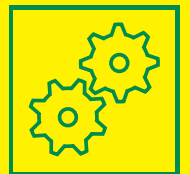




**MANN-FILTER products for hydraulics**

**2007**



**MANN  
FILTER**



## MANN-FILTER products for hydraulics

MANN+HUMMEL has been a specialist for filtration applications in vehicles, mobile plant and mechanical engineering for more than 60 years. In the aftermarket our filter elements are known and recognised worldwide under the MANN-FILTER brand.

MANN-FILTER filter elements stand for OEM quality and maximum reliability during operation. MANN-FILTER products are now available for a variety of hydraulic applications. They meet the latest technical requirements regarding filtration technology, quality and installation sizes.

### MANN-FILTER hydraulic filters guarantee you:

- High  $\beta_x$  values
- High  $\beta_x$  stability
- High dirt holding capacity
- High collapse bursting pressure
- Low initial differential pressure
- Universal use
- High economy

## Application areas

In each system, oil has a certain initial contamination which further increases in the course of operation, due to, for example, wear of components or infiltration with seals. In order to achieve and maintain the required degree of purity, the use of a high quality filter is necessary. This is because the filtration performance of the filter element determines the purity of the hydraulic fluid.

Depending on the position in the system, differentiation is made between:

### Suction filters:

A suction filter is fitted in the intake line to protect the pump from coarse dirt particles. Filter media with a metal mesh are usually used. In order to avoid cavitation problems in the pump, the pressure drop during filtration must not be excessive.

### Pressure filters:

These filters are fitted directly in the pressurised line and ensure that one or more components are supplied with oil having the required degree of purity. Filter media with synthetic fibres are usually used, or partly cellulose media.

### Return filters:

Return filters are fitted downstream of the hydraulic components and filter the oil before it flows back into the tank. They have a high dirt holding capacity to enable a long service life and ensure that the required purity level is maintained in the tank. The filter media consist of synthetic fibres or cellulose.

## Test standards and oil purity

### MANN-FILTER filter elements are tested according to the following test procedures:

- ISO 2943 Verification of material compatibility with fluids
- ISO 3968 Evaluation of differential pressure versus flow characteristics
- ISO/DIS 3724 Flow fatigue characteristics
- ISO 16 889 Filter performance test (multi-pass test)
- ISO 2942 Verification of production quality (bubble-point test)
- ISO 3723 Method for end load test
- ISO 2941 Verification of collapse/burst resistance

### Installation criteria for filter selection

When fitting the filter care must be taken that sufficient space is available for changing the filter element.

### Definition of the required filter fineness

The components of the hydraulic systems mainly determine the filter fineness. In order to ensure reliable service over many years, certain components require obligatory adherence to a defined oil purity class. The most sensitive component is critical for the choice of filter medium.

### Working filters

The following table lists **standard values** which can be used to help select the right filter medium. The required purity class depends on the specific filter surface area load (l/min per cm<sup>2</sup>) and the external conditions.

Oil purity levels acc. to ISO 4406	Filter fineness	Application area
13/10	3 µm	Hydraulic servo valves
16/13	5 µm	Hydraulic proportional valves
18/15	10 µm	Standard hydraulics > 100 bar
19/16	20 µm	Standard hydraulics < 100 bar

### Protective filters

Due to reasons of cost the filter fineness of the protective filter is always of a coarser grade than the grade of the working filter. This is because these filters do not contribute towards achieving the oil purity level, but merely provide additional protection for a certain component.

## β value and separation efficiency

The β value is a useful criterion for the evaluation of filters. It is determined from multi-pass tests acc. to ISO/DIS 4572.

### Definition:

The β value is the ratio of particles of a given size upstream of the filter to the quantity of these particles found downstream.

$$\beta_x = \frac{N_v}{N_h}$$

$N_v$  = Number of particles > x upstream of the filter

$N_h$  = Number of particles > x downstream of the filter

x = Particle size

### Example:

If there are 75 particles with a size 3 µm upstream of the filter and downstream of the filter there is only one such particle, the filter will have the characteristic

$$\beta_3 = 75.$$

The conversion to the separation efficiency  $\eta$  is made as follows:

$$\eta = 1 - 1/\beta_x$$

### Comparison of β value and separation efficiency η (respectively related to a defined particle size)

β value	Separation efficiency η
1	0.00 %
2	50.00 %
10	90.00 %
25	96.00 %
50	98.00 %
75	98.67 %
100	99.00 %
200	99.50 %
1,000	99.90 %
9,999	99.99 %

## Filter media

### Composition and characteristics

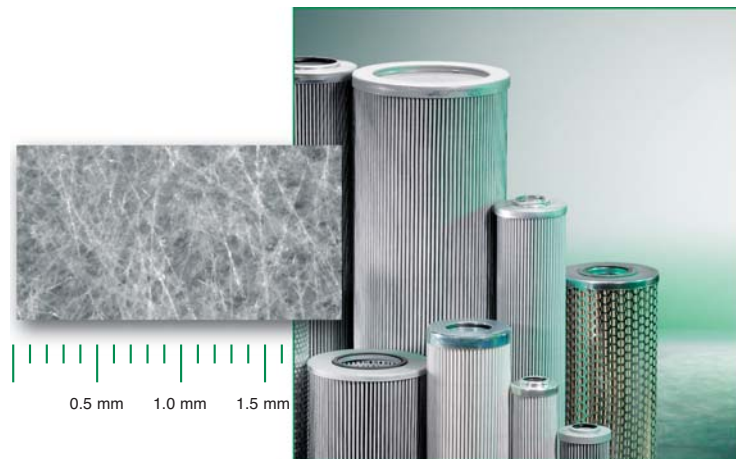
Selection of the right filter medium depends on a number of criteria. These include the type of application, the filter function, level of contamination, the required dirt holding capacity and requirements regarding chemical or physical resistance.

Hydraulic applications use media with fibre-glass, polyester, cellulose and metal fibres and stainless steel mesh. The following list gives you an overview of how these five filter media differ with regard to specific characteristics:

#### Fibre-glass medium

##### Characteristics

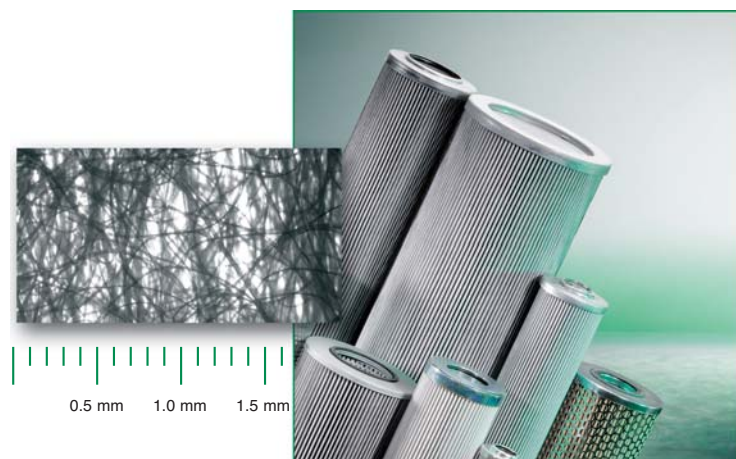
- Fibre-glass fabric based on synthetic fibres with acrylate resin bonding
- Large dirt holding capacity
- Excellent separation efficiency of ultra-fine particles through three dimensional labyrinth structure with deep-bed filtration
- Excellent value for money



#### Polyester medium

##### Characteristics

- 100 % polyester fibres with thermal bonding
- High differential pressure stability
- Large holding capacity through deep-bed filtration with minimal flow resistance
- Good chemical stability
- High separation efficiency of ultra-fine particles
- Tearproof structure
- No static charge





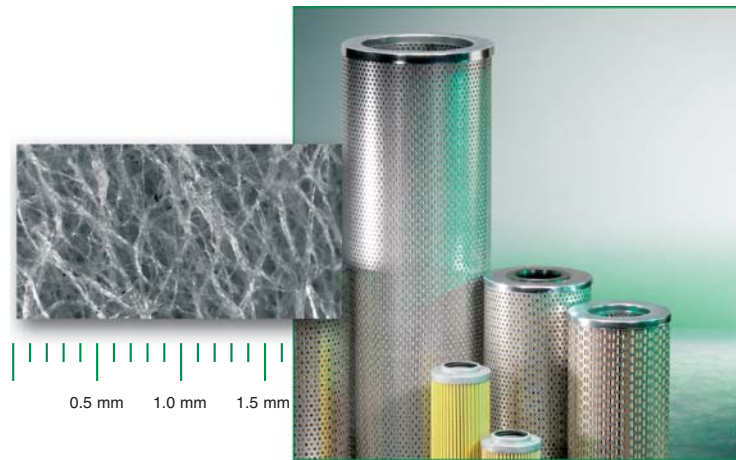
## Filter media

### Composition and characteristics

#### Cellulose medium

##### Characteristics

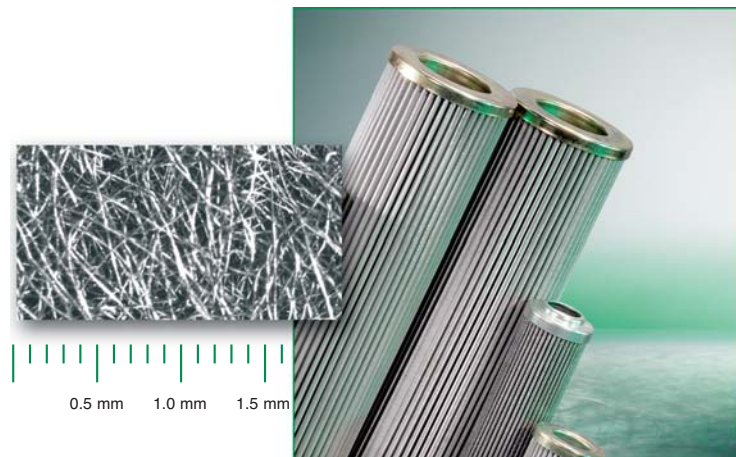
- Cellulose medium
- Filter material from cellulose fibres with special impregnation
- Low-priced variation with good dirt holding capacity
- Not suitable for hydrous substances



#### Metal fibre medium

##### Characteristics

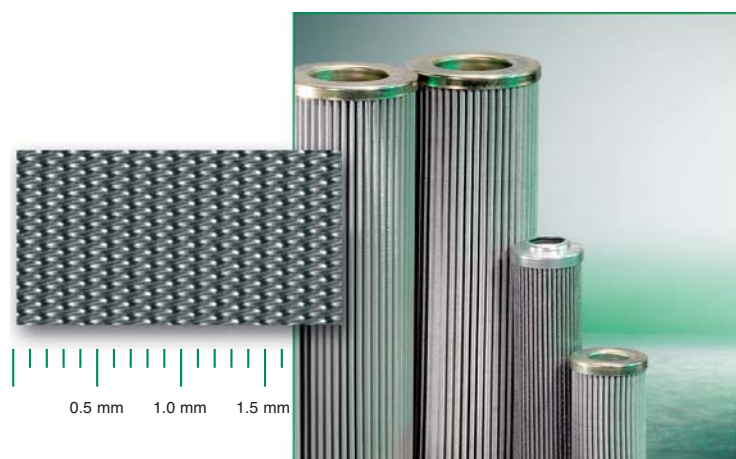
- Sintered metal fibres with three dimensional labyrinth structure for deep-bed filtration
- Low flow resistance with high dirt holding capacity
- Excellent chemical and thermal stability



#### Stainless steel wire mesh

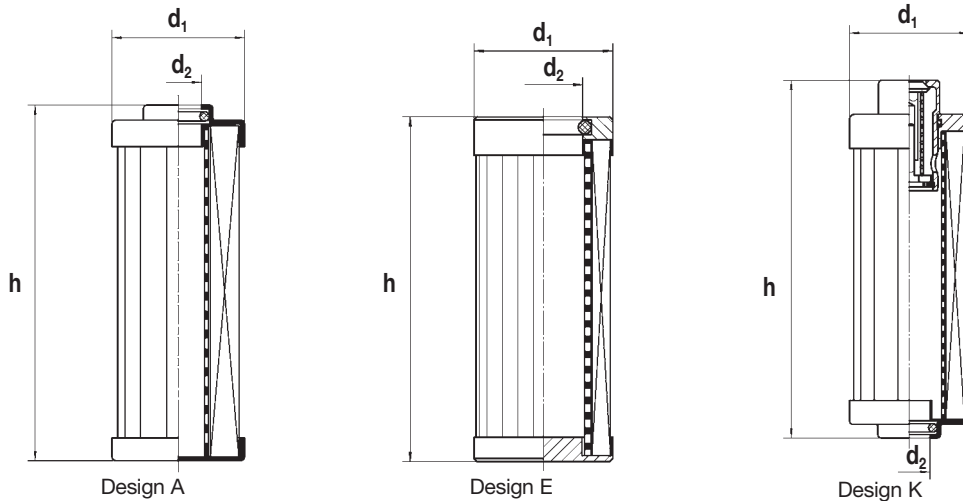
##### Characteristics

- Wire mesh in material 1.431/1.4404 for surface filtration with a web: square mesh or Dutch-twilled weave
- Low flow resistance through large-pored strainer surface
- Excellent chemical and thermal stability



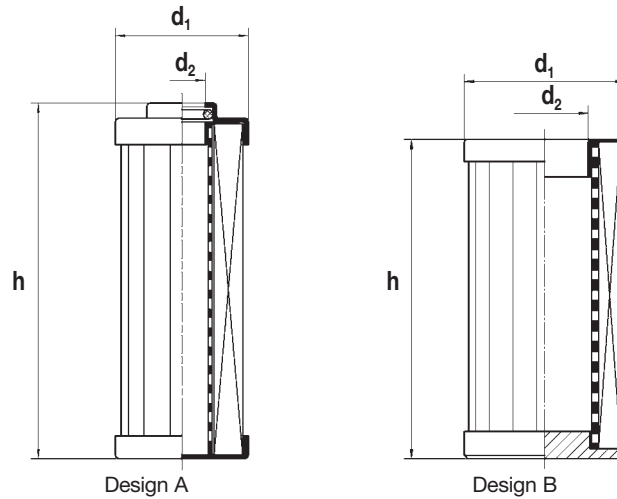
A comprehensive list of the available replacement filter elements suitable for filter housings of different manufacturers is available in our online catalogue at [www.mann-filter.com](http://www.mann-filter.com)

## MANN-FILTER products with fibre-glass medium



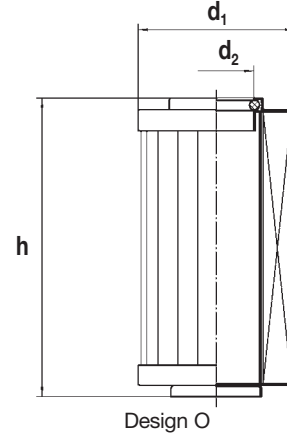
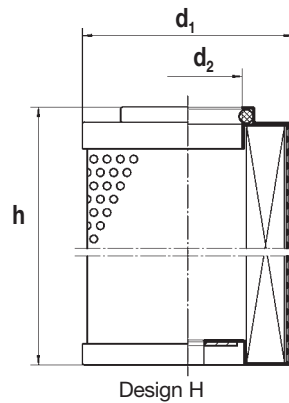
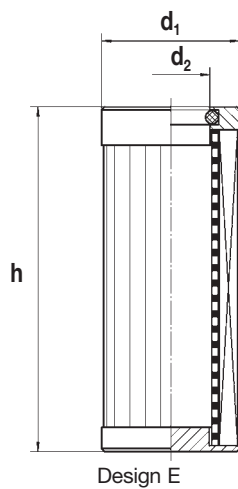
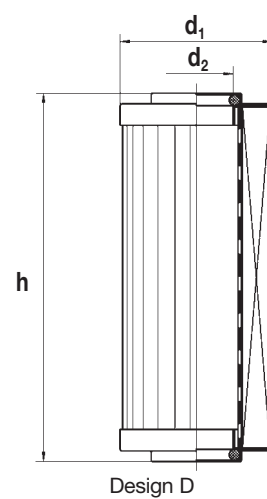
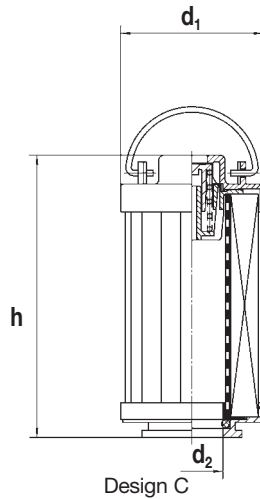
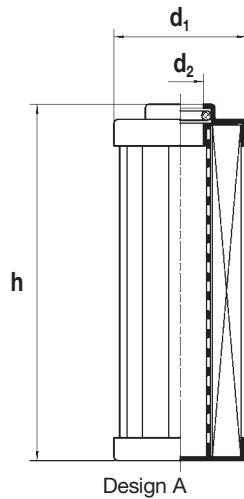
MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	$\beta_x \geq 200$ x	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	d <sub>1</sub>	d <sub>2</sub>	h						
HD 45	35	12.2	94	30	20	30	–	NBR	A
HD 45/1	35	12.2	94	30	3	30	–	NBR	A
HD 45/3	35	12.2	94	30	10	30	–	NBR	A
HD 45/4	35	12.2	94	30	10	210	–	NBR	A
HD 43	35	10	105	30	10	30	3	NBR	K
HD 46/1	40	18	122	10	5	60	–	NBR	A
HD 46/2	40	18	122	10	8	10	–	NBR	A
HD 46/3	40	18	122	10	8	60	–	NBR	A
HD 510/2	44.5	22.2	158	110	10	30	–	NBR	A
HD 508	44.5	22.2	159	63	6	160	–	NBR	A
HD 508/1	44.5	22.2	159	63	10	20	–	NBR	A
HD 511	44.5	22.2	249	100	10	160	–	NBR	A
HD 506	44.8	22.2	99	40	10	20	–	NBR	A
HD 511/1	44.8	22.2	249	100	25	20	–	NBR	A
HD 58	45	25.6	112.5	40	10	160	–	NBR	E
HD 55/2	45	25.6	114	35	20	210	–	NBR	E
HD 55/5	45	25.6	114	35	3	210	–	NBR	E
HD 57/4	45.5	20.5	103	50	20	30	–	NBR	A
HD 58/2	45.5	25.6	112.5	40	20	20	–	NBR	A
HD 55	45.5	25.6	114	35	10	30	–	NBR	A
HD 55/1	45.5	25.6	114	35	20	30	–	NBR	A
HD 55/3	45.5	25.6	114	35	3	30	–	NBR	A
HD 55/4	45.5	25.6	114	35	5	30	–	NBR	A
HD 414	45.5	20.5	197	75	10	30	–	NBR	A
HD 514/2	45.5	25.6	207	42	20	30	–	NBR	A
HD 514/3	45.5	25.6	207	42	3	30	–	NBR	A

## MANN-FILTER products with fibre-glass medium



MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	$\beta_x \geq 200$ x	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	d <sub>1</sub>	d <sub>2</sub>	h						
HD 56	47	22.2	84	60	10	30	–	NBR	A
HD 56/1	47	22.2	84	60	10	210	–	NBR	A
HD 56/2	47	22.2	84	60	20	30	–	NBR	A
HD 56/3	47	22.2	84	60	20	210	–	NBR	A
HD 56/4	47	22.2	84	60	3	210	–	NBR	A
HD 57	47	25.5	94	50	10	20	–	–	B
HD 57/1	47	25.5	94	50	10	210	–	–	B
HD 57/2	47	25.5	94	50	20	20	–	–	B
HD 57/3	47	25.5	94	50	3	210	–	–	B
HD 57/6	47	25.5	94	50	5	210	–	–	B
HD 512	47	22.2	153	110	10	30	–	NBR	A
HD 512/1	47	22.2	153	110	10	210	–	NBR	A
HD 512/2	47	22.2	153	110	20	30	–	NBR	A
HD 512/3	47	22.2	153	110	5	210	–	NBR	A
HD 512/4	47	22.2	153	110	5	25	–	NBR	A
HD 513	47	25.5	172	80	10	20	–	–	B
HD 513/1	47	25.5	172	80	10	210	–	–	B
HD 513/2	47	25.5	172	80	20	20	–	–	B
HD 513/3	47	25.5	172	80	3	210	–	–	B
HD 513/4	47	25.5	172	80	3	20	–	–	B
HD 515	47	22.2	193	140	10	30	–	NBR	A
HD 515/1	47	22.2	193	140	20	210	–	NBR	A
HD 515/2	47	22.2	193	140	20	30	–	NBR	A
HD 518	47	25.5	249	110	10	20	–	–	B
HD 518/1	47	25.5	249	110	10	210	–	–	B
HD 518/2	47	25.5	249	110	20	20	–	–	B

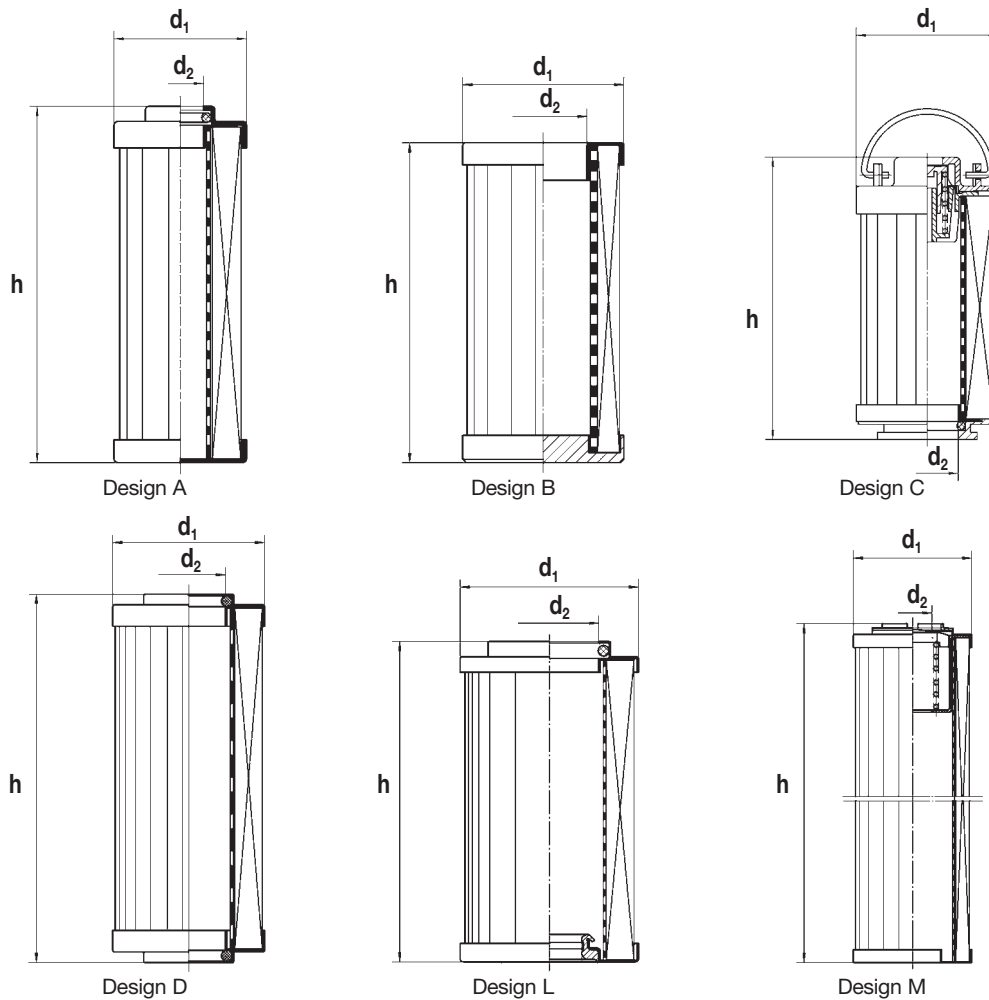
## MANN-FILTER products with fibre-glass medium



MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	$\beta_x \geq 200$ x	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	d <sub>1</sub>	d <sub>2</sub>	h						
HD 509	49.5	23.9	115	40	10	10	–	NBR	A
HD 509/2	49.5	23.9	115	40	20	10	–	NBR	A
HD 509/3	49.5	23.9	115	40	3	10	–	NBR	A
HD 509/5	49.5	23.9	115	40	5	30	–	NBR	D
HD 517	49.5	23.9	207	60	10	30	–	NBR	A
HD 517/1	49.5	23.9	207	60	5	30	–	NBR	A
HD 517/3	49.5	23.9	207	60	3	30	–	NBR	A
HD 517/6	49.5	23.9	207	60	20	30	–	NBR	A
HD 517/4	49.5	23.9	211	60	5	30	–	NBR	D
HD 517/5	49.5	23.9	211	60	10	30	–	NBR	D
HD 509/1	50.4	23.9	115	40	10	210	–	NBR	E
HD 509/4	50.4	23.9	115	40	10	210	–	NBR	E
HD 516/2	50.5	23.9	208	60	20	210	–	NBR	E
HD 67	51.5	22.3	103	60	10	30	3	NBR	C
HD 67/2	51.5	22.3	103	60	20	30	3	NBR	C
HD 614	51.5	22.3	170	110	10	30	3	NBR	C
HD 614/1	51.5	22.3	170	110	5	30	3	NBR	C
HD 611	51.5	32.8	176.5	80	10	20	–	NBR	E
HD 69	55	25.5	101	90	10	15	–	NBR	O
HD 68	55.5	29.5	136	40	10	30	–	NBR	H
HD 618	55.5	29.5	291	80	10	30	–	NBR	H
HD 620	56.5	25.7	170	75	5	30	–	NBR	A
HD 65/1	57	25	71	12	5	180	–	NBR	A
HD 65/2	57	25	71	12	8	15	–	NBR	A
HD 610/1	57	25	124	24	5	180	–	NBR	A
HD 610/2	57	25	124	24	8	15	–	NBR	A

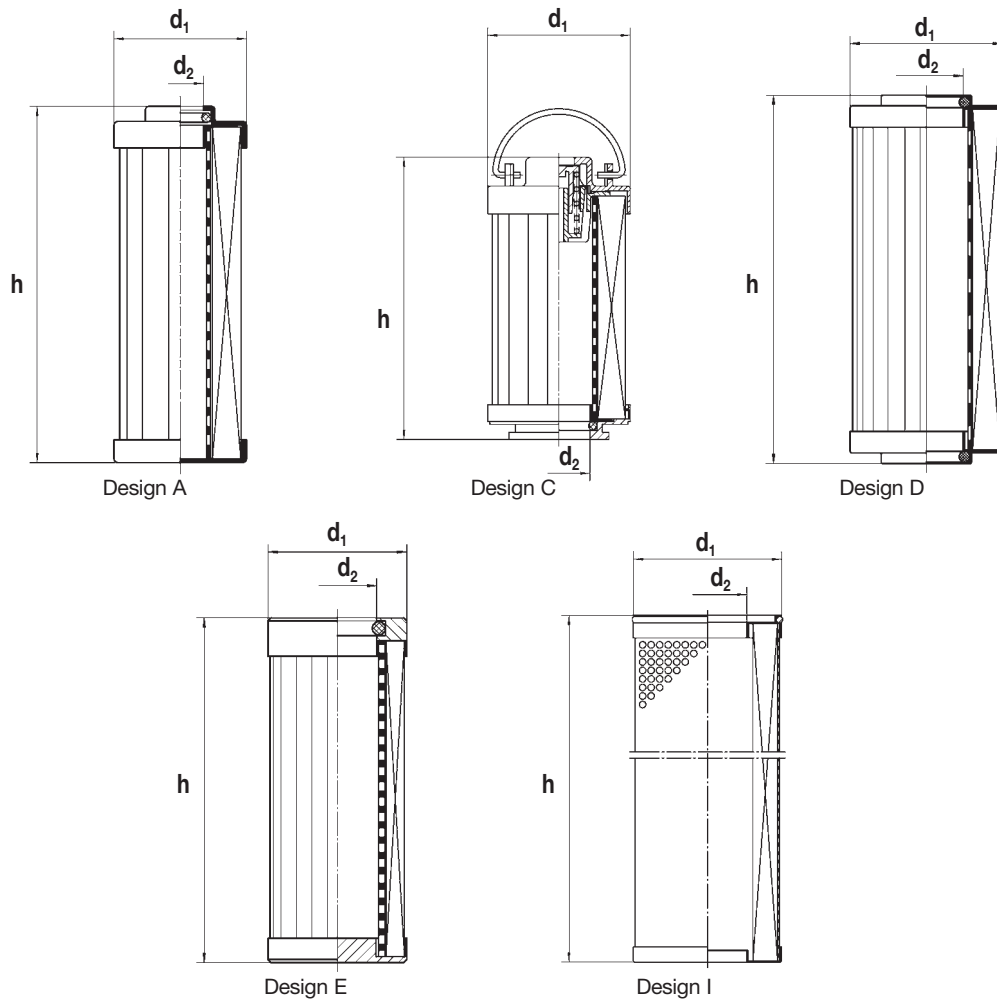


## MANN-FILTER products with fibre-glass medium



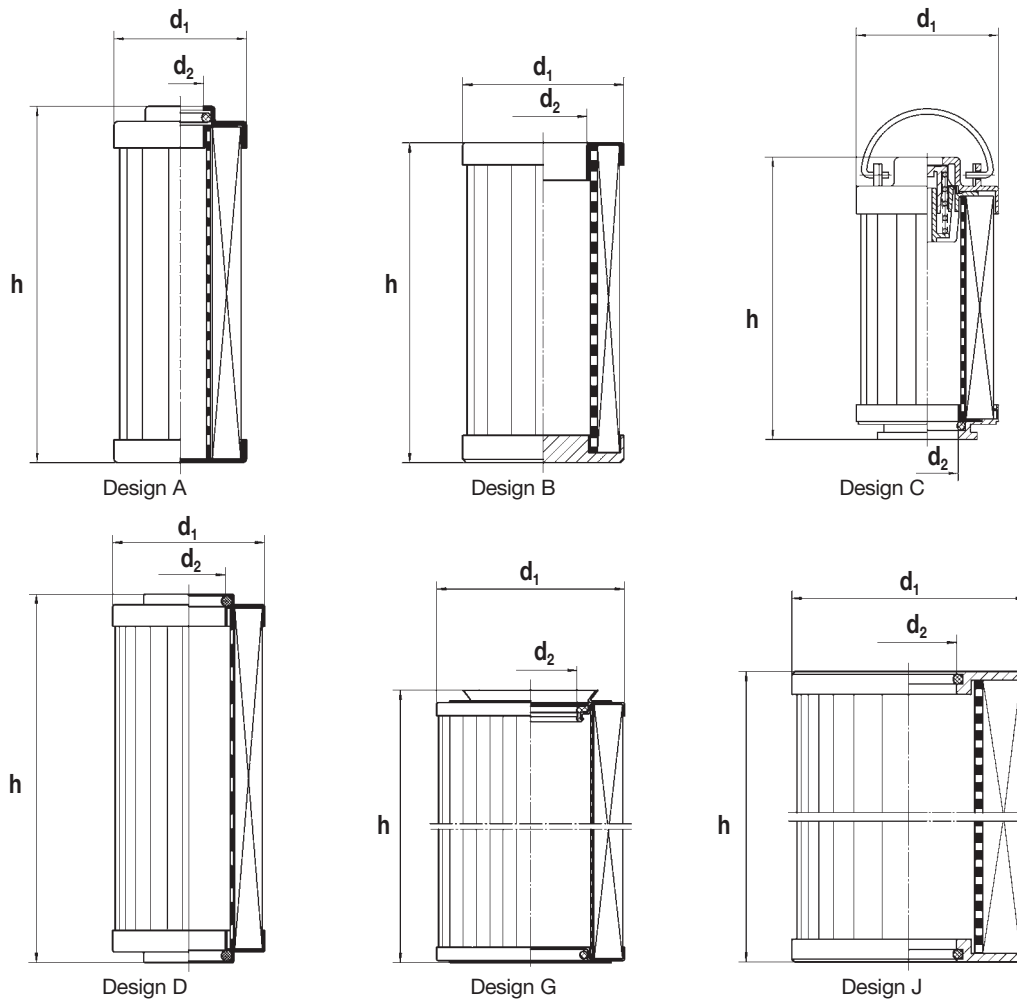
MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	$\beta_x \geq 200$ x	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	$d_1$	$d_2$	h						
HD 613/1	57	25	171	34	5	180	–	NBR	A
HD 613/2	57	25	171	34	8	15	–	NBR	A
HD 615/5	58	32.2	159	63	25	10	–	NBR	D
HD 615/4	58	32.2	179.5	80	10	10	–	NBR	L
HD 624	58	32.2	249	100	10	10	–	NBR	D
HD 616	60	34.2	180	170	10	160	–	NBR	A
HD 419	60	34.3	228	165	10	30	3	NBR	C
HD 626	60	34.2	229	240	20	30	–	NBR	A
HD 626/1	60	34.2	229	240	10	160	–	NBR	A
HD 630	60	34.2	308	360	10	160	–	NBR	A
HD 716	69	34.2	116	160	10	30	–	NBR	A
HD 716/1	69	34.2	116	160	10	210	–	NBR	A
HD 716/2	69	34.2	116	160	20	30	–	NBR	A
HD 716/3	69	34.2	116	160	3	30	–	NBR	A
HD 716/4	69	34.2	116	160	5	210	–	NBR	A
HD 716/5	69	34.2	116	160	5	210	–	NBR	A
HD 716/6	69	34.2	116	160	–	25	–	NBR	A
HD 725	69	34.2	175	240	10	30	–	NBR	A
HD 725/1	69	34.2	175	240	10	210	–	NBR	A
HD 725/2	69	34.2	175	240	20	30	–	NBR	A
HD 725/3	69	34.2	175	240	20	210	–	NBR	A
HD 751	69	34.2	356	280	10	30	–	NBR	A
HD 726	70	26.6	198.5	130	10	30	–	NBR	A
HD 736	70	33.5	210	200	10	20	–	NBR	A
HD 737/1	70	41	306	320	20	16	–	NBR	B
HD 737	70	18	309	320	20	16	2	NBR	M

## MANN-FILTER products with fibre-glass medium



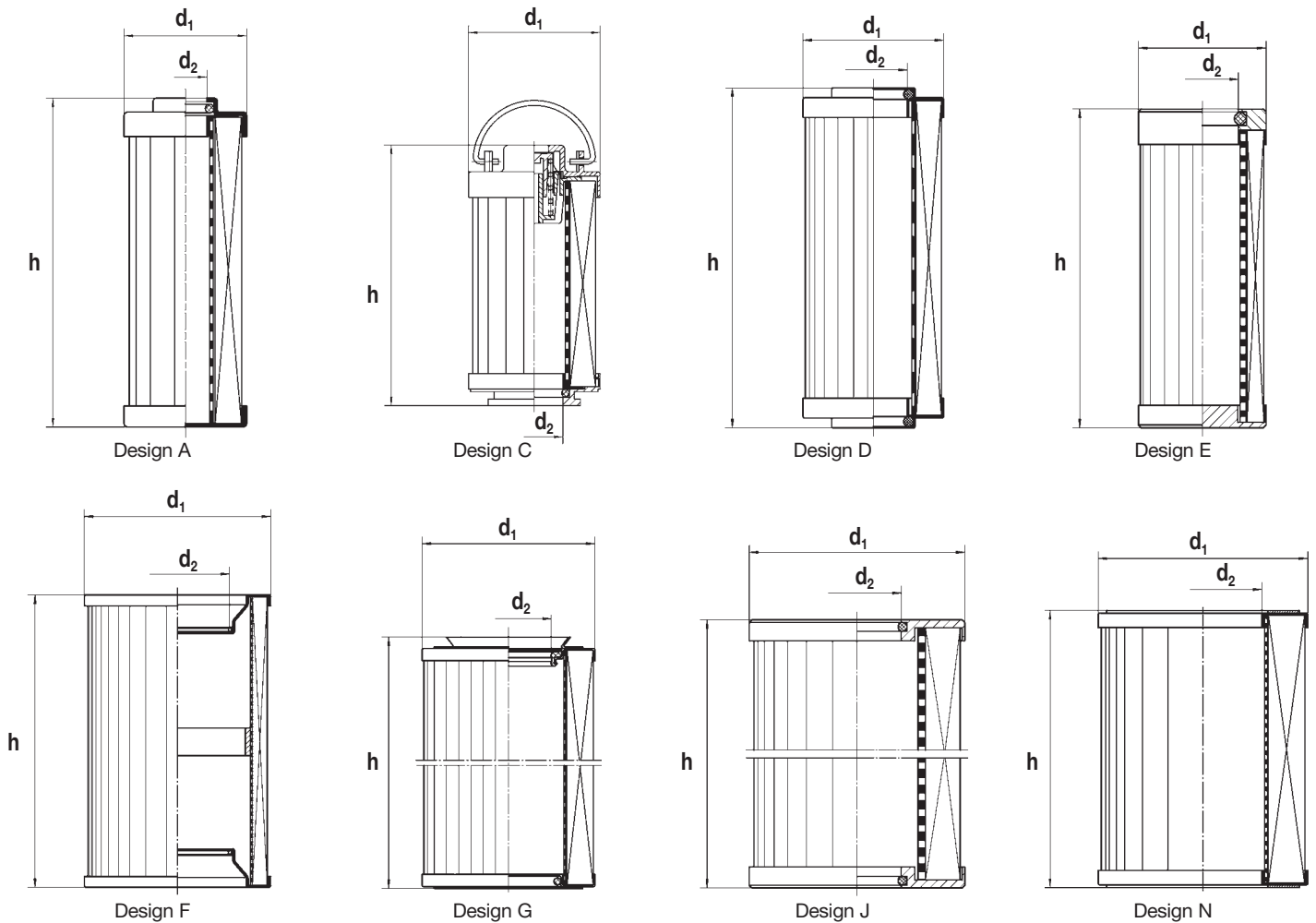
MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	$\beta_x \geq 200$ x	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	$d_1$	$d_2$	h						
HD 757	70	33.5	330	200	10	20	–	NBR	A
HD 819	74	34.2	144	160	10	30	3	NBR	C
HD 819/1	74	34.2	144	160	5	30	3	NBR	C
HD 829	74	34.2	203	240	10	30	3	NBR	C
HD 829/2	74	34.2	203	240	20	30	3	NBR	C
HD 830/2	74	40.5	226	225	20	30	–	NBR	A
HD 830/3	74	40.5	226	225	3	30	–	NBR	A
HD 858	78	41.5	328	220	10	10	–	NBR	I
HD 875	78	41.5	428	300	5	10	–	NBR	I
HD 826	79.8	40.2	159	160	6	20	–	FKM (Viton)	A
HD 835	79.8	40.2	249	250	10	160	–	NBR	A
HD 825/1	80	43.5	114	250	5	30	–	NBR	A
HD 825/2	80	43.5	114	250	20	30	–	NBR	A
HD 825/3	80	43.5	114	250	3	30	–	NBR	A
HD 846	80	43.5	209	240	10	30	–	NBR	A
HD 846/1	80	43.5	209	240	5	30	–	NBR	A
HD 846/2	80	43.5	209	240	20	30	–	NBR	A
HD 846/3	80	43.5	209	240	3	30	–	NBR	A
HD 846/5	80	43	209	315	3	210	–	NBR	E
HD 846/4	80	43.5	212.5	240	5	30	–	NBR	D
HD 863	80	43.5	328.5	360	10	20	–	NBR	A
HD 863/1	80	43.5	328.5	360	5	20	–	NBR	A
HD 863/3	80	43.5	328.5	360	3	20	–	NBR	A
HD 863/2	80	43	329	360	20	210	–	NBR	E
HD 882	80	43	428.5	375	10	30	–	NBR	A
HD 882/1	80	43	431.5	375	10	30	–	NBR	D

## MANN-FILTER products with fibre-glass medium



MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	$\beta_x \geq 200$ x	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	$d_1$	$d_2$	h						
HD 882/2	80	43.5	431.5	375	20	30	-	NBR	D
HD 918	82	33.7	129	120	20	160	-	NBR	J
HD 929	82.5	47.5	142	150	10	20	-	-	B
HD 929/1	82.5	47.5	142	150	10	210	-	-	B
HD 929/2	82.5	47.5	142	150	20	20	-	-	B
HD 929/3	82.5	47.5	142	150	3	20	-	-	B
HD 952	82.5	47.5	257	300	10	20	-	-	B
HD 952/1	82.5	47.5	257	300	10	210	-	-	B
HD 952/2	82.5	47.5	257	300	20	20	-	-	B
HD 952/3	82.5	47.5	257	300	3	20	-	-	B
HD 952/7	82.5	47.5	257	300	20	210	-	-	B
HD 976	82.5	47.5	373	450	10	20	-	-	B
HD 976/1	82.5	47.5	373	450	10	210	-	-	B
HD 938/1	85	46	200	79	8	180	-	NBR	A
HD 958/1	85	46	300	123	8	180	-	NBR	A
HD 1032	90.5	48.5	164	330	10	30	-	NBR	A
HD 1032/1	90.5	48.5	164	330	10	210	-	NBR	A
HD 1032/2	90.5	48.5	164	330	5	25	-	NBR	A
HD 1043/1	90.5	48.5	253	500	5	210	-	NBR	A
HD 1043/2	90.5	48.5	253	500	20	210	-	NBR	A
HD 1066	90.5	48.5	329	660	10	30	-	NBR	A
HD 1066/1	90.5	48.5	329	660	10	210	-	NBR	A
HD 1040	95	48.5	195	330	10	30	3	NBR	C
HD 1045/1	99	48.5	218	180	5	10	-	NBR	G
HD 1060	95	48.5	276	500	10	30	3	NBR	C
HD 1060/1	95	48.5	276	500	20	30	3	NBR	C

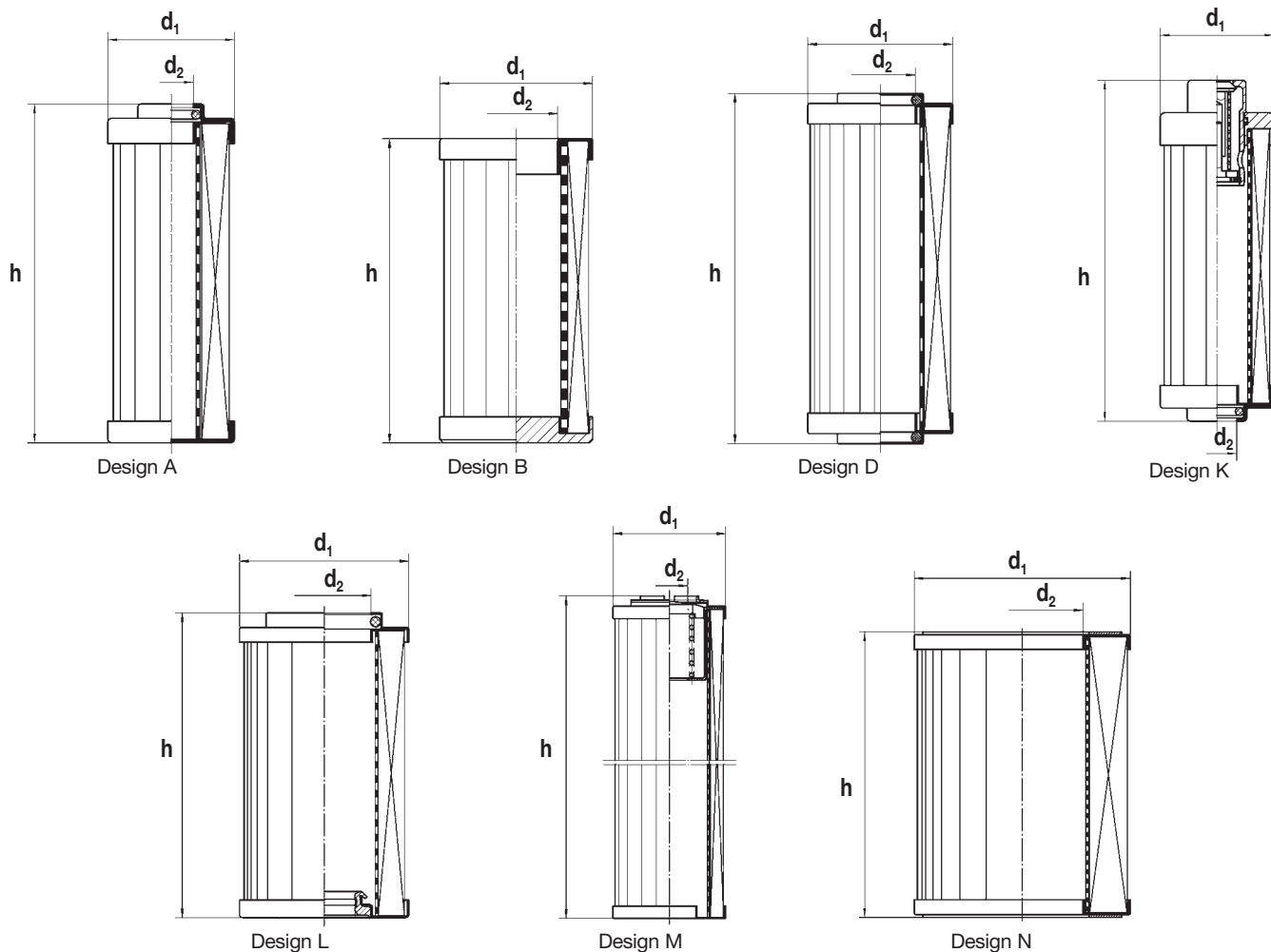
## MANN-FILTER products with fibre-glass medium



MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	$\beta_x \geq 200$ x	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	$d_1$	$d_2$	h						
HD 1069/1	95	55.7	329	1200	5	20	–	NBR	A
HD 10 100	95	55.7	428	1600	10	20	–	NBR	A
HD 10 100/1	95	55.7	428	1600	5	20	–	NBR	A
HD 10 100/2	95	55.7	428	1600	20	20	–	NBR	A
HD 10 133	95	55.7	658	720	10	30	–	NBR	D
HD 10 240	95	55.7	989	770	10	30	–	NBR	D
HD 10 240/1	95	55.7	989	770	20	30	–	NBR	D
HD 10 240/2	95	55.7	989	770	5	30	–	NBR	D
HD 10 240/3	95	55.7	989	770	3	30	–	NBR	D
HD 1044/1	101.6	58.4	231.6	87	5	100	–	NBR	E
HD 1137	109.5	52.3	159	160	10	10	–	NBR	D
HD 1288	114	68.2	334	660	10	30	3	NBR	C
HD 12 112	114	68.2	414	850	10	30	3	NBR	C
HD 12 112/1	114	68.2	414	850	5	30	3	NBR	C
HD 1258	118	59	164.5	300	10	10	–	NBR	J
HD 1387/1	129	66.8	320	360	10	10	–	NBR	G
HD 10 158	143	96.1	483	1300	10	30	3	NBR	C
HD 10 115	143	96.1	364	950	10	30	3	NBR	C
HD 10 158/2	143	96.1	483	1300	20	30	6	NBR	C
HD 1585/3	150	89	204.5	200	3	10	–	NBR	N
HD 1665	152	83.3	203.5	500	10	30	–	NBR	F
HD 1666	152	105	203.5	515	10	30	–	NBR	F
HD 10 137	152	105	423	750	10	30	–	NBR	F
HD 10 137/2	152	105	423	750	20	30	–	NBR	F
HD 16 137	152	83.3	423	800	5	30	–	NBR	F
HD 15 355	152	105	978	785	20	30	–	NBR	F

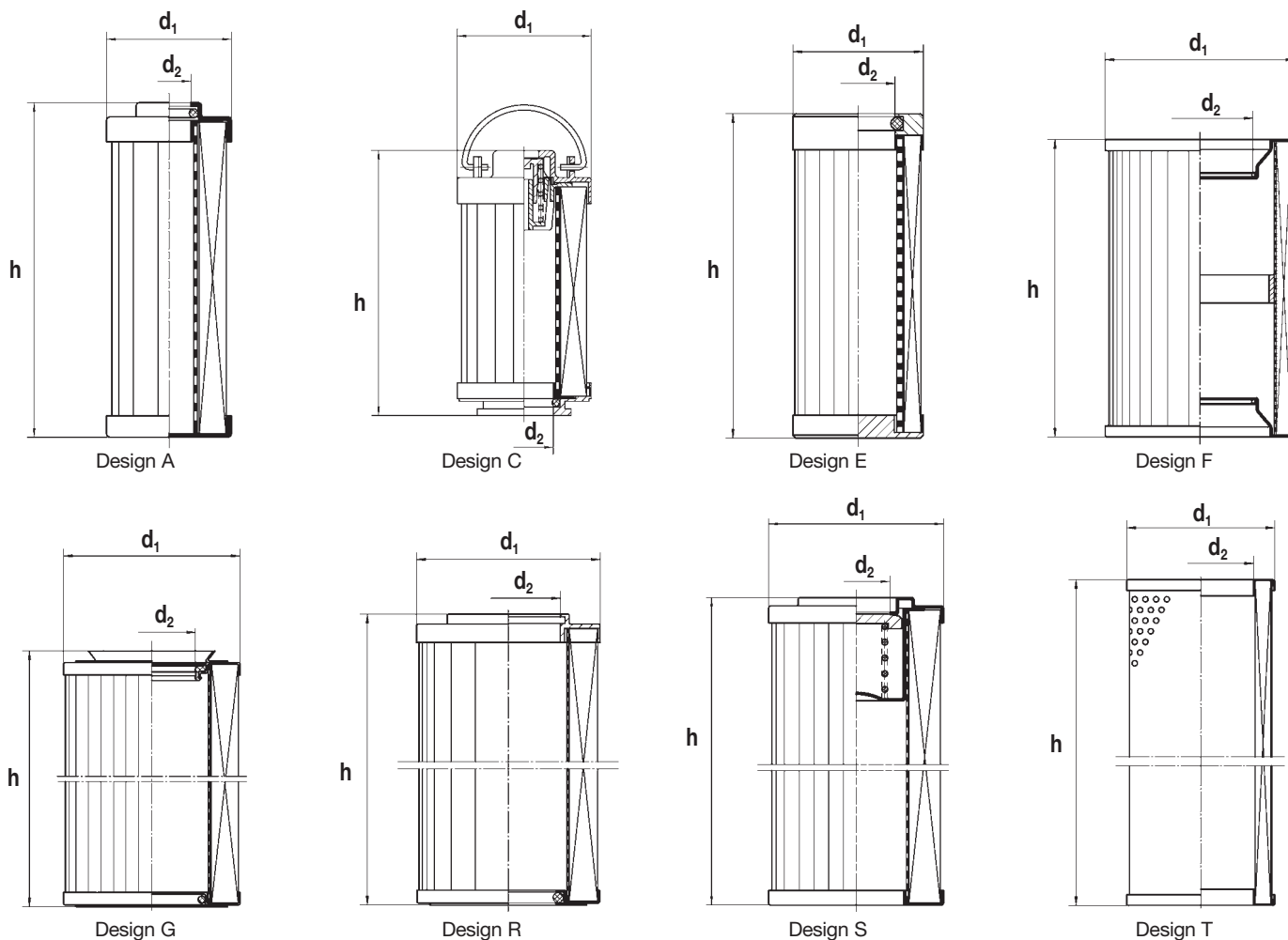


## MANN-FILTER products with cellulose medium



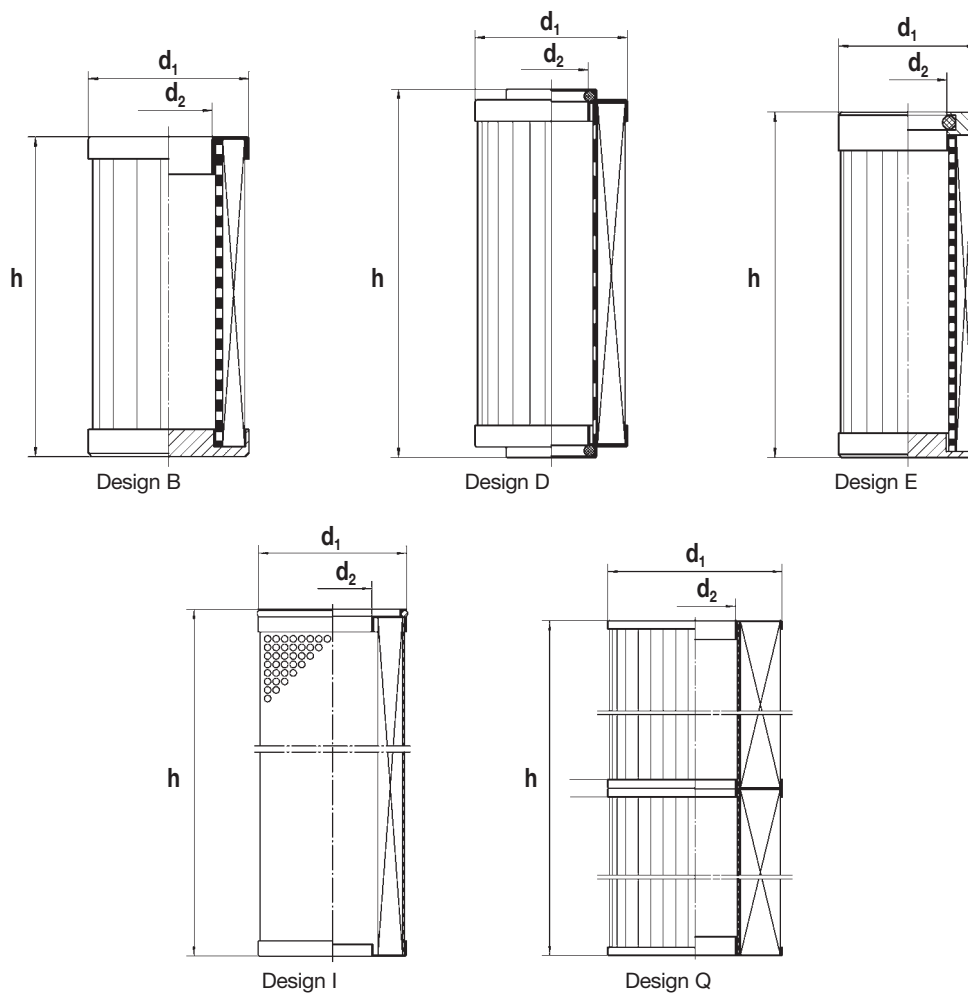
MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	$d_1$	$d_2$	$h$					
HD 46	40	18	122	10	10	–	NBR	A
HD 47	41.5	22.6	85.5	20	20	–	NBR	A
HD 49	41.5	22.6	155.5	30	10	–	NBR	D
HD 614/2	44.5	22.2	170	110	10	3	NBR	K
HD 57/9	45.5	20.5	103	50	5	–	NBR	A
HD 57/10	47	25.5	94	50	20	–	–	B
HD 57/5	47	25.5	94	50	20	–	–	B
HD 513/5	47	25.5	172	80	20	–	–	B
HD 513/8	47	25.5	172	80	20	–	–	B
HD 518/3	47	25.5	249	110	20	–	–	B
HD 615/2	55	18	171	120	16	2	NBR	M
HD 65	57	25	71	9	45	–	NBR	A
HD 610	57	25	124	18	45	–	NBR	A
HD 613	57	25	171	26	45	–	NBR	A
HD 609	58	32.2	99	40	10	–	NBR	D
HD 69/1	58	32.2	104.5	40	5	–	NBR	L
HD 69/2	58	32.2	104.5	40	5	–	NBR	L
HD 615/1	58	32.2	159	63	10	–	NBR	D
HD 615/6	58	32.2	159	63	10	–	NBR	D
HD 615/3	58	32.2	179.5	80	5	–	NBR	L
HD 829/1	60	34.2	203	240	10	3	NBR	K
HD 1040/2	76.5	48.5	195	330	10	3	NBR	K
HD 929/5	82.5	47.5	142	150	20	–	–	B
HD 952/4	83	40.2	197	110	10	–	NBR	N
HD 961/1	83	45	305	425	16	–	NBR	B

## MANN-FILTER products with cellulose medium



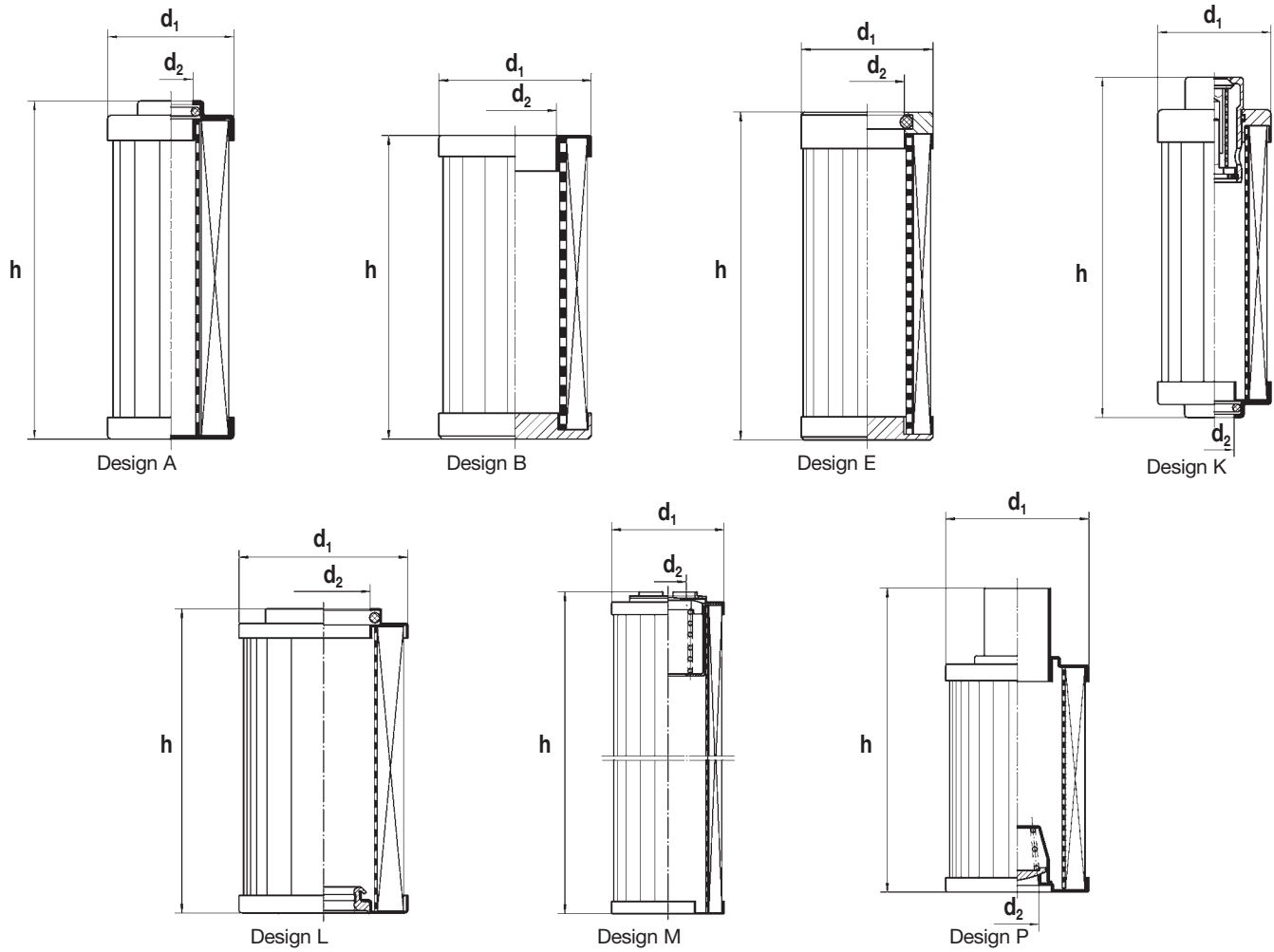
MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	d <sub>1</sub>	d <sub>2</sub>	h					
HD 961	83	32	308	425	16	2	NBR	S
HD 938	85	46	200	60	45	–	NBR	A
HD 938/2	85	46	200	60	15	–	NBR	A
HD 958	85	46	300	93	45	–	NBR	A
HD 958/2	85	46	300	93	15	–	NBR	A
HD 1022	99	48.5	156	130	5	–	NBR	G
HD 1022/2	99	48.5	156	130	5	–	NBR	G
HD 1045	99	48.5	218	180	5	–	NBR	G
HD 1044	100	59	210	201	10	–	–	E
HD 1060/2	100	42	231	210	7	–	–	T
HD 1057	101.6	58.4	231.9	87	7	–	–	F
HD 1164	108	45.2	228	170	7	–	–	E
HD 10 158/1	124.5	96.1	483	1300	30	3	NBR	C
HD 1359	129	66.8	221.5	250	5	–	NBR	G
HD 1383	129	85	280	132	11	–	–	E
HD 1395	129	85	292	132	7	–	–	E
HD 1387	129	66.8	320	360	5	–	NBR	G
HD 1387/2	129	66.8	320	360	5	–	NBR	G
HD 13 142	129.5	73.3	479	520	5	–	NBR	R
HD 13 142/1	129.5	73.3	479	520	5	–	NBR	R

## MANN-FILTER products with cellulose medium



MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	d <sub>1</sub>	d <sub>2</sub>	h					
HD 14 161	140	98	425	220	11	-	-	D
HD 14 560	140	65	848	630	5	-	-	Q
HD 15 117	150	110	300	340	11	-	-	B
HD 15 174	150	96.5	450	500	11	-	-	I
HD 18 354	175	110	450	600	10	-	-	E

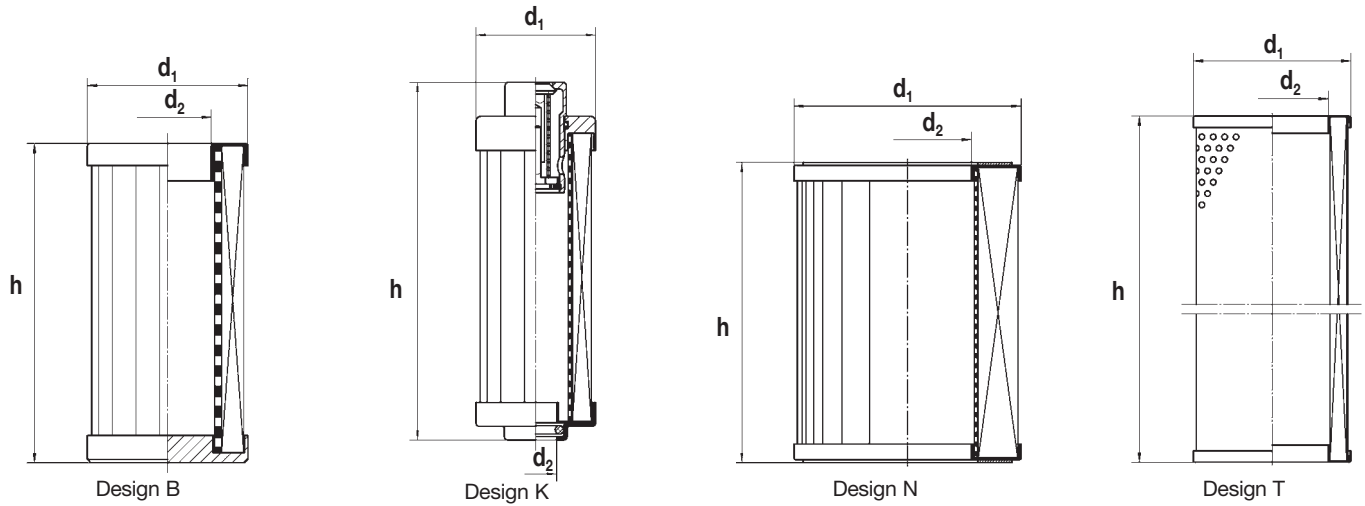
## MANN-FILTER products with stainless steel medium



MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	$d_1$	$d_2$	$h$					
HD 45/2	35	12.2	94	30	30	–	NBR	A
HD 53	44.5	18.2	84	32	30	–	NBR	A
HD 53/1	44.5	18.2	84	32	30	–	NBR	A
HD 56/5	44.5	22.2	91	60	30	–	NBR	A
HD 56/6	44.5	22.2	91	60	210	–	NBR	A
HD 505	44.5	22.2	103	60	30	3	NBR	K
HD 510/1	44.5	22.2	158	110	30	–	–	A
HD 58/3	45	25.4	112.5	40	160	–	NBR	E
HD 57/7	45.5	20.5	103	50	30	–	NBR	A
HD 57/11	47	25.5	94	50	20	–	–	B
HD 57/8	47	25.5	94	50	20	–	–	B
HD 513/6	47	25.5	172	80	20	–	–	B
HD 513/7	47	25.5	172	80	20	–	–	B
HD 513/9	47	25.5	172	80	210	–	–	B
HD 607/1	53.5	15	128.5	65	30	2	NBR	P
HD 608	53.5	24.2	151	90	30	–	NBR	A
HD 615	55	18	171	120	16	2	NBR	M
HD 612	58	32.2	179.5	80	10	–	NBR	L
HD 819/2	60	34.2	144	160	30	3	NBR	K
HD 815	74	40.5	151	140	30	–	NBR	A



## MANN-FILTER products with stainless steel medium



MANN FILTER	Dim. in mm			Nominal flow rate [l/min]	Diff. pressure stability [bar]	Bypass opening pressure [bar]	Seal	Design
	d <sub>1</sub>	d <sub>2</sub>	h					
HD 1040/1	76.5	48.5	195	330	30	3	NBR	K
HD 929/6	82.5	47.5	142	150	20	–	–	B
HD 952/5	82.5	47.5	257	300	20	–	–	B
HD 952/6	82.5	47.5	257	300	20	–	–	B
HD 955	82.5	47.5	373	450	20	–	–	B
HD 955/1	82.5	47.5	373	450	20	–	–	B
HD 929/4	83	47.5	142	150	210	–	–	B
HD 920	83	59	226	100	30	–	–	T
HD 1338/1	128	91.4	194	300	10	–	NBR	N

## Cross-reference list

MANN FILTER	
HYDAC	
002 - 45/411	HD 56/6
002 - 45/502	HD 1040/1
003 - 00/812	HD 517/1
003 - 01/443	HD 1040/2
003 - 01/545	HD 45/1
003 - 01/58	HD 45/1
003 - 01/648	HD 1043/1
003 - 01/845	HD 56/6
003 - 04/085	HD 614/2
003 - 04/113	HD 829/1
003 - 05/158	HD 45/1
003 - 10/275	HD 56/3
003 - 10/644	HD 863/1
003 - 10/728	HD 846/1
003 - 11/0275	HD 56/3
003 - 11/541	HD 10 158/1
003 - 12/221	HD 846/2
003 - 12/893	HD 45
003 - 13/725	HD 515/2
003 - 14/464	HD 512/3
003 - 14/485	HD 716/4
003 - 16/621	HD 863
003 - 18/929	HD 716/5
003 - 19/471	HD 624
003 - 19/480	HD 508/1
003 - 19/481	HD 615/5
003 - 19/485	HD 511/1
003 - 19/491	HD 508
0030 D 003 BN 3 HC	HD 45/1
0030 D 003 BN HC	HD 45/1
0030 D 003 BN HC W	HD 45/1
0030 D 010 BH 3 HC	HD 45/4
0030 D 010 BH HC	HD 45/4
0030 D 010 BN	HD 45/3
0030 D 010 BN 3 HC	HD 45/3
0030 D 010 BN HC	HD 45/3
0030 D 010 BN HC W	HD 45/3
0030 D 020 BN 3 HC	HD 45
0030 D 020 BN HC	HD 45
0030 D 020 BN HC W	HD 45
0030 D 025 W	HD 45/2
0030 R 010 BN 3 HC	HD 43
0030 R 010 BN HC	HD 43
0030 R 010 P	HD 43
0040 DN 010 BN HC	HD 506
0060 D 003 BH 3 HC	HD 56/4
0060 D 003 BH HC	HD 56/4
0060 D 003 BH HC 2	HD 56/4
0060 D 003 BH HC W	HD 56/4
0060 D 010 BH	HD 56/1
0060 D 010 BH 3 HC	HD 56/1
0060 D 010 BH HC	HD 56/1
0060 D 010 BH HC W	HD 56/1
0060 D 010 BN	HD 56
0060 D 010 BN 3 HC	HD 56
0060 D 010 BN HC	HD 56
0060 D 010 BN HC W	HD 56
0060 D 020 BH	HD 56/3
0060 D 020 BH 3 HC	HD 56/3
0060 D 020 BH HC	HD 56/3
0060 D 020 BH HC W	HD 56/3
0060 D 020 BN	HD 56/2
0060 D 020 BN 3 HC	HD 56/2
0060 D 020 BN HC	HD 56/2
0060 D 020 BN HC W	HD 56/2
0060 D 020 V	HD 56/6

MANN FILTER	
HYDAC	
0060 D 020 VW	HD 56/6
0060 D 025 W	HD 56/5
0060 D 025 W HC	HD 56/5
0060 D 025 WW	HD 56/5
0060 R 010 BN 3 HC	HD 67
0060 R 010 BN HC	HD 67
0060 R 020 BN	HD 67/2
0060 R 020 BN 3 HC	HD 67/2
0060 R 020 BN HC	HD 67/2
0060 R 10 V	HD 505
0063 DN 006 BH HC	HD 508
0063 DN 010 BN HC	HD 508/1
0063 RN 025 BN HC	HD 615/5
0075 D 005 BN 3 HC	HD 620
0100 DN 025 BN 3 HC	HD 511/1
0100 DN 025 BN HC	HD 511/1
0100 DN 10 BN HC	HD 511
0100 RN 010 BN HC	HD 624
011 - 63/028	HD 12 112/1
0110 D 005 BH 3 HC	HD 512/3
0110 D 005 BH HC	HD 512/3
0110 D 005 BH HC W	HD 512/3
0110 D 005 BN 3 HC	HD 512/4
0110 D 005 BN HC	HD 512/4
0110 D 005 BN W	HD 510/2
0110 D 010 BH	HD 512/1
0110 D 010 BH 3 HC	HD 512/1
0110 D 010 BH HC	HD 512/1
0110 D 010 BH HC W	HD 512/1
0110 D 010 BN	HD 512
0110 D 010 BN 3 HC	HD 512
0110 D 010 BN HC	HD 512
0110 D 010 BN HC W	HD 512
0110 D 020 BN	HD 512/2
0110 D 020 BN 3 HC	HD 512/2
0110 D 020 BN HC	HD 512/2
0110 D 020 BN HC W	HD 512/2
0110 D 200 W	HD 510/1
0110 R 005 BN	HD 614/1
0110 R 005 BN 3 HC	HD 614/1
0110 R 005 BN HC	HD 614/1
0110 R 010 BN 3 HC	HD 614
0110 R 010 BN HC	HD 614
0110 R 010 P	HD 614/2
012 - 50/486	HD 45/3
012 - 50/490	HD 716
012 - 50/491	HD 725
012 - 50/492	HD 751
012 - 50/493	HD 1032
012 - 50/495	HD 1066
012 - 50/904	HD 716/3
012 - 51/394	HD 863/3
012 - 51/509	HD 509/3
012 - 51/510	HD 509
012 - 51/511	HD 517/3
012 - 51/512	HD 517
012 - 51/513	HD 825/3
012 - 51/515	HD 825/2
012 - 51/516	HD 846
012 - 51/524	HD 882
012 - 51/529	HD 1666
012 - 51/532	HD 10 137
012 - 51/533	HD 10 137/2
012 - 51/535	HD 509/1
012 - 51/570	HD 509/2
012 - 53/038	HD 56/4

MANN FILTER	
HYDAC	
012 - 53/042	HD 56/1
012 - 53/044	HD 56/3
012 - 53/048	HD 512/3
012 - 53/060	HD 515/2
012 - 53/064	HD 716/4
012 - 53/066	HD 716/1
012 - 53/068	HD 716/5
012 - 53/074	HD 725/1
012 - 53/076	HD 725/3
012 - 53/096	HD 1043/1
012 - 53/100	HD 1043/2
012 - 53/106	HD 1066/1
012 - 53090	HD 1032/1
012 - 55/1570	HD 509/2
012 - 60/881	HD 56/2
012 - 60/883	HD 515/1
012 - 60/885	HD 725/2
012 - 60/894	HD 716/6
012 - 60/900	HD 45/1
012 - 60/904	HD 716/3
012 - 62/445	HD 509/4
012 - 62/446	HD 516/2
012 - 62/450	HD 55/3
012 - 62/451	HD 55/4
012 - 62/452	HD 55
012 - 62/453	HD 55/1
012 - 62/454	HD 514/3
012 - 62/457	HD 514/2
012 - 62/458	HD 55/5
012 - 62/460	HD 55/2
012 - 62/921	HD 43
012 - 62/933	HD 67
012 - 62/934	HD 67/2
012 - 62/944	HD 614/1
012 - 62/945	HD 614
012 - 62/956	HD 819/1
012 - 62/957	HD 819
012 - 62/981	HD 829
012 - 62/982	HD 829/2
012 - 62/993	HD 1040
012 - 63/005	HD 1060
012 - 63/006	HD 1060/1
012 - 63/017	HD 1288
012 - 63/028	HD 12 112/1
012 - 63/053	HD 10 158
012 - 63/054	HD 10 158/2
012 - 63/454	HD 45/4
012 - 63/637	HD 506
012 - 68/857	HD 615/5
012 - 68/860	HD 1137
012 - 69/161	HD 955
0140 D 010 BN 3 HC	HD 515
0140 D 010 BN HC	HD 515
0140 D 020 BH 3 HC	HD 515/2
0140 D 020 BH HC	HD 515/2
0140 D 020 BH HC W	HD 515/2
0140 D 020 BN 3 HC	HD 515/1
0140 D 020 BN HC	HD 515/1
0140 D 020 BN HC W	HD 515/1
0160 D 003 BN 3 HC	HD 716/3
0160 D 003 BN HC	HD 716/3
0160 D 005 BH 3 HC	HD 716/4
0160 D 005 BH HC	HD 716/4
0160 D 005 BH HC W	HD 716/4
0160 D 005 BN 3 HC	HD 716/6
0160 D 005 BN HC	HD 716/6

MANN FILTER	
HYDAC	
0160 D 005 BN HC W	HD 716/6
0160 D 010 BH 3 HC	HD 716/1
0160 D 010 BH HC	HD 716/1
0160 D 010 BN 3 HC	HD 716
0160 D 010 BN HC	HD 716
0160 D 010 BN HC 2	HD 716
0160 D 020 BH 3 HC	HD 716/5
0160 D 020 BH HC	HD 716/5
0160 D 020 BH HC W	HD 716/5
0160 D 020 BN 3 HC	HD 716/2
0160 D 020 BN HC	HD 716/2
0160 DN 006 BN B HC V	HD 826
0160 R 005 BN 3 HC	HD 819/1
0160 R 005 BN HC	HD 819/1
0160 R 010 BN 3 HC	HD 819
0160 R 010 BN HC	HD 819
0160 R 100 W	HD 819/2
0160 RN 010 BN HC	HD 1137
0165 R 010 BN 3 HC	HD 419
0165 R 010 BN HC	HD 419
0240 D 010 BH 3 HC	HD 725/1
0240 D 010 BH HC	HD 725/1
0240 D 010 BH HC W	HD 725/1
0240 D 010 BN 3 HC	HD 725
0240 D 010 BN HC	HD 725
0240 D 020 BH 3 HC	HD 725/3
0240 D 020 BH HC	HD 725/3
0240 D 020 BH HC W	HD 725/3
0240 D 020 BN 3 HC	HD 725/2
0240 D 020 BN HC	HD 725/2
0240 D 020 BN HC W	HD 725/2
0240 R 010 BN	HD 829
0240 R 010 BN 3 HC	HD 829
0240 R 010 BN HC	HD 829
0240 R 010 P	HD 829/1
0240 R 020 BN	HD 829/2
0240 R 020 BN 3 HC	HD 829/2
0240 R 020 BN HC	HD 829/2
0250 DN 010 BH HC	HD 835
0280 D 010 BN 3 HC	HD 751
0280 D 010 BN HC	HD 751
0330 D 005 BN 3 HC	HD 1032/2
0330 D 005 BN HC	HD 1032/2
0330 D 005 BN HC W	HD 1032/2
0330 D 010 BH	HD 1032/1
0330 D 010 BH 3 HC	HD 1032/1
0330 D 010 BH HC	HD 1032/1
0330 D 010 BH HC W	HD 1032/1
0330 D 010 BN	HD 1032
0330 D 010 BN 3 HC	HD 1032
0330 D 010 BN HC	HD 1032
0330 D 010 BN HC W	HD 1032
0330 R 010 BN	HD 1040
0330 R 010 BN 3 HC	HD 1040
0330 R 010 BN HC	HD 1040
0330 R 020 P	HD 1040/2
0330 R 025 W	HD 1040/1
0330 R 025 W W	HD 1040/1
0500 D 005 BH 3 HC	HD 1043/1
0500 D 005 BH HC	HD 1043/1
0500 D 005 BH HC W	HD 1043/1
0500 D 020 BH 3 HC	HD 1043/2
0500 D 020 BH HC	HD 1043/2
0500 D 020 BH HC W	HD 1043/2
0500 R 010 BN 3 HC	HD 1060
0500 R 010 BN HC	HD 1060

## Cross-reference list

MANN FILTER	
HYDAC	
0500 R 020 BN 3 HC	HD 1060/1
0500 R 020 BN HC	HD 1060/1
0660 D 010 BH	HD 1066/1
0660 D 010 BH 3 HC	HD 1066/1
0660 D 010 BH HC	HD 1066/1
0660 D 010 BH HC W	HD 1066/1
0660 D 010 BN	HD 1066
0660 D 010 BN 3 HC	HD 1066
0660 D 010 BN HC	HD 1066
0660 D 010 BN HC W	HD 1066
0660 R 010 BN	HD 1288
0660 R 010 BN 3 HC	HD 1288
0660 R 010 BN HC	HD 1288
0850 R 005 BN HC	HD 12 112/1
0850 R 010 BN 3 HC	HD 12 112
0850 R 010 BN HC	HD 12 112
0950 R 010 BN 3 HC	HD 10 115
0950 R 010 BN HC	HD 10 115
10308 R 12 BN	HD 1665
10316 R 06 BN	HD 16 137
10608 D 12 BN	HD 1666
10616 D 12 BN	HD 10 137
10616 D 25 BN	HD 10 137/2
10639 D 25 BN	HD 15 355
10704 D 03 BH	HD 55/5
10704 D 03 BN	HD 55/3
10704 D 06 BN	HD 55/4
10704 D 12 BN	HD 55
10704 D 17 BH	HD 55/2
10704 D 25 BN	HD 55/1
10708 D 03 BN	HD 514/3
10708 D 25 BN	HD 514/2
10816 D 12 BN	HD 10 100
10816 D 25 BN	HD 10 100/2
11026 D 12 BN	HD 10 133
11039 D 03 BN	HD 10 240/3
11039 D 12 BN	HD 10 240
11039 D 25 BH	HD 10 240/1
11104 D 03 BN	HD 825/3
11104 D 06 BN	HD 825/1
11104 D 25 BN	HD 825/2
11108 D 03 BH	HD 846/5
11108 D 03 BN	HD 846/3
11108 D 06 BN	HD 846/1
11108 D 12 BN	HD 846
11108 D 25 BN	HD 846/2
11113 D 03 BN	HD 863/3
11113 D 06 BN	HD 863/1
11113 D 10 BH	HD 863/2
11113 D 12 BN	HD 863
11116 D 12 BN	HD 882
11304 D 03 BN	HD 509/3
11304 D 10 BH	HD 509/1
11304 D 12 BN	HD 509
11304 D 17 BH	HD 509/4
11304 D 25 BN	HD 509/2
11308 D 03 BN	HD 517/3
11308 D 03 DN	HD 517/3
11308 D 06 BN	HD 517/1
11308 D 12 BN	HD 517
11308 D 17 BH	HD 516/2
11308 D 25 BN	HD 516/2
11816 D 12 BN	HD 882/1
125 - 30/50	HD 512/1
125 - 51/524	HD 882
1300 R 010 BN 3 HC	HD 10 158

MANN FILTER	
HYDAC	
1300 R 010 BN HC	HD 10 158
1300 R 020 BN	HD 10 158/2
1300 R 020 BN 3 HC-B6	HD 10 158/2
1300 R 020 BN HC	HD 10 158/2
2050 D 03 BH	HD 57/3
2050 D 06 BH	HD 57/6
2050 D 10 BH	HD 57/1
2050 D 10 BN	HD 57
2050 D 25 BN	HD 57/2
2080 D 03 BH	HD 513/3
2080 D 03 BN	HD 513/4
2080 D 10 BH	HD 513/1
2080 D 10 BN	HD 513
2080 D 25 BN	HD 513/2
2110 D 10 BH	HD 518/1
2110 D 10 BN	HD 518
2150 D 03 BN	HD 929/3
2150 D 10 BH	HD 929/1
2150 D 10 BN	HD 929
2300 D 03 BN	HD 952/3
2300 D 10 BH	HD 952/1
2300 D 10 BN	HD 952
2300 D 100 W	HD 952/5
2300 D 25 BN	HD 952/2
2450 D 10 BH	HD 976/1
2450 D 10 BN	HD 976
2450 D 50 W	HD 955
30 D 010 BN	HD 45/3
H8300 08012 BN	HD 1666
H8300 16012 BN	HD 10 137
H8300 16025 BN	HD 10 137/2
H8300 39020 BN	HD 15 355
H8400 08010 BN	HD 1665
H8400 16005 BN	HD 16 137
H8900 13005 BN	HD 1069/1
H8900 16005 BN	HD 10 100/1
H8900 16010 BN	HD 10 100
H8900 16020 BN	HD 10 100/2
H9020 04003 BN	HD 55/3
H9020 04006 BN	HD 55/4
H9020 04010 BN	HD 55
H9020 04012 BN	HD 55
H9020 04025 BN	HD 55/1
H9020 08003 BN	HD 514/3
H9020 08020 BN	HD 514/2
H9020 08025 BN	HD 514/2
H9021 04003 BH	HD 55/5
H9021 04017 BH	HD 55/2
H9400 26005 BN	HD 10 240/2
H9400 26010 BN	HD 10 133
H9400 39003 BN	HD 10 240/3
H9400 39005 BN	HD 10 240/2
H9400 39010 BN	HD 10 240
H9400 39020 BH	HD 10 240/1
H9600 04003 BN	HD 825/3
H9600 04006 BN	HD 825/1
H9600 04025 BN	HD 825/2
H9600 08003 BN	HD 846/3
H9600 08006 BN	HD 846/1
H9600 08012 BN	HD 846
H9600 08025 BN	HD 846/2
H9600 13003 BN	HD 863/3
H9600 13005 BN	HD 863/1
H9600 13006 BN	HD 863/1
H9600 13012 BN	HD 863
H9600 16010 BN	HD 882

MANN FILTER	
HYDAC	
H9600 16012 BN	HD 882
H9601 08003 BH	HD 846/5
H9601 13017 BH	HD 863/2
H9601 13020 BH	HD 863/2
H9650 08005 BN	HD 846/4
H9650 16010 BN	HD 882/1
H9650 16020 BN	HD 882/2
H9800 04003 BN	HD 509/3
H9800 04012 BN	HD 509
H9800 04025 BN	HD 509/2
H9800 08003 BN	HD 517/3
H9800 08006 BN	HD 517/1
H9800 08012 BN	HD 517
H9800 40020 BN	HD 509/2
H9800 4003 BN	HD 509/2
H9800 4010 BN	HD 509
H9800 4020 BN	HD 509/2
H9800 4025 BN	HD 509/2
H9800 8010 BN	HD 517
H9800 8012 BN	HD 517
H9800 8025 BN	HD 517/6
H9801 04010 BH	HD 509/1
H9801 04017 BH	HD 509/4
H9801 08017 BH	HD 516/2
INTERNORMEN	
300064	HD 45/3
300121	HD 615/2
300128	HD 615
300148	HD 616
300188	HD 626/1
300190	HD 626
300204	HD 737/1
300232	HD 630
300244	HD 961/1
300245	HD 961
300388	HD 67
300397	HD 56/5
300398	HD 56
300399	HD 56/1
300403	HD 512
300404	HD 512/2
300405	HD 512/3
300412	HD 716/1
300413	HD 716/2
300414	HD 716/5
300416	HD 716/6
300417	HD 716/4
300423	HD 725
300424	HD 725/1
300425	HD 725/2
300427	HD 1040
300432	HD 1032/1
300438	HD 1066
300442	HD 10 158
300484	HD 608
300488	HD 815
300493	HD 830/3
300689	HD 737
300807	HD 58/2
300808	HD 58/3
300810	HD 918
300815	HD 952/3
300817	HD 57
300819	HD 952
300820	HD 518/1

MANN FILTER	
INTERNORMEN	
300821	HD 929/1
300822	HD 952/2
300824	HD 57/11
300825	HD 952/5
300840	HD 512/1
300847	HD 716/3
300862	HD 1032
300864	HD 1032/2
300914	HD 830/2
301005	HD 882/1
301006	HD 882/2
301034	HD 57/3
301035	HD 513/3
301039	HD 929
301040	HD 976
301042	HD 57/1
301043	HD 513/1
301044	HD 952/1
301045	HD 976/1
301046	HD 57/2
301047	HD 513/2
301057	HD 10 137/2
301061	HD 55/3
301063	HD 863/3
301065	HD 10 133
301066	HD 863
301067	HD 825/2
301068	HD 846/2
301070	HD 846/1
301071	HD 863/1
301076	HD 509/2
301080	HD 10 137
301092	HD 517/5
301094	HD 517/4
301096	HD 10 100/1
301097	HD 514/3
301098	HD 55
301100	HD 55/1
301101	HD 514/2
301102	HD 55/4
301104	HD 55/5
301110	HD 825/3
301112	HD 882
301115	HD 825/1
301117	HD 846/5
301127	HD 863/2
301134	HD 509
301135	HD 517
301143	HD 509/4
301144	HD 516/2
301825	HD 952/6
302040	HD 955/1
302192	HD 56/3
302841	HD 725/1
303305	HD 1066/1
303308	HD 57/8
303313	HD 513
303317	HD 929/6
303342	HD 611
303530	HD 512/4
305375	HD 517/1
306002	HD 56/4
306202	HD 515/1
306205	HD 515/2
306235	HD 1043/1
306237	HD 1043/2



## Cross-reference list

MANN FILTER	
INTERNORMEN	
306472	HD 513/6
306474	HD 513/7
306479	HD 513/9
306483	HD 518/2
306501	HD 929/4
306519	HD 955
306532	HD 1666
306535	HD 1665
306538	HD 16 137
306562	HD 1069/1
306565	HD 10 100
306566	HD 10 100/2
306726	HD 1585/3
306749	HD 58
306765	HD 1338/1
306777	HD 615/4
306778	HD 612
307302	HD 1040
307623	HD 12 112/1
310560	HD 10 158/2
310584	HD 819/1
310585	HD 819
310593	HD 829
310594	HD 829/2
311365	HD 508/1
311433	HD 506
312301	HD 511
312654	HD 511/1
313167	HD 624
317991	HD 56/5
322087	HD 67/2
322642	HD 505
322668	HD 614
330438	HD 1066
01.E 120.10P.16.S.P	HD 615/2
01.E 120.25VG.16.S.P	HD 615
01.E 170.10VG.HR.E.P	HD 616
01.E 240.10VG.HR.E.P	HD 626/1
01.E 240.25VG.30.E.P	HD 626
01.E 30.10VG.30.E.P	HD 45/3
01.E 30.10VG.HR.E.P	HD 45/4
01.E 320.16VG.16.S.P	HD 737
01.E 320.25VG.16.E.P	HD 737/1
01.E 360.10VG.30.E.P	HD 630
01.E 360.10VG.HR.E.P	HD 630
01.E 425.10P.16.E.P	HD 961/1
01.E 425.10P.16.S.P	HD 961
01.NL 100.10VG.HR.E.P	HD 511
01.NL 100.25VG.30.E.P	HD 511/1
01.NL 40.10VG.30.E.P	HD 506
01.NL 63.10VG.30.E.P	HD 508/1
02.0030 D.20VG.30	HD 45
02.0060 D.10VG.30.HC.E.P	HD 56
02.0060 D.10VG.HR.HC.E.P	HD 56/1
02.0060 D.20VG.30.HC.E.P	HD 56/2
02.0060 D.20VG.HR.HC.E.P	HD 56/3
02.0060 D.25G.30.HC.E.P	HD 56/5
02.0060 D.3VG.HR.HC.E.P	HD 56/4
02.0060 R.10VG.30.HC.S.P	HD 67
02.0060 R.20VG.30.HC.S.P	HD 67/2
02.0110 D.10VG.30.HC.E.P	HD 512
02.0110 D.10VG.HR.HC.E.P	HD 512/1
02.0110 D.20VG.30.HC.E.P	HD 512/2
02.0110 D.6VG.30.HC.E.P	HD 512/4
02.0110 D.6VG.HR.HC.E.P	HD 512/3
02.0110 R.10VG.30.HC.S.P	HD 614

MANN FILTER	
INTERNORMEN	
02.0140 D.10VG.30.HC.E.P	HD 515
02.0140 D.20VG.30.HC.E.P	HD 515/1
02.0140 D.20VG.HR.HC.E.P	HD 515/2
02.0160 D.10VG.30.HC.E.P	HD 716
02.0160 D.10VG.HR.HC.E.P	HD 716/1
02.0160 D.20VG.30.HC.E.P	HD 716/2
02.0160 D.20VG.HR.HC.E.P	HD 716/5
02.0160 D.3VG.30.HC.E.P	HD 716/3
02.0160 D.6VG.30.HC.E.P	HD 716/6
02.0160 D.6VG.HR.HC.E.P	HD 716/4
02.0160 R.10VG.30.HC.S.P	HD 419
02.0160 R.6VG.30.HC.S.P	HD 819/1
02.0165 R.10VG.30.HC.S.P	HD 829
02.0160 R.10VG.30.HC.S.P	HD 819
02.0240 D.10VG.30.HC.E.P	HD 725
02.0240 D.10VG.HR.HC.E.P	HD 725/1
02.0240 D.20VG.30.HC.E.P	HD 725/2
02.0240 D.20VG.HR.HC.E.P	HD 725/3
02.0240 R.10VG.30.HC.S.P	HD 829
02.0240 R.20VG.30.HC.S.P	HD 829/2
02.0280 D.10VG.30.HC.E.P	HD 751
02.0330 D.10VG.30.HC.E.P	HD 1032
02.0330 D.10VG.HR.HC.E.P	HD 1032/1
02.0330 R.10VG.30.HC.S.P	HD 1040
02.0500 D.20VG.HR.HC.E.P	HD 1043/2
02.0500 D.6VG.HR.HC.E.P	HD 1043/1
02.0500 R.10VG.30.HC.S.P	HD 1060
02.0660 D.10VG.30.HC.E.P	HD 1066
02.0660 D.10VG.HR.HC.E.P	HD 1066/1
02.0660 R.10VG.30.HC.S.P	HD 1288
02.0850 R.10VG.30.HC.S.P	HD 12 112
02.0850 R.6VG.30.HC.S.P	HD 12 112/1
02.0950 R.10VG.30.HC.S.P	HD 10 115
02.1300 R.10VG.30.HC.S.P	HD 10 158
02.1300 R.10VG.HR	HD 10 158
02.160 D.20VG.30.HC.E.P	HD 716/2
03.2140 25VG.16.E.P	HD 815
03.2225 25VG.16.E.P	HD 830/2
03.2225 3VG.16.E.P	HD 830/3
03.290 40VG.16.E.P	HD 608
04.8521.26.100G.HR.E.P	HD 58/3
04.8521.26.25VG.16.E.P	HD 58/2
04.8521.26.25VG.HR.E.P	HD 58
04.8521.27.10VG.16.E.P	HD 611
04.8522.64.60G.16.B.O	HD 1338/1
04.8523.62.25VG.HR.E.P	HD 918
04.8524.44.10VG.16.B.P	HD 615/4
04.8524.44.25G.16.B.P	HD 612
04.PI 2108.10VG.16.E.O	HD 513
04.PI 2108.3VG.16.E.O	HD 513/4
04.PI 2115.3VG.16.E.O	HD 929/3
04.PI 2130.3VG.16.E.O	HD 952/3
04.PI 2205.3VG.HR.E.O	HD 57/3
04.PI 2208.3VG.HR.E.O	HD 513/3
04.PI 3105.10VG.16.E.O	HD 57
04.PI 3108.10VG.16.E.O	HD 513
04.PI 3111.10VG.16.E.O	HD 518
04.PI 3115.10VG.16.E.O	HD 929
04.PI 3130.10VG.16.E.O	HD 952
04.PI 3145.10VG.16.E.O	HD 976
04.PI 3205.10VG.HR.E.O	HD 57/1
04.PI 3208.10VG.HR.E.O	HD 513/1
04.PI 3211.10VG.HR.E.O	HD 518/1
04.PI 3215.10VG.HR.E.O	HD 929/1
04.PI 3230.10VG.HR.E.O	HD 952/1
04.PI 3245.10VG.HR.E.O	HD 976/1

MANN FILTER	
INTERNORMEN	
04.PI 4105.25VG.16.E.O	HD 57/2
04.PI 4108.25VG.16.E.O	HD 513/2
04.PI 4111.25VG.16.E.O	HD 518/2
04.PI 4130.25VG.16.E.O	HD 952/2
04.PI 4230.25VG.HR.E.O	HD 952/7
04.PI 8208.25VG.16.E.O	HD 513/6
04.PI 8345.40VG.16.E.O	HD 955/1
04.PI 8408.60G.16.E.O	HD 513/7
04.PI 8415.60G.16.E.O	HD 929/6
04.PI 8430.60G.16.E.O	HD 952/6
04.PI 8445.60G.16.E.O	HD 955
04.PI 8505.100G.16.E.O	HD 57/11
04.PI 8530.100G.16.E.O	HD 952/5
04.PI 8530.16.E.O	HD 952/5
04.PI 9315.40G.HR.E.O	HD 929/4
04.PI 9345.40G.16.E.O	HD 955/1
04.PI 9405.60G.16.E.O	HD 57/8
04.PI 9508.100G.HR.E.O	HD 513/9
05.8300.10VG.10.B.16	HD 10 137
05.8300.10VG.10.PB.8	HD 1666
05.8300.25VG.10. B.P.16	HD 10 137/2
05.8300.25VG.10.PB.39	HD 15 355
05.8400.10VG.10.B.P.8	HD 1665
05.8400.25VG.10.PB.39	HD 10 240/1
05.8400.6VG.10.B.P.16	HD 16 137
05.8700.10VG.10.B.P.4	HD 509/5
05.8700.10VG.10.B.P.8	HD 517/5
05.8700.6VG.10.B.P.8	HD 517/4
05.8900.10VG.10.E.P.16	HD 10 100
05.8900.25VG.10.E.P.16	HD 10 100/2
05.8900.6VG.10.E.P.13	HD 1069/1
05.8900.6VG.10.E.P.16	HD 10 100/1
05.9020.10VG.10.E.P.4	HD 55
05.9020.25VG.10.E.P.4	HD 55/1
05.9020.25VG.10.E.P.8	HD 514/2
05.9020.3VG.10.E.P.4	HD 55/3
05.9020.3VG.10.E.P.8	HD 514/3
05.9020.6VG.10.E.P.4	HD 55/4
05.9021.25VG.10.E.P.4	HD 55/2
05.9021.3VG.210.E.P.4	HD 55/5
05.9600.10VG.10.E.P.13	HD 863
05.9600.10VG.10.E.P.16	HD 882
05.9600.10VG.10.E.P.8	HD 846
05.9600.25VG.10.E.P.4	HD 825/2
05.9600.25VG.10.E.P.8	HD 846/2
05.9600.3VG.10.E.P.13	HD 863/3
05.9600.3VG.10.E.P.4	HD 825/3
05.9600.3VG.10.E.P.8	HD 846/3
05.9600.6VG.10.E.P.13	HD 863/1
05.9600.6VG.10.E.P.4	HD 825/1
05.9600.6VG.10.E.P.8	HD 846/1
05.9601.25VG.210.E.P.13	HD 863/2
05.9601.3VG.210.E.P.8	HD 846/5
05.9800.10VG.10.E.P.4	HD 509
05.9800.10VG.10.E.P.8	HD 517
05.9800.25VG.10.E.P.4	HD 509/2
05.9800.25VG.10.E.P.8	HD 517/6
05.9800.3VG.10.E.P.4	HD 509/3
05.9800.6VG.10.E.P.8	HD 517/1
05.9801.25VG.210.E.P.4	HD 509/4
05.9801.25VG.210.E.P.8	HD 516/2
2.225 H.20SLA.0.00.P	HD 830/2
MAHLE (hydraulic filters)	
665 5568	HD 55/1
757 6630	HD 57/5

MANN FILTER	
MAHLE (hydraulic filters)	
757 6648	HD 57/8
765 7174	HD 513/5
765 7182	HD 518/3
765 7190	HD 929/5
768 0085	HD 513/8
768 0143	HD 513/4
768 0168	HD 929/3
768 0175	HD 952/3
768 0192	HD 57/3
768 0200	HD 513/3
768 0333	HD 518/1
768 0341	HD 513
768 0358	HD 929
768 0366	HD 952
768 0374	HD 976
768 0382	HD 57/1
768 0390	HD 518
768 0408	HD 929/1
768 0415	HD 952/1
768 0424	HD 976/1
768 0440	HD 57/2
768 0457	HD 513/2
768 0465	HD 518/2
768 0481	HD 952/2
768 0523	HD 516/2
768 0549	HD 952/7
768 0929	HD 513/6
768 1000	HD 955/1
768 1018	HD 513/7
768 1034	HD 929/6
768 1040	HD 952/6
768 1042	HD 952/6
768 1067	HD 57/11
768 1943	HD 1585/3
768 2636	HD 47
768 2982	HD 58/3
768 3188	HD 58/2
768 3246	HD 58
768 3618	HD 611
768 5472	HD 1338/1
768 6363	HD 918
768 6769	HD 1359
768 6835	HD 1387
768 6843	HD 1387/2
768 6850	HD 1387/1
768 6900	HD 1022
768 6918	HD 1022/2
768 6975	HD 1045
768 7064	HD 69/1
768 7080	HD 69/2
768 7130	HD 612
768 7163	HD 615/3
768 7197	HD 615/4
768 9078	HD 952/5
768 9185	HD 929/4
769 4540	HD 13 142
769 4656	HD 13 142/1
774 0962	HD 513/9
777 4409	HD 14 560
778 3426	HD 825/3
778 3442	HD 825/2
778 3459	HD 846/3
778 3467	HD 846
778 3475	HD 846/2
778 3483	HD 863/3
778 3491	HD 863



## Cross-reference list

MANN FILTER	
MAHLE (hydraulic filters)	
778 3525	HD 882
778 3566	HD 846/5
778 3590	HD 863/2
778 8433	HD 509/3
778 8441	HD 509
778 8458	HD 509/2
778 8474	HD 517
778 8482	HD 517/6
778 8532	HD 509/4
778 8557	HD 516/2
780 8397	HD 55/3
781 7703	HD 55
781 7711	HD 55/1
781 7786	HD 55/5
781 7794	HD 55/2
781 7927	HD 514/3
781 7943	HD 514/2
788 8449	HD 45/1
788 8464	HD 45/3
788 8472	HD 45
788 8506	HD 45/4
788 8613	HD 57/6
788 8696	HD 510/2
788 9264	HD 56
788 9272	HD 56/2
788 9280	HD 56/4
788 9306	HD 56/1
788 9314	HD 56/3
788 9330	HD 512/4
788 9348	HD 512
788 9355	HD 512/2
788 9371	HD 512/3
788 9389	HD 512/1
788 9405	HD 716/3
788 9413	HD 716/6
788 9421	HD 716
788 9439	HD 716/2
788 9454	HD 716/4
788 9462	HD 716/1
788 9470	HD 716/5
788 9504	HD 725
788 9512	HD 725/2
788 9546	HD 725/1
788 9553	HD 725/3
788 9579	HD 1032/2
788 9587	HD 1032
788 9629	HD 1032/1
788 9660	HD 1066
788 9702	HD 1066/1
789 3522	HD 43
789 3589	HD 614/2
789 3662	HD 829/1
789 3712	HD 1040/2
792 4046	HD 624
792 4145	HD 1137
792 5001	HD 609
792 5019	HD 615/6
792 5571	HD 506
792 5589	HD 508/1
792 5696	HD 835
794 3533	HD 57/6
794 4648	HD 1045/1
796 0149	HD 508
796 0214	HD 615/5
796 2228	HD 615/1
799 9907	HD 825/1

MANN FILTER	
MAHLE (hydraulic filters)	
799 9915	HD 846/1
826 1018	HD 511/1
830 1855	HD 15 355
837 7798	HD 10 158
838 2046	HD 10 137
838 2061	HD 10 137/2
931 3206	HD 825/2
931 3208	HD 846/1
931 3210	HD 846/2
931 32168	HD 55/3
931 3257	HD 514/2
931 4349	HD 55/5
931 4351	HD 55/2
931 4797	HD 863/3
931 4799	HD 863/1
931 48056	HD 863/2
931 48078	HD 846/5
932 5833	HD 55/4
932 6802	HD 846
932 6803	HD 863
953 171 1103	HD 14 560
964 001 2103	HD 47
964 001 3152	HD 58/2
964 001 4151	HD 611
964 050 9103	HD 57/5
964 050 9105	HD 57/10
964 050 9114	HD 57/8
964 050 9115	HD 57/11
964 050 9151	HD 57
964 050 9152	HD 57/2
964 051 0103	HD 513/8
964 051 0105	HD 513/5
964 051 0113	HD 513/6
964 051 0114	HD 513/7
964 051 0150	HD 513/4
964 051 0151	HD 513
964 051 0152	HD 513/2
964 051 1105	HD 518/3
964 051 1151	HD 518
964 051 1152	HD 518/2
964 051 2105	HD 929/5
964 051 2114	HD 929/6
964 051 2150	HD 929/3
964 051 2151	HD 929
964 051 3114	HD 952/6
964 051 3115	HD 952/5
964 051 3150	HD 952/3
964 051 3151	HD 952
964 051 3152	HD 952/2
964 051 4151	HD 976
964 051 4190	HD 955/1
965 001 3120	HD 58/3
965 001 3155	HD 58
965 001 4120	HD 513/9
965 004 6155	HD 918
965 050 9153	HD 57/3
965 050 9154	HD 57/1
965 051 0153	HD 513/3
965 051 0154	HD 513/1
965 051 015A	HD 513/1
965 051 2145	HD 929/4
965 051 2154	HD 929/1
965 051 3155	HD 952/7
965 051 4154	HD 976/1
970 000 7150	HD 1585/3
970 003 6114	HD 1338/1

MANN FILTER	
MAHLE (hydraulic filters)	
970 006 5103	HD 69/1
970 006 5105	HD 69/2
970 006 6105	HD 615/3
970 006 6113	HD 612
970 006 6151	HD 615/4
970 006 7103	HD 1022
970 006 7105	HD 1022/2
970 006 8103	HD 1045
970 006 9105	HD 1359
970 007 0103	HD 1387
970 007 0105	HD 1387/2
970 007 0151	HD 1387/1
970 160 9103	HD 13 142
970 160 9105	HD 13 142/1
85 2438 MIC10	HD 1022
85 2690 MIC10	HD 13 142
85 2690 MIC25	HD 13 142/1
85 2761 MIC10	HD 14 560
852 070 SMX3	HD 1585/3
852 125 MIC10	HD 47
852 126 DRG VST100	HD 58/3
852 126 MIC25	HD 58/2
852 126 SMX VST25	HD 58
852 126 SMX25	HD 58/2
852 127 SMX10	HD 611
852 264 DRG60	HD 1338/1
852 362 SMX VST25	HD 918
852 435 MIC25	HD 1359
852 436 MIC10	HD 1387
852 436 MIC25	HD 1387/2
852 436 SMX10	HD 1387/1
852 438 MIC25	HD 1022/2
852 439 MIC10	HD 1045
852 439 SMX6	HD 1045/1
852 443 MIC10	HD 69/1
852 443 MIC25	HD 69/2
852 444 DRG25	HD 612
852 444 MIC25	HD 615/3
852 444 SMX10	HD 615/4
852 939 MIC10	HD 49
890 001 SMX10	HD 45/3
890 001 SMX16	HD 45
890 001 SMX3	HD 45/1
890 002 SMX VST10	HD 56/1
890 002 SMX10	HD 56
890 003 SMX VST10	HD 512/1
890 003 SMX6	HD 510/2
890 004 MIC10	HD 716
890 004 SMX VST10	HD 716/1
890 004 SMX10	HD 716
890 005 SMX10	HD 725
890 006 SMX VST10	HD 1032/1
890 006 SMX10	HD 1032
890 007 SMX10	HD 1066
890 010 SMX VST10	HD 45/4
890 010 SMX10	HD 43
890 011 SMX10	HD 67
890 012 MIC10	HD 614/2
890 013 SMX10	HD 819
890 014 MIC10	HD 829/1
890 015 MIC16	HD 1040/2
890 015 SMX10	HD 1040
890 016 SMX10	HD 1288
890 019 SMX VST10	HD 56/1
890 019 SMX VST16	HD 56/3
890 019 SMX VST3	HD 56/4

MANN FILTER	
MAHLE (hydraulic filters)	
890 019 SMX10	HD 56
890 019 SMX16	HD 56/2
890 020 SMX VST10	HD 512/1
890 020 SMX VST6	HD 512/3
890 020 SMX10	HD 512
890 020 SMX16	HD 512/2
890 020 SMX6	HD 512/4
890 021 SMX VST10	HD 716/1
890 021 SMX VST6	HD 716/4
890 021 SMX10	HD 716
890 021 SMX16	HD 716/2
890 021 SMX3	HD 716/3
890 021 SMX6	HD 716/6
890 022 SMX VST10	HD 725/1
890 022 SMX VST16	HD 725/3
890 022 SMX10	HD 725
890 022 SMX16	HD 725/2
890 023 SMX VST10	HD 1032/1
890 023 SMX10	HD 1032
890 023 SMX6	HD 1032/2
890 024 SMX VST10	HD 1066/1
890 024 SMX10	HD 1066
890 033 SMX16	HD 10 158
891 011 SMX VST16 NBR	HD 55/2
891 011 SMX VST3 NBR	HD 55/5
891 011 SMX10 NBR	HD 55
891 011 SMX25 NBR	HD 55/1
891 011 SMX3 NBR	HD 55/3
891 012 SMX25 NBR	HD 514/2
891 012 SMX3 NBR	HD 514/3
891 016 SMX25 NBR	HD 825/2
891 016 SMX3 NBR	HD 825/3
891 016 SMX6 NBR	HD 825/1
891 017 SMX VST3 NBR	HD 846/5
891 017 SMX10 NBR	HD 846
891 017 SMX25 NBR	HD 846/2
891 017 SMX3	HD 846/3
891 017 SMX3 NBR	HD 846/5
891 017 SMX6 NBR	HD 846/1
891 018 SMX VST16 NBR	HD 863/2
891 018 SMX10 NBR	HD 863
891 018 SMX3 NBR	HD 863/3
891 018 SMX6 NBR	HD 863/1
891 019 SMX 10NBR	HD 882
891 024 SMX VST16 NBR	HD 509/4
891 024 SMX10 NBR	HD 509
891 024 SMX25 NBR	HD 509/2
891 024 SMX3 NBR	HD 509/3
891 025 SMX VST16 NBR	HD 516/2
891 025 SMX10 NBR	HD 517
891 025 SMX25 NBR	HD 517/6
891 025 SMX3 NBR	HD 517/3
891 025 SMX6 NBR	HD 517/1
891 030 SMX25 NBR	HD 15 355
891 031 SMX10 NBR	HD 10 137
891 031 SMX25 NBR	HD 10 137/2
980 020 SMX10	HD 512
PI 1005 MIC25	HD 57/10
PI 1008 MIC25	HD 513/5
PI 1010 MIC25	HD 518/3
PI 1011 MIC25	HD 518/3
PI 1015 MIC25	HD 929/5
PI 1105 MIC10	HD 57/5
PI 1108 MIC10	HD 513/8
PI 13004 RN MIC10	HD 609
PI 13006 RN MIC10	HD 615/6

## Cross-reference list

MANN FILTER	
<b>MAHLE (hydraulic filters)</b>	
PI 15006 RN MIC25	HD 615/1
PI 2108 SMX3	HD 513/4
PI 2115 SMX3	HD 929/3
PI 2130 SMX3	HD 952/3
PI 2205 SMX VST3	HD 57/3
PI 2208 SMX VST3	HD 513/3
PI 23004 DN SMX10	HD 506
PI 23006 DN SMX10	HD 508/1
PI 23010 RN SMX10	HD 624
PI 23016 RN SMX10	HD 1137
PI 25006 DN SMX25	HD 615/5
PI 25010 DN SMX25	HD 511/1
PI 3105 SMX10	HD 57
PI 3108 SMX10	HD 513
PI 3111 SMX10	HD 518
PI 3115 SMX10	HD 929
PI 3130 SMX10	HD 952
PI 3145 SMX10	HD 976
PI 3205 SMX VST10	HD 57/1
PI 3208 SMX VST10	HD 513/1
PI 3211 SMX VST10	HD 518/1
PI 3215 SMX VST10	HD 929/1
PI 3230 SMX VST10	HD 952/1
PI 3245 SMX VST10	HD 976/1
PI 4105 SMX25	HD 57/2
PI 4108 SMX25	HD 513/2
PI 4111 SMX25	HD 518/2
PI 4115 SMX25	HD 929/2
PI 4130 SMX25	HD 952/2
PI 4230 SMX VST25	HD 952/7
PI 5205 SMX VST6	HD 57/6
PI 72006 DN SMX VST6	HD 508
PI 73010 DN SMX VST10	HD 511
PI 73025 DN SMX VST10	HD 835
PI 8205 SMX VST6	HD 57/6
PI 8208 DRG25	HD 513/6
PI 8345 DRG40	HD 955/1
PI 8405 DRG60	HD 57/8
PI 8408 DRG60	HD 513/7
PI 8415 DRG60	HD 929/6
PI 8430 DRG60	HD 952/6
PI 8445 DRG60	HD 955
PI 8505 DRG100	HD 57/11
PI 8530 DRG100	HD 952/5
PI 9315 DRG VST40	HD 929/4
PI 9508 DRG VST100	HD 513/9
<b>PALL</b>	
HC 2206 FKN6H	HD 512/4
HC 2206 FKS3H	HD 56
HC 2206 FKS6H	HD 512
HC 2206 FKT3H	HD 56/2
HC 2206 FKT6H	HD 512/2
HC 2207 FKN6H	HD 512/3
HC 2207 FKP3H	HD 56/4
HC 2207 FKS6H	HD 512/1
HC 2207 FKT3H	HD 56/3
HC 2208 FKN6H	HD 614/1
HC 2208 FKS4H	HD 67
HC 2208 FKS6H	HD 614
HC 2208 FKT4H	HD 67/2
HC 2216 FKN4H	HD 716/6
HC 2216 FKP3H	HD 716/3
HC 2216 FKP4H	HD 716/3
HC 2216 FKS3H	HD 716
HC 2216 FKS4H	HD 716

MANN FILTER	
<b>PALL</b>	
HC 2216 FKS6H	HD 725
HC 2216 FKT3H	HD 716/2
HC 2216 FKT4H	HD 716/2
HC 2216 FKT6H	HD 725/2
HC 2217 FDT4H	HD 716/1
HC 2217 FDT6H	HD 725/3
HC 2217 FKN4H	HD 716/4
HC 2217 FKS4H	HD 716/1
HC 2217 FKS6H	HD 725/1
HC 2217 FKT4H	HD 716/5
HC 2217 FKT6H	HD 725/3
HC 2218 FKN4H	HD 819/1
HC 2218 FKS4H	HD 819
HC 2218 FKS6H	HD 829
HC 2218 FKT6H	HD 829/2
HC 2233 FKN6H	HD 1032/2
HC 2233 FKS13H	HD 1066
HC 2233 FKS6H	HD 1032
HC 2235 FKS10	HD 952
HC 2235 FKS10H	HD 952
HC 2235 FKS15	HD 976
HC 2235 FKS15H	HD 976
HC 2235 FKS6	HD 929
HC 2237 FKS13H	HD 1066/1
HC 2237 FKS6H	HD 1032/1
HC 2238 FKS10H	HD 1060
HC 2238 FKS6H	HD 1040
HC 2238 FKT10H	HD 1060/1
HC 2285 FKN15H	HD 12 112/1
HC 2285 FKS12H	HD 1288
HC 2295 FKS18H	HD 10 158
HC 2295 FKT18H	HD 10 158/2
HC 6300 FDN16H	HD 875
HC 6300 FDS13H	HD 858
HC 6300 FKN16H	HD 875
HC 6300 FKS13H	HD 858
HC 8300 FDS16H	HD 10 137
HC 8300 FDS8H	HD 1666
HC 8300 FDT16H	HD 10 137/2
HC 8300 FDT39H	HD 15 355
HC 8300 FKS16H	HD 10 137
HC 8300 FKS8H	HD 1666
HC 8300 FKT16H	HD 10 137/2
HC 8300 FKT39H	HD 15 355
HC 8300 FUS16H	HD 10 137
HC 8300 FUS8H	HD 1666
HC 8300 FUT16H	HD 10 137/2
HC 8300 FUT39H	HD 15 355
HC 8400 FDN16H	HD 16 137
HC 8400 FDS8H	HD 1665
HC 8400 FKN16H	HD 16 137
HC 8400 FKS8H	HD 1665
HC 8400 FUN16H	HD 16 137
HC 8400 FUS8H	HD 1665
HC 8700 FDN8H	HD 517/4
HC 8700 FDS4H	HD 509/5
HC 8700 FDS8H	HD 517/5
HC 8700 FKN8H	HD 517/4
HC 8700 FKS4H	HD 509/5
HC 8700 FKS8H	HD 517/5
HC 8900 FDN13H	HD 1069/1
HC 8900 FDN16H	HD 10 100/1
HC 8900 FDS16H	HD 10 100
HC 8900 FDT16H	HD 10 100/2
HC 8900 FKN13H	HD 1069/1
HC 8900 FKN16H	HD 10 100/1

MANN FILTER	
<b>PALL</b>	
HC 8900 FKS16H	HD 10 100
HC 8900 FKT16H	HD 10 100/2
HC 8900 FUN13H	HD 1069/1
HC 8900 FUN16H	HD 10 100/1
HC 8900 FUS16H	HD 10 100
HC 8900 FUT16H	HD 10 100/2
HC 9020 FDN4H	HD 55/4
HC 9020 FDP4H	HD 55/3
HC 9020 FDP8H	HD 514/3
HC 9020 FDS4H	HD 55
HC 9020 FDS8H	HD 514/3
HC 9020 FDT4H	HD 55/1
HC 9020 FDT8H	HD 514/2
HC 9020 FKN4H	HD 55/4
HC 9020 FKP4H	HD 55/3
HC 9020 FKP8H	HD 514/3
HC 9020 FKS4H	HD 55
HC 9020 FKT4H	HD 55/1
HC 9020 FKT8H	HD 514/2
HC 9020 FUN4H	HD 55/4
HC 9020 FUP4H	HD 55/3
HC 9020 FUP8H	HD 514/3
HC 9020 FUS4H	HD 55
HC 9020 FUS8H	HD 514/3
HC 9020 FUT4H	HD 55/1
HC 9020 FUT8H	HD 514/2
HC 9021 FDP4H	HD 55/5
HC 9021 FDT4H	HD 55/2
HC 9021 FUP4H	HD 55/5
HC 9021 FUT4H	HD 55/2
HC 9100 FKN8H	HD 736
HC 9100 FKS13H	HD 757
HC 9100 FKS8H	HD 736
HC 9400 FDN39H	HD 10 240/2
HC 9400 FDP39H	HD 10 240/3
HC 9400 FDS26H	HD 10 133
HC 9400 FDS39H	HD 10 240
HC 9400 FDT39H	HD 10 240/1
HC 9400 FKN39H	HD 10 240/2
HC 9400 FKP39H	HD 10 240/3
HC 9400 FKS26H	HD 10 133
HC 9400 FKS39H	HD 10 240
HC 9400 FKT39H	HD 10 240/1
HC 9400 FUN39H	HD 10 240/2
HC 9400 FUP39H	HD 10 240/3
HC 9400 FUS26H	HD 10 133
HC 9400 FUS39H	HD 10 240
HC 9400 FUT39H	HD 10 240/1
HC 9600 FDN13H	HD 863/1
HC 9600 FDN4H	HD 825/1
HC 9600 FDN8H	HD 846/1
HC 9600 FDP13H	HD 863/3
HC 9600 FDP4H	HD 825/3
HC 9600 FDP8H	HD 846/3
HC 9600 FDS13H	HD 863
HC 9600 FDS16H	HD 882
HC 9600 FDS8H	HD 846
HC 9600 FDT4H	HD 825/2
HC 9600 FDT8H	HD 846/2
HC 9600 FKN13H	HD 863/1
HC 9600 FKN4H	HD 825/1
HC 9600 FKN8H	HD 846/1
HC 9600 FKP13H	HD 863/3
HC 9600 FKP4H	HD 825/3
HC 9600 FKP8H	HD 846/3
HC 9600 FKS13H	HD 863

MANN FILTER	
<b>PALL</b>	
HC 9600 FKS16H	HD 882
HC 9600 FKS8H	HD 846
HC 9600 FKT4H	HD 825/2
HC 9600 FKT8H	HD 846/2
HC 9600 FUN13H	HD 863/1
HC 9600 FUN4H	HD 825/1
HC 9600 FUN8H	HD 846/1
HC 9600 FUP13H	HD 863/3
HC 9600 FUP4H	HD 825/3
HC 9600 FUP8H	HD 846/3
HC 9600 FUS13H	HD 863
HC 9600 FUS16H	HD 882
HC 9600 FUS8H	HD 846
HC 9600 FUT4H	HD 825/2
HC 9600 FUT8H	HD 846/2
HC 9601 FDP8H	HD 846/5
HC 9601 FDT13H	HD 863/2
HC 9601 FKP8H	HD 846/5
HC 9601 FKT13H	HD 863/2
HC 9601 FUP8H	HD 846/5
HC 9601 FUT13H	HD 863/2
HC 9650 FDN8H	HD 846/4
HC 9650 FDS16H	HD 882/1
HC 9650 FKN8H	HD 846/4
HC 9650 FKS16H	HD 882/1
HC 9650 FKT16H	HD 882/2
HC 9650 FUN8H	HD 846/4
HC 9650 FUS16H	HD 882/1
HC 9650 FUT16H	HD 882/2
HC 9800 FDN8H	HD 517/1
HC 9800 FDP4H	HD 509/3
HC 9800 FDP8H	HD 517/3
HC 9800 FDS4H	HD 509
HC 9800 FDS8H	HD 517
HC 9800 FDT4H	HD 509/2
HC 9800 FDT8H	HD 517/6
HC 9800 FKN8H	HD 517/1
HC 9800 FKP4H	HD 509/3
HC 9800 FKP8H	HD 517/3
HC 9800 FKS4H	HD 509
HC 9800 FKS8H	HD 517
HC 9800 FKT4H	HD 509/2
HC 9800 FKT8H	HD 517/6
HC 9800 FUN8H	HD 517/1
HC 9800 FUP4H	HD 509/3
HC 9800 FUP8H	HD 517/3
HC 9800 FUS4H	HD 509
HC 9800 FUS8H	HD 517
HC 9800 FUT4H	HD 509/2
HC 9800 FUT8H	HD 517/6
HC 9801 FDS4H	HD 509/1
HC 9801 FDT4H	HD 509/4
HC 9801 FDT8H	HD 516/2
HC 9801 FKS4H	HD 509/1
HC 9801 FUT4H	HD 509/4
HC 9801 FUT8H	HD 516/2
<b>PARKER (PARKER HANNIFIN)</b>	
925347	HD 514/2
925385	HD 55/1
925666	HD 55/2
926696	HD 825/3
926698	HD 863/3
926837	HD 846
926839	HD 863



## Cross-reference list

MANN FILTER	
PARKER (PARKER HANNIFIN)	
926841	HD 882
926888	HD 882
926996	HD 882/1
927176	HD 846/5
927661	HD 1666
927666	HD 10 137
928932	HD 55
928935	HD 55/3
929105	HD 10 137/2
929111	HD 15 355
930118	HD 846/2
930189	HD 509/3
930194	HD 517/6
930367	HD 55/1
930370	HD 514/2
934236	HD 10 158
934479	HD 10 158/2
934568	HD 1060
934569	HD 1060/1
9326766	HD 846/4
925602Q	HD 514/3
926696Q	HD 825/3
926697Q	HD 846/3
926698Q	HD 863/3
926837Q	HD 846
926839Q	HD 863
926841Q	HD 882
926888Q	HD 882
926996Q	HD 882/1
927176Q	HD 846/5
927181Q	HD 863/2
927696Q	HD 55/2
928642Q	HD 55/2
928934Q	HD 55
929111Q	HD 15 355
930099Q	HD 825/2
930099Q	HD 825/2
930118Q	HD 846/2
930190Q	HD 509
930191Q	HD 509/2
930192Q	HD 517/3
930367Q	HD 55/1
930370Q	HD 514/2
932615Q	HD 55/2
933211Q	HD 10 100/1
933213Q	HD 10 100/2
FDAE1A10Q	HD 506
GO1775	HD 55/1
GO1922	HD 514/2
GO1369Q	HD 55
GO1370Q	HD 55/3
GO1405	HD 514/2
GO1422Q	HD 514/2
GO1428Q	HD 55/2
GO1429Q	HD 55/5
GO1775Q	HD 514/3
GO1922Q	HD 514/2
GO1976	HD 846/3
GO3732Q	HD 509
GO3760	HD 509/3
GO3760Q	HD 509/2
GO4041Q	HD 55/4
GO4048Q	HD 825/1
GO4070	HD 508
GO4167Q	HD 846/1

MANN FILTER	
PARKER (PARKER HANNIFIN)	
GO4484	HD 624
H926697	HD 846/3
MFR2700	HD 945
PR2745	HD 55/4
PR2747	HD 509/3
PR2747Q	HD 509/3
PR2749	HD 509
PR2749Q	HD 509
PR2750	HD 509/2
PR2750Q	HD 509/2
PR2751	HD 517/3
PR2751Q	HD 517/3
PR2752	HD 517/1
PR2752Q	HD 517/1
PR2753	HD 517
PR2753Q	HD 517
PR2754	HD 517/6
PR2756	HD 509/4
PR2756Q	HD 509/4
PR2758	HD 516/2
PR2758Q	HD 516/2
PR2761	HD 825/1
PR2761Q	HD 825/1
PR2762	HD 846/1
PR2762Q	HD 846/1
PR2763	HD 863/1
PR2763Q	HD 863/1
PR2765	HD 882
PR2765Q	HD 882
PR2785	HD 10 133
PR2785Q	HD 10 133
PR2828	HD 57/5
PR2829	HD 57/10
PR2831	HD 57
PR2832	HD 57/2
PR2833	HD 825/3
PR2834	HD 57/1
PR2834Q	HD 57/1
PR2836	HD 513/8
PR2837	HD 513/5
PR2838	HD 513/4
PR2839	HD 513
PR2840	HD 513/2
PR2841	HD 513/3
PR2842	HD 513/1
PR2845	HD 518/3
PR2847	HD 518
PR2848	HD 518/2
PR2850	HD 518/1
PR2853	HD 929/5
PR2854	HD 929/3
PR2854Q	HD 929/3
PR2855	HD 929
PR2855Q	HD 929
PR2856	HD 929/2
PR2858	HD 929/1
PR2862	HD 952/3
PR2863	HD 952
PR2863Q	HD 952
PR2864	HD 952/2
PR2866	HD 952/1
PR2867	HD 952/7
PR2871	HD 976
PR2874	HD 976/1
PR2876	HD 47

MANN FILTER	
PARKER (PARKER HANNIFIN)	
PR2892	HD 58/2
PR2895	HD 58
PR2906	HD 611
PR2926	HD 1585/3
PR2942	HD 1338/1
PR2984	HD 69/1
PR2985	HD 69/2
PR2991	HD 615/3
PR2992	HD 615/4
PR2994	HD 612
PR2996	HD 1022
PR2997	HD 1022/2
PR3002	HD 1045
PR3009	HD 1359
PR3014	HD 1387
PR3015	HD 1387/2
PR3020	HD 13 142
PR3021	HD 13 142/1
PR3031	HD 45/1
PR3033	HD 45/3
PR3034	HD 45
PR3037	HD 45/4
PR3043	HD 56/5
PR3058	HD 56
PR3059	HD 56/2
PR3064	HD 56/4
PR3066	HD 56/1
PR3067	HD 56/3
PR3086	HD 512/4
PR3087	HD 512
PR3087Q	HD 512
PR3088	HD 512/2
PR3094	HD 512/3
PR3095	HD 512/1
PR3095Q	HD 512/1
PR3114	HD 716/3
PR3115	HD 716/6
PR3116	HD 716
PR3117	HD 716/2
PR3123	HD 716/4
PR3124	HD 716/1
PR3125	HD 716/5
PR3145	HD 725
PR3145Q	HD 725
PR3146	HD 725/2
PR3153	HD 725/1
PR3154	HD 725/3
PR3154Q	HD 725/3
PR3173	HD 1032/2
PR3174	HD 1032
PR3182	HD 1032/1
PR3203	HD 1066
PR3203Q	HD 1066
PR3211	HD 1066/1
PR3224	HD 43
PR3241	HD 67
PR3242	HD 67/2
PR3257	HD 614/1
PR3258	HD 614
PR3274	HD 819/1
PR3275	HD 819
PR3292	HD 829
PR3293	HD 829/2
PR3309	HD 1040
PR3326	HD 1288

MANN FILTER	
PARKER (PARKER HANNIFIN)	
PR3428	HD 55
PR3428Q	HD 55
PR3435	HD 825/3
PR3435Q	HD 825/3
PR3436	HD 846/3
PR3436Q	HD 846/3
PR3438	HD 846
PR3438Q	HD 846
PR3439	HD 863
PR3439Q	HD 863
PR3440	HD 825/2
PR3440Q	HD 825/2
PR3441	HD 846/2
PR3441Q	HD 846/2
PR3443	HD 55/3
PR3443Q	HD 55/3
PR3444	HD 55/1
PR3444Q	HD 55/1
PR3445	HD 514/3
PR3445Q	HD 514/3
PR3446	HD 514/2
PR3446Q	HD 514/2
PR3447	HD 55/5
PR3447Q	HD 55/5
PR3448	HD 55/2
PR3448Q	HD 55/2
PR3451	HD 863/3
PR3451Q	HD 863/3
PR3453	HD 1666
PR3454	HD 10 137/2
PR3456	HD 10 137
PR3460	HD 15 355
PR3460Q	HD 15 355
PR3463	HD 846/5
PR3463Q	HD 846/5
PR3466	HD 863/2
PR3466Q	HD 863/2
PR3948	HD 846/4
PR3948Q	HD 846/4
PR3953	HD 882/1
PR3953Q	HD 882/1
PR3954Q	HD 882/2
PR4204	HD 16 137
PR4204Q	HD 16 137
PR4364	HD 10 100/2
PR4364Q	HD 10 100/2
PR4365	HD 10 100
PR4366Q	HD 10 100/1
PR4378	HD 14 560
PR4459Q	HD 517/5
PR4467	HD 1258
PR4468	HD 1258
PR4469	HD 57/9

## Filter glossary

### Bypass valve

The bypass valve ensures the oil flow to the receiving end, e.g. with a cold-start, thick oil or a clogged filter under extreme operating conditions.

### Cavitation damage

Cavitation describes the formation of cavities in fluids. Cavitation occurs when local static pressure in a fluid sinks below a critical value. This critical value usually corresponds to the vapour pressure of the fluid.

Important effects of cavitation are:

- Cavitation wear
- Undissolved gas in the hydraulic system
- Loud noises with a high frequency
- Locally high temperatures in the fluid
- Changing of the resistance characteristics of hydraulic resistance

### Collapse pressure

The failure of the filter through collapsing as the liquid flows from the outside to the inside as a result of excessive differential pressure over the filter.

### Deep-bed filters

Dirt particles penetrate the filter medium and are retained by the structure of the filter medium. Mainly cellulose and fibre-glass media (high stability) and metal fibre media (for temperatures above 130° C) are also used for special applications. The design of the deep-bed filter combines the highest filter fineness with high dirt holding capacity. The structure being similar to a nonwoven allows particle separation in deep-bed filters to take place on the surface of the filtration medium and also for particles to penetrate the filtration medium which leads to a significant increase of the effective filter surface area. In contrast to strainers nonwovens have no "holes" but basically consist of labyrinths which catch the particles. Therefore a defined straining does not take place and a wide range of particles are retained. Deep-bed filters are replaced at the end of their operational life. They are usually not possible to clean.

### Differential pressure

In a filter this is the pressure difference between the raw and clean side. Specification usually given with nominal flow rate without any dirt load.

### Dirt holding capacity [g]

The dirt holding capacity of a filter or filter element is the mass of the dirt under test conditions which is added until the agreed end of the test (usually the time when a service is required).

### Dirt load

The amount of dirt particles the filter is confronted with.

### Fibre-glass medium

Fibre-glass media count as some of the most important materials used today in filtration. During manufacture selected fibres (1 mm – 5 mm long and 3 µm – 10 µm diameter) are processed in a defined combination. The manufacturing process is similar to the process of paper manufacture. The fibres are bonded with a resin and impregnated. The advantage compared to cellulose paper is that the fibre structure is considerably more homogeneous leading to larger open pore surfaces. This enables a lower flow resistance.

### Filter dimensioning

This mainly depends on the factors of volume flow, filter fineness, amount of dirt particles and the required service life of the filter.

### Filter element

This is the component without the housing which is responsible for the actual filtration process. The filter medium can be made of cellulose, fibre-glass, plastic or metal mesh.

### Filter fineness

Regarding filter fineness, a differentiation is made between the used filter materials. For the wire mesh elements often used in suction filters, the filter fineness is simply defined by the mesh size. Wire mesh elements in the field of hydraulics are usually used with a fineness of 20 µm to 200 µm. In order to define the filter fineness with deep-bed filter elements the β value acc. to ISO 16 889 is used. Typical fineness values for hydraulics are 3 µm, 5 µm, 10 µm, 15 µm, 20 µm and 25 µm.





## Filter glossary

### Filter surface area

The filter surface area of a pleated filter element is a calculated value. As the filter surface area of the filter increases, the flow resistance of the filter element decreases. At the same time the dirt holding capacity increases. However, in a filter element a minimum pleat spacing must be maintained so that the filtration surface area can be effectively used. A further increase of the surface area can have negative effects.

### Flow rate

The flow rate of the pressurised fluid determines the flow resistance in pipelines and hydraulic components. Furthermore, there is a critical rate dependent on the viscosity after which the flow changes over from a laminar to a turbulent type. In the field of hydraulics a turbulent flow is undesired. When the filter is dimensioned the flow rate has to be observed to enable the most effective separation of the contaminant particles. The following flow rates are considered to be ideal for a hydraulic system:

Intake line: 0.5 – 1.5 m/s

Pressurised line 30 – 60 bar:  
3 m/s

Pressurised line 60 – 150 bar:  
4 – 5 m/s

Pressurised line > 200 bar:  
5 – 7 m/s

Return line: 2 – 3 m/s

### Full flow

The complete oil volume flows through the filter.

### Full flow filtration

Modern hydraulic systems have high requirements regarding the oil purity level. These can only be met if, as far as is possible, the whole flow volume passing through the system also flows at least once through a fine filter ( $\leq 20 \mu\text{m}$ ). A filter dimensioned in this way is referred to as a filter with full flow filtration.

### Hydraulic fluids

The fluid used to transfer power in a hydraulic system is described as a pressurised fluid. Acc. to ISO 6743 liquids are divided into mineral oil based fluids, flame resistant fluids and environmentally-friendly fluids.

### In-line filter

Filters fitted in pipes or hose lines.

### Medium

Material used to carry out the filtration.

### Multi-pass test for oil filters

Defined in ISO 4548-12 with calibration acc. to ISO 16 889. Mineral oil contaminated with a defined amount of quartz sand (ISO MTD particles) of various sizes is repeatedly sent through the test filter. The measure for the retention rate is the  $\beta$  value as a ratio of the number of particles of a certain size upstream of the filter to those of the same size downstream of the filter. This results in the separation efficiency characteristic over time, the  $\beta$  value and the filter service life. The multi-pass test is standardised acc. to ISO 16 889.

### Nominal flow rate [l/min]

The nominal flow rate relates closely to the geometric dimensioning data of the filter (nominal connection diameter, filter fineness) and the physical characteristics of the liquid to be filtered (density, viscosity).

### Nominal pressure [bar, mbar, kPa]

The filter is dimensioned to handle this pressure.

### Oil purity

The purity of a hydraulic fluid is defined by the quantity of solid particles per millilitre of fluid. The quantity of the particles is usually measured with an automatic particle counter. The purity level rating is determined from the quantity of particles of different particle sizes. The particle count and purity level ratings for hydraulic oils is described in the standard ISO 4406 (1999).

### Opening pressure [bar, kPa]

The pressure difference when the bypass valve is opened, characterised by a defined volume flow.

### Operating pressure [bar, mbar, kPa]

The filter is dimensioned to work at this operating pressure.

### Partial flow

A partial flow is diverted between the pump and lubrication points and then immediately re-directed to the tank via a partial-flow filter. The partial-flow filter is designed to separate either extremely fine particles ( $< 5 \mu\text{m}$ ) or water from the oil.



## Filter glossary

### Return filter

The return filter is fitted in the return pipe of the fluid system and serves to filter the hydraulic fluid before it returns to the tank. This filter offers the best solution for maintaining the system cleanness.

### Separation efficiency [%]

Ratio of the dirt particles retained by the filter to the dirt particles added.

### Separation efficiency, absolute

In one flow through the filter 99 % of the particles of a given size are separated. Example: Particles of the size 15  $\mu\text{m}$  are 99 % separated in one flow through the filter. The separation efficiency is 15  $\mu\text{m}$  absolute.

### Separation efficiency, fractional [%]

The separation efficiency for a given particle size. Determined by a multi-pass test.

### Separation efficiency, nominal

In one flow through the filter 50 % of the particles of a given size are separated. Example: Particles of the size 15  $\mu\text{m}$  are 50 % separated in one flow through the filter. The separation efficiency is 15  $\mu\text{m}$  nominal.

### Spin-on element (filter)

A filter element which is changed after a certain operating time or when a certain flow resistance is reached. The soiled filter element must be disposed of according to the environmental regulations. Most deep-bed filters are spin-on filters.

### Solid particles

Particles suspended in the fluid which do not chemically bind to the fluid are considered to be solid particles. In the field of hydraulics particles from a size of approx. 1  $\mu\text{m}$  are of interest. Particle substances include metals, elastomers, silicon, cinders or textiles.

### Suction filter

A suction filter fitted in a hydraulic circuit ensures that the pump is only driven with oil that is filtered. Suction filtration, however, is disadvantageous for mobile plant applications because the risk of cavitation damage is high with fluids of high viscosity (e.g. caused by low temperatures). Therefore suction filters should only be used where there is a design requirement.

### Surface-type filters

Contaminant particles collect on the surface of the filter element. The design of the surface-type filter is such that the pore size (gap) is consistent and therefore particles of a certain size can be almost completely retained. These filters, however, have a small dirt holding capacity which considerably shortens their service life compared to deep-bed filters. Surface-type filters are manufactured from thin fabric mainly with metal strands (strainer filter). Gap-type filters are also surface-type filters.

### Viscosity

The dynamic viscosity is a measurement of the thickness of the medium to be filtered. The kinematic viscosity is the ratio of the dynamic viscosity of the medium to its density.

### Volumetric flow

This is the volume of the fluid which flows through a defined cross-section within a unit of time. The volumetric flow is generated by the pump. The usual unit is: l/min character: Q or qv

### Wire mesh

Filter elements with a metal mesh medium are less expensive and often used as a reusable solution in protective filters, suction filters or return filters. Various mesh types are used depending on the requirements (fineness, pressure, dynamics) such as Dutch-twilled mesh, plain weaved mesh or also single plain Dutch weave mesh. Wire mesh elements are always surface-type filters which means that they are soiled quicker than filters which use a replaceable element. During regeneration it must be taken into account that elements finer than 40  $\mu\text{m}$  can only be cleaned in an ultrasonic bath.



## Conversion table

Flow rate [l/min ↔ gpm]		
10 l/min	=	2.64 gpm
20 l/min	=	5.28 gpm
30 l/min	=	7.93 gpm
40 l/min	=	10.57 gpm
50 l/min	=	13.21 gpm
60 l/min	=	15.85 gpm
70 l/min	=	18.49 gpm
80 l/min	=	21.14 gpm
90 l/min	=	23.78 gpm
100 l/min	=	26.42 gpm
150 l/min	=	39.63 gpm
200 l/min	=	52.84 gpm
250 l/min	=	66.05 gpm
300 l/min	=	79.26 gpm
350 l/min	=	92.47 gpm
400 l/min	=	106.68 gpm
450 l/min	=	118.89 gpm
500 l/min	=	132.10 gpm
600 l/min	=	158.52 gpm
700 l/min	=	184.94 gpm
800 l/min	=	211.36 gpm
900 l/min	=	237.78 gpm
1000 l/min	=	264.20 gpm

Flow rate [l/h ↔ gph]		
100 l/h	=	26.42 gph
110 l/h	=	29.06 gph
120 l/h	=	31.70 gph
130 l/h	=	34.35 gph
140 l/h	=	36.99 gph
150 l/h	=	39.63 gph
160 l/h	=	42.27 gph
170 l/h	=	44.91 gph
180 l/h	=	47.56 gph
190 l/h	=	50.20 gph
200 l/h	=	52.84 gph
300 l/h	=	79.26 gph
400 l/h	=	105.68 gph
500 l/h	=	132.10 gph
600 l/h	=	158.52 gph
700 l/h	=	184.94 gph
800 l/h	=	211.36 gph
900 l/h	=	237.78 gph
1000 l/h	=	264.20 gph

Pressure [bar ↔ psi]		
0.1 bar	=	1.45 psi
0.12 bar	=	1.74 psi
0.5 bar	=	7.25 psi
1 bar	=	14.5 psi
2 bar	=	29 psi
2.5 bar	=	36.25 psi
3 bar	=	43.5 psi
5 bar	=	72.5 psi
10 bar	=	145 psi
14 bar	=	203 psi
20 bar	=	290 psi
25 bar	=	362.5 psi
30 bar	=	435 psi
35 bar	=	507.5 psi
40 bar	=	580 psi
100 bar	=	1450 psi
200 bar	=	2900 psi
300 bar	=	4350 psi
400 bar	=	5800 psi

Length [mm ↔ inch]		
10 mm	=	0.39 inch
20 mm	=	0.79 inch
30 mm	=	1.18 inch
40 mm	=	1.57 inch
50 mm	=	1.97 inch
60 mm	=	2.36 inch
70 mm	=	2.76 inch
80 mm	=	3.15 inch
90 mm	=	3.54 inch
100 mm	=	3.94 inch
150 mm	=	5.91 inch
200 mm	=	7.87 inch
250 mm	=	9.84 inch
300 mm	=	11.81 inch
350 mm	=	13.78 inch
400 mm	=	15.75 inch
450 mm	=	17.72 inch
500 mm	=	19.69 inch

Volume [cm³ ↔ inch³]		
100 cm³	=	6.102 inch³
200 cm³	=	12.204 inch³
300 cm³	=	18.306 inch³
400 cm³	=	24.408 inch³
500 cm³	=	30.51 inch³
600 cm³	=	36.612 inch³
700 cm³	=	42.714 inch³
800 cm³	=	48.816 inch³
900 cm³	=	54.918 inch³
1000 cm³	=	61.02 inch³
5000 cm³	=	305.1 inch³
10000 cm³	=	610.2 inch³

Temperature [°C ↔ °F]		
-30 °C	=	-22 °F
-10 °C	=	14 °F
0 °C	=	32 °F
10 °C	=	50 °F
30 °C	=	86 °F
50 °C	=	122 °F
80 °C	=	176 °F
100 °C	=	212 °F
120 °C	=	248 °F



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