membrane filtration to the manufacturing of wine, cider, beer, bottled water and other beverages helps ensure complete removal of particles or microorganisms. The unique design of the Vitipore® II and Vitipore® II Plus cartridge filters provides a membrane filtration solution with superior microbial retention performance to ensure safety and preserve product taste and appearance.

Benefits

- Ideal for the removal of particles and beverage-spoiling microorganisms
- Innovative cartridge design generates high flow rates and increased durability
- Superior mechanical robustness resulting from a unique, patented end-cap design
- Ease of cleaning and chemical compatibility extends the filter life for lower overall filtration costs and improved process economics

Superior Construction and Design

Vitipore® II and Vitipore® II Plus cartridges are built to support very demanding process conditions. Their mechanically robust design combined with high microorganism retention capabilities makes these filters uniquely suited for the microbiological stabilization of a variety of beverage products.

Vitipore® II cartridges are constructed of a Durapore® PVDF membrane with polypropylene molded components, offering broad chemical compatibility with commonly used sanitizing agents. The ability of these cartridges to withstand repeated cleaning and sanitizing cycles leads to longer filter life and lower overall filtration costs.

Vitipore® II Plus cartridges have an additional prefilter layer of cellulose esters for higher throughputs, longer filter life, and better performance, particularly in difficult-to-filter liquids with heavy particulate load or high colloidal content.

EMD Millipore is a division of Merck KGaA, Darmstadt, Germany

Selecting the Right Filter is Easy

The Vitipore® II and Vitipore® II Plus cartridges are available in a wide range of pore sizes, fittings and configurations. Selecting the optimal filter configuration for your application results from considering a number of key filtration attributes.

Pore Size

Vitipore® II and Vitipore® II Plus cartridges are available in four pore sizes ranging from 0.22 to 1.0 µm to suit the retention and flow rate requirements of a variety of beverage processing applications. Pore size selection is influenced by two key considerations:

- **Absolute retention of spoilage microorganisms**
  Some microorganisms are retained on pore sizes larger than others. For example, yeasts are typically eliminated by filtration on a 0.65 µm pore size, where the smallest bacteria would only be eliminated by filtration on a 0.2 µm membrane.
- **Flow rate**
  The flow rate, at a given pressure, increases dramatically when larger pore sizes are used, which results in fewer filters and smaller housings for a given process.

Filtration Area (filter sizing)

When selecting an optimal filter configuration, consider the overall filtration surface area. The number of cartridges you need depends on the volume to filter and the desired process time. Filter sizing is calculated so that the entire batch can be filtered within the desired process time without completely clogging the filter. That sizing is based on filtration area and flow rate, both of which are increased in the Vitipore® II cartridge design. Increased filtration surface area and optimal flow rate means that fewer filters will be required, translating into overall lower filtration cost and improved process economics.

Membrane Construction

Filter material and thickness are key factors in adsorption. Vitipore® II and Vitipore® II Plus filters are constructed with a single 150 micron thin layer of Durapore® PVDF membrane. This ultra-thin membrane design, combined with the low binding capacity of the Durapore® material, makes the cartridges ideal for beverage applications, where minimal adsorption and extractables are critical for the quality of the beverage product.

Cleanability

The more durable and long lasting your filters are, the lower your overall filtration costs. The Durapore® membrane and polypropylene construction of Vitipore® II filters offer broad chemical compatibility with commonly-used cleaning and sanitizing agents. Vitipore® II and Vitipore® II Plus filters can be cleaned using water regeneration or chemical regeneration processes. Additionally, you can efficiently sanitize your entire filtration process when Vitipore® II cartridge filters are used.

- **Water regeneration**
  Water regeneration removes and dissolves particles from the membrane. This process also reduces bio burden contamination, which is the number of living microorganisms retained on the membrane surface. The recommended temperature range for maximum cleaning efficiency is typically 60 °C (140 °F) to 80 °C (180 °F).
- **Chemical regeneration**
  When hot water washing cycle does not properly restore flow rate, chemical cleaning is most often an efficient, complementary cleaning process. Typical chemicals include sodium hypochlorite, strong acids, and many other commercially available CIP (clean-in-place) chemicals.*
- **Sanitization**
  Sanitization must be performed immediately before each production batch and after extended shut-down periods to kill microorganisms retained on the filter surface. Typical sanitation includes steam at 105 °C (220 °F), hot water 85 °C (185 °F), chlorine 100 ppm at 40 °C (100 °F), peracetic acid 100 ppm at 40 °C (100 °F).

* Check with EMD Millipore for chemical compatibility.

Quality Assurance

Vitipore® II and Vitipore® II Plus cartridges are 100% integrity tested during production. Each filter package includes a Certificate of Quality, which certifies that the filters meet Quality Assurance lot release criteria. The Certificate of Quality includes the microorganism retention claims.

Vitipore® II cartridges are manufactured in a facility whose Quality Management System is approved by an accredited registering body to the ISO® 9000 Quality Systems Standard.

Specifications (per 10-inch cartridge)

Nominal Dimensions	
Outside diameter:	6.9 cm (2.7 in.)
Length:	25 cm (10 in.)
Filtration Area	0.78 m^2 (8.4 ft^2)
Materials of Construction	
Filter membrane:	Hydrophilic PVDF Mixed cellulose esters (Vitipore® II Plus cartridges only)
Film edge:	Polypropylene
Supports:	Polypropylene
Structural components:	Polypropylene
O-rings:	Silicone
Maximum Differential Pressure	
Forward:	80 psid (5500 mbar) at 25 °C; 25 psid (1700 mbar) at 80 °C; 5 psid (350 mbar) at 135 °C
Reverse:	Intermittent 50 psid (3500 mbar) at 25 °C
Maximum Operating Temperature	80 °C for continuous use
Bubble Point at 25 °C	CVBW: 3100 mbar (45 psig) CVBB, CVPB: 1930 mbar (28 psig) CVBY, CVPY: 970 mbar (14 psig) CVBA: 620 mbar (9 psig)
Air Diffusion at 25 °C	CVBW: 15.2 mL/min at 2760 mbar (40 psig) CVBB, CVPB: 17.1 mL/min at 1520 mbar (22 psig) CVBY, CVPY: 9.1 mL/min at 620 mbar (9 psig) CVBA: 6.3 mL/min at 480 mbar (7 psig)
Sterilization/Sanitization	May be in-line steam sterilized 100 times for 30 minutes, up to 109 °C, or hot water sanitized 50 times for 30 minutes, up to 80 °C, except for CVBW which may be hot water sanitized 30 times for 30 minutes, up to 80 °C. **Note:** As measured under test conditions. Actual cumulative time depends on process conditions.

Microbiological Performance

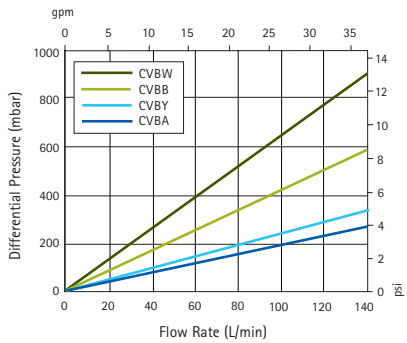
Microorganism reduction efficiency: Vitipore® II and Vitipore® II Plus cartridge filters have the following microorganism retention capabilities (cfu/cm^2):

	Vitipore® II Cartridge				Vitipore® II Plus Cartridge	
Reduction Titer	CVBW	CVBB	CVBY	CVBA	CVPB	CVPY
Pseudomonas aeruginosa	10^7	10^6				
Escherichia coli	10^7	10^7			10^7	
Saccharomyces cerevisiae		10^7	10^7	10^7	10^7	10^7
Lactobacillus hilgardii		10^7	$10^{3.5}$		10^7	10^6
Oenococcus oeni		10^7	10^3		10^7	10^6
Brettanomyces				10^6		

Cleanliness	Cartridge effluent meets the requirements for USP sterile water after a water flush of 1 L per 10-inch autoclaved cartridge
Component Material Toxicity	Cartridge materials were tested and meet the criteria of the USP Class VI Biological Test for plastics.
Food Contact Compliance	The Durapore® membrane used in this filter meets the FDA Indirect Food Additive requirements cited in 21 CFR 177.2910. All other component materials also meet the FDA Indirect Food Additive requirements cited in 21 CFR 177–182. All component materials used in these products meet the requirements of the EU framework regulation (1935/2004/EC) regarding materials and articles intended to contact food.
Non-Fiber Releasing	Durapore® membrane meets the criteria for a "non-fiber releasing" filter as defined in 21CFR 210.3(b)(6)
Good Manufacturing Practices	These products are manufactured in a EMD Millipore facility, which adheres to FDA Good Manufacturing Practices

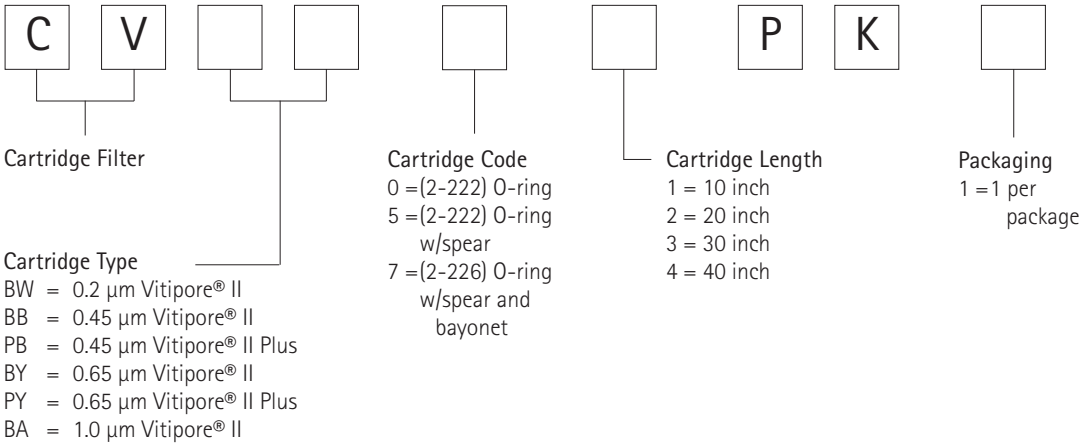
Typical Water Flow Rate at 25 °C

75 cm (30-in.) Cartridge



Ordering Information

Vitipore® II and Vitipore® II Plus Filters



To Place an Order or Receive Technical Assistance

In the U.S. and Canada, call toll-free **1-800-645-5476**

For other countries across Europe and the world, please visit: **www.emdmillipore.com/offices**

For Technical Service, please visit: **www.emdmillipore.com/techservice**

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