

Membralox IC ceramic elements are high surface area multichannel membranes designed for high capacity crossflow filtration of process fluids and effluents.

Membralox membranes are the key components of crossflow systems used in numerous food and beverage applications, such as the clarification of glucose syrups, fruit juices, beer tank bottom and fermentation broths, the purification and concentration of food and dairy products, CIP chemical recovery and wastewater treatment with ceramic membrane bioreactors.

### Description

Membralox IC ceramic elements are asymmetric multi-channel membranes composed of a porous alumina support and filtering layers. Their innovative and highly compact design in unique 4 and 5.5 mm channel geometries provide superior filtration area per multi-channel element - up to 570 m<sup>2</sup>/m<sup>3</sup>.

The increased capacity of the Membralox IC filtration modules, up to 45% more than standard module configurations, enables optimized system loop design, which results in more compact systems, with smaller footprint and reduced hardware costs. The smaller hold-up volume of the system loops also results in a significant reduction of the related water and chemical cleaning costs.

Pall Membralox IC membranes, 100% ceramic and 100% bubble point tested, feature the same exceptional performance, mechanical and chemical resistance and service life as the well-recognized Membralox product range.

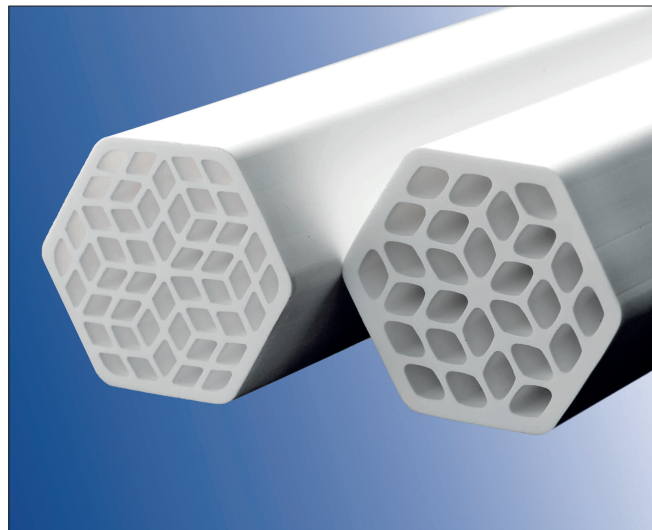
HCS and SD modules are available in a smart 3-A sanitary design, which meets the requirements of 3-A Sanitary Standards #10-04, and industrial compact design enable flexible loop design, optimum cleanability and long reliable operating life.

### Features and Benefits

| Features   | Benefits   |
|--|--|
| Unique and highly compact geometry, designed with increased surface area for higher flow rates | <ul style="list-style-type: none"> <li>• Optimization of membrane system loops</li> <li>• Cost-effective solution requiring less filtration modules and smaller system footprint</li> <li>• Reduced hold-up volume and shorter return on investment</li> </ul> |
| Highly asymmetric structure with 12 µm ceramic support pore size                               | <ul style="list-style-type: none"> <li>• High flux and module capacity</li> </ul>  |
| High homogeneity and quality of the filtration layers  | <ul style="list-style-type: none"> <li>• Optimum filtration performance and selectivity</li> <li>• High recovery and process yields</li> </ul>   |
| Exceptional mechanical resistance  | <ul style="list-style-type: none"> <li>• Suited to high fouling liquids, viscous products, high concentration factors</li> <li>• Ability to withstand upset conditions and high frequency backpulsing cycles</li> <li>• Long service life</li> </ul>           |
| Wide chemical and pH compatibility (0-14)<br>Excellent thermal stability                       | <ul style="list-style-type: none"> <li>• Easily sanitizable and sterilizable</li> <li>• Suited to continuous hot temperature operation and numerous cleaning-in-place (CIP) cycles</li> <li>• Long service life</li> </ul>                                     |
| Patented alumina end-sealing   | <ul style="list-style-type: none"> <li>• Superior resistance to corrosion and to cleaning cycles</li> </ul>  |
| 100% integrity tested prior to dispatch  | <ul style="list-style-type: none"> <li>• Lot traceable with documented quality</li> </ul>  |

## Membralox® IC Ceramic Membranes

### For High Capacity Crossflow Filtration



### Materials of construction

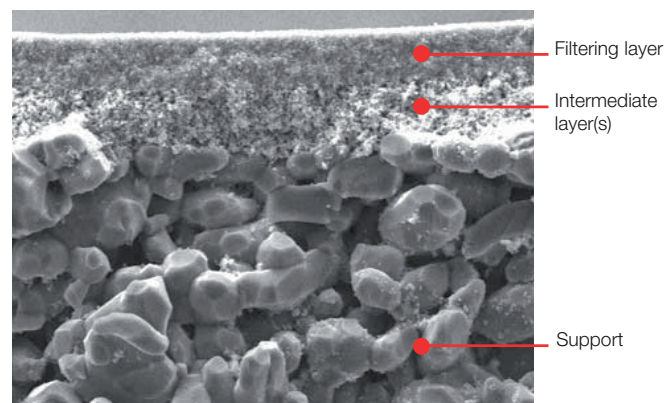
| Components                 | Description  |
|----------------------------|--|
| Membrane support           | Ultrapure alpha-alumina                              |
| Filtration layers          | alpha-alumina and/or zirconia depending on pore size |
| End sealing                | High purity α-alumina                                |
| Ceramic-to-housing gaskets | EPDM, FPM or PTFE depending on housing design        |

### Quality

Manufactured under an ISO 9001:2008 certified Quality Management System

### Food Contact Compliance

Please refer to the Pall website <http://www.pall.com/foodandbev> for a Declaration of Compliance to specific National Legislation and/or Regional Regulatory requirements for food contact use.



Cross section view of Membralox ceramic membrane (with x1010 magnification)

## Technical Information

### Multichannel Element Characteristics

|                               | EP4840                                    | EP2760                                     |
|-------------------------------|---|--|
| Channel diameter <sup>1</sup> | 4.0 mm                                    | 5.5 mm                                     |
| Number of channels            | 48  | 27   |
| Filtration surface area       | 0.7 m <sup>2</sup> (7.4 ft <sup>2</sup> ) | 0.5 m <sup>2</sup> (5.38 ft <sup>2</sup> ) |
| Length                        | 1020 mm (3.35 ft)                         | 1020 mm (3.35 ft)                          |

<sup>1</sup> based on equivalent open cross sectional area

### Membrane Characteristics

|                 | Pore Sizes <sup>2,3</sup> | Membrane Material |
|-----------------|---------------------------|-------------------|
| Microfiltration | 0.8, 0.2 μm               | Alpha-alumina     |
| Ultrafiltration | 100, 50 nm                | Zirconia          |

The 12 μm pore size ceramic support of Membralox membranes is made of high purity alpha-alumina.

<sup>2</sup> as measured by Pall proprietary permeametry method

<sup>3</sup> other pore sizes available on request

### Membralox IC Membrane Modules

Membralox IC ceramic membranes are available assembled in 3-A sanitary (HCS and SD modules) or industrial module types (HCB modules). Based on pilot test data, Pall's Scientific and Laboratory Services experts can provide guidance in selecting the best membrane and module configuration to match process requirements.

### Ordering Information

This information is a guide to the part number structure and possible options. For availability of specific options and housings and gasket details, please contact Pall.

#### Example Part Number: EP 4840 GL 100nmZ

(Refer to bold references in the tables below)

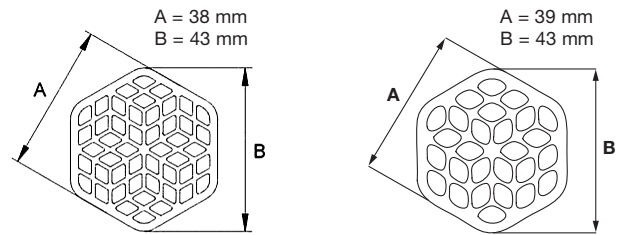
Part Number: EP  GL   
Table 1      Table 2

**Table 1: Multichannel Element Type**

| Code | Description        |
|------|--------------------|
| 4840 | 48 channels 4.0 mm |
| 2760 | 27 channels 5.5 mm |

**Table 2: Membrane Pore Size**

| Code   | Description                           |
|--------|---------------------------------------|
| 0.8μA  | Alumina 0.8 μm microfiltration layer  |
| 0.2μA  | Alumina 0.2 μm microfiltration layer  |
| 100nmZ | Zirconia 100 nm ultrafiltration layer |
| 50nmZ  | Zirconia 50 nm ultrafiltration layer  |



Drawings of P48-40 and P27-60 showing external dimensions

### Membralox Compact HCB and 3-A HCS Module Designs

|                         | M-19P <sup>4</sup>  | M-36P  |
|-------------------------|---|--|
| Number of membranes     | 19  | 36   |
| Filtration surface area | EP4840 13.1 m <sup>2</sup> (141.1 ft <sup>2</sup> )<br>EP2760 9.5 m <sup>2</sup> (102.3 ft <sup>2</sup> ) | 24.8 m <sup>2</sup> (267.4 ft <sup>2</sup> )<br>18.0 m <sup>2</sup> (193.8 ft <sup>2</sup> ) |

<sup>4</sup> only available in HCB design

### Membralox 3-A SD Module Design

|                         | M-1P                                      | M-3P                                       | M-12P                                      | M-22P  |
|-------------------------|---|--|--|--|
| Number of membranes     | 1   | 3  | 12   | 22   |
| Filtration surface area |   |  |  |  |
| EP4840                  | 0.7 m <sup>2</sup> (7.4 ft <sup>2</sup> ) | 2.1 m <sup>2</sup> (6.8 ft <sup>2</sup> )  | 8.3 m <sup>2</sup> (27.2 ft <sup>2</sup> ) | 15.2 m <sup>2</sup> (163.4 ft <sup>2</sup> ) |
| EP2760                  | 0.5 m <sup>2</sup> (5.4 ft <sup>2</sup> ) | 1.5 m <sup>2</sup> (16.1 ft <sup>2</sup> ) | 6.0 m <sup>2</sup> (64.6 ft <sup>2</sup> ) | 11.0 m <sup>2</sup> (118.4 ft <sup>2</sup> ) |

### Operating Limits of Membralox Modules in Aqueous Liquids<sup>5</sup>

|                                |                                 |
|--------------------------------|---------------------------------|
| Maximum Continuous Temperature | 95°C (203°F)                    |
| Maximum Pressure               | 10 bar (145.1 psi) <sup>6</sup> |

<sup>5</sup> Any liquids belonging to group II from PED 97/23/EC art. 9-§

<sup>6</sup> 1 bar = 100kPa

The limits of use of **Membralox modules** are determined mainly by the type of housing or gasket materials employed. For more information, please contact Pall.



HCB Module

3-A HCS Module

3-A SD Modules



### Pall Food and Beverage

25 Harbor Park Drive  
 Port Washington, NY 11050 USA  
 +1 516 484 3600 telephone  
 +1 866 905 7255 toll free US  
 foodandbeverage@pall.com

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