



Pall Corporation



SUPRAdisc™
Depth Filter Modules

SUPRAdisc Depth Filter Modules

The Complete Filter System

Pall, has consistently developed high performance depth filters for chemical applications. The SUPRAdisc module design concept combines the advantages of conventional depth filter sheets with the positive features of enclosed filters.

SUPRAdisc MODULE CONCEPT

Each module consists of three major components:

- Filter cells
- Tubular center core
- Adapters

The individual filter cells have two filter sheets and a drainage plate which are edge sealed in an injection mold process. The drainage plate reduces the flow resistance, guarantees an excellent flow distribution over the filter sheet and enables a high filter cell stability.

Up to 21 cells can be stacked on a tubular core, compressed and joined to form a unit. This design results in a reliable sealing between the filter cells, even if the module is in a dry state, which eliminates the need for retightening after wetting.

SUPRAdisc MODULE – FILTER MEDIA

Depth filter sheets have been successfully used in a vast range of applications. Due to their excellent mechanical strength, these sheets can readily be incorporated into modules. Almost all grades of depth filter available in Pall flat sheet format are also available in SUPRAdisc modules, so that the change from open sheet filter systems to closed systems is straightforward. SUPRAdisc modules provide a system similar to filter cartridges, with high efficiency and excellent filtration properties. In many applications, SUPRAdisc modules provide a more economic alternative to cartridge filters.

THE COMPLETE FILTER SYSTEM

The SUPRAdisc module adapter has two O-rings and a bayonet lock. Consequently, the SUPRAdisc modules can be installed quickly and easily into filter housings. A flat gasket adapter version is also available. For both adapter types, a module lifting device is available. In the flat gasket adapter version an integrated gripping groove permits the use of a module lifting device and in the double O-ring type the bayonet lock enables this capability.

SUPRAdisc MODULE SCALE-UP INFORMATION

Product Filter	Filter area in m ²	Filter area in ft ²	Typical filtered volume (L)
SUPRAcap 60 EDF* 6-0 EDF* 6-3	0.002	0.022	0.5 – 5
EDF*14-0 EDF*14-3	0.012	0.13	1 – 10
EDF* 32-0 EDF* 32-5	0.075	0.81	3 – 20
SUPRAdisc 203	0.30	3.2	5 – 50
SUPRAdisc 205	0.50	5.3	5 – 300
SUPRAdisc 209	1.00	10.7	> 50
SUPRAdisc 216	1.80	19.3	> 50
SUPRAdisc 509	2.30	24.7	> 100
SUPRAdisc 516	4.00	43.0	> 100
SUPRAdisc 520	5.00	53.8	> 100

*Filter holder



Technical Service

For best possible results and maximum reliability we recommend a test run under practical conditions. Depth filtration calls for detailed knowledge of the product and the filtration sequence. In this area Pall specialists can provide valuable assistance – they are in an position to study the filtration task in the field or in our SLS (Scientific and Laboratory Services) labs. Pall offers hands-on assistance and places its extensive technical resources at the disposal of its customers in the form of worldwide technical advice, including cost reduction programs, process review and problem solving.

SUPRAdisc Depth Filter Modules

High Performance Filtration

Due to their material composition and their structural design, depth filters can be compared with a maze-like, extremely fine three-dimensional sieve with a huge number of branched micro “channels”.

Depth filters form a structure with a void volume of 70 - 85% of the total volume of the depth filter. This is indicative of the high dirt holding capacity. The void volume of a **Pall** depth filter can amount to almost 4 L/m² of filter area.

The passage of the liquid through the module channels is relatively slow so that the contact time with the filter medium is relatively long. Particles and colloids are trapped on this long passage through this fine maze with a synergistic effect between the three-dimensional mechanical screen and the adsorptive capabilities of the electrokinetic potential.

Table 1 indicates the factors which influence the retention rates of **Pall** depth filters.

In a special process developed originally by Pall, the relatively “coarse” cellulose fibers are processed to a specific fineness. In this way they are rendered suitable for the homogeneous

incorporation of additives such as very fine mixtures of diatomaceous earth. Due to sophisticated manufacturing methods, a stable positive electrokinetic potential forms during aqueous product flow through the filter.

The special manufacturing process provides a highly permeable void volume with a characteristic, very high dirt holding capacity. As a result, the progressive differential pressure increase during filtration is slow, and the tendency for spontaneous blocking is practically eliminated. Careful selection of the raw materials, their specific upgrading, a wellbalanced ratio between void volume and electrokinetic potential, the proportion of the ingredients, as well as reliable control of all process parameters, determine the desired properties of **Pall** depth filters and required to maximize performance.

Fiber or particle release from the outlet side of the depth filters is prevented by special technologies.

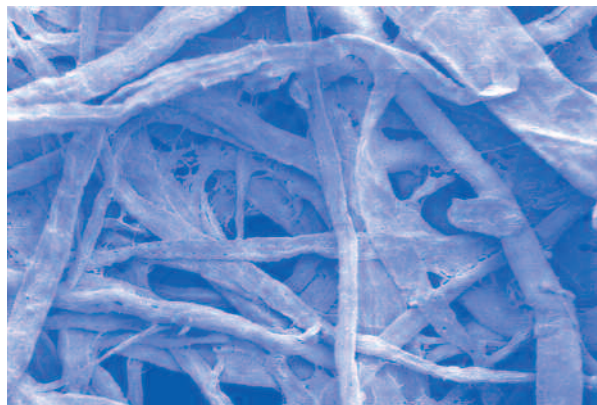


TABLE 1

Mechanical Factors

Product

Nature of the solids/particles

Number and size of the solids/particles

Viscosity

Chemical composition

Adsorptive Factors

Product

Chemical composition

Charge of the solids/particles

Concentration of the solids/particles

pH

Polarity of the solids/particles

Temperature

Depth Filter

Void volume of the filter medium

Structure of the “three-dimensional” screen

Size of the internal surface area
(dirt holding capacity)

Thickness of the filter medium

Composition and processing of media
components

Depth Filter

Structure of the “three-dimensional” screen

Number of the charge carriers

Nature of the charge carriers

Magnitude of the charge carriers



SUPRAdisc Depth Filter Modules

SD-Series



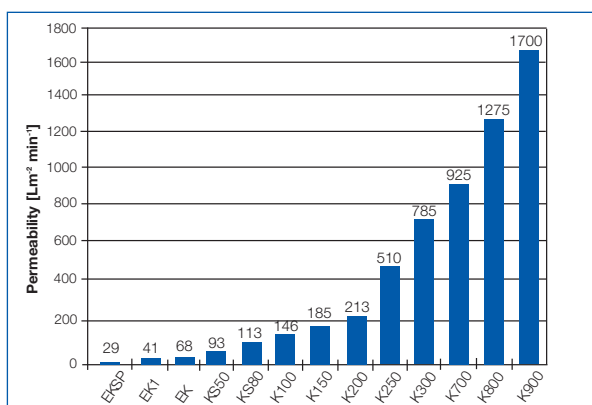
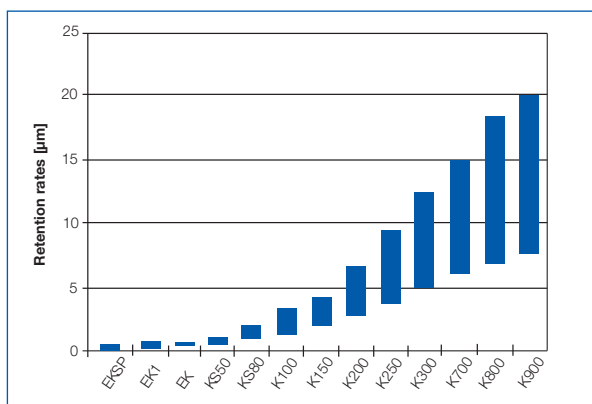
SD-SERIES

With 13 different retention rates the K series represents the standard depth filter media series of Pall SUPRAdisc modules. The retention rate starts from 0,1 µm and goes up to 20 µm. The EKSP, the EK 1 and the EK are used for fine particles. Grades K 100 through to K 900 cover the entire range from fine filtration through clarifying filtration to coarse filtration.

Material components

Due to their material composition and their structural design SeitzSchenk depth filters can basically be compared with a maze-like, extremely fine three-dimensional sieve with innumerable, branched micro"channels".

The main components are cellulose, diatomaceous earth and/or perlite and synthetic polymers. The cellulose generates the matrix of the depth filter. The diatomaceous earth and/or perlite are responsible for the clarifying effect. The synthetic polymers build up the wet strength and the the positive ZETA potential.



Δp = 100 kPa (1 bar), T = 20°C, medium H₂O

Medium	Application
EKSP EK 1 EK KS 50 KS 80	Fine clarification
K 100 K 150 K 200 K 250 K 300	Clarifying filtration Retention of activated carbon Retention of salts Removal of gels from silicones, alkyd resins, polymers Catalyst retention from various solutions
K 700 K 800 K 900	Retention of gels from resins (alkyd resins, polyacrylates) Silicon oils and silicon resins Tensides (clarifying filtration)

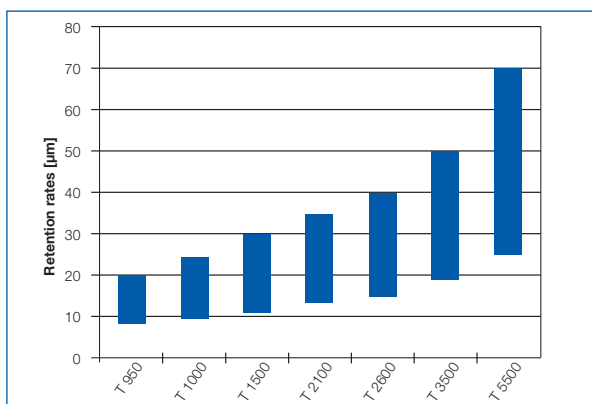
The figures quoted in the diagrams and tables should be regarded as guidelines.



T-SERIES

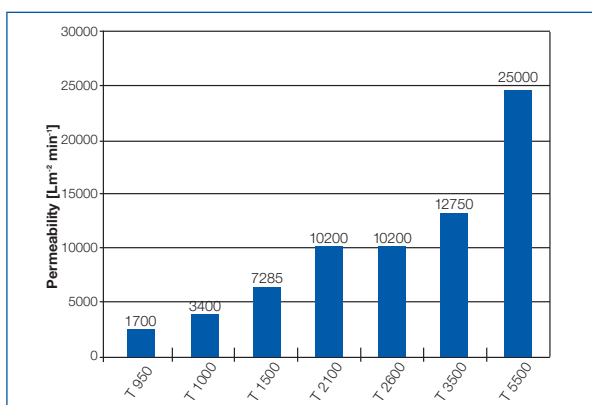
The T series of Pall SUPRAdisc modules includes filter media with 7 different degrees of permeability.

Grade T 950 is used for clarifying filtration. Due to its positive ZETA potential this depth filter possesses a high adsorption capacity. In contrast, grades T 1000 to T 5500 are designed for coarse filtration. They are characterized by an open structure and combine very high outputs with long filtration cycles due to their high dirt holding capacity. Grades T 1000 to T 5500 have proved successful in the filtration of viscous media, for the retention of gel particles and coarse dispersed substances at low differential pressures.



Medium	Application
T 950	
T 1000	Filtration of viscous oils and highly viscous oils
T 1500	
T 2100	
T 2600	Catalyst removal (e.g. from tensides and amines, from silicones etc.)
T 3500	
T 5500	Coarse filtration
	Removal of salt / Removal of gels

The figures quoted in the diagrams and tables should be regarded as guidelines.



$\Delta p = 100 \text{ kPa (1 bar)}$, $T = 20^\circ\text{C}$, medium H_2O

SUPRAcap 200 Depth Filter Module

Encapsulated for Reduced Cleaning and Easier Handling

The use of encapsulated systems in the chemical industry is becoming more widespread due to the significant advantages they provide including reduced operator exposure, reduced cleaning, increased yield and easier handling. Encapsulate filters can also help eliminate cleaning problems – this is particularly beneficial where chemical products are being filtered. In applications where toxic materials such as catalysts or contaminated activated carbon have to be removed, Pall® SUPRAcap 200 modules offer increased operator protection and simplified process handling. Pall SUPRAcap 200 modules are the first encapsulated disposable depth filter modules for large scale process filtration.

Pall SUPRAcap 200 modules help to reduce cleaning costs, minimize operator exposure and enhance product yields.

Pall SUPRAcap 200 modules are encapsulated in polypropylene and installed in a specially constructed housing so that only the inlet and outlet socket and the ejection plates between the stacked modules are in contact with product in the filter housing. These housings parts are removable and can be washed separately so that the cleaning effort are dramatically reduced, compared to standard depth module applications.

- Minimized contact between operator and fluids, means reduced expose risks
- Reduced product hold-up due to capsule design means higher yields
- Easier handling of difficult and toxic products
- Shorter processing times due to reduced cleaning effort
- Reduced cross contamination risks

Applications for Pall SUPRAcap 200 modules include:

- Filtration of toxic products
- Removal of filter aids
- Removal of catalysts
- Removal of activated carbon



SUPRAdisc II Depth Filter Modules

Next Generation Depth Filter Modules

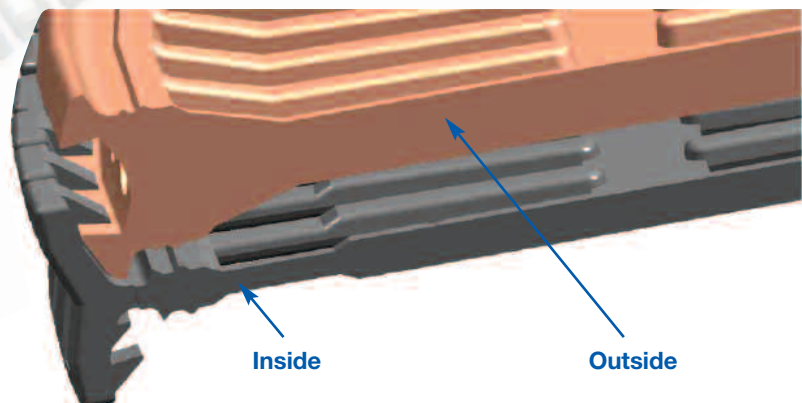
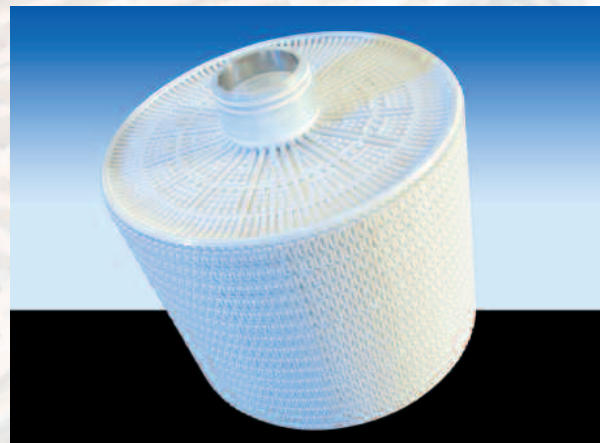
The constantly increasing demands and requirements in the chemical industries not only relate to the manufacturing process itself, but also to the components used. In these processes, filtration is of crucial importance – from coarse filtration to fine filtration.

For many years, Pall filter cartridges have proved to combine excellent reliability and high performance. These high quality standards are now extended to Pall lenticular depth filters, with the development of SUPRAdisc II depth filter modules. These modules are based on a completely new design incorporating the double separator concept, whereby the filter medium and separators are stacked on the central core and compressed to produce a stable, high strength unit.

Pall SUPRAdisc II features

This new concept guarantees distinctly increased process safety and reliability.

- **Optimal support for the filter sheets** – During filtration the upper and lower filter sheets of the modules are very well protected against pressure surges
- **Highest handling safety** – Rigid edge clipping protects the filter medium from damages during insertion or removal
- **Highest process safety by back pressure resistance** – Damage to the depth filter module by vacuum shocks and pressure shocks can be clearly reduced by the new design
- **Constant flow distribution due to stable design** – The stiff clip connection leads to defined and regular filter cell spacing around the periphery



SUPRADisc Depth Filter Modules

Technical and Ordering Information

FILTER MEDIA CONFIGURATIONS

Media Code	Depth Filter Type ⁽¹⁾	Weight per Area (g/m ²)	Typical Ash Content (%)	Extractable Ions Soluble in Acetic Acid (mg/m ²) (Typical Values)		
				Ca	Fe	Al
PEKS	EKSP	1400	58	600	30	220
XEK1	EK 1	1400	51	1600	15	140
XEK0	EK	1350	46	1400	10	120
X050	KS 50	1350	46	1400	10	120
X080	KS 80	1350	46	1200	15	120
X100	K 100	1350	46	1400	15	120
X150	K 150	1350	46	1300	15	120
X200	K 200	1350	46	1200	15	110
X250	K 250	1300	46	1000	15	70
X300	K 300	1300	46	900	15	50
X700	K 700	1300	46	900	15	50
X900	K 900	1300	46	900	25	40
C100	K 100 IR	1400	51	200	20	75
C250	K 250 IR	1250	46	150	15	50
C800	K 800 IR	1250	46	120	10	30
C900	K 900 IR	1200	46	120	10	30
T950	T 950	850	40	600	13	25
T100	T 1000	950	35	570	15	30
T150	T 1500	850	33	500	12	25
T210	T 2100	700	15	350	11	20
T260	T 2600	700	< 1	300	1	5
T350	T 3500	880	15	450	15	30
T550	T 5500	750	< 1	300	1	5

⁽¹⁾ Other Depth Filter Types available on request.

TECHNICAL SPECIFICATIONS

Operating Characteristics ⁽¹⁾	
Maximum Operating Temperature	80°C (176°F) in Polypropylene design 160°C (320°F) in Polyamide design
Maximum Operating Differential Pressure	2.4 bard (35 psid)
⁽¹⁾ With compatible fluids, which do not soften, swell or adversely affect the products or its material of construction.	
Plastic Parts of Construction of SUPRAdisc Modules	
SUPRAdisc components	Polypropylene Polyamide (Only high temperature version)
O-rings	Silicone elastomer FEP capsulated PTFE EPDM Viton

Nominal Dimensions	
SUPRAdisc Modules	
Nominal Total Length Double-O-ring	332 mm (13.1 in.)
Flat gasket	272 mm (10.7 in.)
Nominal Diameters	284 mm (12 in.) for ordering codes 203, 205, 209 and 216 in Polypropylene and Polyamide designs 410 mm (16.1 in.) for ordering codes 409, 416 and 421 in Polyamide design 413 mm (16.3 in.) for ordering codes 509, 516 and 520 in Polypropylene design

PART NUMBERING AND ORDERING INFORMATION

SUPRAdisc I Part Number: 3

Code	Module Type	Code	Filter components	Code	Adapter Option	Code	Filter Area	Code	Gasket Material	Code	Plastic Parts
00	SD I Standard	see filter media code		S	Double O-ring	203 ⁽³⁾	0.3 m ² (3.2 ft ²)	S	Silicone elastomer	P	Polypropylene
01	SD I High Temperature			C	Flat Gasket	205 ^{(3)*}	0.5 m ² (5.3 ft ²)	F	FEP	A	Polyamide ⁽⁶⁾
30	SD I Increased cell distance			209 ⁽³⁾	1.0 m ² (10.7 ft ²)	T	PTFE ⁽⁷⁾				
				216 ⁽³⁾	1.8 m ² (19.3 ft ²)	E	EPDM				
				409 ⁽⁴⁾	2.1 m ² (22.5 ft ²)	V	Viton				
				416 ⁽⁴⁾	3.7 m ² (39.8 ft ²)	P	Perpunan				
				421 ⁽⁴⁾	5.0 m ² (53.8 ft ²)						
509 ⁽⁵⁾	2.3 m ² (24.7 ft ²)										
516 ⁽⁵⁾	4.0 m ² (43.0 ft ²)										
520 ⁽⁵⁾	5.0 m ² (53.8 ft ²)										

This is a guide to the part number structure and possible options only.
For availability of specific options, contact Pall.

Example Part Numbers

Standard 300X100S216SP
High Temperature 301X100S216SA

Other gaskets available on request
(3) Available in Polyamide and Polypropylene design
(4) Only available in Polyamide design
(5) Only available in Polypropylene design
(6) High Temperature only SD I
(7) On request for SUPRAdisc II
* Only available with Double O-ring.

SUPRAdisc II Part Number: 2 **p****

Code	Module Type	Code	Filter components	Code	Adapter Option	Code	Filter Area	Code	Gasket Material
00	SD II	see filter media code		S	Double O-ring	232	1.8 m ² (19.4 ft ²)	S	Silicone elastomer
** Polypropylene parts									
				C	Flat Gasket			F	FEP
								T	PTFE ⁽⁷⁾
								E	EPDM
								V	Viton
								P	Perpunan

SUPRAcap 200 Part Number: C **S** **p****

Code	Contains Module Type	Code	Inter Disc Spacing	Code	Filter Media	Code	Filter Area	Code	Gasket Material
2	SUPRAdisc II	00	Standard	see filter media code		209 ⁽²⁾	1.0 m ² (10 ft ²)	S	Silicon elastomer
3	SUPRAdisc I	30	Increased cell distance ⁽¹⁾			214	1.6 m ² (17.2 ft ²)	F	FEP coated silicone
						216 ⁽²⁾	1.8 m ² (19.4 ft ²)	⁽²⁾ SUPRAdisc I design only.	
						232 ⁽²⁾	1.8 m ² (19.4 ft ²)	⁽³⁾ SUPRAdisc II design only.	

⁽¹⁾ SUPRAdisc I design only. **** Polypropylene parts**



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