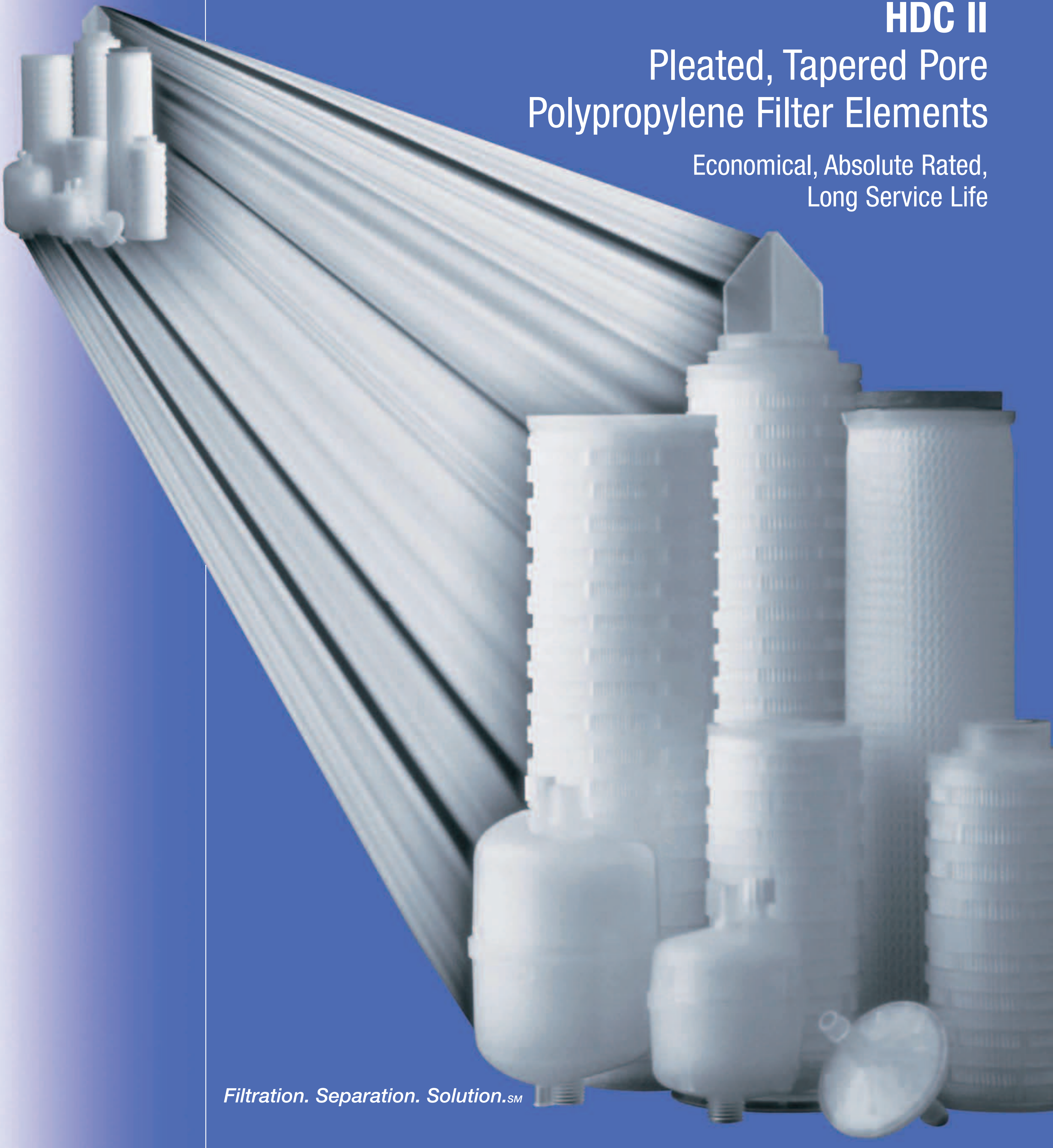
Pall Corporation

HDC II
Pleated, Tapered Pore Polypropylene Filter Elements

Economical, Absolute Rated, Long Service Life



Filtration. Separation. Solution.SM

HDC® II Filters: Pleated, Profiled, Polypropylene Filter Elements

Table of Contents **Page**

Figure 1 demonstrates how small fiber diameter creates a high dirt-holding capacity filter medium.

Dirt Holding Capacity Increases As Fiber Diameter Decreases

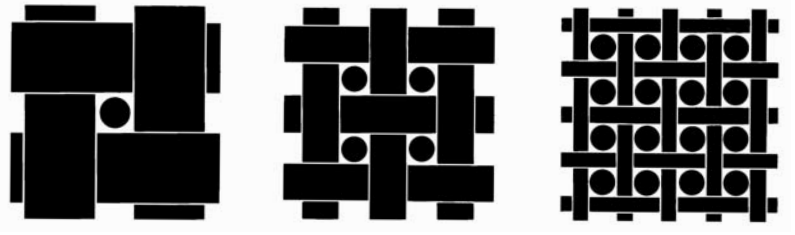


Figure 1. *Variation in Permeability and Dirt Holding Capacity of Non-woven Media as a Function of Fiber Diameter (Constant Pore Size).*

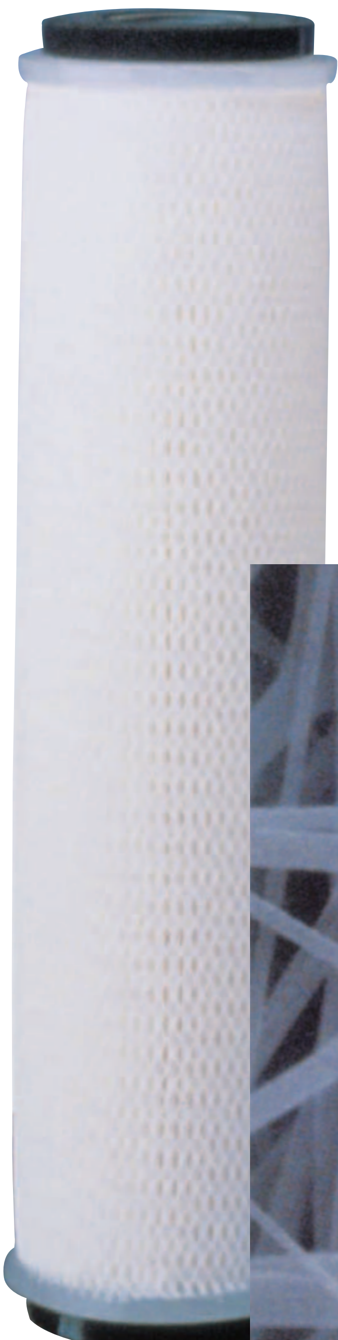
[1] The test procedure used is an adaptation of ANSI B93.31 - 1973 modified to determine the micron size above which particles are quantitatively removed.

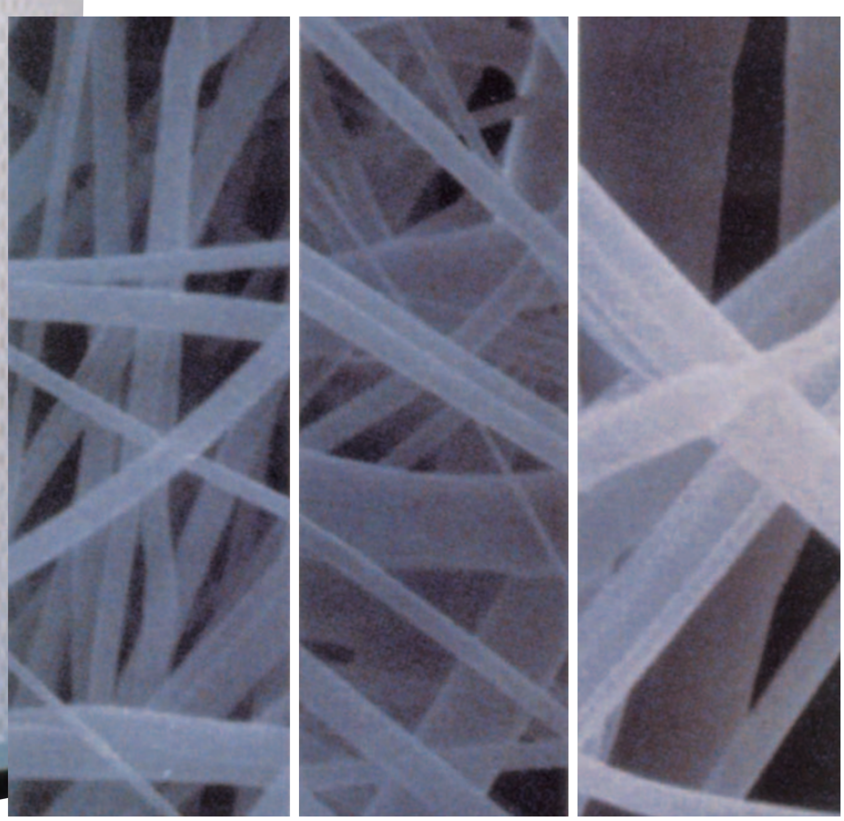
HDC II Filter Medium

The HDC® II pleated polypropylene filter uses fibers of varying diameters to produce a pore size distribution from coarse (upstream) to fine (downstream).

The construction of the HDC II filter permits more contaminant to be trapped in the outer and inner layers of the medium, thereby substantially increasing dirt-holding capacity.

HDC II filters are available in absolute removal ratings from 0.6 to 70* μm and are all polypropylene for compatibility with a wide range of fluids. The filters have more open area and pores than filters of similar appearance. Based upon tests both in the field and in Pall laboratories, HDC II elements can be expected to yield longer service lives compared with products at equal efficiencies.





Downstream Layer | Middle Layer | Outermost Layer

Figure 2

Figure 2 illustrates the varying fiber diameter used in the HDC II filter. This proprietary construction enables the filter cartridge to hold more contaminant and have longer life.

** One micrometer (μm) referenced as a micron is 1/1000 of a millimeter. The smallest visible particle is about 30-50 μm in diameter.*

Filter Construction

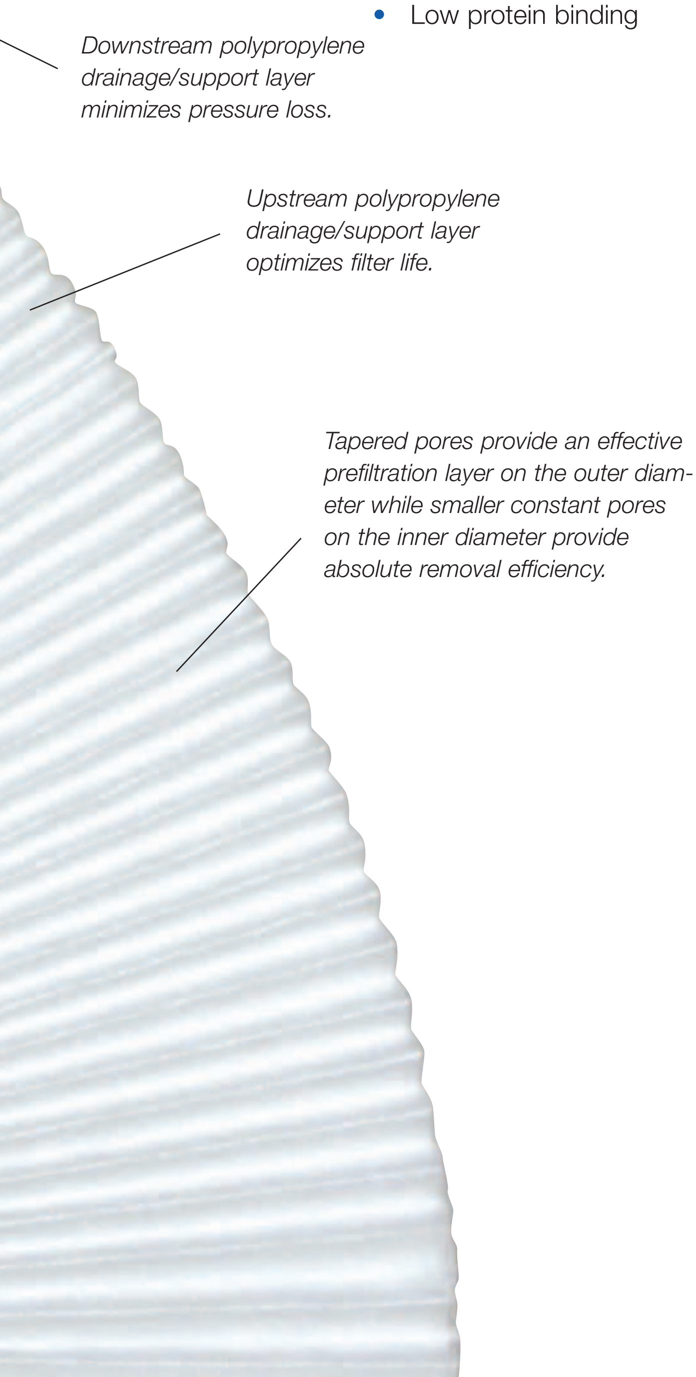
Each grade of HDC II element is carefully constructed for optimal service life, efficiency and integrity.

Absolute Rated
- 99.98% absolute removal efficiency*
- Consistent, verifiable filtration

Varied Fiber Diameter
- High dirt holding capacity
- Low cost per gallon or volume of filtrate

Fixed Pore Structure
- No solids unloading
- No fiber migration

Pure Polypropylene Construction
- Wide chemical compatibility
- No surfactants or binder resins
- Meets FDA requirements
- Low protein binding



"P" Optimization for Pharmaceuticals
- Materials of Construction:
  - All polypropylene components meet the specifications for Biological Safety as per USP for Class VI 121°C plastic – gaskets/O-rings excluded
  - Meet incoming materials QC inspection
  - Manufactured from materials which are listed for food contact application in titles of the US code of Federal Regulation
- Fabrication Integrity:
  - Prefilters lot sampled for manufacturing integrity
  - Lot samples are multiple steam cycle tested to assure element integrity
- Manufacturing Environment:
  - A controlled environment under cleanroom conditions
  - ISO 9001 Registered
  - Total Quality Management system
- Performance and Qualification Tests:
  - Cleanliness: Meets current USP limit under Particulate Matter in injections Non-fiber-releasing per CFR Title 21, parts 211.72 and 210.3 (b) (6)
  - Oxidizable Substances:
    Meets current USP requirements under Purified Water after flushing

    Meets current USP requirements under Sterile Purified Water after flushing
  - Bacterial Endotoxins:
    Meets current USP requirements under Bacterial endotoxins test
- Documentation and Traceability:
  Certificate of Test provided with each 'P-Rated' filter
  - Identification provided on every box, bag and filter label that includes:
    Part Number
    Lot Number
  - Installation instructions and steaming procedures provided with each filter
  - Lot and serial number for full traceability
- Packaging:
  Factory sealed protective packaging

Applications

HDC II filters are specifically designed for use in applications where economy and reliability are critical. All materials of construction are FDA listed for direct food contact, and all components have been tested according to the USP Class VI biological tests for plastics at 121°C. Pall is dedicated to meeting the filtration requirements of many applications including:

Pharmaceuticals: small and large volume parenterals, ophthalmics, and oral medications

Biologicals: serum and serum fractions, tissue culture media, vaccine preparations, microbiological growth media, media make-up water and diagnostic sera

Veterinary: parenterals and therapeutic sera

Electronics: photoresists, acids, bases, solvents, etchants, gases and deionized water

Fermentation Bioprocessing: liquid growth media, make-up water, intermediates, additives, exhaust gas prefiltration, downstream processing and final liquid products

Food and Beverage: potable liquids, wine, beer, soft drinks, flavors, storage tank/reactor vents and corn syrup

Rinse water for printed circuit board fabrication.

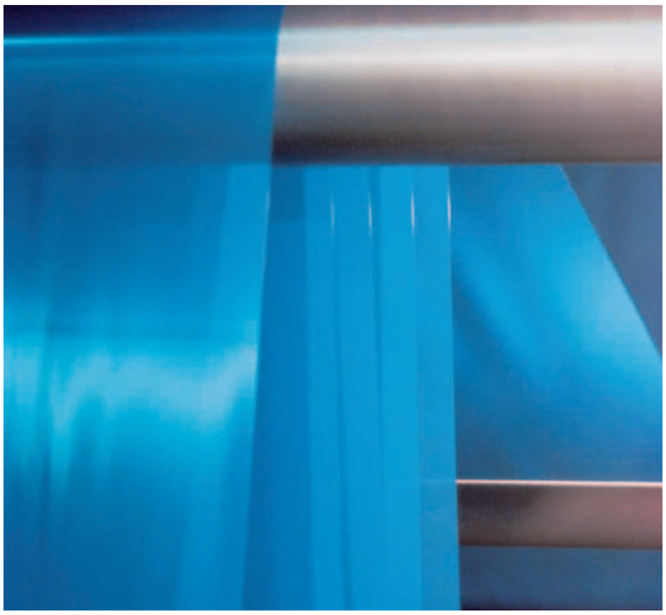
Water: rinse water, reverse osmosis system prefiltration water (prior to and/or after demineralization)

Industrial Process: printing inks, adhesives, liquid detergents, dyestuffs, fabric coatings, paper coatings, electroplating solutions, metal etching solutions, audio and video tape, automotive paints, can coatings, coil coatings, computer tape coatings, floppy and rigid disc coatings, photographic film manufacturing and processing

Chemical/Petrochemical: amine treating solvents for gas scrubbing, monomer, polymers, glycols, herbicides and pesticides, catalysts, product polishing, photoresists, acids, bases, solvents and deep well disposal fluids

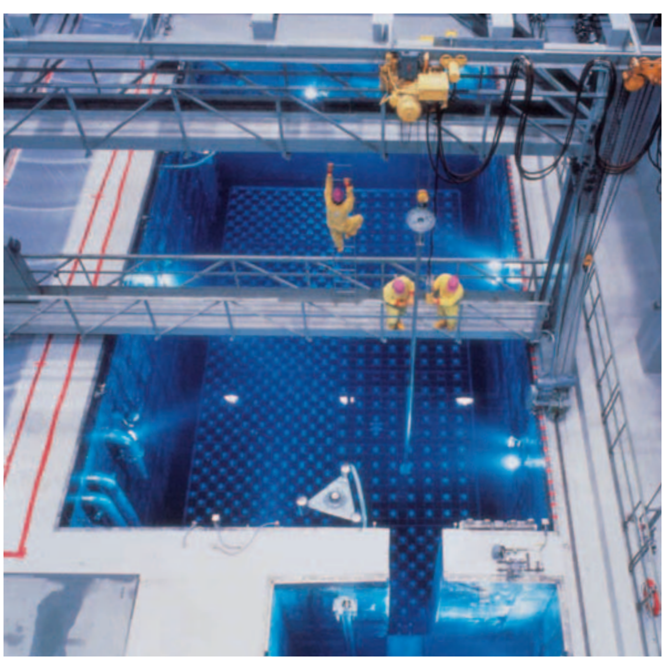
Cosmetics: toiletries, after shaves, perfumes, oils, lotions, creams, ointments, shampoos, body rinses and mouthwashes

Polymer: monomers, quench water, slurry additives, delusterants, slip agents, deionized water, solvents, spin finishes and aqueous salt solutions



Polymer film manufacturing

Power Generation: make-up water, steam generator blowdown prefilters



Coolant water filtration at a nuclear power plant

Filter Selection Guide

To facilitate selection of the best HDC II media and to ensure optimum performance, it is recommended that the flow requirements and differential pressure be considered.

Follow this simple procedure to select a filter:

1 Select the preferred filter style and absolute removal rating:
   Industrial: pages 8-9
   Sanitary: pages 10-11
   Disposable Filter Assemblies: pages 12-13

2. Determine the required number of elements by dividing the required flow rate by the typical aqueous flow per element using one of the following tables:
   Industrial: Table 1A
   Sanitary: Table 2A
   Small Flow Encapsulated Disposable Assemblies: Table 3
   Verify allowable clean pressure drop by multiplying the required flow rate by the clean pressure drop per GPM found in the tables listed above in 2. Divide by the number of elements calculated in step 2.

3. For Industrial and Sanitary applications, refer to housing Tables 1B and 2B, respectively, to determine appropriate housing size based upon system flow rates and number of filter elements calculated in step 2 [above].

4. Refer to pages 10,12 and 14 for complete ordering information on Industrial Elements, Sanitary Elements and Disposable Assemblies, respectively.

Example:

A filtration system is required for 10 µm absolute removal in a UNICAP style. The flow rate is 75 GPM and allowable clean pressure drop is 5 psid.

According to table 1a, fifteen, 10” filter elements are needed.

$$75\text{ GPM} \div \frac{5\text{ GPM}}{10\text{” modules}} = (15)\ 10\text{” filters}$$

To verify the clean pressure drop of the system, divide the system flow rate by the number of elements calculated in 2 and multiply by the clean pressure drop per 10” filter:

$$\frac{75\text{ GPM}}{(15)\ 10\text{”}} \times \frac{0.06\text{ PSID}}{\text{GPM/10”}} = 0.3\text{ PSID}$$

In Table 1B, a PC07 Series housing for UNICAP style elements is recommended for a flow rate of up to 225 GPM. A stacking array, which will accept a minimum of fifteen 10” filter elements, is required. Therefore, the PC07 housing series with a stacking array of 7 x 30” will meet the requirements. The part number for this filter element is

PUY3J100J

Note: *optimum sizing depends upon available system pressure and nature of contaminant. The housing pressure drop must be added to the element pressure drop. Therefore, it is recommended to review your filter selection with a Pall representative.*

Industrial Style Filter and Housings

UNICAP Style

UNICAP style cartridges are 2½″ (63.5 mm) O.D. double open end elements that are available as 10″, 20″, 30″, or 40″ long continuous length filters

10″ UNICAP element

PUY ● ▲ ■

● Code	Cartridge Length (Nominal)
1	10″
2	20″
3	30″
4	40″

■ Code	Gasket Options
H13	Buna N (std)
H	Viton A[4]
J	Ethylene Propylene

▲ Code	Filter Grades
J006	0.6 µm[3]
J012	1.2 µm
J025	2.5 µm
J045	4.5 µm
J060	6 µm
J100	10 µm
J200	20 µm
J400	40 µm
J700	70 µm

Temperature/Pressure Ratings		
Temperature °F (C°)	122 (50)	180 (82.2)
Maximum Differential Pressure psid (bard)	80 (5.5)	45 (3.1)

Unicap style cartridges fit the following Pall housings:
IDL, PC04, PC07, PC15, P23, P38 Series

Junior Style (4463)

Single open end 5¼″ (133.4 mm) long element with a single internal O-ring seal and 2¼″ (57.2 mm) O.D. used in small flow applications of 5 gpm (19 lpm) or less

● Code	Filter Grades
J006	0.6 µm[3]
J012	1.2 µm
J025	2.5 µm
J045	4.5 µm
J060	6 µm
J100	10 µm
J200	20 µm
J400	40 µm
J700	70 µm

MCY4463 ● ◆

◆ Code	O-ring Options
H13	Buna N (std)
H	Viton A[4]
J	Ethylene Propylene

Temperature/Pressure Ratings		
Temperature °F (C°)	122 (50)	180 (82.2)
Maximum Differential Pressure psid (bard)	80 (5.5)	50 (3.5)

Junior Style elements fit MLL, MDA and MDY series housings

[3] Extrapolated value

[4] Registered trademark of E.I. duPont de Nemours and Company

Table 1A. Industrial Style Filter Elements - Performance Specifications

Filter Grade	Filtration Rating in Liquid Service (µm) at % Efficiency[5]		UNICAP Style Elements		4463Style	
	90%	99.97%	Typical[6] Flow Rate per 10″ Module GPM (lpm)	Clean Pressure Drop[7] per 10″ Module PSID/GPM (mbard/lpm)	Typical[6] Flow Rate per 5″ Module GPM (lpm)	Clean Pressure Drop[7] per 5″ Module PSID/GPM (mbard/lpm)
J006	-	0.6*	1-2 (3.8-7.6)	1.55 (28.2)	-	-
J012	<1.0	1.2	2-3 (7.6-11.4)	0.31 (5.7)	1-2 (3.8-7.6)	0.63 (11.5)
J025	<1.0	2.5	2-3 (7.6-11.4)	0.16 (2.9)	1-2 (3.8-7.6)	0.43 (7.8)
J045	1.2	4.5	2-3 (7.6-11.4)	0.12 (2.2)	2-3 (7.6-11.4)	0.31 (5.6)
J060	3.0	6.0	2-3 (7.6-11.4)	0.08 (1.5)	2-3 (7.6-11.4)	0.23 (4.2)
J100	5.4	10.0	3-5 (11.4-18.9)	0.06 (1.1)	3-4 (11.4-15.1)	0.17 (3.1)
J200	10.0	20.0	3-5 (11.4-18.9)	0.03 (0.5)	3-4 (11.4-15.1)	0.09 (1.6)
J400	22.0	40.0	5-8 (18.9-30.3)	0.02 (0.4)	4-5 (15.1-18.9)	0.06 (1.1)
J700	35.0	70.0	8-10 (30.3-37.9)	0.01 (0.2)	4-5 (15.1-18.9)	0.03 (0.5)

[5] *Determined by the Pall F-2 efficiency test.*
* *Extrapolated value.*
[6] *Typical flows are based on aqueous service. For elements having multiple modules, multiply the flow rate in the table by the number of modules per element.*
[7] *Pressure drops are based on aqueous service. For fluids other than water, multiply differential pressure by fluid viscosity (cp). For elements having multiple modules, multiply the flow rate in the table by the number of modules per element.*

Table 1B. Housings for Industrial Elements

Housing Series	Material of Construction	Element Stacking Array	Typical Flow Capacity (GPM)	Max Allowable Pressure (PSIG)	Max Allowable Temp °F
Housings for UNI LOC Style Elements					
PC01	Carbon steel or 316 Stainless	1 x 10” 1 x 20” 1 x 30”	to 15 to 30 to 38	200	300
PC04	Carbon steel or 316 Stainless	4 x 10” 4 x 20” 4 x 30”	to 120 to 120 to 120	230 215	300 300
PC07	Carbon steel or 316 Stainless	7 X 20” 7 X 30” 7 X 40”	to 210 to 368 to 420	230 215	300 300
P15	Carbon steel or 316 Stainless	15 X 20” 15 X 30” 15 X 40”	to 340 to 480 to 675	230 215	300 300
P23	Carbon steel or 304 or 316 Stainless	23 x 30” 23 x 40”	to 820 to 1240	200	300
PC38	Carbon steel or 304 or 316 Stainless	38 x 30” 38 x 40”	to 1630 to 1930	200	300
Housings for 4463 Style Elements					
MLL	316L Stainless	1 x 5¼”	to 5	150	250
MDA	Aluminum	1 x 5¼”	to 5	150	130
MDY	Polypropylene	1 x 5¼”	to 5	60	110

Sanitary Style Filters and Housings

Single open end 2¾″ (70 mm) diameter element with double external O-rings at one end. Multiple 10″ (254 mm) filter segments are melt sealed together to form lengths of 20″ (508 mm), 30″ (762 mm) and 40″ (1016 mm). Most commonly used in pharmaceutical, food and beverage and electronics applications. Advanta Series housings are recommended.

AB ● ◆ ▲ ■ ▼

● Code	Cartridge Length (Nominal)
1	10″
2	20″
3	30″
4	40″

◆ Code	Filter Grades
J006	0.6 µm³
J012	1.2 µm
J025	2.5 µm
J045	4.5 µm
J060	6 µm
J100	10 µm
J200	20 µm
J400	40 µm
J700	70 µm

▲ Code	End Configurations
3	SOE flat closed end, external 222 O-ring
7	SOE fin end and bayonet lock, external 226 O-ring
8	SOE fin end, External 222 O-ring

■ Code	Applications
P	Pharmaceutical
(Blank)	All Others

▼ Code	O-ring Options
H4	Silicone Eastover (std)
H	Viton A
J	Ethylene Propylene

Temperature/Pressure Ratings		
Temperature °F (C°)	122 (50)	176 (80)
Maximum Differential Pressure psid (bard)	80 (5.5)	60 (4.1)

Sealkleen® Style

Single open end 2¼″ (57 mm) diameter element (excluding flange) that incorporates a patented seal to eliminate fluid bypass from the upstream to the downstream side of the filter. The elastomeric O-ring is placed on a special flange, which is an integral part of the element outlet end cap. Sealkleen housings are recommended.

SLK700 ● ■ ★

● Code	Cartridge Length (Nominal)
1	2½″
2	5″

★ Code	Applications
P	Pharmaceutical
(Blank)	All Others

Temperature/Pressure Ratings		
Temperature °F (C°)	122 (50)	176 (80)
Maximum Differential Pressure psid (bard)	80 (5.5)	60 (4.1)

■ Code	Filter Grades
J006	0.6 µm³
J012	1.2 µm
J025	2.5 µm
J045	4.5 µm
J060	6 µm
J100	10 µm
J200	20 µm
J400	40 µm

Table 2A. Sanitary Style Filter Elements Performance Specifications

Filter Grade	Filtration Rating[9] in Liquid Service at % Efficiency (µm)		AB Style		Sealkleen 7001 Style		Sealkleen 7002 Style	
	90%	99.98%	Typical Flow Rate[10] per 10″ Module GPM (lpm)	Clean Pressure Drop[11] per 10″ Module PSI/GPM (mbard/lpm)	Typical Flow Rate[10] per 2½″ Module GPM (lpm)	Clean Pressure Drop[11] per 2½″ Module PSI/GPM (mbard/lpm)	Typical Flow Rate[10] per 5¼″ Module GPM (lpm)	Clean Pressure Drop[11] per 5¼″ Module PSI/GPM (mbard/lpm)
J006	-	0.6*	1-2 (3.8-7.6)	1.25 (22.8)	0.5 (1.9)	7.43 (135.4)	1-1.5 (3.8-5.7)	3.59 (65.4)
J012	<1.0	1.2	2-3 (7.6-11.4)	0.22 (4.0)	0.5-1 (1.9-3.8)	1.30 (23.7)	1-2 (3.8-7.6)	0.63 (11.5)
J025	<1.0	2.5	2-3 (7.6-11.4)	0.15 (2.7)	1-1.5 (3.8-5.7)	0.88 (16.0)	2-3 (7.6-11.4)	0.43 (7.8)
J045	1.2	4.5	2-3 (7.6-11.4)	0.11 (2.0)	1-1.5 (3.8-5.7)	0.61 (11.1)	2-3 (7.6-11.4)	0.31 (5.6)
J060	3.0	6.0	3-5 (11.4-18.9)	0.08 (1.5)	1-2 (3.8-7.6)	0.48 (8.8)	2-3 (7.6-11.4)	0.23 (4.2)
J100	5.4	10.0	3-5 (11.4-18.9)	0.06 (1.1)	1-2 (3.8-7.6)	0.36 (6.6)	3-4 (11.4-15.1)	0.17 (3.1)
J200	10.0	20.0	5-8 (18.9-30.3)	0.03 (0.5)	2-3 (7.6-11.4)	0.18 (3.3)	3-4 (11.4-15.1)	0.09 (1.6)
J400	22.0	40.0	5-8 (18.9-30.3)	0.02 (0.4)	-	-	-	-
J700	35.0	70.0	8-10 (30.3-37.9)	0.01 (0.2)	-	-	-	-

[9] Determined by the Pall F-2 efficiency test.
** Extrapolated value.*
[10] Typical flows are based on aqueous service. For elements having multiple modules, multiply the flow rate in the table by the number of modules per element.
[11] Pressure drops are based on aqueous service. For fluids other than water, multiply differential pressure by fluid viscosity (cp). For elements having multiple modules, multiply the flow rate in the table by the number of modules per element.

Table 2B. Housings for Sanitary Style Elements

Housing Series	Material of Construction	Element Stacking Array		Typical Flow Capacity (GPM)	Maximum Allowable Pressure (PSIG)	Maximum Allowable Temp °F
Housings for AB Style Elements						
VSVNL In-Line Flow Sanitary	316L Stainless	1 x 5” 1 x 10” 1 x 20”	1 x 30” 1 x 40”	to 40	200	300
VSVTL “T” Flow Sanitary	316L Stainless	1 x 5” 1 x 10” 1 x 20”	1 x 30” 1 x 40”	to 40	200	300
VSGTL “T” Flow Sanitary, 1½” TC Gauge Port	316L Stainless	1 x 10” 1 x 20”	1 x 30” 1 x 40”	to 40	200	300
SLL-In-Line or “T” Flow Sanitary Steam Jacketed	316L Stainless	1 x 10” 1 x 20”	1 x 30” 1 x 40”	to 40	200	300
STL03 “T” Flow Sanitary Multistack	316L Stainless	3 x 10” 3 x 20”	3 x 30” 3 x 40”	to 100	125	200
STL06 “T” Flow Sanitary Multistack	316L Stainless	6 x 10” 6 x 20”	6 x 30” 6 x 40”	to 200	125	200
STL10 “T” Flow Sanitary Multistack	316L Stainless	10 x 10” 10 x 20”	10 x 30” 10 x 40”	to 200	125	200
Housings for 4463 Style Elements						
SLK In-Line Flow Sanitary	316L Stainless	1 x 5”		to 10	100	200

Disposable Filter Assemblies

KLEENPAK® Style

HDC II Filter elements are melt sealed into small, disposable polypropylene filter housings and are available in various lengths and diameters. Maximum operating pressure is 50 psig (3.5 bar) in gas and 75 psig (5.2 bar) in liquid at 100°F (37.8°C). Specifically designed for small volume batch sizes, these filter assemblies satisfy a wide range of laboratory, pilot plant and production scale applications.

KA ● ■ P ▼

● Code	Filter Area[12] ft^2 (m^2) (Nominal)
1	0.5 (0.05)
2	1.0 (0.1)
3	2.0 (0.2)
4	5.0 (0.5)

■ Code	Filter Grades
J006	0.6 µm
J012	1.2 µm
J025	2.5 µm
J045	4.5 µm
J060	6 µm
J100	10 µm
J200	20 µm
J400	40 µm

▼ Code	Connection Styles Connector Styles	KA1 Length Inches (mm)	KA2 Length Inches (mm)	KA3 Length Inches (mm)
1	1-1½″ Tri-Clamp[13]	4.6″ (117)	6.2″ (158)	6.9″ (175)
2	¼-½″ Hosebarb	6.2″ (158)	7.8″ (198)	-
3	¼″ NPT	5.6″ (141)	7.2″ (182)	-
4	6 mm Walther Connection (British)	-	-	
5	12 mm Walther Connection (British)	-	-	8.6″ (219)
6	⅜″ Hosebarb	-	-	8.3 (211)

[12] Refer to the Connection/Length table for cartridge length.
[13] Registered trademark of Tri-Clover, Inc.

DFA® Style

DFA ▲ 001 ■ ★
Dimensions (nominal):
Outside Diameter: 2¾″ (70 mm)
Length: 4″ (102 mm)

▲ Code	Connection Styles
3	⅜″ Hosebarb
4	¼″ NPT

★ Code	Applications
P	Pharmaceutical
(Blank)	All Others

■ Code	Filter Grades
J006	0.6 µm[14]
J012	1.2 µm
J025	2.5 µm
J045	4.5 µm
J060	6 µm
J100	10 µm
J200	20 µm
J400	40 µm
J700	70 µm

[14] Extrapolated value

FLF® Style

FLF6601 ■ ●
Dimensions (nominal):
Outside Diameter: 2½″ (63.5 mm)
Length: 3¼″ (83 mm)

● Code	Applications
P	Pharmaceutical
(Blank)	All Others

■ Code	Filter Grades
J006	0.6 µm[14]
J012	1.2 µm
J025	2.5 µm
J045	4.5 µm
J060	6 µm
J100	10 µm

Table 3. Disposable Filter Assemblies - Performance Specifications

Filter Grade	Liquid Filtration Rating at % Efficiency[15] (µm) 90%	Liquid Filtration Rating at % Efficiency[15] (µm) 99.98%	DFA Typical[16] Flow Rate GPM (lpm)	DFA Clean[17] Pressure Drop PSID/GPM (mbard/lpm)	FLF Typical[16] Flow Rate GPM (lpm)	FLF Clean[18] Pressure Drop PSID/GPM (mbard/lpm)
J006	-	0.6*	0.5 (1.9)	7.43 (135.4)	0.2 (0.76)	20.38 (371.3)
J012	<1.0	1.2	0.5-1 (1.9-3.8)	1.30 (23.7)	0.2 (0.76)	3.58 (65.2)
J025	<1.0	2.5	1-1.5 (3.8-5.7)	0.88 (16.0)	0.3 (1.14)	2.43 (44.3)
J045	1.2	4.5	1-1.5 (3.8-5.7)	0.66 (12.0)	0.3 (1.14)	1.78 (32.4)
J060	3.0	6.0	1-2 (3.8-7.6)	0.48 (8.7)	0.4 (1.51)	1.30 (23.7)
J100	5.4	10	1-2 (3.8-7.6)	0.36 (6.6)	0.4 (1.51)	0.97 (17.7)
J200	10	20	2-3 (7.6-11.4)	0.18 (3.3)	-	-
J400	22	40	2-3 (7.6-11.4)	0.12 (2.2)	-	-
J700	35	70	2-3 (7.6-11.4)	0.06 (1.1)	-	-

** Extrapolated Value*
[15] Determined by the Pall F-2 efficiency test. J700 used the maximum spherical particle passed test.
[16] Typical flows are based on aqueous service.
[17] For fluids other than water, multiply differential pressure by fluid viscosity (cp).
Add housing ΔP: PSID=0.312 $(GPM)^2$, for fluids other than water, multiply housing ΔP by specific gravity.
[18] For fluids other than water, multiply differential pressure by fluid viscosity (cp).
Add housing ΔP: PSID=0.624 $(GPM)^2$, for fluids other than water, multiply housing ΔP by specific gravity.

Performance Data

Removal Ratings

There is no universally accepted system for determining removal ratings of cartridge filters in liquid service.

A rating method developed at Oklahoma State University in the 1970s (OSU F-2 Test Method) has received wide acceptance for use on lubricating and hydraulic fluids. Pall Corporation extensively uses this method for oils, and has adapted it for use with water in the 0.5 to 25 µm range. A second modification uses oil and covers the range from 25 to 70 µm.

Comparing Dirt Capacities

The OSU F-2 test data can be used to obtain very meaningful comparisons of efficiency between filters of varying types and from various sources. The dirt holding capacity data, however, correlates only very roughly with actual service life. Bearing in mind the approximate nature of these data, various competitive filter elements of equal efficiencies, as determined by the F-2 Test, were compared with HDC II elements. These comparisons indicated that when elements with equal F-2 efficiencies are compared, the service life of HDC II elements could be expected to be up to four times longer.

Table 4. HDC II Compatibility Data

Chemical Classification	Examples	Maximum Temperature °F (°C)	Polypropylene
Inorganic Acids	Hydrochloric, Sulfuric, Dilute Nitric, Boric, Phosphoric	180 (82.2)	GR
Organic Acids	Acetic, Formic	150 (65.6)	GR
Bases (Alkalis)	Sodium Hydroxide, Potassium Hydroxide, Amines, Quaternary Ammonium Hydroxide	180 (82.2)	GR
Salt Solutions	Aluminum Chloride, Sodium Sulfate Sodium Nitrate	180 (82.2)	GR
Brines	Sodium Chloride, Potassium Chloride, Sodium Bromide, Calcium Chloride	180 (82.2)	GR
Oxidizers	Peroxides, Peracids	N/A	NR
Organic Solvents	Esters, Amides, Ketones, Alcohols, Cellosolves, Glycols	150 (65.6)	GR
	Benzene, Toluene, Xylene, Gasoline, Kerosene	N/A	NR
	Hexane, Octane, Fats, Oils, Propylene, Freon, Methylene Chloride, Ethers, Perchloroethylene	90 (32.2)	T
Water	Without Oxidants With Oxidants	180 (82.2) N/A	GR NR
Air	Ambient and Hot	N/A	NR

Disclaimer: *The compatibility data presented in this chart is for general guidance only. Because so many factors can affect the chemical resistance of a given product, you should pretest under your own operating conditions observing applicable safety practices such as those given on the Material Safety Data Sheet for each chemical. If any doubt exists about specific applications, please contact Pall Corporation.*

GR = Generally Recommended
NR = Not Recommended
T = Testing Recommended

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