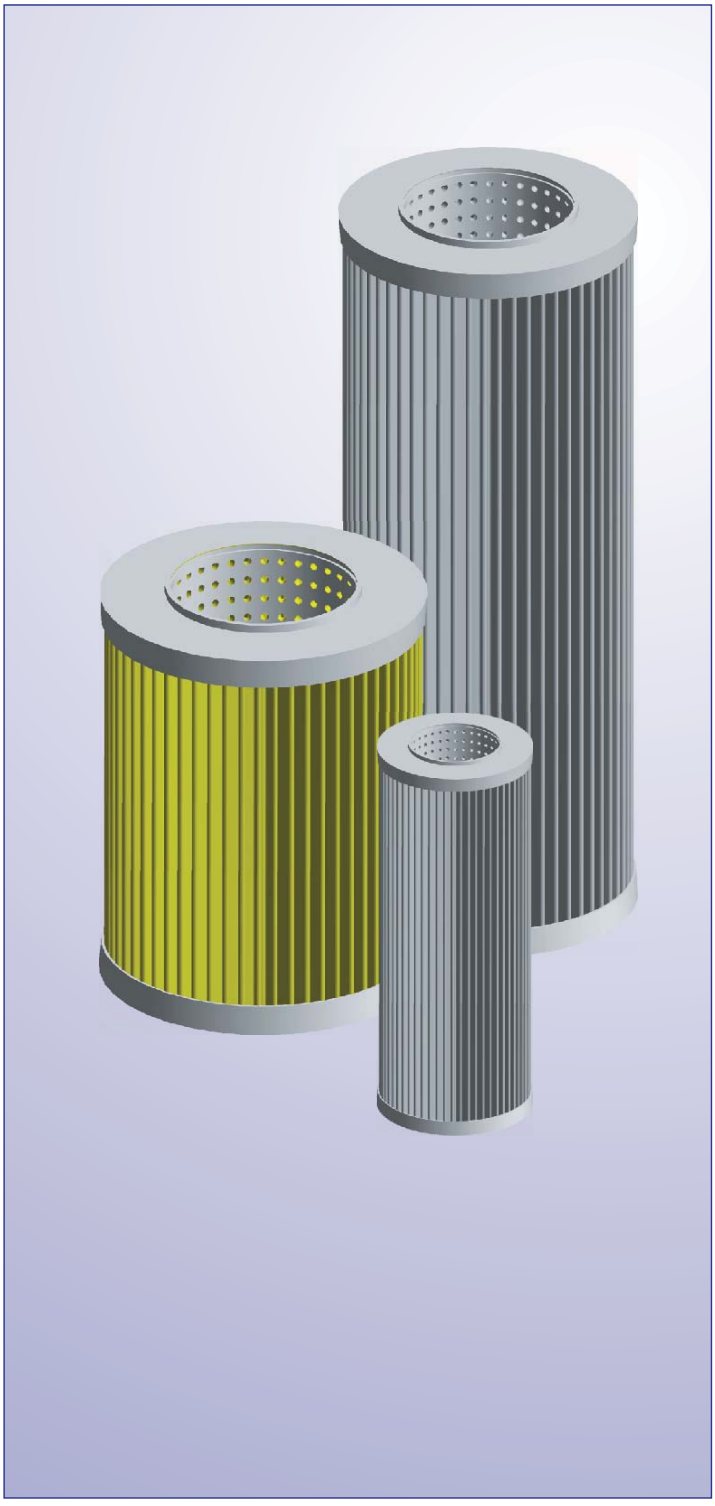
EPE

Filters . Accumulators
an ISO 9001 Company

Filter Elements



Filter media for all applications

Made out of glassfibre-paper, filter-paper, wire mesh, nonwovens and metal fibre

Achievable oil cleanliness up to ISO 12/8/3 (ISO 4406)

Filtration ratio $\beta x = 1000$

Cleanable filter media

Superior dirt holding capacity using multiple layer technology

Filtration grade: 1– 1500 µm
Filter area: 10cm2 – 4.8 m2

EPE PROCESS FILTERS & ACCUMULATORS PVT LTD
An ISO 9001 Company

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Note : Technical specifications are subject to change.

Filter Elements for EPE-Industrial Filters

Application
Filtration of hydraulic fluids, lubricants, industrial liquids and gases

Construction
Special star pleated filter media that is mounted on a perforated support tube.
It is glued with a 2-component adhesive in a longitudinal direction and with metal end-caps.
Sealed with O-ring or profile seal.

Filter Media
H…-XL
Combination of inorganic glass-fibre paper laminated with protective nonwoven media, high dirt holding capacity through 2-layer glass-fibre technique.
Filtration grade: 1/3/6/10/16/20 µm "absolute" accordingly to ISO 4572. Performance data for ISO 16889 refer to "Filter element characteristics".
Use: For highest cleanliness requirements of hydraulic fluids and lubricants.
Non-cleanable.

G…
Surface filter made of stainless steel mesh 1.4401 and 1.4572, underlaid with supporting mesh.
Mesh size: 10-1500 µm "Nominal".
Use: For protective, surface, coarse and pre-filtration.
Cleanable, regenerative.
(see separate information in this catalogue).

P…
Low-priced depth filter made from filter paper, underlaid with supporting mesh.
Made of special impregnated cellulose fibres to resist moisture and swelling.
Filtration grade: 5/10/25 µm "nominal".
Use: For coarse and preliminary filtration.
Non-cleanable.

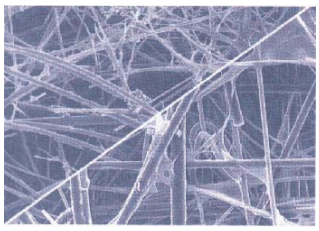
M…
Depth filter in stainless steel fibre 1.4404 with supporting fabric underlay.
Filtration grade: 5/10/15 µm "absolute" accordingly to ISO 16889.
Use: For highest cleanliness requirements with aggressive industrial and chemical liquids at high operating temperatures.
Cleanable dependant on application.
(see separate information in this catalogue).

VS…
Surface filter of extremely solid reinforced fibre made of polyethylene-wrapped polypropylene fibre.
Filtration grade: 10/25/40/60 µm "nominal"
Use: Surface, coarse and pre-filtration.
Especially recommended for cooling lubricants.
Non-cleanable.

AS…
Nonwoven media with water-absorbent material combined with glass fibre media.
Filtration grade: 1/3/6/10/20 µm "absolute" accordingly to ISO 16889.
Use: Dehydration of hydraulics, lubricants and air.
Non-cleanable.

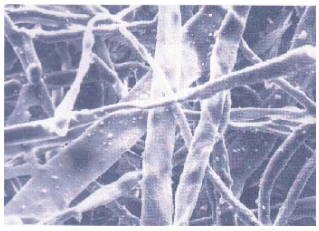
Electronic Microscope Pictures of EPE Filter Media

H...-XL
Glass fibre media
H1XL
H3XL
H6XL
H10XL
H16XL
H20XL



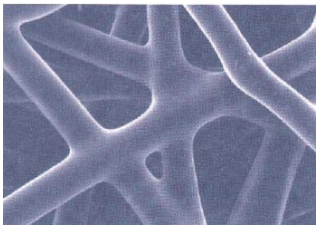
G...
Stainless steel mesh
G10
G25
G40
G60-G1500

P...
Filter paper
P5
P10
P25

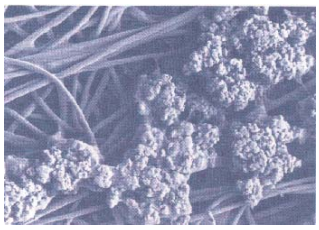


M...
Metal fibre
M5
M10
M15

VS...
Nonwovens
VS10
VS25
VS40
VS60



AS...
Water-absorbent media
AS1
AS3
AS6
AS10
AS20



Filter Element Characteristics

Filtration grade and achievable oil cleanliness code

Besides the direct protection of machine components, the most important target when using an industrial filter is to achieve a given oil cleanliness. This is defined by oil cleanliness codes which classify the particle size distribution of the existing contamination.

The table on the right side contains recommendations for filter media selection dependent on application and
shows typical reachable oil cleanliness codes per ISO 4406 or NAS 1638.

Filter performance

Filtration ratio β_x

The filtration ratio β_x represents the most important filter efficiency characteristic for a hydraulic filter. As an average value during initial and final test Δp it is measured by the multi pass test method according to ISO 16889, using ISOMTD test dust contaminant. It is defined as the ratio of particles upstream divided by the particles downstream larger than size of interest.
In earlier times the β-ratio was measured according to the multi pass test as per ISO 4572. The test results from ISO 4572 are not directly comparable to those of ISO 16889. Further Information about the β-ratio characteristic is given in our technical documentation.

Dirt holding capacity

This is also measured using the Multipass test and gives the amount of test dust ACFTD or ISOMTD that the filter media can retain until a definite increase in pressure is reached.

In comparison to the conventional filter material, the EPE H-XL material displays superior dirt holding capacity, due to its two separate filter layers.

Δp (Pressure Drop)

The sizing of the EPE filter and filter element by means of the initial Δp or pressure drop can be easily carried out with the selection program "EPE-FILTERSELECT", which is available on request. Additionally, the pressure drop curves are shown in the filter catalogues.

Filter Element Test

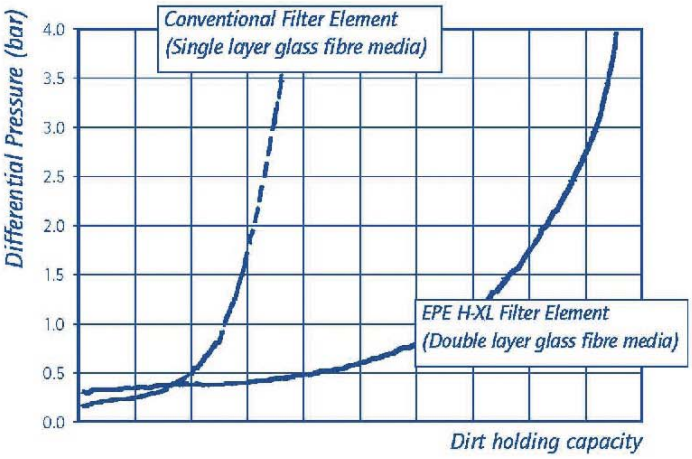
EPE Filter elements are tested at our own test benches in accordance with various ISO test standards.

Use	Required oil cleanliness in accordance with ISO 4406 (NAS 1638)	Recommended Filter Media/ Filtration grade
System with extreme dirt sensitive parts and very high usage. Filling servo installations	≤ 16/12/9 (3)	H1XL/1 µm
System with dirt sensitive parts and very high usage. Servo valve systems.	≤ 18/13/10 (5)	H3XL/3 µm
Systems with proportional valves and pressure > 160 bar	≤ 19/14/11 (6)	H6XL/6 µm
Modern industrial hydraulic directional valves	≤ 20/16/13 (8)	H10XL/10 µm
Industrial hydraulic with large tolerances and low Dirt sensitivity.	≤ 21/17/14 (10)	H20XL/20 µm

Typical β values up to 4 bar Δ-p filter element

Filter media	Particle size "x" for various β-ratios measured according to ISO 16889		
	βx = 75	βx = 200	βx = 1000
H1XL	< 4.0µm(c)	< 4.0µm(c)	< 4.0µm(c)
H3XL	4.0µm(c)	< 4.5µm(c)	5.0µm(c)
H6XL	4.8µm(c)	5.5µm(c)	7.5µm(c)
H10XL	6.5µm(c)	7.5µm(c)	9.5µm(c)
H16XL	13.5µm(c)	16.0µm(c)	19.5µm(c)
H20XL	18.5µm(c)	20.0µm(c)	22.0µm(c)

Superior dirt holding capacity of H-XL Filter Elements



Production quality (Bubble Point Test)	ISO 2941
Performance filter test (Multipass Test)	ISO 16889
Δp (Pressure loss) characteristic lines	ISO 3968
Compatibility with hydraulic fluid	ISO 2943
Collapsibility pressure test	ISO 2941
Flow fatigue test	ISO 3724

Filter Element for Filter Type:

RE
FRE / FREN
FRD / FRDN
LE / LEN
FLE / FLEN
LD / LDN

Special types are possible on request.

Element Design
0 … = Standard-adhesive T = 100° C
E … = Adhesive T = 160° C
K … = Cooling agent resistant Adhesive
L … = Welded T = 180°C
Z … = Tension rod
… 0 = Standard material
… V = Stainless steel 1.4571
… D = Nickel-plated
… Z = Zinc free
For temp. > 100° C please call for consultation

Valve
0 = without
5 = 2.5 bar for size 1.0004 Only
7*)= 3.5 bar for size 3.0003 Only
*) not for 1.0004-1.0012

Gasket
P = Buna N
V = Viton
E = EPDM
T = Teflon
N = Neoprene
I = IT

Additional Information
0 = without
5 = Silicone free
Z = Certificates

Ordering Information for filter element → 1. 0020 H20XL – A 00 – 0 – P 0

Element Type
1. = Open one side with valve built into filter element
1. = Open both sides
2. = Open one side
3. = Open one side with valve built into filter element

Nominal Size
0004 - 0012
0005 - 0120 0040 - 1000
0145 - 0270
0003
0004 - 0145
0040 - 1000
0003

Filtration Grade

Cleanable:
Nominal filtration grade in µm
G 10 G 100 G 350 G 1000
G 25 G 130 G 450 G 1500
G 40 G 200 G 550
G 60 G 250 G 600
G 80 G 300 G 800
Absolute filtration grade (ISO 16889) in µm
M5 M10 M15
cleanable (dependent on application)

Disposable:

Absolute filtration grade (ISO 16889) in µm		Nominal filtration grade in µm	
H1XL	AS1	P5	VS10
H3XL	AS3	P10	VS25
H6XL	AS6	P25	VS40
H10XL	AS10		VS60
H16XL	AS20		
H20XL			

Differential Pressure
A = 30 bar
0 = 15 bar A = 30 bar
A = 30 bar
A = 30 bar B = 330 bar C = 160 bar
A = 30 bar B = 330 bar
A = 30 bar

Filter Element for Filter Type:

TLF
SG / SE
RA / RL / DR
L / D / F
ZH

Special types are possible on request.

Element Design
0 … = Standard-adhesive T = 100° C
E … = Adhesive T = 160° C
K … = Cooling agent resistant Adhesive
L … = Welded T = 180°C
Z … = Tension rod
… 0 = Standard material
… V = Stainless steel 1.4571
… D = Nickel-plated
… Z = Zinc free
For temp. > 100° C please call for consultation

Valve
0 = without

Seal
P = Buna N
V = Viton
E = EPDM
T = Teflon
N = Neoprene
I = IT
X = Special
0 = without For 1.10-1.225/450, 1.E10-1.E225/450, 6.56-6.560

Additional Information
0 = without
5 = Silicone free
C = Silica Gel For 7. only
Z = Certificates

Ordering Information for filter element → 2. 140 G60 – A 00 – 0 – P 0

Element Type
1. = Open both sides
1.E = Open one side
1. = Open both sides
2. = Open one side
4. = for 20 L only
6. = for SG and SE only
7. = for TLF only
2.Z = for ZH only

Nominal Size
10 to 225/450 for return filter, for valve
10 to 225/450 for return filter, without valve
361 to 1801, 360 to 1800 without valve only
10 to 900 without valve only
06 to 20
56 to 560 without valve and O-ring only
002/004/006/007/008 Without valve only
30 to 220

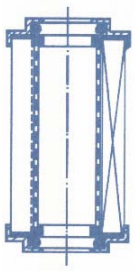
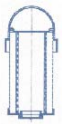
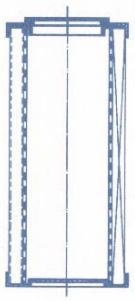
Filtration Grade

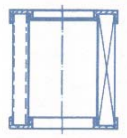
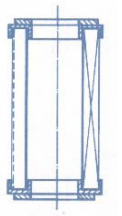
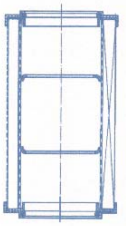
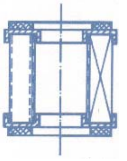
Cleanable:
Nominal filtration grade in µm
G 10 G 100 G 350 G 1000
G 25 G 130 G 450 G 1500
G 40 G 200 G 550
G 60 G 250 G 600
G 80 G 300 G 800
Absolute filtration grade (ISO 16889) in µm
M5 M10 M15
cleanable (dependent on application)

Disposable:

Absolute filtration grade (ISO 16889) in µm		Nominal filtration grade in µm	
H1XL	AS1	P5	VS10
H3XL	AS3	P10	VS25
H6XL	AS6	P25	VS40
H10XL	AS10		VS60
H16XL	AS20		
H20XL			

Differential Pressure
A = 30 bar
A = 30 bar
A = 30 bar C = 160 bar D = 60 bar
A = 30 bar B = 330 bar C = 160 bar D = 60 bar
A = 30 bar
S = Standard
S = Standard
B = 330 bar C = 160 bar

Type	Nominal Size	Number per Filter housing	Type. Nominal Size	Illustration
FRE FRD FLE FLD	0005 0008 0013 0015 0018 0020 0030 0045 0060 0095 0145 0200 0270	1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x	1.0005 1.0008 1.0013 1.0015 1.0018 1.0020 1.0030 1.0045 1.0060 1.0095 1.0145 1.0200 1.0270	1 
FRE FRD FLE FLD	0190 0290 0400 0540 0600 0810 1080 1350	3 x 3 x 3 x 3 x 4 x 4 x 5 x 6 x	1.0095 1.0145 1.0200 1.0270 1.0200 1.0270 1.0270 1.0270	
FREN FRDN FLEN FLDN According to DIN 24550	0040 0063 0100 0160 0250 0400 0630 1000	1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x	1.0040 1.0063 1.0100 1.0160 1.0250 1.0400 1.0630 1.1000	
FREN FRDN FLEN FLDN According to DIN 24550	1260 2000	2 x 2 x	1.0630 1.1000	
FRE	0003	1 x	3.0003 with valve	2 
FRE	0003	1 x	2.0003 without valve	3 
RE	0004 0006 0010 0012	1 x 1 x 1 x 1 x	1.0004 1.0006 1.0010 1.0012	4 
LE LD	0003 0005 0008 0013 0015 0018 0020 0030 0045 0060 0095 0145	1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x	2.0004 2.0005 2.0008 2.0013 2.0015 2.0018 2.0020 2.0030 2.0045 2.0060 2.0095 2.0145	5 
LEN LDN According to DIN 24550	0040 0063 0100 0160 0250 0400 0630 1000	1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x	2.0040 2.0063 2.0100 2.0160 2.0250 2.0400 2.0630 2.1000	

Type	Nominal Size	Number per Filter housing	Type. Nominal Size	Illustration
16 RA 16 DR	10 18 32 56 90 140 225 225/360 225/450	1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x	1.10 1.18 1.32 1.56 1.90 1.140 1.225 1.225/360 1.225/450	6 
16 RA 16 DR	10 18 32 56 90 140 225 225/360 225/450	1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x	1.E10 1.E18 1.E32 1.E56 1.E90 1.E140 1.E225 1.E225/360 1.E225/450	7 
16 RA 16 DR 25 L 100 L 25 D 100 D	360 560 900 1400 1800	1 x 1 x 1 x 1 x 1 x	1.360 1.560 1.900 1.1400 1.1800	8 
16 L 16 D 16 RA 16 DR	2200 3200 5400 7200	4 x 4 x 4 x 4 x	1.560 1.900 1.1400 1.1800	
16 RL 16 DR 25 L 100 L 25 D 100 D	361 561 901 1401 1801	1 x 1 x 1 x 1 x 1 x	1.361 1.561 1.901 1.1401 1.1801	9 
16 L 16 D 16 RA 16 DR	2201 (2202) 3201 (3202) 5401 (5402) 7201 (7202) 8401 (8402) 10801 (10802) 12601 (12602) 14401 (14402)	4 x 4 x 4 x 4 x 6 x 6 x 7 x 8 x	1.561 1.901 1.1401 1.1801 1.1401 1.1801 1.1801 1.1801	
ZH	30 90 120 180 220	1 x 1 x 1 x 1 x 1 x	2.Z30 2.Z90 2.Z120 2.Z180 2.Z220	10 
25 / 100 250 / 400 L, D, F	10 18 32 56 90 140 225 360, 225/360 460, 225/460 560 900	1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x	2.10 2.18 2.32 2.56 2.90 2.140 2.225 2.360 2.460 2.560 2.900	11 
20 L	6 10 20	1 x 1 x 1 x	4.06 4.10 4.20	12 
SG SE	56 90 140 225 360 460 560	1 x 1 x 1 x 1 x 1 x 1 x 1 x	6.56 6.90 6.140 6.225 6.360 6.460 6.560	13 
TLF	1 2 3 4 5 6 7 8	1 x 1 x 1 x 1 x 1 x 1 x 1 x 1 x	7.002 7.002 7.004 7.004 7.004 7.006 7.007 7.008	14 

Aquasorb - AS... Water-absorbing Filter Elements

EPE Aquasorb filter elements are used to remove water from hydraulic and lubricating oil, as well as to dehumidify air.
Water, even when present in only small amounts above the adsorption level of oil, can accelerate the aging of the oil through oxidation.
Increased corrosion and a higher level of wear are the result. Water can also cause change of the condition of certain oil additives, and also produce precipitation in the form of solid, slimy substances that can prematurely block the pores of the filter in use.

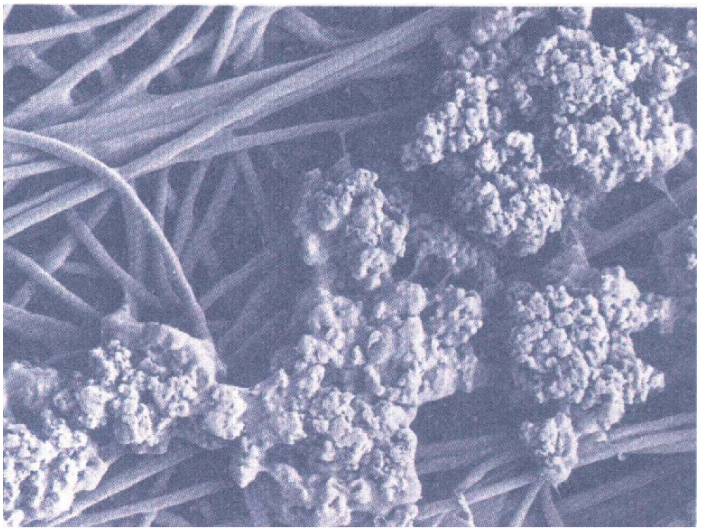
Operational Aspects
EPE Aquasorb filter elements, like the EPE industrial filter elements, have a pleated design, but also have a non woven media type layer covered with a water-adsorbing substance in form of granulates.
Depending upon filtration grade, the corresponding glass fibre filter media (1 µm - 20 µm) is fitted behind the nonwoven media.

Effectiveness
The effectiveness of the EPE Aquasorb elements has been proven in internal tests and in scientific experiments verified by an independent organisation.
The water content (free water) can be reduced to approximately the saturation level of the oil.
The effectiveness and the water adsorption are dependent on the surface pressure of the filter, the oil viscosity and the oil temperature.
The values of water adsorption and changes due to increased viscosity are shown opposite.

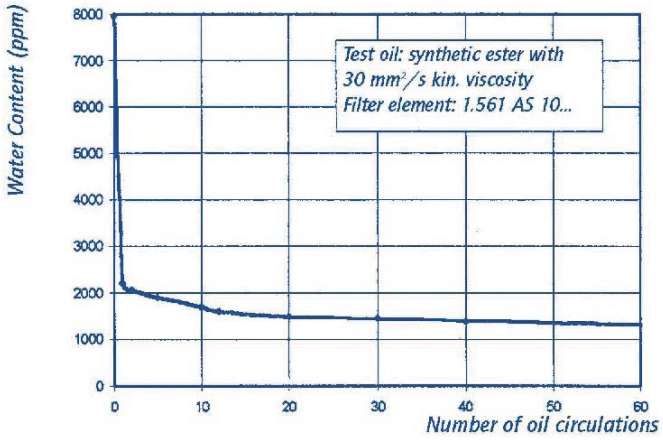
Concept and Scope
EPE Aquasorb elements are to be so selected that the drop of pressure at the beginning does not exceed 0.2 bar. They are used preferably as by-pass filters in low pressure < 5 bar. The filter element is to be changed when a differential pressure of 1.5 bar is reached.

Ordering Information
EPE Aquasorb filter elements can be ordered using the following code in accordance with the current EPE catalogue:

E.g. 1.0270-AS10-A-00-0-P



Reduction of water content of hydraulic oil using AS elements



Typical water adsorption with a selection of EPE filter elements

Filter Element	Nominal Flow[1] (l/min)	Water Absorption[2] (ml)
1.561	37	476
1.1801	112	1428
1.0060	40	511
1.0270	267	3454
2.225	8	104
2.0045	28	365

Water adsorption in relation to oil viscosity

Oil Viscosity (mm2/s)	15[3]	30	46	120
Water Absorption	100% (= reference mark)	70%	58%	38%

The size selection of the EPE AS filter element can also be executed by the "EPE-FILTERSELECT" program.

[1] = Maximum recommended flow rate
[2] = Water adsorption of free, undissolved water at 15 mm2/s and the indicated norminal flow rate
[3] = Reference viscosity

Cleaning of G... & M... Filter Elements

Which filter elements are cleanable?
Before cleaning first check whether the filter element in use is re-usable (cleanable) or a disposable filter element.
EPE filter elements with the following materials are cleanable:

Wire Mesh G10 - G40
As this material is a surface filter it is generally cleanable.
Cleaning is however time consuming, due to the fine mesh, when compared to coarse filter material.
The opposite table shows how to clean these filter elements effectively.

Wire Mesh G60 - G1500
This typical surface filter material can be readily cleaned.
Cleaning can be carried out in accordance with the instructions opposite.

Metal Fibre M5, M10, M15
As this material is composed of stable stainless steel fibres that are closely woven and integrated together, it is classified as a cleanable material.
Cleaning of this material is difficult due to its depth filtration, and should be supported using an ultrasonic bath.

Cleaning or Replacing?
Before a G- or M-element can be cleaned, one must remove the filter element and check to see whether cleaning makes sense.
Does the fabric contain, for example, a good deal of fibrous substances with a material finer than G 40 or the M-material, an effective and complete cleaning is often no longer possible.
Wire mesh which has been recognizably damaged through too-frequent cleaning must be replaced.

Generally it is valid to say: The finer the mesh, the thinner the wire.
Therefore it is necessary, particularly with fine mesh, that a cleaning method must be chosen that is gentle to the materials.

Please make sure that the wire mesh and the metal fibre are not torn, otherwise you won't have sufficient filtration effect.

Manual and simple cleaning methods for G- and M-Elements

Method	**Wire mesh G10, G25, G40** **Metal fibre M5, M10, M15**
Pre-cleaning chemically	Allow the filter element to dry-out for approx. 1 hour. Afterwards wash with solvent.
Pre-cleaning mechanically	Free from large direct particles with a soft brush. To prevent damage to the high quality filter material, do not use hard or sharp objects.
Main cleaning Mechanically/ chemically	Place the pre-cleaned element in a ultra sonic bath with special solvent. Continue ultrasonic cleaning until contamination has disappeared.
Inspection	Visually check condition of material for intactness. Replace filter element when obviously damaged.
Preservation	After drying the cleaned element spray with conservation fluid and place in dust-proof plastic cover.

Method	**Wire Mesh G60 - G1500**
Pre-cleaning chemically	Allow the filter element to dry-out for approx. 1 hour. Afterwards wash with solvent.
Pre-cleaning mechanically	Free from large dirt particles with a soft brush. To prevent damage to the high quality filter material, do not use hard or sharp objects.
Main cleaning mechanically/ chemically	Steam-out with hot wash solution (water with corrosion prevention fluid).
Inspection	Visually check condition of material for intactness. Replace filter element when obviously damaged.
Preservation	After drying the cleaned element, spray with conservation fluid and place In dust-proof plastic cover.

Automatic Cleaning

Method	**Wire mesh G10, G25, G40, G60 - G1500** **Metal fibre M5, M10, M15**
Pre-cleaning Chemically	As detailed above
Main cleaning mechanically/ chemically	With special cleaning equipment for filter elements. These usually involve a fully automatic and combined cleaning, including ultrasonic, mechanical and chemical cleaning. The best possible results are obtained through a gentle cleaning.

Frequency of Cleaning
Experience shows that filter elements with G10, G25, G40, as well as M5 and M10 can be cleaned upto a maximum of ten times. Wire mesh > 60 µm can usually be used more than ten times. Repeated use is, however, heavily dependent on the amount and type of contamination as well as the pressure level (End-Δp before removing the filter element). To obtain maximum re-use, we recommend changing fine mesh and the M-material when an End-Δp of 2.5 bar is reached. The values quoted are for obvious reasons only recommended values for which there is no guarantee.

EPE

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