



Emflon II Filters



***an outstanding
innovation in air
and gas filtration***



'Emflon II' is an outstanding filter medium from Pall, designed specifically for air and gas filtration for total removal of particles as fine as $0.01\mu\text{m}$ and contaminating bacteria and bacteriophage.

Made from a proprietary modified polyvinylidene fluoride, 'Emflon II' is inherently hydrophobic, chemically inert, and available in a wide range of filter styles – both cartridges and disposable filter assemblies.

'Emflon II' filters have an absolute rating of $0.01\mu\text{m}$ in air and gas filtration and have been scientifically validated using state-of-the-art test methods and equipment. The unique features of 'Emflon II' include a double layer membrane for high filtration security, an exceptionally high surface area for economy of use and long service life and the ability to be steam sterilised repeatedly at 142°C , in either direction of flow.

Hydrophobic Membrane

'Emflon II' is a Pall developed hydrophobic filter medium made from modified polyvinylidene fluoride. Naturally hydrophobic and chemically inert, it can be used in a wide range of process conditions including the sterilisation of wet air and the filtration of corrosive gases. The inherent structure of 'Emflon II' gives exceptional reliability.

heat-sealed by a patented method into a robust cartridge or disposable filter assembly. No glues, resins, binding agents or loose fibres are used during manufacture.

The double layer membrane, another Pall feature, gives added security whilst the exceptionally high surface area provides economy of use and long service life.

'Emflon II' filters can be used for the filtration of high purity air and gases. Filter cleanliness is assured by manufacture under clean room conditions to stringent quality control standards. Each filter is tested for integrity during manufacture using the high sensitivity validated Forward Flow Test developed by Pall, a test several orders of magnitude more sensitive than dioctyl phthalate (DOP) or similar tests.

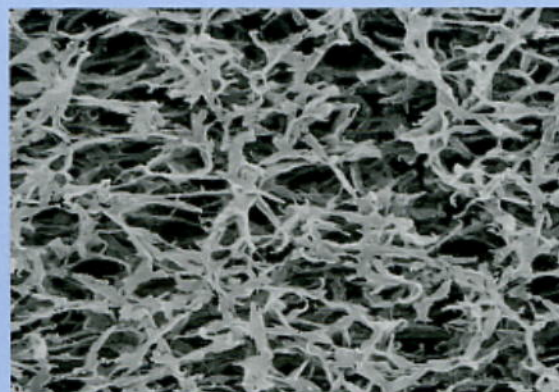
Superior Performance

'Emflon II' filter cartridges can withstand up to 4 bar differential pressure at 80°C and maintain their sterilising capability ratings under such conditions. Removal efficiency is sustained at extremely high levels independent of fluctuations in flow-rate or differential pressure. The correlation of microbial removal with a non-destructive high sensitivity integrity test, the Forward Flow Test, provides the final confirmation of filter performance for the user and assurance of correct installation.

The extremely high flow rates achievable with 'Emflon II' filters result in very economical filtration through the use of smaller installations. Reduced pressure loss is achieved with 'Emflon II' and this results in the reduction of energy costs.

'Emflon II' filters are designed for continuous use in air, with a typical service life of 12-18 months at up to 60°C

Figure 1



5000X Photo micrograph of surface of 'Emflon II' membrane.

Manufactured to highest standards of quality and reliability

'Emflon II' filters are manufactured from only two basic materials, PVDF membrane and polypropylene,

'Emflon II'

under normal operating conditions. For higher temperature operation or enriched oxygen applications, please contact Pall for further details.

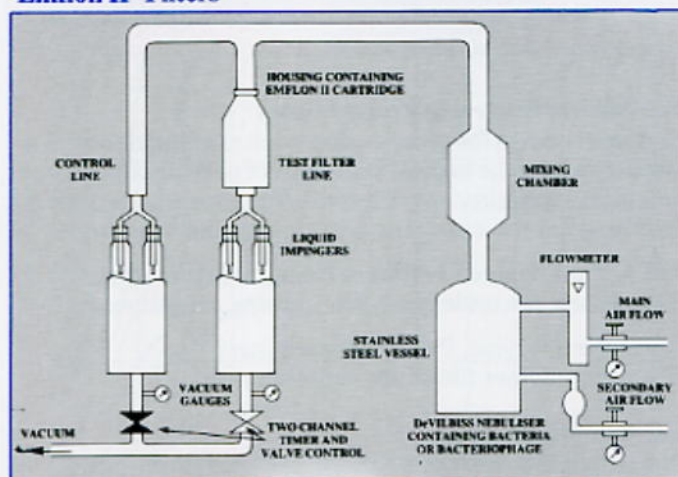
Scientific Validation

'Emflon II' filters have been extensively and scientifically validated using the most advanced methods and the most sensitive equipment available. Filters are validated to an absolute rating of $0.01\mu\text{m}$ in gases using bacteria, bacteriophage and smaller particle challenge tests.

'Emflon II' filters also have a removal rating of $0.2\mu\text{m}$ in liquids, validated with *Pseudomonas diminuta* to conditions of blockage.

Removal ratings of 'Emflon II' for bacteria are not influenced by the presence of moisture or by variations in flow and pressure. Drying of air or restriction of flow is not necessary. Effluent quality tests have demonstrated the absence of particle shedding and media migration under constant or pulsating flow conditions.

Figure 2
Simplified diagram of Pall Aerosol Challenge Test Rig for 'Emflon II' Filters



Steam Sterilisation

'Emflon II' filters can be steam sterilised *in situ* up to 142°C in either direction of flow. In addition, the ability of 'Emflon II' filters to be repeatedly sterilised gives the benefit of repeated use of 'Emflon II' filters, such as in vent or sterile air applications, to give low operating costs.

'Emflon II' disposable filter assemblies such as the Pall 'Kleenpak' and AVF filters are not designed for *in situ* steam sterilisation but can be autoclaved repeatedly at up to 140°C .

Table 1
Summary of Validation Data for 'Emflon II' Filters

Test Organism	No of Filters Tested	Challenge Level per 254mm Filter (0.66m^2)	Effluent Quality
<i>Pseudomonas diminuta</i> (aerosol)	15	$1.2\text{--}3.6 \times 10^{10}$	Sterile
T1 Bacteriophage (aerosol)	22	$1.7 \times 10^8\text{--}1.6 \times 10^{10}$	Sterile
<i>Pseudomonas diminuta</i> (liquid)	30	$8 \times 10^{11}\text{--}2 \times 10^{12}$	Sterile

For full details please refer to Pall Publication STR 1132

Purpose built for the Pharmaceutical ...

'Emflon II' filters for the pharmaceutical, biotechnology and related industries are manufactured to a special 'P' grade standard of quality. This means that they are manufactured in conformance with Good Manufacturing Practices. All components are fully traceable, FDA listed, and are tested for biological safety and toxicity in accordance with United States Pharmacopoeia. They are also non-fibre releasing. All of these and many other qualifications are embodied in the 'Emflon II' 'P' Certificate, which is issued for each batch of 'P' grade cartridges and sent separately to the user.








... and Electronics Industries

'Emflon II' filters for the electronics and related industries are manufactured to an 'E' grade standard of quality. This means that they are manufactured in clean room conditions specially developed for electronics grade filters. All cartridges are double-seal packed to protect the product and maintain its ultra-clean condition.

Wide range of filter styles plus full technical support

'Emflon II' filters range from small disposable filter assemblies to replaceable plug-in cartridges of 762mm in length with an effective filtration area of 1.98m^2 .

Availability of 'Emflon II' filters is assured by manufacture to the same high standards in three different locations worldwide and an extensive international sales organisation. In addition, Pall Scientific and Laboratory Services groups worldwide offer full technical support including technical advice and practical assistance in evaluation and problem solving. This unique service is available to all Pall customers free of charge.

	Pharmaceutical		Laboratories
	Biotechnology		Electronics
	Fermentation		Food and Beverage
	Hospitals		Packaging

'Emflon II' filters are specifically designed for use in the following processes:

- Sterile Process Air or Gases
- Fermenter Sterile Air Inlet
- Fermenter Exhaust (filtration)
- Venting of Storage Tanks
- Particulate Control of Process Gases in the Electronics Industry
- Pneumatic Conveying of Food and other Bacterial Sensitive Products
- Microbiological Control during Aseptic Packaging
- Particulate Control during Packaging of Clean Components

For Pressurised Air and Gas Sterilisation

Emflon II cartridges with a rating in gases of $0.01\mu\text{m}$ provide total assurance of sterility by removal of bacteria and bacteriophage and take away the risks associated with non-absolute depth-type media. The correlation of microbial removal with a non-destructive high sensitivity integrity test, the Forward Flow Test, provides the final confirmation of filter performance for the user and assurance of correct installation. In addition, the medium is inherently hydrophobic – so much so, even when the air is wet and contains free water droplets, low pressure drop is maintained.

There is generally no need to dry the filter before use; there is no need to heat or insulate the filters; the air can be warm

or cold, saturated or unsaturated. Removal efficiency remains constant, even at high and pulsating flow rates and at high differential pressures. Energy savings will be considerable and the superior area and high voids volume of Emflon II cartridges obviate the need for prefilters in many cases – yet another saving.

For Particle Control in Process Gases

Emflon II is ideal for process gases such as in the electronics industry where the highest assurance of particle control and reliability is required together with filter manufacturing and testing under the most stringent clean room conditions.

The highest degree of effluent cleanliness is maintained during use even under high flow pulsing conditions.

For oxygen service, Pall Supercheminert™ all-fluoropolymer filters are recommended.

For Vent Applications

The extremely hydrophobic nature of the Emflon II membrane makes Emflon II filters ideally suited for venting of storage tanks or pressure vessels.

Emflon II membrane with its pleated construction gives high flow capacity in either direction with minimum pressure drop and long service life.

Emflon II vent filters are compact, easy to install and will operate under wet or dry conditions. Generally there is no need to heat or insulate the filters.

Note: If Emflon II is to be used for venting tanks containing high concentrations of volatile solvents or corrosive chemicals please contact Pall for advice.

Operating Characteristics

Figure 3

Pressurised Air (2 bar gauge inlet)
Air Flow v Differential Pressure
AB Style Cartridges

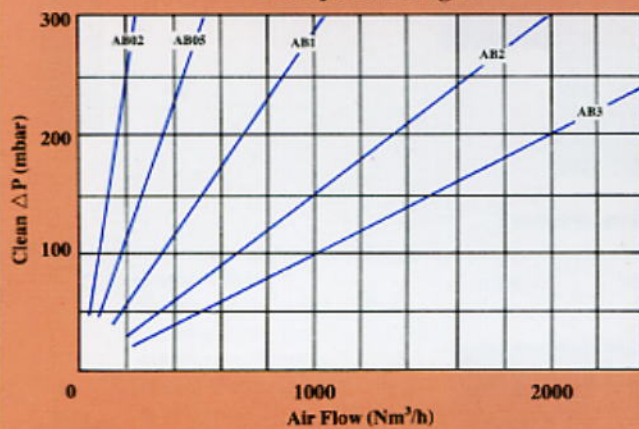


Figure 4

Pressurised Air (2 bar gauge inlet)
Air Flow v Differential Pressure
Small Cartridges and Disposable Filter Assemblies

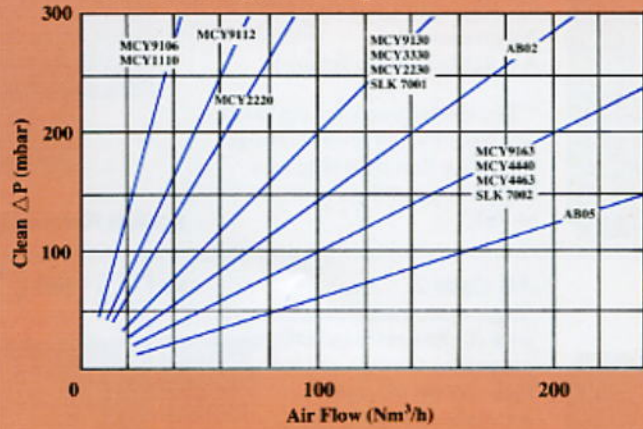
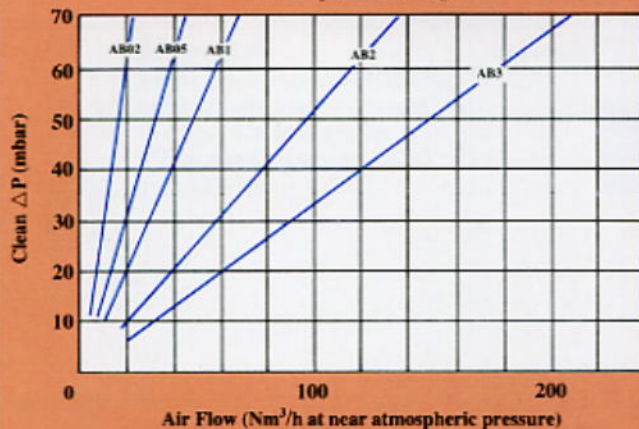


Figure 5

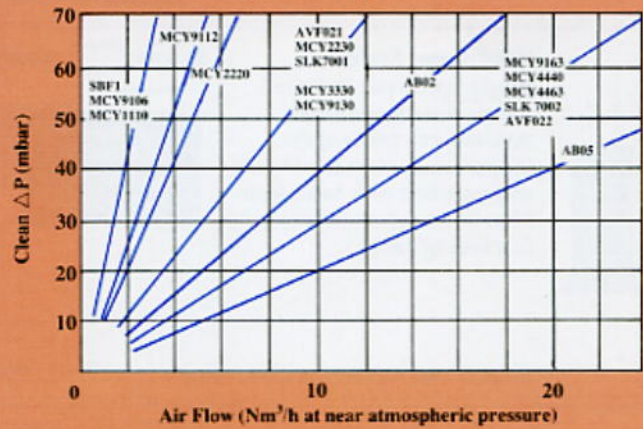
Vent Filters
Air Flow v Differential Pressure
AB Style Cartridges



NOTE: Special sizing procedures may be required if the tanks are to be steam or hot water sanitised.

Figure 6

Vent Filters
Air Flow v Differential Pressure
Small Cartridges and Disposable Filter Assemblies



NOTE: Special sizing procedures may be required if the tanks are to be steam or hot water sanitised.

Steam Sterilisation Limits

Procedure	Temperature	Maximum Steam Exposure Time
<i>In-situ</i> Sterilisation (Normal flow direction)*	142°C	165 hours
Autoclave Sterilisation	125°C 140°C**	100 hours 50 hours**

*EMFLON II filters can also be steam sterilised *in-situ* in reverse direction of flow – please contact Pall for details.

** Values extrapolated from validation data

Maximum Differential Pressure

Styles	
AB, SLK, Junior, AVF	Kleenpak
To 80°C For maximum differential pressure during steam sterilisation, please refer to Pall publication SD805.	4.1 bar up to 40°C 3.5 bar

'Emflon II'

Filter Styles Available in 'Emflon II' Media



AB Code 7

Locating fin* and single open ended plug-in style with double external ethylene propylene 'O' rings and bayonet lock. 70mm diameter. Available in three lengths.

* The distinctive locating fin at one end of a Pall filter cartridge identifies that cartridge as a Pall product and is a trademark of Pall.

AB V0027 VJ

Code	Nominal Length	Area m ²
1	254mm	0.66
2	508mm	1.32
3	762mm	1.98

Code	Application
P	Pharmaceutical
E	Electronics

Example Part Number: AB2V0027PVJ



AB Code 2

Single open ended plug-in style with double external ethylene propylene O-rings and bayonet lock. 70mm diameter. Available in two lengths.

AB V0022 VJ

Code	Nominal Length	Area m ²
02	65mm	0.16
05	125mm	0.33

Code	Application
P	Pharmaceutical
E	Electronics

Example Part Number: AB05V0022PVJ



'Sealkleen' Style

Single open end. Patented flange seal on open end. Available in two lengths. (Separate elastomeric O-ring seal supplied with Sealkleen filter housing). 56mm diameter (excluding flange).

SLK700 V002PV

Code	Nominal Length	Area m ²
1	66mm	0.11
2	133mm	0.22

Example Part Number: SLK7001V002PV



Autoclave Vent Filter (AVF) Style

Single open end. 56mm diameter. End adaptor 1/2" BSPL male thread with EPR flat gasket.

AVF02 V002PVJ

Code	Nominal Length	Area m ²
1	87mm	0.11
2	150mm	0.22

Example Part Number: AVF021V002PVJ

Junior Style

Single open ended with single internal ethylene propylene O-ring. 56mm diameter. Available in four lengths.



MCY V002 VJ

Code	Nominal Length	Area m ²	O-ring Type
2230	66mm	0.11	209
4463	133mm	0.22	209
9130	66mm	0.11	209
9163	133mm	0.22	209
9106	27mm	0.04	115
9112	44mm	0.07	115

Code	Application
P	Pharmaceutical
E	Electronics

Example Part Number: MCY4463V002EVJ

Junior Style

Single open ended with 4 locking tabs. Double external ethylene propylene O-rings. 56mm diameter (excluding tabs) Available in four lengths.



MCY V002 VJ

Code	Nominal Length	Area m ²
1110	32mm	0.045
2220	57mm	0.09
3330	82mm	0.14
4440	106mm	0.19

Code	Application
P	Pharmaceutical
E	Electronics

Example Part Number: MCY4440V002PVJ

Junior Style

Single open ended with double external ethylene propylene O-rings. 42mm diameter. 51mm nominal length. Filter area 0.045m².



SBF1V002 VJ

Code	Application
P	Pharmaceutical
E	Electronics

Example Part Number: SBF1V002PVJ

'Kleenpak' Capsule Filter

Filter element bonded in compact disposable polypropylene shell. Available in three lengths. Integrally moulded inlet and outlet connections, available in Triclover or hosetail fittings.



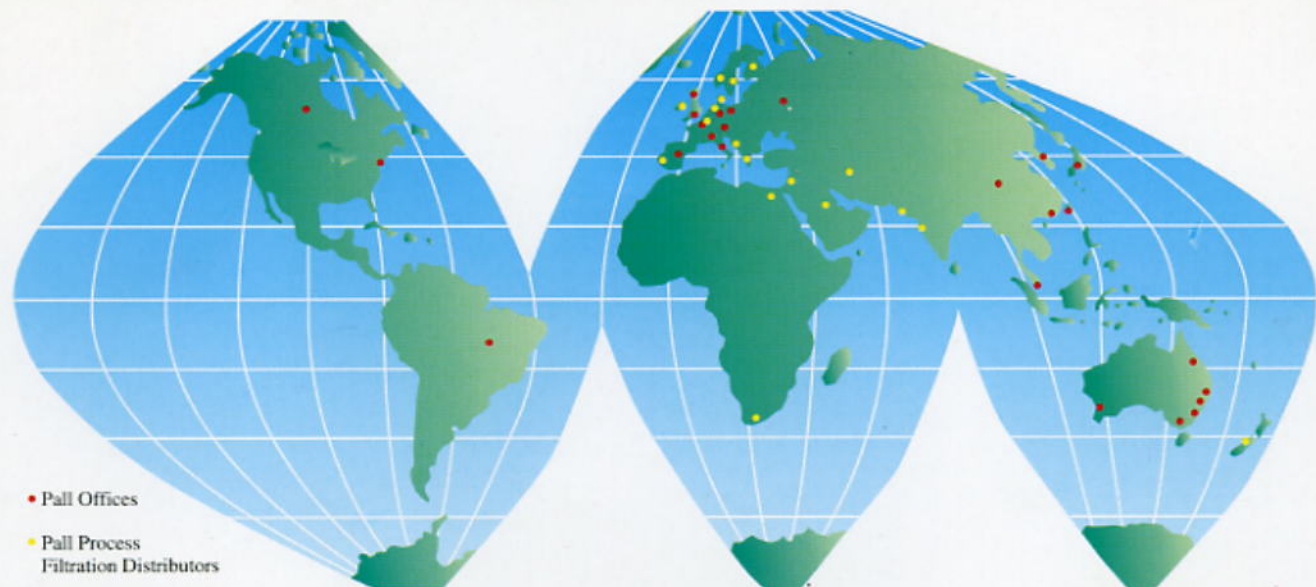
KA V002PV

Code	Code	Connector	Nominal Length (mm)		
			KA1	KA2	KA3
1	1	1 Triclover	117	158	174
2	2	Hosetail ⁽¹⁾ (6 to 13mm multi-barb)	158	199	-
3					

(1) Sizes KA1 and KA2 only.

Please see Pall publication SD 1382 for further details on the Kleenpak Capsule filters in 'Emflon II' media.

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