

LABORATORY FILTRATION

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14 LABORATORY FILTER PAPERS

QUANTITATIVE ASHLESS FILTER PAPERS

Quantitative ashless filter papers are recommended for quantitative analysis. As quantitative analysis requires a high purity, these filter papers are being washed out with acid.

We offer two types of quantitative filter papers – ashless and ashless hardened. Our ashless grades are made of 100% cotton linters with an ash content of 0.007% The ashless hardened grades are made of pure cellulose with an alpha cellulose content of almost 100%

ASHLESS HARDENED PAPERS

Grade	Basis Weight g/m ²	Filtration Velocity s/10 ml	Herzberg s/100 ml	Herzberg ml/min	Typical Pore Size µm
Ederol					
1 / N	80	9	75	800	12 - 15
2 / N	80	23	170	350	8 - 12
3 / N	80	63	260	230	5 - 8
4 / N	80	150	920	65	2 - 3
Filtrak					
388	84	10	70	850	12 - 15
389	84	20	150	375	8 - 12
390	84	100	1200	50	3 - 5
391	84	180	2500	25	2 - 3
392	84	50	450	130	5 - 8
393	100	250	3500	17	1 - 2

LABORATORY FILTRATION

ASHLESS PAPERS

Grade	Basis Weight g/m ²	Filtration Velocity s/10 ml	Herzberg s/100 ml	Herzberg ml/min	Typical Pore Size µm
Munktell					
00H	80	160	1500	40	1 - 2
006	100	75	860	70	3 - 4
00A	80	48	600	100	4 - 5
00K	80	29	375	160	5 - 6
00M	90	13	305	130	8 - 10
00R	90	11	120	500	> 10
005	130	9	70	850	> 20

STANDARD SIZES Filter Circles, Ø in mm

45 50 55 70 90 110 125 150 185 240 270 320

STANDARD SIZES Folded Filters, Ø in mm

90 110 125 150 185 240 270 320

Other sheet sizes and rolls available upon request.

For ordering information please refer to the enclosed grade index.



MUNKTELL

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QUANTITATIVE PAPERS

Grade	Filtration Properties	Applications
Ederol / Filtrak		
1 / N 388 black spot	fast filtering, wide pores, ashless hardened	for coarse and voluminous precipitates such as iron- aluminum- and chromium hydroxide; Si-determination in steel and pig iron analysis
2 / N 389 white spot	medium fast filtering, medium wide pores, ashless hardened	typical grades for quantitative tasks, coarser precipitates such as lead-, iron- and silver sulphide; alkali carbonates; food stuff and soil analysis
3 / N 392 red spot	medium to slowly filtering, medium tight, ashless hardened	fast filtration of fine precipitates such as calcium oxalate, magnesium ammonium phosphate, coarser forms of barium sulphate
4 / N 391 blue spot	very slowly filtering, fine pores, ashless hardened	fine-grained precipitates such as barium sulphate, meta-stannic acid, cuprous oxide
390 green spot	slowly filtering, narrow pores, ashless hardened	Filtration of fine precipitates such as lead dioxide, calcium fluoride, nickel sulphide, zinc sulphide
393 purple spot	particularly slow filtration, especially fine pores, ashless	for extremely difficult filtration conditions and particularly fine precipitates
Munktell		
005	very fast filtering, very wide pores, ashless	for coarse and voluminous precipitates such as iron- aluminum- and chromium hydroxide; Si-determination in steel and pig iron analysis
00R	fast filtering, wide pores, ashless	for coarse and voluminous precipitates such as iron- aluminum- and chromium hydroxide; Si-determination in steel and pig iron analysis
00M	medium to fast filtering, medium wide pores, ashless	medium to fast filtering, medium wide pores, ashless typical grades for quantitative tasks, coarser precipitates such as lead-, iron- and silver sulphide; alkali carbonates
00K	medium to slowly filtering, medium wide pores, ashless	typical grades for quantitative tasks, coarser precipitates such as lead-, iron- and silver sulphide; calcium oxalate
00A	medium to slowly filtering, medium tight, ashless	fast filtration of fine precipitates such as calcium oxalate, magnesium ammonium phosphate, coarser forms of barium sulphate
006	slowly filtering, narrow pores, ashless	Filtration of fine precipitates such as lead dioxide, calcium fluoride, nickel sulphide, zinc sulphide
No. 00H	very slowly filtering, fine pores, ashless	fine-grained precipitates such as barium sulphate, meta-stannic acid, cuprous oxide



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QUALITATIVE PAPERS

The extremely pure filter paper grades 120H to 5 and 292, 292a are made of pure cotton pulp. All other grades are made of cellulose with an alpha content of nearly 100%. The ash content for grades 120H to 5 is approx. 0.06%. For all other grades it is below 0.1%.

HIGH PURITY HARDENED FILTER PAPERS

Grade	Basis Weight g/m ²	Filtration Velocity s/10 ml	Herzberg s/100 ml	Herzberg ml/min	Typical Pore Size µm
Ederol					
11/N	80	10	60	900	12 - 15
12/N	80	25	150	400	8 - 12
13/N	80	60	240	250	5 - 8
14/N	80	150	750	80	2 - 3
Filtrak					
1288	84	10	70	850	12 - 15
1289	84	20	160	375	8 - 12
1290	84	100	1200	50	3 - 5
1291	84	180	2500	25	2 - 3
1292	84	50	400	130	5 - 8

HIGH PURITY PAPERS

Grade	Basis Weight g/m ²	Filtration Velocity s/10 ml	Herzberg s/100 ml	Herzberg ml/min	Typical Pore Size µm
Filtrak					
292	87	50	500	120	5 - 8
292 a	97	60	650	90	5 - 8
293	80	300	4000	15	1 - 2
Ederol					
15	65	25	170	350	8 - 12
20	120	11	120	500	12 - 15
Munktell					
5	130	9	60	1000	> 20
3	90	11	85	700	> 10
150	90	13	130	450	8 - 10
1F	80	29	300	200	5 - 6
110	80	48	480	125	4 - 5
106	100	75	750	80	3 - 4
120H	80	160	1500	40	1 - 2

STANDARD SIZES Filter Circles, Ø in mm

45 50 55 70 90 110 125 150 185 240 270 320 385 450 500

STANDARD SIZES Folded Filters, Ø in mm

90 110 125 150 185 240 270 320 385 450 500

Other sizes and sheet dimensions available upon request.

For ordering information please refer to the enclosed grade index.



MUNKTELL

www.munktell.com

QUALITATIVE PAPERS

Grade	Filtration Properties	Applications
Ederol / Filtrak		
11/N 1288	fast filtering, wide pores, hardened	for coarse and voluminous precipitates such as iron- aluminum- and chromium hydroxide; Si-determination in steel and pig iron analysis
12/N 1289	medium fast filtering, medium wide pores, hardened	typical grades for quantitative tasks, coarser precipitates such as lead-, iron- and silver sulphide; alkali carbonates; beer and malt analysis
13/N 1292	medium to slowly filtering, medium tight, hardened	fast filtration of fine precipitates such as calcium oxalate, magnesium ammonium phosphate, coarser forms of barium sulphate
14/N 1291	very slowly filtering, fine pores, ashless, hardened	fine-grained precipitates such as barium sulphate, metastannic acid, cuprous oxide
1290	slowly filtering, narrow pores, hardened	filtration of fine precipitates such as nickel sulphide, lead dioxide, calcium fluoride
15	medium fast filtering, medium large pores, thin, hardened	thin filter paper for general laboratory work, filtration of water samples
20	fast filtering, wide pores, slightly hardened	strong paper, particularly used in form of folded filters, for coarse, voluminous precipitates
293	particularly slowly filtering, particularly fine pores	for extremely difficult filtration conditions and particularly fine precipitates, common type for wine clarification
Munktell / Filtrak		
5	fast filtering, wide pores	for coarse and voluminous precipitates such as iron- aluminum- and chromium hydroxide; Si-determination in steel and pig iron analysis
3	fast filtering, wide pores	for coarse and voluminous precipitates such as iron- aluminum- and chromium hydroxide; Si-determination in steel and pig iron analysis
150	medium fast filtering medium large pores	typical grades for quantitative tasks, coarser precipitates such as lead-, iron- and silver sulphide; alkali carbonates; calcium oxalate
1F	medium to slowly filtering, medium tight	fast filtration of fine precipitates such as calcium oxalate, magnesium ammonium phosphate, coarser forms of barium sulphate
110 292	medium to slowly filtering, medium tight	fast filtration of fine precipitates such as calcium oxalate, magnesium ammonium phosphate, coarser forms of barium sulphate
106 292a	slowly filtering, narrow pores	filtration of fine precipitates such as lead dioxide, calcium fluoride, nickel sulphide, zinc sulphide
120 H	very slowly filtering narrow pores	for very fine precipitates such as barium sulphate, metastannic acid, cuprous oxide

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GENERAL PURPOSE FILTER PAPERS

These papers are made for general purpose filtration. Their ash content is so low that they can be used for ordinary qualitative filtration work. They are filter papers for a variety of different applications with different basis weights. The development of these papers was keyed particularly to their final use. This is documented by their different surface structures. The papers are made of very pure cellulose with a high alpha cellulose content. The average ash content of these filter papers is 0.1%



WETSTRENGTHENED PAPERS

Grade	Basis Weight g/m ²	Surface	Filtration Velocity s/10 ml	Herzberg s/100 ml	Herzberg ml/min	Typical Pore Size µm
Ederol / Filtrak						
3 hw	65	plain	20	140	430	8 - 12
3 h	65	plain	35	330	180	7 - 10
4 b	75	plain	20	165	360	8 - 12
6	80	plain	15	70	850	10 - 13
34/N	60	creped	4	40	1500	> 20
1602/N	70	creped	5	50	1200	> 15
53	70	embossed	18	150	400	8 - 12
603/N	75	creped	8	65	925	> 15
55/N	75	creped	14	120	500	10 - 13
37/N	135	creped	4	40	1500	> 20
39/N	180	creped	4	40	1500	> 20
Munktell						
1001	90	plain	110	1200	50	2 - 3
1002	90	plain	28	240	250	6 - 10
1003	90	plain	10	80	800	12 - 15

STANDARD SIZES Filter Circles, Ø in mm

45 50 55 70 90 110 125 150 185 240 270 320 385 450 500

STANDARD SIZES Folded Filters, Ø in mm

90 110 125 150 185 240 270 320 385 450 500

Other sizes and sheet dimensions available upon request

For ordering information please refer to the enclosed grade index



MUNKTELL

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ANALYTICAL		GENERAL PURPOSE			
quantitative		qualitative	qualitative-technical		
ashless	ashless hardened	high purity			
005		5	37/N	39/N	gel-type
00R 388 ●	1/N ●	3	1288 11/N	1602/N	coarse crystalline
				34/N 603/N 1003	
	00M 389 ○	2/N ○	150 1F	6 53 3 hw 1002 4 b	medium crystalline
	00K 00A 392 ● 006 390 ●	3/N ●	292 a 110 292 106	13/N 3 h 1290 1001	fine crystalline
	391 ● 00H 393 ●	4/N ●	120H 293	14/N 1291	

- **black spot**
fast filtering, wide pores, soft, lose structure
ashless
- **white spot**
medium fast filtering, medium pores, ashless
- **red spot**
medium fast filtering, medium tight, ashless
- **green spot**
slowly filtering, narrow pores, tight, ashless
- **blue spot**
very slowly filtering, fine pores, very tight,
ashless
- **purple spot**
particularly slowly filtering, very fine pores,
very tight, ashless

LABORATORY FILTRATION



CHROMATOGRAPHY AND BLOTTING PAPERS

CHROMATOGRAPHY PAPERS

Made of pure cotton linters. Produced with an alpha-cellulose content of nearly 100%. In this page's chart, they are listed according to their basis weights and absorption capacity. Here are some hints as to their practical application:

- in order to obtain reproducible results, the fibre direction has to be taken into account
- The capillary rise is always higher in machine direction than in cross direction.
- The machine direction can be determined with a drop of water
- The larger elliptical diameter of the water drop is an indication for the machine direction.

CHROMATOGRAPHY

Grade	Basis Weight g/m ²	Capillary Rise mm/30 min.	Thickness mm	Absorption
FN 1	90	145	0.20	fast
FN 2	120	145	0.25	fast
FN 3	90	93	0.18	medium fast
FN 4	120	93	0.24	medium fast
FN 5	90	60	0.17	slow
FN 6	120	60	0.22	slow
FN 7	150	145	0.32	fast
FN 7a	200	145	0.32	fast
FN 8	280	190	0.55	very fast
FN 30	320	235	0.90	very fast
FN 100	195	115	0.35	fast



ORDERING INFORMATION

Grade	Size mm	Pack Size
FN 1, FN 2	580 x 600	100 sheets
FN 3, FN 4		
FN 5, FN 6		
FN 7, FN 7a	580 x 600	50 sheets
FN 8		
FN 30	580 x 600	25 sheets
FN 100	460 x 570	50 sheets
	580 x 600	50 sheets

Other dimensions and sheet sizes available upon request

BASE PAPER FOR INDICATORS AND REAGENTS

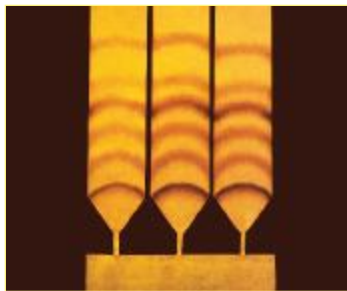
Grade	Basis Weight g/m ²	Capillary Rise mm/10 min.
64	100	80
64 a	135	80

For ordering information please refer to the enclosed grade index.



CHROMATOGRAPHY AND BLOTTING PAPERS

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BLOTTING PAPERS

Grade	Basis Weight g/m ²	Thickness mm	Capillary Rise mm/10 min.
BF 1	90	0.16	80
BF 2	190	0.36	70
BF 3	330	0.76	130
BF 4	550	1.3	160
1600	250	0.50	75
FN 100	195	0.35	130 mm/30 min

APPLICATION OF BLOTTING PAPERS

	GRADE
Cover for gel-membrane sandwich	BF 1; BF 2
Slot and Dot processes ,gel-lifting, buffer-wicking, semi dry blotting	BF 2; FN 100; 1600
Capillary and semi dry blotting, liquid buffer for DANN and RNA	BF 3; BF 4
Liquid buffer, highest absorbency	BF 3; BF 4



STANDARD SIZES

Grade	Size mm	Pack Size
BF 1	580 x 600	100 sheets
BF 2	580 x 600	100 sheets
	460 x 570	100 sheets
BF 3	580 x 600	50 sheets
	300 x 600	50 sheets
BF 4	580 x 600	25 sheets
FN 100	460 x 570	50 sheets
	580 x 600	50 sheets
1600	460 x 570	100 sheets
	580 x 600	100 sheets

Other dimensions and sheet sizes available upon request

For ordering information please refer to the enclosed grade index.



22 INDICATOR PAPERS



LYPHAN®-INDICATOR PAPERS WITHOUT COLOUR SCALE

Booklets of 100 strips

Size: 9 x 65 mm

Typical Applications

General tests on acid or alkalic reactions. Test on neutralization or if already crossing from acidic to alkalic phase or opposite has been effected. Litmus paper is one of the oldest and most popular indicator papers.

Product Name	pH Range	Color Change	Application
Congo Red Paper	5.0 - 3.0	red - > blue	neutralization analysis acid detection
Phenolphthalein Paper	8.3 - 10.0	white - > red	neutralization analysis Determination of strong alkaline reaction
Litmus Paper blue	8.0 - 5.0	blue - > red	Test for acid reaction Neutralization test
Litmus Paper red	5.0 - 8.0	red - > blue	Test for alkaline reaction Neutralization test

LABORATORY FILTRATION



INDICATOR- AND REAGENT PAPERS

First class cotton linters papers are being soaked in indicator dye stuff mixtures or chemicals changing their colour within a certain pH range or in the presence of determined substances.

Indicator respectively reagent papers are available in form of strips each or rolls.

For base papers for indicators and reagents please refer to page 20.

For ordering information please refer to the enclosed grade index.

LYPHAN® pH-indicator papers stand out for:

- a broad selection covering the whole pH range in intervals of 0.2 and 0.3
- quick and precise testing of coloured, turbid as well as clear aqueous solutions
- highest level of accuracy due to several adjacent indicator zones for Lyphan® rolls

LYPHAN® pH-indicator papers are available in form of:

- Lyphan® strips
boxes of 200 pcs. each
- Lyphan® rolls
roll with 6 m length

GRADE

Strips	0,2 pH Interval								
L 653-8	pH	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2
L 656-8	pH	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4
L 662-8	pH	3.9	4.1	4.3	4.5	4.7	4.9	5.1	5.3
L 665-8	pH	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6
L 666-8	pH	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4
L 667-8	pH	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0
L 668-8	pH	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0
L 669-8	pH	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0
L 671-8	pH	7.3	7.5	7.7	7.9	8.1	8.3	8.5	8.7
L 676-8	pH	8.6	8.8	9.0	9.2	9.4	9.6	9.8	10.0

Strips	0,3 pH Interval								
L 650	pH	0.4	0.5	0.7	0.9	1.1	1.4		
L 651	pH	1.0	1.3	1.6	1.9	2.2	2.5	2.8	
L 652	pH	1.6	1.9	2.2	2.5	2.8	3.1	3.4	3.7
L 656	pH	2.6	2.9	3.2	3.5	3.8	4.1		
L 662	pH	3.9	4.2	4.5	4.8	5.1	5.4		
L 664	pH	4.3	4.6	4.9	5.2	5.5	5.8	6.1	
L 665	pH	5.2	5.5	5.8	6.1	6.4	6.7		
L 668	pH	6.0	6.3	6.6	6.9	7.2	7.5		
L 669	pH	6.6	6.9	7.2	7.5	7.8	8.1		
L 671	pH	7.5	7.8	8.1	8.4	8.7			
L 674	pH	8.2	8.5	8.8	9.1	9.4	9.7		
L 677	pH	8.8	9.1	9.4	9.7	10.0			
L 680	pH	9.4	9.6	9.8	10.0	10.3			
L 683	pH	10.1	10.4	10.7	11.0	11.3			
L 686	pH	10.4	10.7	11.0	11.3	11.6			

LYPHAN® - Strips

LABORATORY FILTRATION

LYPHAN® - Rolls

Rolls	Original Roll in plastic twist cap dispenser															
R 111	pH	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0				
R 3969	pH	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9				
R 4979	pH	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9				
R 6999	pH	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	9.9				
Rolls	Refill pack with 2 rolls															
NF 111	pH	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0				
NF 3969	pH	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9				
NF 4979	pH	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9				
NF 6999	pH	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	9.9				
Rolls	Original Roll in plastic twist cap dispenser															
R 014	pH	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
Rollen	Refill pack with 1 roll															
NF 014	pH	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0



24 INDICATOR PAPERS

STUPHAN®

Unitest pH Paper

For the easy and quick determination of pH values with an accuracy that is sufficient for almost all routine pH tests

- available for narrow pH ranges of 1 – 5, 5 – 9 and 9 – 14
- available for complete pH range of 1 – 11 resp. 1 – 14
- rolls: 10 mm wide x 5 m long, individually packed in plastic dispenser



Product Name	pH Range	Pack Size
Unitest I Paper	1 – 11	1 roll
Unitest II Paper	1 – 5	1 roll
Unitest III Paper	5 – 9	1 roll
Unitest IV Paper	9 – 13	1 roll
Unitest V Paper	1 – 14	1 roll

LABORATORY FILTRATION

STUPHAN® INDICATOR STRIPS

for the precise determination of pH values in water samples as well as for the adjustment of the pH value of a sample during analysis

- by immersion of the strips, weakly buffered solutions can be examined until final colour of reactive solution has been obtained
- no influence of the specimen due to indicator dye stuffs; can be used for further analysis
- available in 9 standard grades and dimensions in units of 250 test strips (10 x 74 mm)



Product Name	pH Range	Packing Unit
Stuphan No. 1	0.4 – 1.4	250 strips
Stuphan No. 2	1.2 – 2.7	250 strips
Stuphan No. 3	2.7 – 4.2	250 strips
Stuphan No. 4	3.9 – 5.4	250 strips
Stuphan No. 5	5.1 – 6.6	250 strips
Stuphan No. 6	6.0 – 7.5	250 strips
Stuphan No. 7	7.5 – 8.7	250 strips
Stuphan No. 8	8.1 – 9.6	250 strips
Stuphan No. 9	6.6 – 8.1	250 strips

For ordering information please refer to the enclosed grade index



MUNKTELL

www.munktell.com

SEED TESTING AND SOIL ANALYSIS

25



FILTER PAPERS FOR SOIL ANALYSIS

Filter papers for the determination of toxic substances, nutrients for plants and trace elements in soil specimen.
Circular Filters, folded filters and various other sizes

Grade	Basis Weight g/m ²	Filtration Velocity sec/10 ml	Herzberg sec/100 ml	Application
12/N	80	25	150	general filtration
3 hw	65	20	140	general filtration
13 P	80	60	240	low phosphate content
14 P	80	150	750	low phosphate content
14 M	80	150	750	low magnesium content
131	80	100	1300	low phosphate + potassium content
132	80	55	450	low phosphate + potassium content
292	87	45	500	low nitrogene content
292a	97	60	650	low nitrogene content
00H	80	160	1500	quantitative paper
00M	90	13	130	quantitative paper

You are most welcome to contact us in order to obtain specific information about soil testing and suitable filter papers.

For ordering information, please refer to the enclosed grade index.



SEED TESTING AND SOIL ANALYSIS

GERMINATION CAPACITY TEST

SPECIES	METHOD (apparatus)	GRADE
Smaller seeds (grasses etc.)	Jacobsen (Copenhagen tank) Top of paper	1700, 1701 (circles) 1700 (wicks/sheets)
Smaller seeds (grasses etc.)	Germination Cabinet Top of paper	1701 (sheets) 1200 (underlay) *
Cereals	Rolled towel Between paper	M-Towel (pair of 1750 + 1755)
Peas	Between paper	1760
Beet and pelleted seeds	Pleated paper	1765, 50/S

* see page 32



HEALTH TESTS

SPECIES	METHODE (apparatus)	GRADE
Smaller seeds (grasses etc.)	Jacobsen (Copenhagen tank) Top of paper	1700, 1701 (circles) 1700, 6 (wicks/sheets)
Cereals	Dishes or boxes Top of paper	1731 (circles)
Cereals	Osmosis test	1731 (circles)



SEED TESTING AND SOIL ANALYSIS

27

SEED TESTING PAPERS

MUNKTELL Seed Testing Papers are widely used by seed testing institutes and others for germination capacity testing and for health tests e.g. Jacobsen (Copenhagen tank), on top of paper and osmosis test.



TYPICAL PROPERTIES

Grade	Basis Weight g/m ²	Capillary Rise mm/10 min	Ash Content %	Delivery Form
1700	135	65	0.1	circles with hole wicks and sheets
1701	135	55	0.1	circles and sheets
1731	400	70	0.1	circles and sheets
C350	350	80	0.1	circles and sheets

STANDARD SIZES Circles, Ø in mm

75	85	88	95	130	160	162	170
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SHEETS in mm

150 x 150	220 x 220	480 x 480
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Also available in other sizes.

MUNKTELL TOWELS have been especially developed for germination capacity testing of cereals. From an occupational safety point of view, e.g. cleanliness and lifting heavy weights, this method is widely preferred before the conventional method of growing in sand. It also requires much less space.



TYPICAL PROPERTIES

Grade	Basis Weight g/m ²	Capillary Rise mm/10 min.	Ash Content %	Size mm
1750	90	80	0.1	220 x 400
1755	53	polyethylene-coated		190 x 400

1750 and 1755 are used in combination



28 SEED TESTING AND SOIL ANALYSIS

GERMINATION AND SEED TEST PAPERS

Germination and seed test papers are wetstrengthened for use in germination tests of seed specimen to improve seed growth and growth velocity.

Available both in form of white pleated strips for germination capacity test in Petri dishes test especially for beet seed acc. to NEEB and in form of circles. They are of high purity, offering absolutely reproducible results and are internationally recognized by all leading laboratories.



germination capacity test in Petri dishes



Vigour test in a Vienna Germination Roll Test

You will find further descriptions in the ISTA Manual.

LABORATORY FILTRATION

Grade	Basis Weight g/m ²	Sizes	Method	Finish
6	80	110 x 580 mm	carrier filter	plain, strips
20	120	115 x 180 mm	inlay strips	plain, strips
4 b	75	110 x 580 mm	inlay strips	plain, strips
20, 50/S	120	110/20 mm, 50 pleats	for beet seeds	folded, white
20	120	110/8 mm, 25 pleats	for beet seeds	folded, white
20	120	130 x 235 mm		plain, wrapping sheets
37/N	135	150 x 580 mm	for cold tests	creped, strips
39/N	180	150 x 580 mm	for cold tests	creped, strips
58	150	20 x 200 mm		plain, strips
58	150	85 x 85 mm		plain, special design
58	150	80 mm	Jacobsen	plain, circles
152A	340	700 x 300 mm		board, plain
152A	340	370 x 630 mm		board, plain

Other Methods acc. to ISTA:

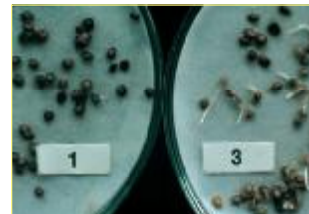
Beet seeds in pleated strips



Grass seeds on circles



Centian seeds, different treatments



MUNKTELL

www.munktell.com

LABORATORY TABLE PAPER**CREPED PAPER**

is used as surface protection and for the absorption of liquids in laboratories.

Grade	Basis Weight g/m ²	Capillary Rise mm	Finish
326	65	100	white, wetstrengthened

Rolls: 750 mm x 100 m

Sheets: 460 mm x 570 mm



dispenser box

SURFACE PROTECTION WITH COATED PAPERS AND NONWOVEN

These polyethylene-coated materials both paper and nonwoven protect laboratory benches and working areas. Spilled chemicals, toxic, infectious, aggressive and radioactive substances are quickly soaked up into the carrier material consisting of paper or nonwoven. The polyethylene layer prevents contamination of the surface underneath. Particularly suitable for clinical laboratories as it can be treated with disinfectants to prevent contamination. They are also suitable for laying out chemicals cupboards, trays and experimental animal cages. Furthermore, the soft character of the carrier material lowers the risk of breaking glass.

Grade	Basis Weight g/m ²	Thickness mm	Finish
358/PE	150	0.23	absorbent carrier material + PE coating
601/PE	140	0.22	ultra-absorbent carrier material + PE coating
1370	150	0.23	absorbing carrier material + PE coating
1371	82	0.42	ultra-absorbent carrier material (Tissue) + PE coating

STANDARD SIZES

Grade	Rolls mm x m	Sheets mm x mm
1370	500 x 50	430 x 430
	500 x 100	480 x 600
		in dispenser box
1371 (nonwoven)	600 x 50	480 x 600
358/PE	460 x 50	460 x 570
	920 x 50	480 x 600
601/PE	400 x 50	460 x 570
	400 x 100	480 x 600
	600 x 50	
	600 x 100	



For ordering information please refer to the enclosed grade index.

30 SPECIAL PRODUCTS



Sugar Beets



Sugar Cane

FILTER PAPERS FOR USE IN SUGAR LABORATORIES

Laboratories in the sugar industry use filter papers for the analysis of sugar beets or sugar cane. The fruit is being mashed and then further analyzed acc. to the aluminum sulphate method. By means of e.g. spectrophotometry, potassium-, nitrogene- sodium- and saccharine content can be determined.

LABORATORY FILTRATION

TYPICAL GRADES

Grade	Basis Weight g/m ²	Finish
20	120	plain, qualitative
55/N	75	creped
12/N	80	plain, qualitative
15, 3 hw	65	plain, qualitative
470	140	plain with kieselguhr
95/5	150	plain with kieselguhr
69/K	155	filter paper with activated carbon
50	90	plain, in coffee filter form, folded
100/N	85	belt filter for filter units, plain
6 S/N	145	creped
601/N	65	creped

All grades are available in form of circles, folded filters and sheets.

Further information is available upon request.



FOLDED FILTER, READY FOR USE,

for immediate application, especially designed for large series of standard filtration

Diam.: 240 mm **Grade: 50**

MEMBRANES FOR THE SUGAR INDUSTRY

In our membrane filter range you can find suitable grades for your analysis. See pages 38 - 44



MUNKTELL

www.munktell.com

FILTER PAPERS FOR USE IN BREWERIES

For malt filtration and malt analysis acc. to MEBAK and EBC standards as well as for gas removal prior to beer analysis.

Grade	Basis Weight g/m ²	Filtration Vel. s/10 ml	Properties
41b	75	22	medium fast filtration, plain
6	80	18	thicker and faster filtration, higher wetstrength as grade 41 b, plain
53	70	18	embossed, wetstrengthened, medium fast
11/N	80	10	plain, fast
292	87	45	plain, medium tight, medium filtration
12/N	80	20	plain
289	80	20	plain, medium wide pores, medium fast
470	140	80	plain, Kieselguhr paper, slow, thick



FILTER PAPER FOR USE IN WINE LABORATORIES



Grade	Basis Weight g/m ²	Filtration Vel. s/10 ml	Properties
293	80	300	slow filtration, particularly fine pores and tight, high-efficiency retention of finest particles
3hw	65	20	medium fast filtration, high wetstrength, plain
37/N	135	4	soft, particularly wide pores, fast filtration, creped
39/N	180	4	soft, particularly wide pores, filtration velocity as in 37/N but extra thickness, creped
470	140	80	Kieselguhr paper, slow filtration, thick
MGA	52	105	micro-glass fibre, binder-free, high flow rates with excellent clarification properties

For ordering information please refer to the enclosed grade index.

PAPERS FOR SPECIAL APPLICATIONS

Grade	Basis Weight	Filtration Velocity	Surface	Finish
	g/m ²	s/10 ml		
4 b	75	18	plain	slightly wetstrengthened
69/K	160	65	plain	activated carbon
95/5	150	70	plain	slightly wetstrengthened
1200	280	15	plain	slightly wetstrengthened

4 b	plain, medium pores, medium fast, slightly wetstrengthened	universal filter for laboratories in the chemical and pharmaceutical industry, especially suitable for alcohols, tinctures etc.
69/K	medium fast filtering, with activated carbon, smoothened	activated carbon treated paper for clarification and brightening of dull and dark urines, for polarimetric sugar determination
95/5	plain, tight, slow filtration, slightly wetstrengthened	paper with highly ennobled kieselguhr. Filter medium of highest separation capacity. Retains the finest turbidities. For clarification of urine sugar and starch solutions as well as milk serum.
1200	plain, medium fast, slightly wetstrengthened	for gelatine and oil filtration. For use in filter presses for transformer oil filtration

STANDARD SIZES Circles, Folded Filters from 90 mm Ø ; Ø in mm

45	55	70	90	110	125	150
185	240	270	320	385	450	500

SHEETS in mm

470 x 470	470 x 580	580 x 580
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PARCHMENT CUTTINGS

For weighing syrup-like, half-crystalline substances or beet pie. Especially suitable for sugar laboratory tasks as it can easily be beaten into pieces.

Available in sheets of 100 x 100 mm

Other sizes available on request.



Grade	Basis Weight
605	20 g/m ²



PHASE SEPARATING PAPER

Hydrophobic, with silicone impregnated paper for the separation of aqueous solutions from organic solutions. The organic phase permeates the filter whereas the aqueous phase and solid components are being retained. Usable as disposable separating funnel. The density of the organic phase has no influence on the separating process.



STANDARD SIZES		Circles, Ø in mm	
90	125	150	185

Grade	Basis Weight
480	85 g/m ²

LENS CLEANING PAPER

Thin, soft, non-linting silk paper made of 100% manila fibres. Used for cleaning optical glasses, bulbs, and as protection paper for metallographic grinding. Particularly high cleaning capacity.



STANDARD SIZES		in mm
120 x 120		120 x 150

Grade	Basis Weight
2113	10 g/m ²

Other sizes are available upon request.

PAPER FOR SOOT DETERMINATION

Plain filter paper for collecting soot specimen or oil derivatives from gas chimneys acc. to DIN 51 402 - T2. Our grade 11 R is tested and approved by TÜV – certificate U118-556134/2.

Available in rolls, sheets, cuts or perforated strips.



Grade	Basis Weight
11 R	80 g/m ²

For ordering information please refer to the enclosed grade index.

SPECIAL PRODUCTS

STANDARD FILTER PAPER SHEETS

These are

ECONOMIC FILTER PAPERS,

preferably from the beginning of production runs when papers do not match all specification parameters.

They have been standardized to the sizes

580 x 580 mm and 460 x 570 mm

Occasionally also available in other sizes.

Pack sizes can be adjusted to your requirements. Please tell us what you need, we will be glad to quote.



Available in basis weights between **60 g/m² and 100 g/m²** plain and creped

PERFUME SAMPLING BOARD AS CARRIER FOR AEROSOLS AND PERFUMES

Take advantage of our more than 100 years experience in paper making to obtain a genuine fragrance!

We provide you with our perfume cards in every confection form or size, with or without imprint resp. stamping of your company's logo etc.

With perfume cards from Munktell

- you preserve the fragrance-specific properties of your products as we use only raw materials of high purity in our paper production
- the fragrance is available immediately after application and persists for a very long time. All perfume cards have a very high absorption capacity
- you obtain a carrier with commercial appeal that we can produce individually for you in terms of form, size and possibly a logo
- you can put down the name of the perfume or aerosol or, for documentation reasons a whole specification onto the perfume card.

Further information and samples are available upon request.



Grade	Basis Weight g/m ²	Properties	Typical Applications
C 160	160	naturally white, smooth	for collection of aerosols or perfumes as well
C 250	250	products, absorbent and	as for the comparison of different fragrances
1200	280	printable	in perfume laboratories and chemist's shops for the customer and for takeaway, suitable for imprint of company's stamps and logos



BINDER-FREE MICRO-GLASS FIBRE FILTERS FOR ANALYTICS AND DIAGNOSTICS

The following list contains indications as to particular grades and their specific application. Quite often it is necessary to find an individual solution. We can offer the following grades:

APPLICATION	GRADE					
	MGA	MGB	MGC	MGD	MGF	MGG
Staining of dyed papers			◆			
Clarification Filtration (biochemical)					◆	
Ligand binding test			◆			
Solvent filtration	◆				◆	
Membrane pre-filters		◆		◆		
Specimen filtration (HPLC)					◆	
Protein filtration					◆	
Radio-immuno test		◆	◆			
Scintillation counting	◆	◆				◆
Cell harvesters			◆		◆	◆
Carbohydrate analysis			◆			

For technical information please refer to pages 45 and 68.

Further information is available upon request.

For ordering information please refer to the enclosed grade index.



36 EXTRACTION THIMBLES

Extraction Thimbles consist of

- cellulose fibres
- micro-glass fibres
- micro-quartz fibres

Grade	Material	Max. Temperature Res.
Nr. 30	cellulose	120
ET/401	cellulose	120
Nr. 35	cellulose	120
Nr. 40	micro-glass	500
ET/MG 160	micro-glass	500
T 293	micro-quarz	900
ET/MK 360	micro-quarz	900

TOLERANCES

Thimble Type	Cellulose Fibre	Micro-Glass Fibre	Micro-Quartz Fibre
Internal diam. mm	+0 / -3	+1 / -3	+0 / -3
Thimble height mm	± 1	± 1	± 1
Wall Thickness mm	1.5 ± 0.5	2 ± 0.5	2 ± 0.5
Ash Content %	< 0.1	-	-
Penetration % DOP (0.3 µm)	-	< 0.002	< 0.002
Temperature °C	-	500 max.	900 max.

Thimbles with other tolerances are available upon request

CELLULOSE FIBRE THIMBLES

Filter thimbles made of cotton fibres with high alpha cellulose content offer high mechanical strength and excellent retention capacity. Particularly suitable for the extraction of organic combinations out of reaction mixtures, food, natural substances, lacquer and binder analysis in paint colours, dust and tar determination in gases.

We can offer you two different thimbles geometries:

- with defined internal diam. x external length, **round** bottom acc. to DIN 12449 (grades No. 30 and ET/401)
- with defined external diam. x external length, **flat** bottom (grade No. 35)

THIMBLES ACC DIN 12 449

Internal diam. mm	Thimble Height mm	Wall Thickness mm	fitting extractors with a nominal volume ml
22	80	1.5	30
33	94	1.5	100
33	205	1.5	250
48	230	2.0	500
57	315	2.5	1,000

STANDARD SIZES

Internal diam. x height in mm

GRADE NR. 30 AND ET/401 (round bottom)

10 x 110	16 x 100	19 x 90	20 x 80	22 x 80	22 x 100
25 x 80	25 x 100*	25 x 125	26 x 60	26 x 80	26 x 80
28 x 100	28 x 120	30 x 80	30 x 90	30 x 100	33 x 80**
33 x 90	33 x 94*	33 x 118	33 x 205	35 x 120	35 x 150
37 x 130	40 x 150	43 x 123*	48 x 145	48 x 200	48 x 250
53 x 145	60 x 120	60 x 180	60 x 275	75 x 200	75 x 250

* suitable for Büchi Extraction System B-811

** suitable for Gerhard Soxtherm Automatic or Foss-Teactor Auto System

Also available with double wall thickness. Packing in boxes of 25 pcs. each.



CELLULOSE FIBRE THIMBLES**STANDARD SIZES**

Outer diam. x height in mm

GRADE NR. 35 (flat bottom)

20 x 90	22 x 70	22 x 80	22 x 100	25 x 60	25 x 80	25 x 90	25 x 100	30 x 80	30 x 90
30 x 100	30 x 120	33 x 80	33 x 95	33 x 100	33 x 118	33 x 145	33 x 150	37 x 90	37 x 95
37 x 100	37 x 210	43 x 123	43 x 150	48 x 145	57 x 280	60 x 120	60 x 180	60 x 275	70 x 200

MICRO-GLASS FIBRE THIMBLES

Filter thimbles of high purity for temperatures up to 500°C. Particularly recommended for aggressive solvents. For analytical registration of environmental pollution.

STANDARD SIZES

Internal diam. x height in mm

GRADE NR. 40 AND ET/MG 160

10 x 50	22 x 80	26 x 60
33 x 80	33 x 94	33 x 150
26 x 80	30 x 77	30 x 95
43 x 123	53 x 145	

Type Gothe 23.8 mm x 68 mm
53 mm x 145 mm

MICRO-QUARTZ FIBRE THIMBLES

A special development for the analysis of air pollution. Binder-free and temperature-resistant up to 900°C

STANDARD SIZES

Internal diam. x height in mm

GRADE T 293 AND ET/MK 360

22 x 62	25 x 100	30 x 77	34 x 150	35 x 150	43 x 123	53 x 145
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Type Gothe 21.5 mm x 68 mm
53 mm x 145 mm

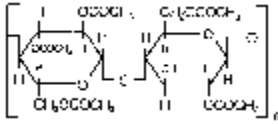
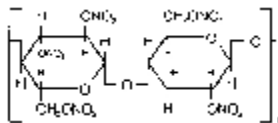
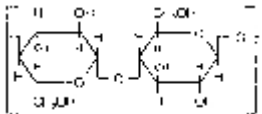
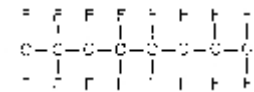
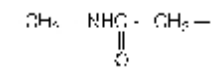
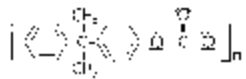
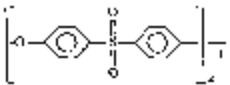
Available in boxes of 25 pcs. each. Other types and sizes available upon request.

For ordering information please refer to the enclosed grade index.

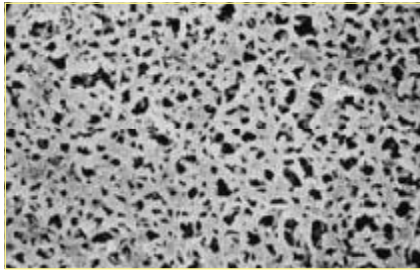


LABORATORY FILTRATION

MEMBRANE FILTER MEDIA

Type	Description
Cellulose Acetate 	low protein adsorption, excellently suited for sterile filtration and clarification of aqueous solutions, nutrient media, buffers and sera. These hydrophilic membranes stand out for their high flow rates and thermal stability of max. 180°C.
Cellulose Nitrate 	is the standard material for analytical and microbiological membrane filtration. Available in a wide range of pore sizes. 0.45 µm pore size is often used for particle retention. Due to its high absorption for biomolecules, this membrane is very advantageous for diagnostic kits and blotting techniques.
Regenerated Cellulose 	resistant to solvents and hydrophilic, 0.45 µm pore size is standardly used for cleaning and de-gasing of e.g. eluents for HPLC.
PTFE 	permanently hydrophobic filter material, very suitable for air and gas filtration. This type of membrane stands out for its chemical compatibility and is the filter for acids and aggressive solvents.
Polyamide 	chemically resistant to alkaline solutions and organic solvents. This membrane type offers particularly high mechanical stability.
Polycarbonate 	track-etch-membrane filters, with very low halogen blind values and uniform and precise capillary pore structure. Their smooth, flat surface results in high visibility of captured particles.
Polyethersulfone 	membranes with high mechanical stability, excellent flow rates and lowest protein adsorption; perfect choice for the filtration of biological and pharmaceutical specimen.
Glass Fibre Pre-Filters	Glass fibre pre-filters are placed directly on top of the membrane filter in order to increase the filtrable volume in case of clarification and sterile filtration.





CELLULOSE ACETATE MEMBRANE FILTERS

These membranes combine very low adsorption characteristics and thermal stability with high flow rates.

They have a very low aqueous extract of < 0.1 % and are available in four pore sizes: 0.2 – 0.45 – 0.65 and 0.8 µm.

Typical applications are filtration of enzyme solutions to minimize protein loss, diagnostic cytology, receptor binding studies and general sterilization and clarification of aqueous and alcoholic solutions and oils.

SPECIFICATION FOR CELLULOSE ACETATE MEMBRANES

Bubble Point (minimum values, wetted with water):

0,2 µm	3.5 bar	0,65 µm	1.3 bar
0,45 µm	2.0 bar	0,8 µm	0.8 bar

Flow rates (mean values cm² with water and Δp = 1 bar (100 kPa))

0.2 µm	22 ml/min
0.45 µm	69 ml/min
0.65 µm	130 ml/min
0.8 µm	200 ml/min

Chemical Compatibility:

stable in solutions for pH range 4-8, resistant to most alcohols, hydrocarbons and oils. See compatibility table

Extractables (in water):

less than 1%

Max. temperature resistance: 180°C

Sterilization:

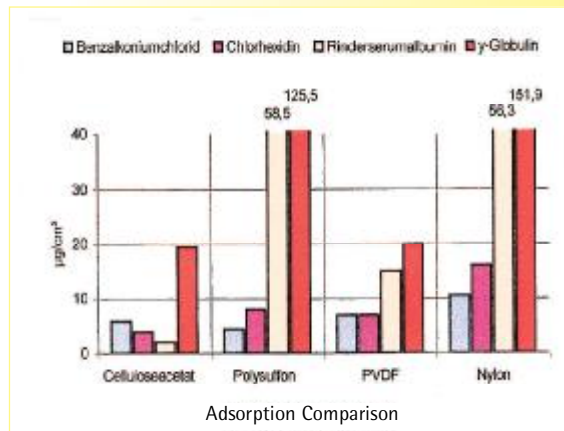
autoclave (121°C or 134°C) with γ-radiation or with ethylene oxide

Thickness (average value):

135 µm.

Validation:

Correlation bubble point values of membranes with a pore size of 0.2 µm. For checking sterilization filtration, the Standard BCT test (Bacteria Challenge Test) was used.



For ordering information, please refer to the enclosed grade index.

CELLULOSE NITRATE MEMBRANE FILTERS

Cellulose nitrate membrane filters are used in a large number of analytical and laboratory processes that require filtration. They are hydrophilic and have a uniform pore structure across a wide range of pore sizes and, therefore, are recommended for sample pre-treatment, particle testing and particle removal.

These membranes have a high non-specific adsorption behaviour which makes them suitable for many blotting procedures and for diagnostic kits. The adsorption decreases with increasing pore size.

Sterile, individually packed membrane filters are standard for routine microbiological control. Filter identification and batch number are printed on each individual pack. During production, we check every single membrane and pack prior to shipping.

All gridded membranes are made of cellulose nitrate which guarantees excellent retention and colony growth. The grid size is 3.1 x 3.1 mm and can be supplied in black, white and green colour. White membranes with black grid and green membranes with dark green grid are used for colony growth. Grey/black membranes with white grid are used for the detection of yeasts and moulds. White membranes with green grid are used for E.coli and coliforms. Our programme also comprises gridded and sterile membranes with a pink-coloured hydrophobic edge.

We also offer non-sterile, gridded membranes in standard packing for particle counting and microscopy.

SPECIFICATION FOR CELLULOSE NITRATE MEMBRANES

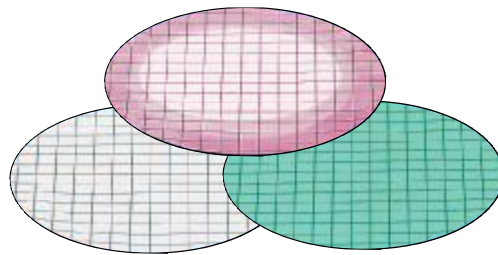
Bubble Point (minimum value, wetted with water):

0.2 µm	4.2 bar
0.45 µm	2.5 bar
0.65 µm	2.0 bar
0.8 µm	1.4 bar
1.2 µm	1.0 bar
3.0 µm	1.6 bar
5.0 µm	0.5 bar
8.0 µm	0.3 bar

0.2 µm cellulose nitrate membrane filters are available only in gridded, sterile and individually packed version.

Flow rates (mean values per cm² with water and $\Delta p = 1$ bar (100 kPa)):

0.2 µm	22 ml/min
0.45 µm	69 ml/min
0.65 µm	130 ml/min
0.8 µm	200 ml/min
1.2 µm	320 ml/min
3.0 µm	430 ml/min
5.0 µm	570 ml/min
8.0 µm	750 ml/min



Compatibility:

compatible with aqueous solution in pH range 4-8, resistant to hydrocarbons and some organic solvents.

Sterilization:

Autoclave (121°C), γ -radiation (25 KGy) or with ethylene oxide.

Max. temperature resistance: 130°C.

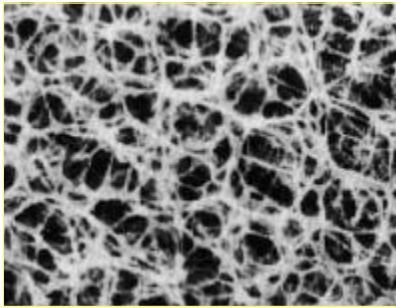
Thickness: varies acc. to pore diameter between 140 µm (8 µm) and 90 µm (0.1 µm).

Validation:

Sterilization Capability of 0.2 µm membrane filter has been verified with the BCT (Bacteria Challenge Test).

For ordering information please refer to the enclosed grade index.





REGENERATED CELLULOSE MEMBRANE FILTERS

Regenerated Cellulose Membrane filters are chemically resistant to almost all organic solvents and aqueous solutions in the pH range of 3 – 12.

Regenerated Cellulose Membranes have a low unspecific adsorption behaviour which makes them suitable for biological solutions. They are also recommended for filtering the mobile phase during HPLC-examinations.

SPECIFICATION FOR REGENERATED CELLULOSE MEMBRANE FILTERS

Adsorption:

0.2 μm 24 $\mu\text{g}/\text{cm}^2$ 0.45 μm 18 $\mu\text{g}/\text{cm}^2$

Bubble Point (average values, wetted with water):

0.2 μm 4.4 bar 0.45 μm 2.8 bar

Flow Rates (average value per cm^2 with water and $\Delta p = 1 \text{ bar (100 kPa)}$):

0.2 μm 20 ml/min 0.45 μm 47 ml/min

Compatibility:

compatible with aqueous solutions in pH range of 3 – 12. Resistant to most solvents.
See compatibility table.

Extractables (with water):

less than 1%.

Sterilization:

Autoclave (121° C or 134° C), dry heat 180° C, γ -radiation (25 Kgy) or with ethylene oxide.

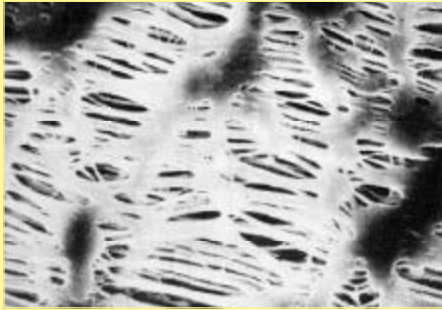
Thickness (average value):

160 μm .

Validation:

Sterilization Capability of 0.2 μm membrane filter has been validated with the BCT (Bacteria Challenge Test).

For ordering information please refer to the enclosed grade index.



HYDROPHOBIC PTFE MEMBRANE FILTERS

PTFE membrane filters are permanently hydrophobic by their composition. They allow the passage of air and gases and do not get clogged up by humidity. When intended for the filtration of aqueous solutions, they need to be wetted with ethanol or methanol prior to use in order to permit water penetration. PTFE membrane filters are ideal for venting applications, phase separations, aerosol collection and gas filtration. PTFE membrane filters offer an excellent chemical compatibility so that they can be used even for those solvents and acids which other filter types are not resistant against.

SPECIFICATION FOR HYDROPHOBIC PTFE MEMBRANE FILTERS

Adsorption: 8 µg/cm² for γ-globuline for pore size 0.2 µm.

Bubble Point (minimum value for the 0.2 µm membrane and average values for all other porosities, treated in all cases with isopropanol):

0.2 µm	1.2 bar	1.2 µm	0.45 bar
0.45 µm	0.8 bar	5.0 µm	0.1 bar

Flow Rates (average values per cm² with air and Δ p = 0.05 bar):

0.2 µm	0.2 l/min	1.2 µm	1.6 l/min
0.45 µm	0.3 l/min	5.0 µm	4 l/min

Compatibility:

compatible with most solvents. See compatibility table.

Extractable Substances (with water):

none detected

Sterilization:

Autoclave (121° C oder 134° C), with ethylene oxide.

Thickness:

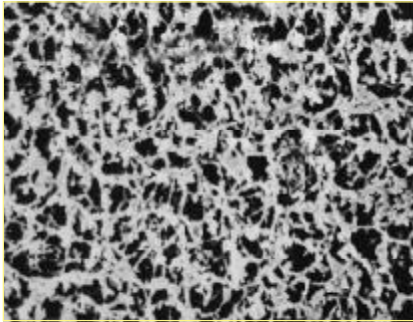
varies acc. to pore size, between 65 µm (0.2 µm) and 100 µm (5.0 µm).

Validation:

Sterilization Capability of 0.2 µm membrane filter has been verified with the BCT (Bacteria Challenge Test).

For ordering information please refer to the enclosed grade index.





POLYAMIDE MEMBRANE FILTERS

Polyamide membranes are both hydrophilic and chemically resistant to most bases which makes them excellently suited as particle remover or sterilization filter for alkaline solutions.

Good compatibility with many solutions and aqueous samples makes them an economical choice for the clarification of the mobile phases for HPLC.

The high adsorption capacity and good mechanical strength make them useful for blotting techniques such as transfer and immobilization for nucleic acids.

They are not recommended as sterile filters for tissue culture solutions. Cellulose acetate membrane filters should be used for this application.

SPECIFICATION FOR POLYAMIDE MEMBRANE FILTERS

Adsorption: 100 µg/cm² with bovine serum for 0.2 µm membranes.

Bubble Point (minimum values, wetted with water):

0.2 µm	3.4 bar
0.45 µm	2.2 bar

Flow Rates (minimum values per cm² with water and $\Delta p = 1$ bar (100 kPa)):

0.2 µm	23 ml/min
0.45 µm	46 ml/min

Compatibility:

compatible with solutions in pH range 3 – 14, resistant to some solvents.

Sterilization:

steam sterilization (121°C or 134°C), with ethylene oxide.

Thickness (average value):

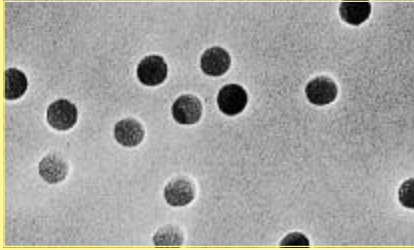
125 µm

Validation:

Sterilization Capability of 0.2 µm membrane filter has been verified with the BCT (Bacteria Challenge Test).

For ordering information please refer to the enclosed grade index.

MICROFILTRATION



POLYCARBONATE MEMBRANE FILTERS

Polycarbonate Membrane Filters are hydrophilic. They are produced from a highly pure polycarbonate film using nuclear radiation. They have a very uniform pore structure and a narrow pore size distribution. Thanks to their very low halogen values they are suitable for AOX analysis acc. DIN and ASTM.

Thermally stable up to 140°C

SPECIFICATIONS FOR POLYCARBONATE MEMBRANES

Bubble Point (minimum values, wetted with water):

0.2 µm	4.8 bar
0.4 µm	2.5 bar

Flow Rates (mean values per cm² with water and Δ P=1 bar):

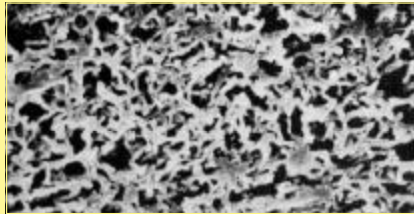
0.2 µm	20 ml/min
0.4 µm	70 ml/min

Compatibility: for aqueous and organic solutions

Extractables (in water): low

Sterilization: Autoclave 121° C or 134° C

Thickness: 6 - 11 µm



POLYETHERSULFONE MEMBRANE FILTERS

Polyethersulfone membrane filters offer the user high flow rates with low adsorption. Particularly suitable for biological and pharmaceutical analytics. The mechanical stability is higher than with cellulose-type membranes. They are an appropriate medium for aqueous and organic solutions in a pH range of 2 - 12.

SPECIFICATIONS FOR POLYETHERSULFONE MEMBRANES

Bubble Point (minimum values, wetted with water):

0.2 µm	3.2 bar
0.45 µm	2.3 bar

Flow Rates (mean values per cm² with water and Δ P=1 bar):

0.2 µm	> 28 ml/min
0.45 µm	> 32 ml/min

Compatibility: compatible with aqueous and organic solutions in pH range 2 - 12

Extractable parts (in water): < 0.2%

Thickness: 150 µm

Sterilization: Autoclave 121°C or 134°C, with gamma sterilization or ethylene oxide.

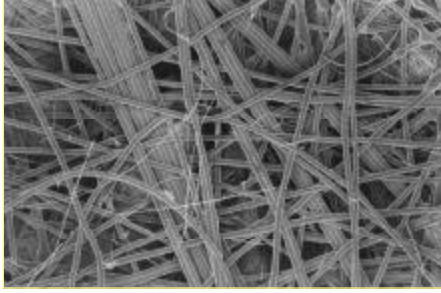
Max. Temperature: 180° C

Validation:

Sterilization Capability of 0.2 µm membrane filter has been verified with the BCT (Bacteria Challenge Test).

For ordering information please refer to the enclosed grade index.





GLASS FIBRE PRE-FILTERS

Generally, glass fibre filters are very open-structured and have a large available surface area and filter depth.

Other than membranes, they offer a rather high dirt holding capacity and are therefore often used in the filtration of difficult-to-filter liquids. They are placed on top of the membrane filter to enhance its service life.

We offer three different grades – with and without binder. Filters without binder are recommended for analytical and gravimetric analysis as well as for the pre-filtration of relatively clean solutions such as tissue culture media.

SPECIFICATION OF GLASS FIBRE FILTERS

Grade	1387/1	MGB	MGD
Basis Weight g/m ²	90	143	120
Material	Borosilicate-Glass Fibres	Borosilicate-Glass Fibres	Borosilicate-Glass Fibres
Binder	yes	no	no
Thickness	0.38 mm	0.7 mm	0.53 mm
Sterilization	autoclave – 121°C	autoclave – 121°C	autoclave – 121°C
	dry heat – 180°C	dry heat – 180°C	dry heat – 180°C
Max. Temperature Resistance	220°C	500°C	500°C

For ordering information please refer to the enclosed grade index.



46 MICROFILTRATION

CELLULOSE ACETATE SYRINGE FILTERS

Cellulose acetate syringe filters are used for the filtration of volumes of up to 100 ml. The syringe filter units are ideal for applications requiring maximum sample recovery such as: tissue culture preparation, sterile filtration and clarification of biological fluids, specimen solutions, protein and enzyme filtration, hybridization buffers and other aqueous solutions.

We supply them sterile or non-sterile in five different pore sizes: 0.2-0.45-0.8-1.2-5.0 μm . The 0.2 and 0.45 μm units can be supplied with the option of a micro-glass fibre pre-filter.

COLOUR CODE in μm

Blue	Yellow	Green	Red	Brown
0.2	0.45	0.8	1.2	5.0

SPECIFICATION FOR CELLULOSE ACETATE SYRINGE FILTERS

Pore Size	0.2 μm	0.45 μm	0.8 μm	1.2 μm	5 μm
Membrane	Cellulose Acetate	Cellulose Acetate	Cellulose Acetate	Cellulose Acetate	Cellulose Acetate
Housing	Cyrolite	Cyrolite	Cyrolite	Cyrolite	Cyrolite
Diameter	25 mm	25 mm	25 mm	25 mm	25 mm
Filter Area	5.3 cm ²	5.3 cm ²	5.3 cm ²	5.3 cm ²	5.3 cm ²
Idle Volume	0.1 ml	0.1 ml	0.1 ml	0.1 ml	0.1 ml
Bubble Point	3.2 bar	1.6 bar	0.8 bar	0.7 bar	0.4 bar
Max. Pressure	4.5 bar	4.5 bar	4.5 bar	4.5 bar	4.5 bar
Burst Strength	6 bar	6 bar	6 bar	6 bar	6 bar
Max. Temperature	50°C	50°C	50°C	50°C	50°C
Flow Rate (water, $\Delta p=1$ bar)	60 ml/min	180 ml/min	300 ml/min	400 ml/min	500 ml/min
Hydrophilic	yes	yes	yes	yes	yes
Inlet	Luer lock	Luer lock	Luer lock	Luer lock	Luer lock
Outlet	Luer lock/ Luer slip	Luer lock/ Luer slip	Luer lock	Luer lock	Luer lock
Version*	ns/ns/s	ns/ns/s	ns/ns/s	ns/ns/s	ns/ns/s
Pack Size	100/500/50	100/500/50	100/500/50	100/500/50	100/500/50

* ns = non-sterile
s = sterile

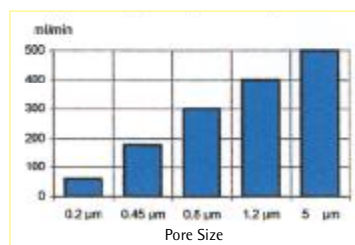


Outlet: Luer Lock



Outlet: Luer Slip

Flow Rate - Pore Size



For ordering information please refer to the enclosed grade index.





REGENERATED CELLULOSE SYRINGE FILTERS

Inside these syringe filters, there are hydrophilic and solvent-resistant regenerated cellulose membranes. These syringe filters are suitable for the ultra-cleaning of small volumes of samples for HPLC or GC.

We supply these syringe filters in two pore sizes – 0.2 and 0.45 μm – and in three sizes 4 – 15 – 25 mm.

DIAMETER (mm)	RECOMMENDED FILTRATION	
	VOLUME (ml)	
4	< 1	
15	< 5	
25	< 100	

SPECIFICATION FOR REGENERATED CELLULOSE SYRINGE FILTERS

	0.2 μm	0.45 μm	0.2 μm	0.45 μm	0.2 μm	0.45 μm
Pore Size	0.2 μm	0.45 μm	0.2 μm	0.45 μm	0.2 μm	0.45 μm
Membrane	reg. Cell.	reg. Cell.	reg. Cell.	reg. Cell.	reg. Cell.	reg. Cell.
Housing	Polyprop.	Polyprop.	Polyprop.	Polyprop.	Polyprop.	Polyprop.
Diameter	4 mm	4 mm	15 mm	15 mm	25 mm	25 mm
Filter Area	0.07 cm ²	0.07 cm ²	1.7 cm ²	1.7 cm ²	4.8 cm ²	4.8 cm ²
Idle Volume	0.005 ml	0.005 ml	0.01 ml	0.01 ml	0.15 ml	0.15 ml
Bubble Point	3.4 bar	2.0 bar	3.4 bar	2.0 bar	3.4 bar	>2.0 bar
Max. Pressure	7 bar	7 bar	6 bar	6 bar	6 bar	6 bar
Max. Temp.	121°C/30 min	121°C/30 min	121°C/30 min	121°C/30 min	121°C/30 min	121°C/30 min
Water Flow						
($\Delta p=1$ bar)	0.5 ml/min	1.5 ml/min	10 ml/min	30 ml/min	60 ml/min	100 ml/min
Methanol Flow						
($\Delta p=1$ bar)	1.5 ml/min	3 ml/min	55 ml/min	105 ml/min	160 ml/min	325 ml/min
Inlet	Luer lock	Luer lock	Luer lock	Luer lock	Luer lock	Luer lock
Outlet	Luer slip	Luer slip	Luer slip	Luer slip	Luer slip	Luer slip
Version	non-sterile	non-sterile	non-sterile	non-sterile	non-sterile	non-sterile

For ordering information please refer to the enclosed grade index.

48 MICROFILTRATION

PTFE SYRINGE FILTERS

This is a filter for quick, simple and reliable ultra-cleaning of small volumes. PTFE is hydrophobic and has an excellent compatibility with aggressive samples. These units are recommended for HPLC – solvent preparation and de-gasing to ensure column protection. They can be autoclaved. We supply them in two pore sizes – 0.2 and 0.45 μm – and in three diameters 4 – 15 – 25 mm

DIAMETER (mm)	RECOMMENDED FILTRATION	
	VOLUME (ml)	
4	up to 1	
15	up to 5	
25	up to 100	



LABORATORY FILTRATION

SPECIFICATION FOR PTFE SYRINGE FILTERS

Pore Size	0.45 μm	0.2 μm	0.45 μm	0.2 μm	0.45 μm
Membrane	PTFE reinforced	PTFE reinforced	PTFE reinforced	PTFE reinforced	PTFE reinforced
Housing	Polyprop.	Polyprop.	Polyprop.	Polyprop.	Polyprop.
Diameter	4 mm	15 mm	15 mm	25 mm	25 mm
Filter Area	0.07 cm^2	1.7 cm^2	1.7 cm^2	4.8 cm^2	4.8 cm^2
Idle Volume	0.001 ml	0.01 ml	0.01 ml	0.1 ml	0.1 ml
Bubble Point (Isopropanol)	0.9 bar	1.4 bar	0.9 bar	1.4 bar	0.9 bar
Water Penetration Pressure	3 bar	4 bar	3 bar	4 bar	3 bar
Max. Pressure	6 bar	6 bar	6 bar	6 bar	6 bar
Max. Temperature	121°C/30 min	121°C/30 min	121°C/30 min	121°C/30 min	121°C/30 min
Air Flow ($\Delta p=1$ bar)	0.1 l/min	0.6 l/min	0.9 l/min	1.7 l/min	3 l/min
Inlet	Luer lock	Luer lock	Luer lock	Luer lock	Luer lock
Outlet	Luer slip	Luer slip	Luer slip	Luer slip/ Luer lock	Luer slip
Version	non-sterile	non-sterile	non-sterile	non-sterile	non-sterile
Pack Size	50	50	50	50	50

For ordering information please refer to the enclosed grade index.



MUNKTELL

www.munktell.com

HIGH FLOW POLYETHERSULFONE (PES) SYRINGE FILTERS

These syringe filter contain polyethersulfone material. It offers high flow rates, low extraction losses and higher mechanical resistance compared to cellulose-type membranes. It is suitable for biological, pharmaceutical and sterilizing filtration.

The membrane is sealed within the polymer housing without using any adhesive. Each unit can be supplied sterilized with ETO or Gamma radiation and is guaranteed pyrogene-free.



SPECIFICATION FOR POLYETHERSULFONE SYRINGE FILTERS

Pore Size	0.2 µm	0.45 µm
Housing	MBS-Copolymer	MBS-Copolymer
Diameter	25 mm	25 mm
Filter Area	5.3 cm ²	5.3 cm ²
Idle Volume	0.1 ml	0.1 ml
Max. Pressure	4.5 bar	4.5 bar
Max. Temperature	50°C	50°C
Bubble Point	>3.5 bar	>2.5 bar
Colour	blue	yellow
Version	sterile/non-sterile	sterile/non-sterile
Pack Size	50 - sterile 500 - non-sterile	50 - sterile 500 - non-sterile
Inlet	Luer lock (f)	Luer lock (f)
Outlet	Luer lock (m) Luer slip (m)	Luer lock (m) Luer slip (m)

Available with Luer lock and Luer slip outer connectors.

For ordering information please refer to the enclosed grade index.

MICROFILTRATION

MICRO-GLASS FIBRE SYRINGE FILTERS

In order to prevent the narrow pore structure of membranes from clogging up quickly, micro-glass fibre pre-filters are being used as a pre-cleaning device. The syringe filter has an efficiency in particle retention of 97% for particles of 0.7 µm size.

SPECIFICATION FOR MICRO-GLASS FIBRE SYRINGE PRE-FILTERS

Housing	Cyrolite
Diameter	25 mm
Filter Area	5.3 cm ²
Idle Volume	0.25 ml
Bubble Point	0.5 bar
Max. Pressure	4.5 bar
Max. Temp.	50°C
Flow Rate	450 ml/min water $\Delta p=1$ bar
Inlet	Luer lock
Outlet	Luer slip
Version	non-sterile
Pack Size	100/500



HYDROPHOBIC PTFE VENTING FILTERS

For small containers and air venting bottles, we have a 26 mm polyester-reinforced 0.2 µm PTFE venting filter. The connectors are luer lock - female and male.

The housing – made of cyrolite – withstands a maximum pressure of 6 bar. The filters can be supplied in both sterile and non-sterile version.

SPECIFICATION FOR 26 MM VENTING FILTERS

Air Flow Rates	abt. 1.4 l/min at $\Delta p=1$ bar
Bubble Point	1.2 bar min. values with isopropanol
Burst Strength	6.0 bar (600 kPa; 87 psi)
Filter Area	5.3 cm ²
Water Penetration Point	≥ 4.0 bar (400 kPa; 58 psi)



For ordering information please refer to the enclosed grade index.



64 MM PTFE VENTING FILTER

For containers of culture media, small fermenters and other containers needing sterile ventilation, we have developed a 64 mm venting filter with a hydrophobic PTFE membrane. The membrane is reinforced with a polypropylene grid.

We offer two different pore sizes – 0.2 and 0.45 μm – and two different connectors – hose nipple inlet/outlet and 1/8" male NPT. The venting filters are available in both sterile and non-sterile version. Our unique design allows high air flow at low differential pressures.



with hose olive



with 1/8" external NPT



SPECIFICATION FOR 64 MM VENTING FILTERS

Pore Sizes	0.2 μm ; 0.45 μm
Biosafety	all materials pass USP Plastics Test Class VI
Bubble Point	min. value with isopropanol is 1.4 bar (140 kPa) for 0.2 μm unit (1.1 bar after autoclaving) and 0.9 bar (90 kPa) for 0.45 μm unit
Connectors	Hose nipples for 6 to 12 mm i.d. tubing as well as luer inlet for luer syringes; connector 1/8" external NPT
Filter Area	20 cm ²
Air Flow Rates	typical values for 0.2 μm pore size: 1.1 l/min at 0.02 bar (1.8 l/min for 0.45 μm) 2.9 l/min at 0.05 bar (4.6 l/min for 0.45 μm) 5.0 l/min at 1.0 bar (8.5 l/min for 0.45 μm)
Housing \varnothing	64 mm
Materials	PTFE-Membrane filters, reinforced with polypropylene grid
Housing	polypropylene
Limits	max. pressure – 3 bar (300 kPa) max. temperature 134°C
Sterilization	autoclave at 121°C (at least 20 times) or 134°C
Priming Volume	approx. 3 ml
Water Penetrations Point	approx. 4.0 bar (0.2 μm), 3.0 bar (0.45 μm)

For ordering information, please refer to the enclosed grade index.

MICROFILTRATION

PUMPGARD

Pumpgard is a ready-to-connect filter unit consisting of a PTFE membrane filter sealed within a polypropylene housing.

Pumpgard stops water from overflowing from a full glass flask preventing its penetration into the pump, as well as corrosion, expensive cleaning and break-down of vacuum pumps that would result from it.



SPECIFICATION FOR PUMPGARD

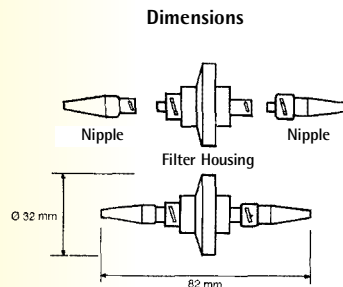
Housing	Polypropylene
Membrane	PTFE 0.45 µm reinforced with polypropylene grid
Connectors	stepped hose barb 6 - 12 mm
Diameter	64 mm
Filter Area	20 cm ²
Typical air flow rates	1.8 l/min at 0.02 bar 4.6 l/min at 0.05 bar 8.5 l/min at 0.1 bar
Max. operation pressure	3 bar (300 kPa)
Water Penetration Point	approx. 400 kPa (0.2 µm)
Max. Temperature	134°C (autoclave)
Pre-sterilized with	ethylene oxide
Pack Size	3 pcs./pack

MICROFILTER MS-20

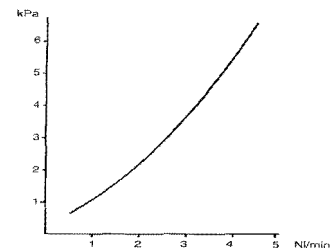
Applications

microfilter for supply air and venting
filter for medical and pharmaceutical applications.

Removal of particles and liquids (at low pressures) from air/gas supplies going to instruments that are sensitive to impurities



Pressure Drop vs. flow graph for MS-20



SPECIFICATION

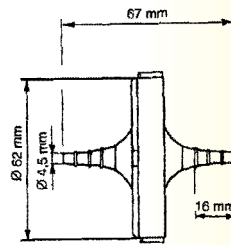
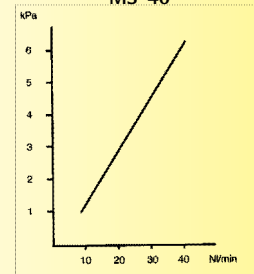
Housing:	Polystyrene
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Connectors:	nipples connected to filter housing with snap lock. Tubes with an internal diam. of 4 to 8 mm can be connected to the nipples
Retention:	> 99.999% (0.3 µm)
Max. temperature:	80°C
Filter Area:	5.3 cm ²
Sterilization:	can be supplied in sterile version

Each filter is checked individually for retention.



MICROFILTER MS-40**Applications**

Microfiltration of supply air/gas (e.g. in CO₂ incubators and oxygenators) and venting filter in medicine and for pharmaceuticals production

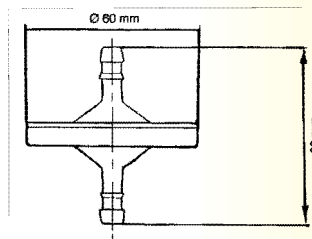
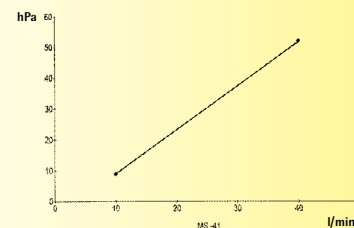
Dimensions**Pressure Drop vs. flow graph for MS-40****SPECIFICATION**

Houses:	Polystyrene
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Connections:	for tubes with internal diam. of 4 – 6.5 mm
Retentions:	> 99.999% (0.3 µm)
Max. temperature:	80°C
Sterilization:	can be supplied in sterile version

Each filter is checked individually for retention.

MICROFILTER MS-41**Applications**

Microfiltration of supply air/gas (e.g. in CO₂ incubators and oxygenators) and venting filter in medicine and for pharmaceuticals production

Dimensions**Pressure Drop vs. flow graph for MS-41****SPECIFICATION**

Housing:	Polystyrene
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Connections:	for tubes with internal diam. of 6 – 9 mm
Retention:	> 99.999% (0.3 µm)
Max. temperature	80°C
Sterilization:	can be supplied in sterile version

Each filter is checked individually for retention.

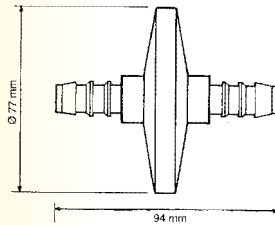
For ordering information please refer to the enclosed grade index.

54 MICROFILTRATION

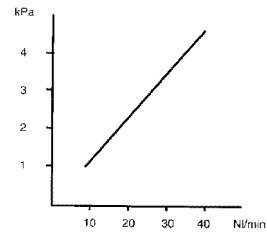
MICROFILTER MS-64

Applications:
 elimination of bacteria, micro-organisms and other particles for various types of medical work. Filtration for supply of particle-free air or gas for measuring devices, assuring their reliable function and high quality

Dimensions



Pressure drop vs. flow graph for MS-64



SPECIFICATION

Housing:	Polystyrene
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Connections:	for tubes with internal diam. of 10 - 14 mm
Retention:	> 99.999% (0.3 µm)
Max. temperature	80°C
Sterilization:	can be supplied in sterile version

As MS-61 available with a length of 110 mm

Each filter is checked individually for retention.

MICROFILTER MS-42 T AND MICROFILTER MS-43 T

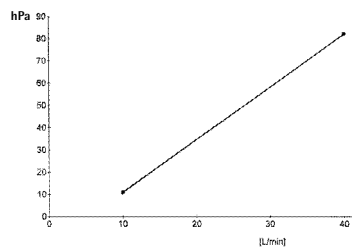
SPECIFICATION

MS-42 T

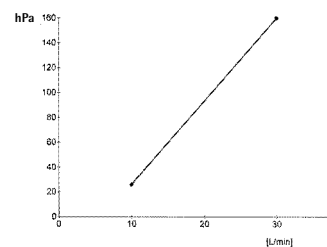
MS-43 T

Housing	Polystyrene - transparent	
Filter Medium	Hydrophobic Micro-glass Fibre Medium	
Connectors:	for Tubes with inner Ø of 6 - 9 mm	for Tubes with inner Ø of 4 - 6.5 mm
Retention	> 99.999% (0.3 µm)	
Max. temperature	80°C	
Sterilization:	can be supplied in sterile version	

Pressure Drop vs. flow graph for MS-42 T



Pressure Drop vs. flow graph for MS-43 T



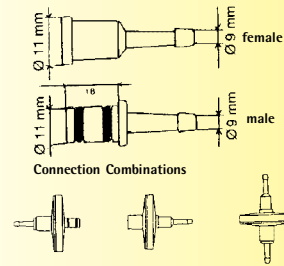
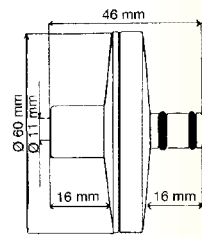
LABORATORY FILTRATION

MICROFILTER MS-40-S

Applications:

Microfiltration of volumes of up to 30-40 l/min for sterile and particle-free air or gases. Mainly used for cleaning exhaust air from suction devices

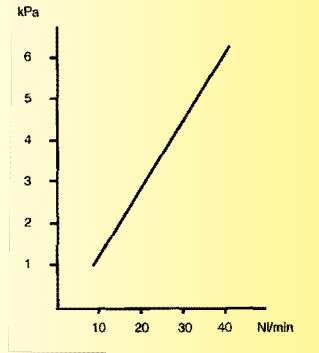
Dimensions



SPECIFICATION

Housing:	Polystyrene
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Connections:	male and female -diam.: 11 mm or special connections for tubes with internal diam. of 6.5 – 9 mm
Retention:	> 99.999% (0.3 µm)
Max. temperature	80°C

Pressure Drop vs. flow graph for MS-40-S



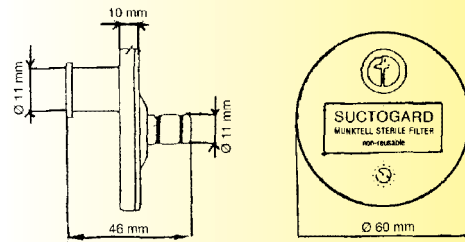
Each filter is checked individually for retention.

MICROFILTER SUCTOGARD

Applications:

Microfiltration of volumes of up to 30-40 l/min for sterile and particle-free air or gases. Mainly used for cleaning exhaust air from suction devices.

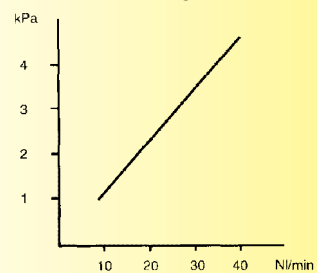
Dimensions



SPECIFICATION

Housing:	Polystyrene
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Connections:	male and female -diam.: 11 mm or special connections for tubes with internal diam. of 6.5 – 9 mm
Retention:	> 99.999% (0.3 µm)
Max. temperature	80°C

Pressure Drop vs. flow graph for Suctogard



Each filter is checked individually for retention.

For ordering information, please refer to the enclosed grade index.

LABORATORY FILTRATION

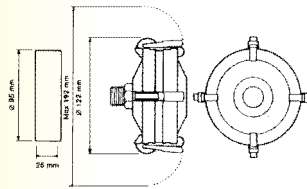
MICROFILTRATION

MICROFILTER MS-681

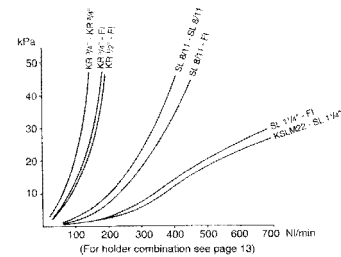
Applications:

microfiltration of air in cultivation and storage tanks requiring sterile and particle-free air. In medicine used e.g. in autoclaves, sterilizers, incubators and ventilators for venting and sterile air supply.

Dimensions



Pressure Drop vs. flow graph for MS-681 with holder combination



SPECIFICATION

Housing:	Polystyrene (element)
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Holders:	nickel-plated brass, one half with snap-lock
Retention:	> 99.999% (0.3 µm)
Connections:	see page 58
Max. temperature	80°C
Sterilization:	the element (CMS-681) is usually supplied in sterile version. Upon request it is available in non-sterile version
Packing:	individually packed (CMS-681)

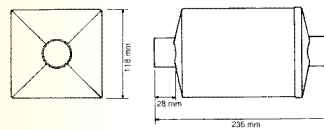
Each filter is checked individually for retention.

MICROFILTER LP-10

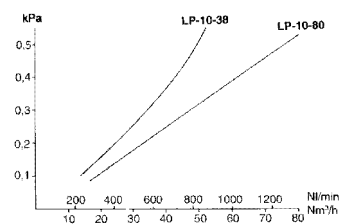
Applications:

Supply and exhaust air filters for the ventilation of tanks and other containers where a sterile environment is required, e.g. in breweries, pharmaceuticals manufacture and the food industry. Also used as an absolute filter for particles deriving from laser cutting.

Dimensions



Pressure Drop vs. flow graph for LP-10



SPECIFICATION

Housing:	Polystyrene
Filter Medium:	Munktell hydrophobic micro-glass fibre paper with spacers
Connections:	outside diameter 38 or 80 mm
Retention:	> 99.999% (0.3 µm)
Max. temperature	80°C

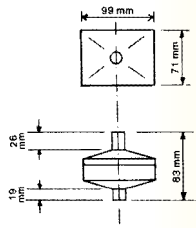
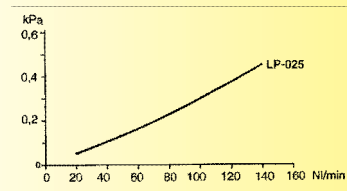
Each filter is checked individually for retention.

For ordering information please refer to the enclosed grade index.



MICROFILTER LP-025**Applications:**

microfiltration of air and gases to supply a sterile and particle-free flow to medical equipment (ventilators, sterilizers...) and in pharmaceutical and food applications (autoclaves, venting filters...)

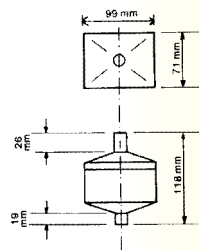
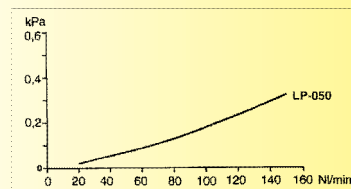
Dimensions**Pressure Drop vs. flow graph for LP-025****SPECIFICATION**

Housing:	Polystyrene Styrolux (transparent LP-025)
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Efficiency:	> 99.999% (0.3 µm)
Connectors:	female connector ISO Ø 22 mm male connector ISO Ø 22 mm
Max. temperature:	80°C
Packing:	individually packed
Sterilization:	can be supplied in sterile version

Each filter is checked individually for retention.

MICROFILTER LP-050**Applications:**

microfiltration of air and gases to supply a sterile and particle-free flow to medical equipment (ventilators, sterilizers...) and in pharmaceutical and food applications (autoclaves, venting filters...)

Dimensions**Pressure Drop vs. flow graph for LP-050****SPECIFICATION**

Housing:	High-impact Polystyrene
Filter Medium:	Munktell hydrophobic micro-glass fibre paper
Efficiency:	> 99.999% (0.3 µm)
Connectors:	female connector ISO Ø 22 mm male connector ISO Ø 22 mm
Max. temperature:	80°C
Packing:	individually packed
Sterilisierung:	can be supplied in sterile version

Each filter is checked individually for retention.

For ordering information please refer to the enclosed grade index.

CONNECTORS AND ADAPTERS

Product		Dimensions	Material	Munktell Filter
Male Nipple Olive		male 11 mm Ø, for tubes with internal Ø 6-9 mm	Polystyrene	MS-40-S, Suctogard, MS-61
Female Nipple Olive		female 11 mm Ø, for tubes with internal Ø 6-9 mm	Polystyrene	MS-40-S, Suctogard,
Connection piece R 3/8"		female ISO 22 mm R 3/8"	ABS	LP-025, LP-050
Connection piece R 1/2"		female ISO 22 mm R 1/2"	ABS	LP-025, LP-050
MS-681 holders Tapered pipe thread 3/4" (KR 3/4")*			nickel-plated brass	MS-681 holder combinations:
Tube connection Ø 31.8 mm 1 1/4" (SL1 1/4")*			nickel-plated brass	 LKR 3/4" FI LSL1 1/4" SL1 1/4"
Free inlet/ outlet (FI)**			nickel-plated brass	

* also available with clamps

** als available without clamps

KR = tapered pipe thread

FI = free inlet

SL = tube connection

The prefix L indicates holder half with lock clamps

For ordering information please refer to the enclosed grade index.

**MUNKTELL**

www.munktell.com

READY-TO-USE PRESSURE FILTRATION UNITS

These pressure filtration units are designed for reliable sterile filtration of tissue culture solutions. They have a large filtration area and an automatic venting which allows high flow rates. Attached to a pump, these filters are suitable for the filtration of 100 ml up to 5 liters of media and aqueous solutions. They come in a polycarbonate housing and have a female luer lock or hose nipple connector.



SPECIFICATION FOR SCAP

Adsorption	less than 10 µg per cm ² found in tests with γ-Globulin
Bubble Point	minimum value is 3.4 bar (340 kPa)
Connectors	inlet female luer lock (6-12 mm) outlet stepped hose nipple (6-12 mm)
Cytotoxicity	non-toxic as confirmed with MRC-5 embryonic lung cells and L-929 mouse fibroblast cells
Extractables	pass the USP plastic test class VI
Filling Volume	6.0 ml
Filtration Area	20 cm ²
Flow Rates	typical flow rate for water at 250 ml/min bei $\Delta p = 1$ bar (100 kPa)
Idle Volume	0.3 ml after bubble point, 1.3 ml before bubble point
Materials	cellulose acetate membrane filter (0.2 µm), PTFE vent. filter, polycarbonate housing
Housing	Polycarbonate
Max. Pressure	max. recommended initial pressure during filtration = 3 bar (300 kPa) The housing withstands at least 5 bar (500 kPa)

For ordering information please refer to the enclosed grade index.



60 MICROFILTRATION

BOTTLE TOP SYSTEMS – READY-TO-USE VACUUM FILTRATION UNITS

The bottle top units are optimised for the application in cell culture. The built-in membrane made of polyethersulfone guarantees extremely high flow rates and low protein binding and is therefore ideal for the filtration of protein containing solutions.

The receiver flask is delivered with tube adapter and closure lid.

The bottle top units are sterile complete units with drainage vessel; the bottle top filtration units can be adapted on usual in trade, vacuum resistant bottles with a screw connector 45. Attention: only use bottles which are licensed for subpressure methods.



- available in different sizes
- ready-to-use and easy to handle
- PES membranes combine high flow rates with low unspecific adsorption

LABORATORY FILTRATION

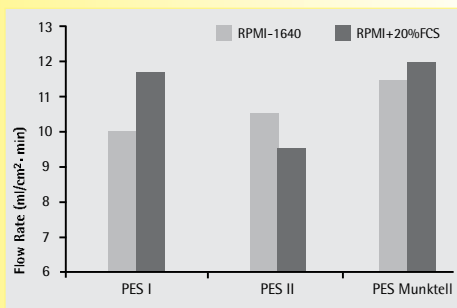
SPECIFICATION

Pore Size	0.2 µm
Finish	sterile
Volume	150 ml, 500 ml, 1000 ml
Membrane	polyethersulfone (PES) 50 mm and 90 mm diam.
Housing	polystyrene
Connectors	plug - hose nipple
Cytotoxicity	all materials correspond to USP class VI and cytotoxicity test ISO 10993
Bottleneck sizes for the Bottle Top Units	45 mm diam.
Sterilization	Gamma Sterilization

OUR OFFER

150 ml, incl. receiver flask
500 ml, incl. receiver flask
1000 ml, incl. receiver flask
Pack Size: 12 pcs.

150 ml, without receiver flask
500 ml, without receiver flask
1000 ml, without receiver flask
Pack Size: 12 pcs.



The graph shows the flow rate of the PES membrane with RPMI cell culture media with and without additional fetal calf serum (FCS) compared with PES-membranes of other manufacturers.



MUNKTELL

www.munktell.com

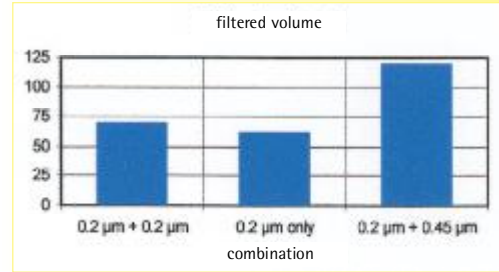
CELLULOSE ACETATE CAPSULES

Our capsule filters are ready-to-connect and -to-use pre-tested, complete filters. They can be rinsed after use, re-autoclaved and re-used if the application allows. The pleated cellulose acetate membrane is inside the polypropylene housing. The housing contains two membrane filters. The first membrane acts as a pre-filter to the finer second membrane.

We offer four different types of connectors and three different sizes

- hose nipple inlet and outlet
- sanitary flange inlet and outlet
- sanitary flange inlet, hose nipple outlet
- G 3/8 male thread inlet, hose nipple outlet
- filtration areas 0.05-0.1-0.2 m²

The capsules are used for flow volumes up to 200 litres



Capacity (ml) for cellulose acetate capsules (solution high colloid content)



Type 00: inlet and outlet hose nipple



Type SS: inlet and outlet sanitary flange



Type SO: inlet sanitary outlet: hose nipple



Type RO: inlet G 3/8" thread outlet: hose nipple

SPECIFICATION FOR CELLULOSE ACETATE CAPSULES

Adsorption	see "cellulose acetate" in the diagramme on page 39
Biosafety	all materials pass USP Plastics Test Class VI
Compatibility	chemically compatible with aqueous solutions of pH 4 – 8 and with most alcohols and hydrocarbons
Cytotoxicity	all materials are non-toxic, as determined with L929 cells and MRC-5 cells
Filtration Area	0.05 m ² ; 0.1 m ² ; 0.2 m ²
Integrity Test Data	all capsules are integrity testable. Details on min. bubble points and max. air diffusion values are given in the Manual supplied with them.
Materials	double-layer cellulose acetate membrane, reinforced with nonwoven
Housing	polypropylene
Max. Pressure Drop	4 bar at 20°C, 2 bar at 80°C
Sterilization	by autoclaving at 121°C for 30 minutes

For ordering information please refer to the enclosed grade index.

62 MICROFILTRATION

PTFE CAPSULES

High air flow rates of the membrane and large filtration area allow effective sterile venting at low differential pressure.

As PTFE is extremely hydrophobic, we guarantee maximum reliability even when filtering moist air.

Each capsule is a ready-to-use, pre-tested, complete filter. The pleated PTFE membrane ensures maximal filtration area.

We offer two different connectors and three different sizes

- Capsules with inlet and outlet hose nipple
- Capsules with inlet and outlet sanitary flange
- Filtration areas 0.05 – 0.1 – 0.2 m²

For the filtration of those acids, bases and non-aqueous solvents for which our cellulose acetate capsules cannot be used, PTFE capsules are an excellent choice.



Type 00: Inlet and outlet hose nipple

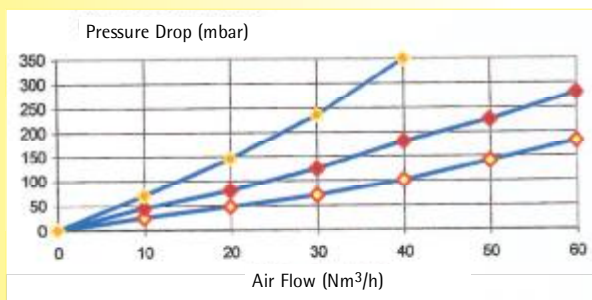


Type SS: Inlet and outlet sanitary flange

LABORATORY FILTRATION

SPECIFICATION FOR PTFE CAPSULES

Biosafety	all materials pass USP Plastics Test Class VI
Bubble Point	minimum values, wetted with 60% isopropanol 1.5 bar (150 kPa) for pore size 0.1 µm 1.0 bar (100 kPa) for pore size 0.2 µm 0.6 bar (60 kPa) for pore size 0.45 µm
Compatibility	see compatibility guide
Connectors	10 mm hose nipple or 1"-1/2"
Max. Pressure Drop	max. 4 bar at 20°C, 2 bar at 80°C
Operating Pressure	max. 4 bar at 20°C
Filtration area	0.05 m ² ; 0.1 m ² ; 0.2 m ²
Flow rates	for 0.2 µm capsules – see diagramme here below
Material	PTFE membrane filter
Housing	polypropylene housing and support grid
Sterilization	by autoclaving at 121°C or 134°C
Water Penetration Point	occurs at approx. 4.5 bar (450 kPa) with 0.2 µm pore size capsules



Differential pressure vs. air flow rate of PTFE capsules

For ordering information please refer to the enclosed grade index.



MUNKTELL

www.munktell.com

ULTRAFILTRATION WITH ULTRASPIN CENTRIFUGAL CONCENTRATORS

Ultrafiltration is a gentle, non-denaturing procedure for the separation of dissolved macro-molecules from solution media by their size and by the means of a semi-permeable membrane.

Typical applications are:

- concentration of proteins and biomolecules
- dialysis
- deionization of buffers
- buffer exchange

"ULTRASPIN"

The ultraspins are centrifugal units with built-in ultrafiltration membranes. Their special constructions offer the following advantages

- high flow rates
- vertically built-in membrane offers a large membrane area and thus prevents clogging up
- with built-in dead stop pocket to prevent the unit from running dry and thus guaranteeing a secure operation
- the concentrated specimen can be recovered by simple pipetting without any re-centrifugation
- It is very easy to find the optimal units for your separation task. You can choose from a large variety of membranes with different properties and units of different sizes

TECHNICAL PROPERTIES

Grade	ULTRASPIN 500	ULTRASPIN 6	ULTRASPIN 20
Sample Volume	100 - 600 µl	2 - 6 ml	5 - 20 ml
Ultrafiltration Material	PES	PES	PES
Separation Capacity		5.000 cut off	
	10.000 cut off	10.000 cut off	10.000 cut off
	30.000 cut off	30.000 cut off	30.000 cut off
	100.000 cut off	100.000 cut off	100.000 cut off
Pack Size	25 pcs.	25 pcs.	25 pcs.
Recommended centrifugal rotors	fixed angle rotor for 2.2 ml centrifuge tubes	fixed angle- and swing bucket rotors for 15 ml standard tubes	up to 20 ml in swing bucket rotors, up to 14 ml in 25° fixed angle rotors (both for 50 ml centrifuge tubes)



64 NUTRI CULT

CULTURE MEDIA IN PETRI DISHES

In order to avoid time-consuming and extensive preparation of culture media, you should use NUTRI CULT.

Our NUTRI CULT is an absorbent pad which has been impregnated with a culture medium, then dried and sterilized in Petri dishes.

They are available with 7 different media and are supplied in sets, which also contain sterile, individually packed membrane filters. The membrane is, of course, chosen for optimum colony growth and colony counting.

The shelf life of NUTRI CULT is 9 to 24 months, depending on the type of medium used.

Type	Endo	Standard TTC	Wort	Beer
Detection of	E. coli and coliforms	Colony count	Yeast and moulds	Pediococci lactobacilli
Membrane*	0.45 µm white with green grid	0.45 µm green with dark green grid	0.65 µm grey with green grid	0.45 µm white with green grid
Conditions of Incubation	24 Std. at 37°C	2-5 days; 30°C	2-5 days; 25°C-30°C	5-7 days; 25, 28°C (anaerobic)
Application	Water, Food, Beverages, Pharmaceutical lab.	Beverages, Water, Food	Beer, Sugar, Wine, Drinking Water	Beer
Reference	„Standard Methods of Water and Wastewater“, 1998	„Standard Methods of Water and Wastewater“, 1998, modified by TTC supplement		Eweis modified acc. to Rinck and Wackerbauer

Type	Schaufus-Pottinger	Tergitol TTC	Cetrimid
Detection of	Colony count of yeast and moulds	coliform bacteria and E. coli	Pseudomonas aeruginosa
Membrane*	1.2 µm, white with green grid 0.8 µm, grey with white grid 0.65 µm, grey with white grid	0.45 µm white with green grid	0.45 µm white with green grid
Conditions of Incubation	2-7 days at 25-30°C	20+-4 hours at 37°C	48 hours at 37°C
Application	Softdrinks, Wine, Sugar	Food, Water	Food, Water, pharmaceutical products
Reference		Identification of Escherichia coli, ISO 9308-1	corresponds to recommendation of USP and APHA ISO 12780

* Membrane filter Ø 47 mm

NUTRI CULT – READY-TO-USE

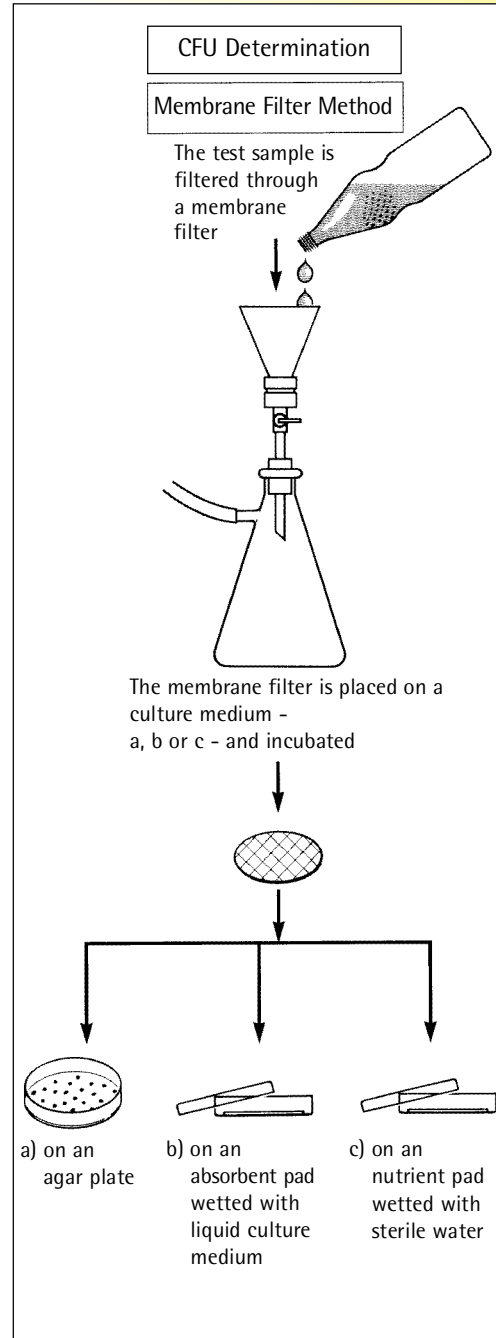
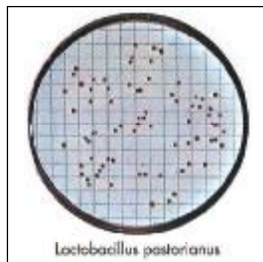
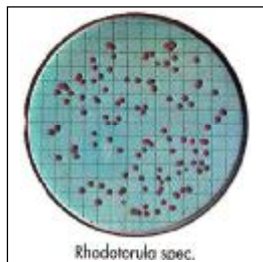
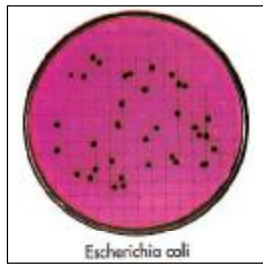
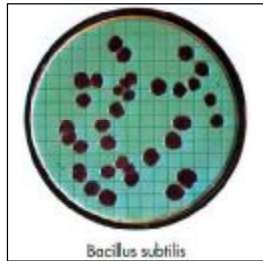
For ordering information, please refer to the enclosed grade index.



MUNKTELL

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CULTURE MEDIA



LABORATORY FILTRATION