

# Laboratory filtration

Product guide



# What's new?

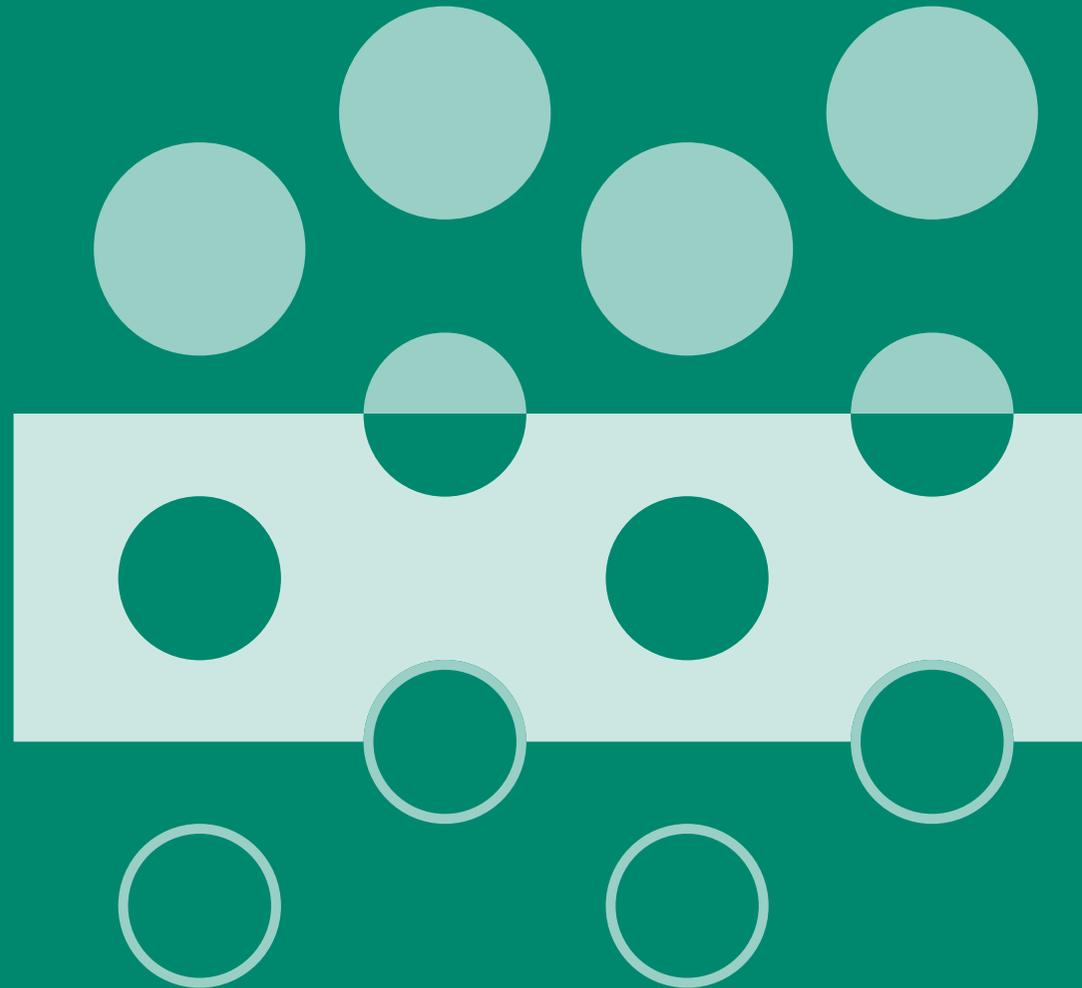
**Cytiva is a global provider of technologies and services that advance and accelerate the development and manufacture of therapeutics that transform human health.**

## New products

- Puradisc™ H-PTFE Syringe filters: 0.2 and 0.45 µm pore size, 13 and 25 mm diameters
- Uniflo™ H-PTFE Syringe filters: 0.2 and 0.45 µm pore size, 13 and 25 mm diameters
- 850-DS Channel Filter plate with expanded range of membranes
- FFHP Plus Thick Nitrocellulose filters — new grades
- Benchkote™ surface protectors for ÄKTA™ systems
- Pre-folded filter papers in new grades and formats: pleated, pyramid, cone and flat quadrant
- Grade 597 Plus and 595 Plus cellulose filter papers, a standard grade for a wide variety of routine applications
- QM-C, pre-ignited silica microfiber filter without any additives or binder

## Introducing

Cytiva Diagnostic Services: custom services to accelerate the development of early-stage lateral flow and flow-through immunoassays. See page 254.



# Welcome to filtration by Cytiva

In laboratories across the globe, the Whatman™ filter brand is synonymous with quality, reliability, and ease of use. Our instinct for simplification helps customers reduce costs, save time, and accelerate the rate of discovery. Our products have a reputation for working right the first time—every time, which is why they are specified for the most exacting applications across a wide range of industries around the globe.

## We are where you are

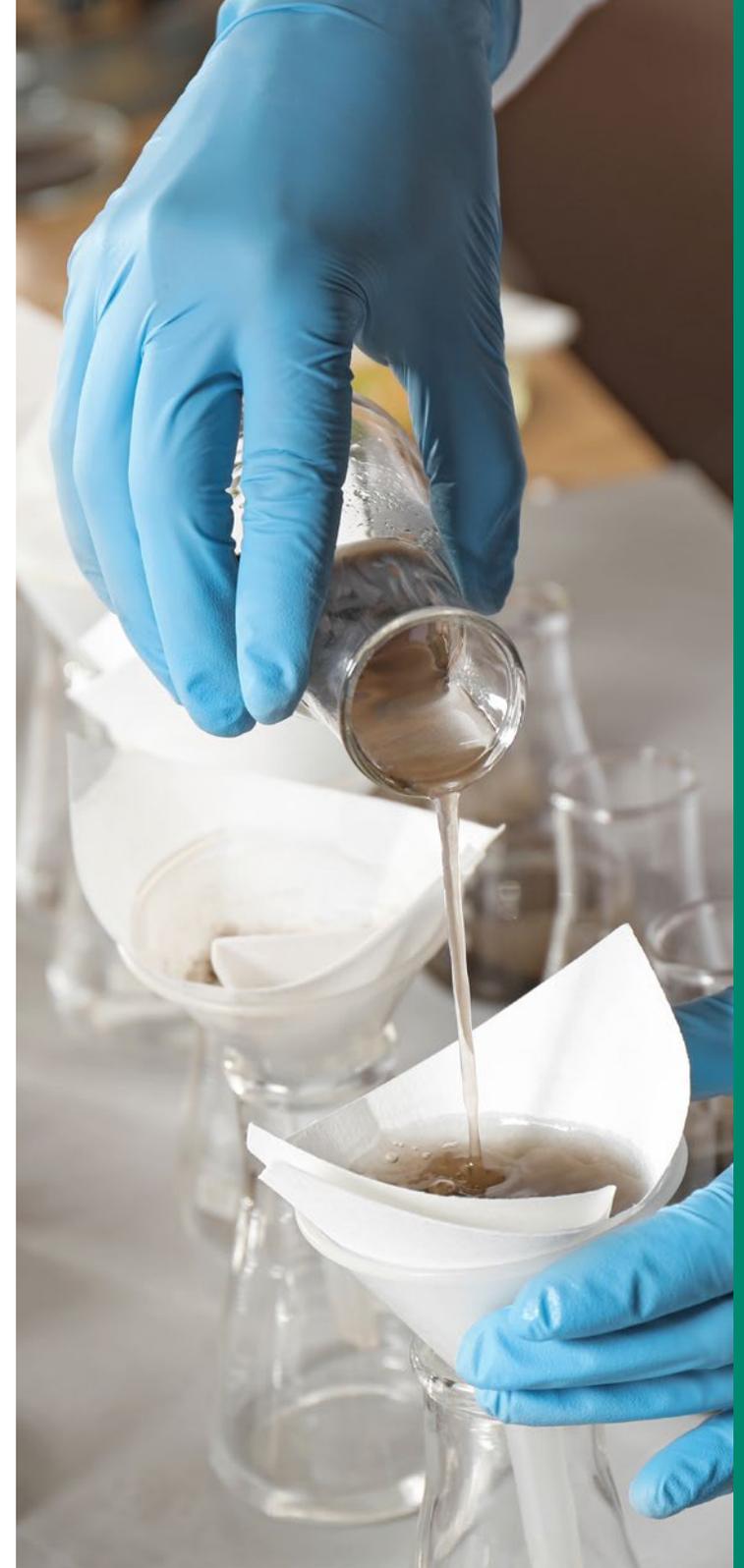
We can meet the filtration and separations needs of virtually any laboratory with the right product at the right time. Through partnerships with the world's leading laboratory supply distribution companies, we ensure speedy delivery of products to your lab.

## How to buy

1. Shop online at [cytiva.com/shop/whatman-laboratory-filtration](https://www.cytiva.com/shop/whatman-laboratory-filtration).
2. Call us now to speak with a customer service representative.
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4. Find a distributor: details of your nearest distributor can be found at [cytiva.com/support/find-a-distributor](https://www.cytiva.com/support/find-a-distributor).

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# Filtration in your industry

## Basic analytical testing

In the vast and disparate world of analytical chemistry, products are used for basic laboratory processes that range from simple clarification to solvent extraction. Products range from filter papers, thimbles and Benchkote™ benchtop protectors, to membrane filters and phase separator papers.

## Food and beverage

Our filter papers are used to prepare food samples prior to a wide range of analyses. Our syringe filters prevent fatty or particulate laden samples from damaging valuable equipment. Our membranes are used to test for harmful bacteria.

## Pharmaceutical

Mini-UniPrep™ syringeless filters and vials reduce high-performance liquid chromatography (HPLC) sample preparation time and consumables usage, and track-etched and Anopore™ membranes are also vital to extruding liposomes for encasing and targeting drugs.

## Environmental monitoring

Whatman products are cited in U.S. Environmental Protection Agency (EPA) and American Society for Testing and Materials (ASTM) and ISO protocols for environmental monitoring. Whether it is detecting suspended solids in water, measuring air for dangerous particulates, or supporting asbestos analysis to maintain healthy spaces there is a Whatman filter that is central to the test.

## Diagnostic testing

Filter paper in many forms are designed into a wide range of registered diagnostic products, from application such as cancer detection, though to infectious diseases and even pregnancy tests. Our products include cellulose fiber, glass fiber and membrane products for use in rapid tests.

## Industrial

Filtration products can be found in analytical testing laboratories across many industries. Cytiva filters and equipment can stand up to the rigors of petrochemical, mining and cement testing, and deliver the precision required for testing microelectronics.

# Three ways to use this guide

Choose from the three paths below to find the product that meets your specific requirements. In addition to product information, we have included general quick reference material in the appendix for your convenience.

## Industry application

Our application finder on the following pages allows you to easily locate products by industry or application (p. 6).



## Product type

If you know the type of product you're looking for, such as filter papers or membranes, you can find it quickly using the table of contents (p. 8).



## Product/catalog number

Look up products by name or catalog number through the indices at the back of this catalog (p. 273).



# Application finder

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# 01

# Filter papers

**Whatman™ filter papers are associated with quality, reliability, and customer service. We maintain high standards for reproducibility and uniformity by using only the highest quality raw materials and strict quality control measures.**

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# Cellulose filters

Whatman™ cellulose filters are manufactured from high-quality cotton linters which have been treated to achieve a minimum alpha cellulose content of 98%. These cellulose filter papers are used for general filtration and exhibit particle retention levels down to 2.5 µm. We offer a wide choice of retention/flow rate combinations to suit numerous laboratory applications.

The different groups of cellulose filters offer increasing degrees of purity, hardness, and chemical resistance.

## Cellulose filters, trace element composition

Typical values (µg/g paper)

Grade	1	42	542
Aluminum	3.6	2.5	3.4
Antimony	< 0.5	< 0.5	< 0.5
Arsenic	< 0.5	< 0.5	< 0.5
Barium	< 0.5	< 0.5	< 0.5
Boron	< 1.0	< 1.0	< 1.0
Calcium	27.5	8.3	14.7
Chromium	1.0	1.5	1.1
Copper	0.9	2.0	8.2
Iron	13.7	12.0	16.3
Lead	< 0.5	< 0.5	< 0.5
Magnesium	21.0	4.0	3.3
Manganese	< 0.5	< 0.5	< 0.5
Mercury	< 0.5	< 0.5	< 0.5
Potassium	6.2	2.3	3.7
Silicon	8.8	6.2	< 6.0
Sodium	32.3	16.8	17.0
Zinc	58.3	64.5	87.8

Typical values for additional grades can be found in Appendix A.



Grade 5 qualitative filter papers

# Qualitative filter papers

**These cellulose filters are used in qualitative analytical techniques to determine and identify materials. Fluted qualitative filters are available, which give improved flow rate and increased loading capacity compared to equivalent flat filters.**

## Grade 1 (11 $\mu\text{m}^*$ )

The most widely used filter paper for routine applications with medium retention and flow rate. This grade covers a wide range of laboratory applications and is frequently used for clarifying liquids. Traditionally, the grade is used in qualitative analytical separations for precipitates such as lead sulfate, calcium oxalate (hot), and calcium carbonate.

- In agriculture, it is used for soil analysis and seed testing procedures.
- In the food industry, Grade 1 is used for numerous routine techniques to separate solid foodstuffs from associated liquid, or extracting liquid and is widely used in education for teaching simple qualitative analytical separations.
- In air pollution monitoring, using circles or rolls, atmospheric dust is collected from airflow and the stain intensity measured photometrically.
- For gas detection, the paper is impregnated with a chromogenic reagent and color formation is quantified by optical reflectance.

Available fluted as Grade 1V.

## Grade 2 (8 $\mu\text{m}^*$ )

Slightly more retentive and absorbent than Grade 1, with a corresponding increase in filtration time (i.e. slightly slower filtration speed). In addition to general filtration in the 8  $\mu\text{m}$  particle size range, the extra absorbency is utilized, for example, to hold soil nutrient in plant growth trials. Also used for monitoring specific contaminants in the atmosphere and in soil testing.

Available fluted as Grade 2V.

## Grade 3 (6 $\mu\text{m}^*$ )

Double the thickness of Grade 1 with still finer particle retention and excellent loading capacity; more precipitate can be held without clogging.

- The extra thickness gives increased wet strength and makes this grade highly suitable for use in Büchner funnels.
- The high absorbency is particularly valuable when the paper is used as a sample carrier.

## Grade 4 (25 $\mu\text{m}^*$ )

Extremely fast filtering with excellent retention of coarse particles and gelatinous precipitates such as ferric hydroxide and aluminum hydroxide.

- Very useful as a rapid filter for routine clean-up of biological fluids or organic extracts during analysis.
- Used when high flow rates in air pollution monitoring are required and the collection of fine particles is not critical.

Available fluted as Grade 4V.



Grade 4 qualitative filter papers

\* Particle retention rating at 98% efficiency.

### **Grade 5 (2.5 µm\*)**

The maximum degree of fine particle filtration in the qualitative range. Capable of retaining the fine precipitates encountered in chemical analysis. Slow flow rate.

- Excellent clarifying filter for cloudy suspensions and for water and soil analysis.

Also available fluted as Grade 5V.

### **Grade 6 (3 µm\*)**

Twice as fast as Grade 5 with similar fine particle retention. Often specified for boiler water analysis applications.

### **Grade 591 (7–12 µm\*)**

A thick filter paper with very high loading capacity for fast filtration of medium to coarse precipitates. Offers high absorbency and increased wet strength.

Also available fluted as Grade 591 ½.

### **Grade 595 (4–7 µm\*)**

Very popular, thin filter paper, medium-fast with medium to fine particle retention. Used for many routine analytical applications in different industries (e.g. particle separation from food extracts or filtration of solids from digested environmental samples for ICP/AAS analysis).

Also available fluted as Grade 595 ½.

### **Grade 597 Plus (4–7 µm)**

A standard grade filter paper for a variety of routine applications in food and beverage industries.

- Well-suited for determination of fat content in food or removal of carbon dioxide and turbidity from beverages such as beer.

Available in sheets and circles.

### **Grade 597 (4–7 µm\*)**

A medium fast filter paper with medium to fine particle retention.

- Used for a wide variety of routine analytical applications in different industries like food testing (e.g. determination of fat content) or removal of carbon dioxide and turbidity from beverages (as in beer analysis).

Available fluted as Grade 597 ½.

### **Grade 597L (7 µm\*)**

A qualitative filter paper with low fat content. Suitable for nitrate determination in foodstuffs to §35 LMBG\* (\* LMBG = German law for food and consumer products).

\* Particle retention rating at 98% efficiency.



Grade 597 Plus filter papers

### **Grade 598 (8–10 µm\*)**

A thick filter paper with high loading capacity. Combines medium retention with medium-fast to fast filtration speed.

Available fluted as Grade 598 ½.

### **Grade 602 h (< 2 µm\*)**

A dense filter paper for collecting very small particles and removing fine precipitates.

- Used in sample preparation (e.g. in the beverage industry for residual sugar determination, acidic spectra, refractometric analysis, and HPLC).

Available fluted as Grade 602 h ½.

### **Grade 602 eh (2 µm\*)**

These cellulose filters are used in qualitative analytical techniques to determine and identify materials. A standard grade filter paper for very fine precipitates. Used for recovery of microfine ultrapure crystalline components (< 1 µm) in alkaline tests in waste analysis (e.g. soils, filter dust, ash, ore/slag waste).

Available fluted as Grade 602 eh ½.



Grade 602 eh filter papers

\* Particle retention rating at 98% efficiency.

## Technical specifications

### Qualitative filter papers—standard grades

Grade	Description	Typical particle retention in liquid (µm) <sup>1</sup>	Filtration speed (approx) herzberg (s)	Nominal air flow (s/100 mL/in <sup>2</sup> )	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Typical water flow rate (mL/min) <sup>2</sup>	Nominal ash content (%) <sup>3</sup>
1	–	11	–	13	180	87	57	0.06
2	–	8	–	20	190	97	38	0.06
3	Thick	6	–	26	390	185	28	0.06
4	–	25	37	4	210	92	247	0.06
5	–	2.5	1420	96	200	100	5	0.06
6	–	3	–	32	180	100	22	0.15
591	Medium fast, thick	7–12	45	5.9	350	161	–	–
595	Medium fast, thin	4–7	80	–	150	68	–	–
597	Medium fast	4–7	140	–	180	85	–	–
597L	Medium fast, low fat	7	170	–	180	82	–	–
597 Plus	Medium fast	4–7	300	–	190	85	–	–
598	Medium fast, thick	8–10	50	–	320	140	–	–
602 h	Slow, dense	< 2	375	–	160	84	–	–
602 eh	Very slow, very dense	2	3000	–	150	85	–	–

<sup>1</sup> Particle retention rating at 98% efficiency

<sup>2</sup> For 9 cm diameter

<sup>3</sup> Ash is determined by ignition of the cellulose filter at 900°C in air

## Ordering information

### Qualitative filter circles—standard grades

Diameter (mm)	Catalog number						Quantity/pack
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	
10	1001-6508	–	–	–	–	–	500
15	1001-0155	–	–	–	–	–	500
20	1001-020	–	–	–	–	–	400
23	–	–	1003-323	–	–	–	100
25	1001-325	–	–	–	1005-325	–	100
25	1001-025	–	–	–	–	–	400
27	–	–	–	1004-027	–	–	400
30	1001-329	–	–	–	–	–	100
30	1001-030	–	–	–	–	–	400

## Ordering information

Qualitative filter circles—standard grades (continuation)

Diameter (mm)	Catalog number						Quantity/pack
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	
32	1001-032	-	-	-	-	-	100
41	-	-	-	1004-041	-	-	100
42.5	1001-042	1002-042	-	1004-042	1005-042	1006-042	100
47	1001-047	1002-047	-	1004-047	1005-047	-	100
50	-	-	-	1004-050	-	-	100
55	1001-055	1002-055	1003-055	1004-055	1005-055	-	100
60	-	-	-	-	1005-060	-	100
70	1001-070	1002-070	1003-070	1004-070	1005-070	1006-070	100
76.2	1001-10035						500
82	1001-082	-	-	-	-	-	100
85	1001-085	-	-	-	-	-	100
90	1001-090	1002-090	1003-090	1004-090	1005-090	1006-090	100
90	1001-10048	1002-10048					5000
110	1001-110	1002-110	1003-110	1004-110	1005-110	1006-110	100
125	1001-125	1002-125	1003-125	1004-125	1005-125	1006-125	100
145	1001-045	-	-	-	-	-	100
150		1002-147	-	-	-	-	100
150	1001-150	1002-150	1003-150	1004-150	1005-150	1006-150	100
185	1001-185	1002-185	1003-185	1004-185	1005-185	1006-185	100
240	1001-240	1002-240	1003-240	1004-240	1005-240	1006-240	100
270	1001-270	1002-270	-	1004-270	-	-	100
320	1001-320	1002-320	1003-320	1004-320	1005-320	-	100
385	1001-385	1002-385	-	-	-	-	100
400	1001-400	-	-	1004-400	-	-	100
500	1001-500	1002-500	-	-	-	-	100

## Ordering information

### Qualitative filter circles—standard grades

Diameter (mm)	Catalog number					Quantity/pack
	Grade 595	Grade 597 Plus	Grade 597	Grade 598	Grade 602 h	
12.7	–	989410108	10311862	–	–	1000
45	–	989410101	10311804	–	–	100
55	–	98949552	10311807	–	–	100
70	–	989410102	10311808	–	–	100
90	–	98949329	10311809	10312209	10312609	100
110	10311610	989410103	10311810	–	–	100
125	10311611	989410104	10311811	–	10312611	100
150	10311612	98949613	10311812	–	10312612	100
185	10316114	989410105	10311814	–	10312614	100
240	–	989410106	10311820	–	10312620	100
320	–	989410107	10311822	–	–	100

## Ordering information

### Qualitative filter sheets—standard grades

Dimensions (mm)	Catalog number	Quantity/pack
<b>Grade 1</b>		
26 × 31	1001-813	1000
75 × 100	1001-824	500
460 × 570	1001-917	100
460 × 570	1001-918	500
580 × 680	1001-931	100
580 × 680	1001-932	500
600 × 600	1001-929	100
<b>Grade 2</b>		
460 × 570	1002-917	100
580 × 680	1002-931	100
600 × 600	1002-929	100
<b>Grade 3</b>		
460 × 570	1003-917	100

## Ordering information

Qualitative filter sheets—standard grades (continuation)

Dimensions (mm)	Catalog number	Quantity/pack
<b>Grade 4</b>		
460 × 570	1004-917	100
580 × 580	1004-930	100
6 × 6 in	1004-492	100
<b>Grade 591</b>		
580 × 580	10311387	250
<b>Grade 595</b>		
580 × 580	10311687	500
<b>Grade 597</b>		
580 × 580	10311887	500
580 × 580	10311897	100
<b>Grade 597 Plus</b>		
580 × 580	989410110	100
580 × 580	989410109	500
<b>Grade 598</b>		
580 × 580	10312287	250

## Ordering information

Qualitative filter reels—standard grades

Dimensions	Catalog number				Quantity/pack
	Grade 4	Grade 597L	Grade 598	Grade 602 eh	
10 mm × 50 m	–	–	–	10312500	20
38 mm × 30 m*	1004-648	–	–	–	1
40 mm × 100 m	–	10312070	–	–	10
500 mm × 100 m	–	–	10312000	–	1

\* Approximate dimensions

# Quantitative filter papers—ashless grades

Whatman™ quantitative filters are designed for gravimetric analysis and the preparation of samples for instrument analysis. They are available in three formats designed for specific requirements.

- **Ashless:** 0.007% ash nominal for Grades 40 to 44 and a typical nominal ash content of 0.01% for the 589 Grades. These filters are very pure and suitable for a wide range of critical analytical filtration procedures.
- **Hardened low ash:** 0.015% ash nominal—treated with a strong acid to remove trace metals and produce high wet strength and chemical resistance. These filters are particularly suitable for Büchner filtration where the tough, smooth surface of the filter makes it easy to recover precipitates.
- **Hardened ashless:** 0.005% ash nominal, acid hardened to give high wet strength and chemical resistance with extremely low ash content. The tough surface makes these filters suitable for a wide range of critical filtration procedures.

## Grade 40: 8 µm\*

The classic general purpose ashless filter paper with medium speed and retention. Typical applications include gravimetric analysis for numerous components in cements, clays, iron, and steel products; as a primary filter for separating solid matter from aqueous extracts in general soil analysis; quantitative determination of sediments in milk, and as a pure analytical grade clean-up filter for solutions prior to AA spectrometry. Also used as a high-purity filter in the collection of trace elements and radionuclides from the atmosphere.

## Grade 41 (20 µm\*)

The fastest ashless filter paper, recommended for analytical procedures involving coarse particles or gelatinous precipitates (e.g. iron or aluminum hydroxides). Also used in quantitative air pollution analysis as a paper tape for impregnation when determining gaseous compounds at high flow rates.

## Grade 42 (2.5 µm\*)

Used for critical gravimetric analysis with the finest particle retention of all cellulose filter papers. Typical analytical precipitates include barium sulfate, metastannic acid, and finely precipitated calcium carbonate.

## Grade 43 (16 µm\*)

Intermediate in retention between Grades 40 and 41, and twice as fast as Grade 40. Typical applications include foodstuffs analysis, soil analysis, particle collection in air pollution monitoring for subsequent analysis by XRF techniques, and inorganic analysis in the construction, mining, and steel industries.

## Grade 44 (3 µm\*)

Thin version of Grade 42 retaining very fine particles but with lower ash weight per sample and almost twice the flow rate of Grade 42.

\* Particle retention rating at 98% efficiency.



Quantitative filter papers, ashless

### Grade 589/1 (12-25 µm\*)

Black Ribbon Filter: ashless filter paper with very high flow rate. Used for many quantitative standard methods, especially for gravimetric applications (e.g. determination of the ash content in foodstuffs or for the Blaine test in the cement industry).

Also available fluted as Grade 589/1 ½.

### Grade 589/2 (4-12 µm\*)

White Ribbon Filter: ashless standard filter paper for medium fine precipitates offering medium filtration speed. Applied in a variety of routine methods in quantitative analysis, (e.g. determination of the sand content in foodstuffs, determination of the grade of flour or analysis of aqueous suspensions in the paper industry).

Also available fluted as Grade 589/2 ½.

### Grade 589/3 (2 µm\*)

Blue Ribbon Filter: ashless standard filter paper for very fine precipitates. Slow filter paper with highest efficiency for collecting very small particles. Also used for many analytical routine methods in different industries (e.g. determination of the amount of insoluble contaminants in animal and vegetable fats and oils).

\* Particle retention rating at 98% efficiency



Ashless quantitative filter paper circles

## Technical specifications

### Quantitative filter papers—ashless grades

Grade	Typical particle retention in liquid (µm) <sup>1</sup>	Filtration speed (approx) herzberg (s)	Nominal ash content (%) <sup>3</sup>	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Typical water flow rate (mL/min) <sup>2</sup>	Nominal air flow rate (s/100 mL/in <sup>2</sup> )
40	8	-	0.007	210	95	25	21
41	20	-	0.007	215	85	254	4
42	2.5	-	0.007	200	100	5	96
43	16	-	0.007	220	95	62	11
44	3	-	0.007	176	80	11	56
589/1	12-25	25	0.01	190	80	-	-
589/2	4-12	70	0.01	180	85	-	-
589/3	2	375	0.01	160	84	-	-

<sup>1</sup> Particle retention rating at 98% efficiency

<sup>2</sup> For 9 cm diameter

<sup>3</sup> Ash is determined by ignition of the cellulose filter at 900°C in air

## Ordering information

### Quantitative filter papers—ashless grades

Diameter (mm)	Catalog number								Quantity/pack
	Grade 40	Grade 41	Grade 42	Grade 43	Grade 44	Grade 589/1	Grade 589/2	Grade 589/3	
<b>Filter circles</b>									
12.7	1440-012	-	-	-	-	-	-	-	400
12.7	-	-	-	-	-	-	10300102	10300263	1000
25	1441-6309	1441-6309	-	-	-	-	-	-	10000
30	1440-329	-	-	-	-	-	-	-	100
32	1440-032	-	-	-	-	-	-	-	100
40.5	-	-	-	-	-	-	10300103	-	100
42.5	1440-042	1441-042	1442-042	-	-	-	-	-	100
47	1440-047	1441-047	1442-047	-	-	-	-	-	100
50	-	1441-050	-	-	-	-	10300106	-	100
55	1440-055	1441-055	1442-055	-	-	-	10300107	-	100
60	-	1441-060	-	-	-	-	-	-	100
70	1440-070	1441-070	1442-070	-	1444-070	-	10300108	-	100
79	-	-	1442-10055	-	-	-	-	-	100
90	1440-090	1441-090	1442-090	1443-090	1444-090	10300009	10300109	-	100
110	1440-110	1441-110	1442-110	1443-110	1444-110	10300010	10300110	10300210	100
125	1440-125	1441-125	1442-125	1443-125	1444-125	10300011	10300111	10300211	100
142	-	-	-	-	-	-	-	10300213	100
150	1440-150	1441-150	1442-150	1443-150	1444-150	10300012	10300112	10300212	100
185	1440-185	1441-185	1442-185	1443-185	1444-185	10300014	10300114	10300214	100
240	1440-240	1441-240	1442-240	-	1444-240	-	10300120	-	100
320	1440-320	1441-320	1442-320	-	-	-	-	-	100
450	1440-6168	-	-	-	-	-	-	-	100
500	-	-	-	-	-	-	-	-	100
700	-	-	-	-	-	-	-	-	100
<b>Filter sheets</b>									
25.4 × 90	-	-	1442-6551	-	-	-	-	-	100
203 × 254	-	1441-866	-	-	-	-	-	-	100
460 × 570	1440-917	1441-917	1442-917	-	-	-	-	-	100
Flag shape	-	-	1442-971	-	-	-	-	-	100

# Quantitative filter papers—hardened low ash grades

The maximum ash content of these grades is intermediate between ashless and qualitative grades. They are particularly suitable for Büchner filtrations where it is desirable to recover the precipitate from the filter surface after filtration. Other characteristics include high wet strength and chemical resistance, which are similar to the acid hardened ashless filter papers.

## Grade 50 (2.7 µm\*)

Retention of very fine crystalline precipitates. The thinnest of all filter papers with a slow flow rate, these filters have a hardened and highly glazed surface, which also keeps the paper free from loose surface fibers. Highly suitable for qualitative or quantitative filtrations requiring vacuum assistance on Büchner or 3-piece filter funnels. Very strong when wet and will withstand wet handling and precipitate removal by scraping. In the electronics industry, the virtual absence of fiber shedding is utilized in carriers for integrated circuits.

This grade is also available in Smear Tab format for wipe testing (e.g. testing of surfaces for radionuclide contamination).

## Grade 52 (7 µm\*)

The general purpose hardened filter paper with medium retention and flow rate. Very hard surface.

## Grade 54 (22 µm\*)

Very fast filtration and high wet strength makes this grade very suitable for vacuum assisted fast filtration of difficult coarse or gelatinous precipitates.

\* Particle retention rating at 98% efficiency.



Hardened low ash quantitative filter papers

## Technical specifications

### Quantitative filter papers—ashless grades

Grade	Typical particle retention in liquid (µm) <sup>1</sup>	Nominal ash content (%) <sup>3</sup>	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Typical water flow rate (mL/min) <sup>2</sup>	Nominal air flow rate (s/100 mL/in <sup>2</sup> )	Nominal air flow rate (s/100 mL/in <sup>2</sup> )
50	2.7	0.015	115	96	10	144	21
52	7	0.015	175	96	66	15	–
54	22	0.015	185	90	453	3	–

<sup>1</sup> Particle retention rating at 98% efficiency

<sup>2</sup> For 9 cm diameter

<sup>3</sup> Ash is determined by ignition of the cellulose filter at 900°C in air

## Ordering information

Quantitative filter papers—hardened low ash grades

Dimensions (mm)	Catalog number			Quantity/pack
	Grade 50	Grade 52	Grade 54	
<b>Filter circles</b>				
42.5	1450-042	–	–	100
55	1450-055	–	1454-055	100
63.5	1450-063	–	–	100
70	1450-070	–	1454-070	100
90	1450-090	1452-090	1454-090	100
110	1450-110	1452-110	1454-110	100
125	1450-125	1452-125	1454-125	100
150	1450-150	1452-150	1454-150	100
185	1450-185	–	1454-185	100
240	1450-240	1452-240	1454-240	100
320	1450-320	–	1454-320	100
500	1450-500	–	1454-500	100
Smear Tab	1450-993	–	–	100
<b>Filter sheets</b>				
150 × 230	1450-916	–	–	100
460 × 570	1450-917	–	1454-917	100



Hardened low ash quantitative filter papers

# Quantitative filter papers—hardened ashless grades

Hardened ashless filter papers are suited for a variety of precipitate sizes. Along with general filtration Grade 540, the range includes Grade 542 for retention of fine precipitates and Grade 541 for fast filtration. All three grades are designed for use in gravimetric analysis.

These filter papers exhibit high wet strength and chemical resistance and are acid hardened, which reduces ash to an extremely low level. Their tough surfaces make them suitable for a wide range of critical analytical filtration operations. Each grade offers a convenient combination of filtration speed and particle retention.

## Grade 540 (8 µm\*)

A general purpose hardened ashless filter paper with medium retention and flow rate. Extremely pure and strong with a hard surface. High chemical resistance to strong acid and alkali. Frequently used in the gravimetric analysis of metals in acid/alkali solutions and in collecting hydroxides after precipitation by strong alkalis.

## Grade 541 (22 µm\*)

The general purpose hardened filter paper with medium retention and flow rate. Very hard surface.

## Grade 542 (2.7 µm\*)

High retention of fine particles under demanding conditions. Slow flow rate. Very hard and strong with excellent chemical resistance. Often used in gravimetric metal determinations.

\* Particle retention rating at 98% efficiency.



Hardened ashless quantitative filter papers, Grade 540

## Technical specifications

### Quantitative filter papers—hardened ashless grades

Grade	Typical particle retention in liquid (µm) <sup>1</sup>	Nominal ash content (%) <sup>3</sup>	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Typical water flow rate (mL/min) <sup>2</sup>	Nominal air flow rate (s/100 mL/in <sup>2</sup> )
540	8	0.005	160	85	97	13
541	22	0.005	155	78	359	3
542	2.7	0.005	150	96	13	64

<sup>1</sup> Particle retention rating at 98% efficiency

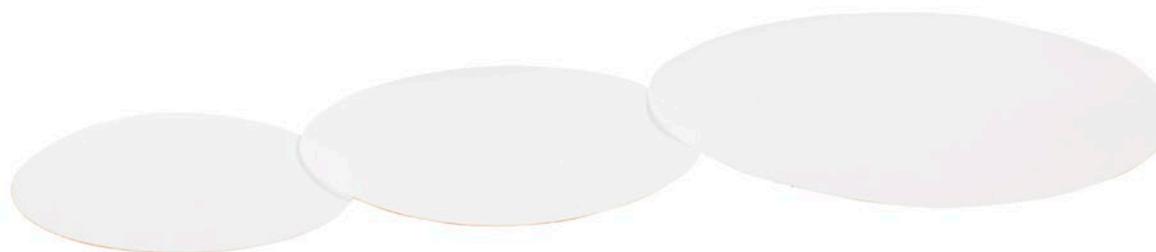
<sup>2</sup> For 9 cm diameter

<sup>3</sup> Ash is determined by ignition of the cellulose filter at 900°C in air

## Ordering information

Quantitative filter papers—hardened ashless grades

Dimensions (mm)	Catalog number			Quantity/pack
	Grade 540	Grade 541	Grade 542	
<b>Filter circles</b>				
21	1540-321	–	–	100
24	1540-324	–	–	100
42.5	1540-042	1541-042	–	100
47	–	1541-047	–	100
55	1540-055	1541-055	1542-055	100
70	–	1541-070	1542-070	100
90	1540-090	1541-090	1542-090	100
110	1540-110	1541-110	1542-110	100
125	1540-125	1541-125	1542-125	100
150	1540-150	1541-150	1542-150	100
185	1540-185	1541-185	1542-185	100
240	1540-240	1541-240	1542-240	100
270	–	1541-270	–	100
320	1540-320	1541-320	–	100
400	–	1541-400	1542-400	100
<b>Filter sheets</b>				
460 × 570	–	1541-917	–	100



Hardened ashless quantitative filter paper circles

# Wet strengthened general purpose filter papers

## Wet strengthened grades

These extremely strong filter papers have a high wet strength due to the addition of a small quantity of chemically stable resin. Their use in normal qualitative applications will not introduce any significant impurities into the filtrate. The resins do, however, contain nitrogen, so these grades should not be used in Kjeldahl estimations, etc. Some wet strengthened grades are available in folded (fluted) forms.

### Grade 91 (10 µm\*)

A general purpose creped filter for less critical routine analysis. Widely used to assay sucrose in cane sugar and within pharmaceutical laboratories for routine filtration.

### Grade 93 (10 µm\*)

This filter paper is intermediate in speed and retention between Grades 1 and 4. Available in a dispenser pack, which can be attached to the wall or bench, placed on a shelf either upright or flat, and used as a normal carton or as a convenient dispenser. The envelopes are released individually for easy one-at-a-time removal. Package and envelopes are clearly marked for size and content.

### Grade 113 (30 µm\*)

A fast, open filter paper with creped surface and high loading capacity — making it highly suited for use with coarse or gelatinous precipitates. Fastest flow rate of the qualitative grades.

Also available as Grade 113V.

### Grade 114 (25 µm\*)

Half the thickness of Grade 113 and suitable for coarse or gelatinous precipitates. Smooth surface for easy recovery of precipitates.

Also available fluted as Grade 114V.

### Grade 1573 (12–25 µm\*)

A fast filter paper with high wet strength. It has a very smooth surface, making it easy to scrape or wash off precipitate. Resistant against: sulfuric and nitric acid solutions (up to 40% at 50°C), hydrochloric (up to 10% at 100°C, 20% at 60°C, 25% at 20°C) and alkalis (up to 10% at 20°C).

Also available fluted as Grade 1573 ½.

### Grade 1574 (7–12 µm\*)

A medium fast filter paper with high wet strength. This paper has the same chemical resistance characteristics as Grade 1573 (see above).

Available fluted as Grade 1574 ½.

### Grade 1575 (< 2 µm\*)

Slow filter paper with high wet strength. This paper has the same chemical resistance characteristics as Grade 1573 (see above).

\* Particle retention rating at 98% efficiency.



Qualitative filter papers, Grade 91

## Technical specifications

### Wet strengthened grades

Grade	Description	Typical particle retention in liquid (µm) <sup>1</sup>	Filtration speed (approx) herzberg (s)	Nominal air flow (s/100 mL/in <sup>2</sup> )	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Typical water flow rate (mL/min) <sup>2</sup>
91	Creped	10	-	6	205	65	274
93	Medium	10	-	7	145	65	194
113	Creped	30	-	2	420	125	774
114	-	25	-	4	190	75	333
1573	Fast, smooth	12-25	25	-	170	88	-
1574	Medium fast, very low fiber release	7-12	85	-	160	90	-
1575	Slow	< 2	700	-	140	92	-

<sup>1</sup> Particle retention rating at 98% efficiency

<sup>2</sup> For 9 cm diameter

## Ordering information

### Wet strengthened grades

Dimensions (mm)	Catalog number							Quantity/pack
	Grade 91	Grade 93	Grade 113	Grade 114	Grade 1573	Grade 1574	Grade 1575	
<b>Filter circles</b>								
90	-	-	1113-090	1114-090	-	-	-	100
110	1091-110	-	-	-	-	-	-	4000 <sup>†</sup>
110	-	1093-110	1113-110	-	-	-	-	100
110	-	1093-111*	-	-	-	-	-	1250
125	1091-125	-	-	-	-	-	-	4000 <sup>†</sup>
125	-	1093-125	1113-125	1114-125	-	-	-	100
125	-	1093-126*	-	-	-	-	-	1250
150	1091-150	1093-6215**	-	-	-	-	-	1000 <sup>†</sup>
150	-	-	1113-150	1114-150	10314712	-	10314915	100
165	1091-165	-	-	-	-	-	-	1000 <sup>†</sup>
185	1091-185	-	-	-	-	-	-	1000 <sup>†</sup>
185	-	-	1113-185	1114-185	10314714	-	10314914	100
190	1091-190	-	-	-	-	-	-	1000 <sup>†</sup>

\* Packed 50 envelopes of 25 circles

\*\* Packed 10 bags of 100 circles

<sup>†</sup> Subdivided into 100

## Ordering information

### Wet strengthened grades (continuation)

Dimensions (mm)	Catalog number							Quantity/pack
	Grade 91	Grade 93	Grade 113	Grade 114	Grade 1573	Grade 1574	Grade 1575	
200	-	-	-	-	-	-	10314916	100
240	1091-240	-	-	-	-	-	-	1000 <sup>†</sup>
240	-	-	1113-240	1114-240	10314720	-	-	100
290	-	-	-	-	10314726	-	-	100
320	-	-	1113-320	-	-	-	-	100
330	1091-330	-	-	-	-	-	-	100
400	-	-	-	1114-400	-	-	-	100
500	-	-	1113-500	-	-	-	-	100
685	-	-	-	-	-	10314828	-	100
<b>Filter sheets</b>								
580 mm × 580 mm	-	-	-	1114-930	-	-	-	100
580 mm × 580 mm	1091-930	1093-930	-	-	-	-	-	500
610 mm × 610 mm	1091-935	1093-935	-	-	-	-	-	500
460 mm × 570 mm	-	-	1113-917	-	-	-	-	100
<b>Rolls</b>								
25 mm × 145 m	-	-	-	-	10314769	-	-	1
25.5 mm × 210 m	-	-	-	-	10314766	-	-	1
70 mm × 80 m	-	-	-	-	10314765	-	-	1
70 mm × 100 m	-	-	-	-	-	10314871	-	1

\* Packed 50 envelopes of 25 circles

\*\* Packed 10 bags of 100 circles

† Subdivided into 100

# General purpose filter papers

These filter papers are made from super-refined cellulose and have been specifically designed to have particular properties for each application, ranging from the filtration of beverages to the purification of electroplating baths.

## Grade 520 a (15–18 µm\*)

A thin paper with great wet strength and a very high flow rate. Frequently used in technical applications such as the filtration of viscous liquids and emulsions (e.g. sweetened juices, spirits and syrups, resin solutions, oils, or plant extracts).

Available fluted as Grade 520 a ½.

## Grade 520 bII (15–19 µm\*)

A thick paper with high wet strength offering a very high flow rate.

## Grade 0858 (7–12 µm\*)

Medium retention and flow rate with a grained surface. Used for the filtration of extracts, oils, beer, syrups, etc. Also suitable for use in filter presses or for the aspiration of liquids.

Available fluted as Grade 0858 ½.

## Grade 0903 (7 µm\*)

A thin filter paper with smooth surface. Offers medium to slow flow rate and good retention for small particles.

## Grade 0905 (12–25 µm\*)

A creped paper for coarse particles, offering a very high filtration speed.

## Grade 2294 (8–15 µm\*)

A very thick filter card with high wet strength. Offers very high flow rate and retains medium to coarse particles.

## Grade 2589 a (6–12 µm\*)

A fast to medium fast filter with high wet strength offering medium retention.

## Grade 2589 c (4–8 µm\*)

Thick filter with medium to slow filtration speed, high wet strength, and good retention for smaller particles.

## Grade 2589 d (2–6 µm\*)

A very thick filter with high wet strength. Offers medium to slow flow rate and retains very fine precipitates.

## Grade Shark Skin™ (8–12 µm\*)

Creped, medium to slow filter paper. Resistant to weak acids and bases. Often used as a protective paper for filter press cloths, as well as in processing of cocoa butter and edible oils.

\* Particle retention rating at 98% efficiency.



Grade 2294 filter papers for technical use

## Technical specifications

### General purpose filter papers

Grade	Description	Typical particle retention in liquid (µm)	Filtration speed (approx) herzberg (s)	Nominal air flow (s/100 mL/in <sup>2</sup> )	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )
520 a	Very fast, creped, high wet strength	15–18	17.5	–	300	90
520 b II	Very fast, creped, wet strength, thick	15–19	15	–	500	135
0858	Medium fast, grained	7–12	55	4.9	170	75
0903	Medium to slow, smooth	7	175	–	140	65
0905	Very fast, creped	12–25	20	–	270	75
2294	Fast, wet strength, thick	8–15	27.5	4.4	1500	556
2589 a	Medium fast, wet strength	6–12	60	–	430	200
2589 c	Medium to slow, wet strength	4–8	160	–	750	400
2589 d	Medium to slow, wet strength, thick	2–6	235	–	1000	500
Shark Skin™	Medium to slow, wet strength, thin, creped	8–12	77.5	–	170	44

## Ordering information

### General purpose filter papers

Dimensions (mm)	Catalog number						Quantity/pack
	Grade 0858	Grade 0903	Grade 0905	Grade 520 a	Grade 520 bII	Shark Skin™	
<b>Filter sheets</b>							
110 × 580	10334365	–	–	–	–	–	500
390 × 390	10334383	–	–	–	–	–	500
450 × 450	10334385	10334885	–	–	–	–	500
580 × 580	–	–	10334987	–	–	–	500
580 × 580	–	–	–	10331487	10331687	–	250
300 × 250	–	–	–	–	–	10538877	100
<b>Filter reels</b>							
21" × 750'	–	–	–	–	–	10537138	1

## Ordering information

### General purpose filter papers

Filter sheets	Catalog number			Quantity/pack
	Grade 2589 a	Grade 2589 c	Grade 2589 d	
25 × 75	–	10343876	10343976	100
580 × 580	10343687	–	–	100

## Ordering information

General purpose filter papers (continuation)

Dimensions (mm)	Catalog number			Quantity/pack
	Grade 2294	Grade 2589 a	Shark Skin™	
<b>Filter circles</b>				
90	-	-	10347509	100
110	10342810	-	10347510	100
125	-	-	10347511	100
140	-	10343630	-	500
150	-	-	10347513	100
180	10342860 <sup>1</sup>	-	-	100
185	-	-	10347512	100
210	10342862 <sup>2</sup>	-	-	100
240	-	-	10347519	100
270	-	-	10347521	100
290	-	-	10347577	100
320	-	-	10347530	100
340	-	-	10347522	100
385	-	-	10347523	100
500	-	-	10347525	100

<sup>1</sup> 180 mm with central hole 33 mm

<sup>2</sup> 210 mm with central hole 60 mm

# Folded and fluted filter papers

## Ready-to-use paper solutions

Many grades of our qualitative and quantitative filter paper are available as fluted circles. We also offer a selection of prefolded cones, quadrant-folded and pyramid-folded filter papers. These convenient formats eliminate time-consuming manual pleating or folding, streamlining operations in busy labs.

Whatman™ ready-to-use folded filter papers from Cytiva support your application needs, save valuable time and provide ease of use when undertaking repetitive or multiple analyses.

## Fluted filter papers

This convenient format has major advantages over flat circles.

- Savings in time required to quadrant-fold circles to fit conical filter funnels in repetitive or multiple analyses
- Decreased overall filtration time because of the extra surface area exposed; the normal slow-down of filtration speed due to the loading of particulate is postponed
- Increased total loading capacity as more filter area is available
- Maintained flow rate due to the reduction in filter paper contact with funnel side and the self-supporting shape of the filter itself
- The prepleating does not significantly affect any of the technical data and the same figures may be used for the flat circles

## Additional folded formats

Qualitative and quantitative grades are now available in several convenient folded formats. These ready-to-use paper filters are available in cone, pyramid, and flat quadrant folded formats, in diameters and grades to support your applications.

Pyramid, flat quadrant-folded and cone filters come in a range of media and diameters, and fit conical funnels. Convenient stacking and packaging options are available.



Folded and fluted filter papers, 113V

## Folded and fluted papers

Available formats and grades

Equivalent flat stock grade	Type	Fluted	Quadrant-folded	Cone folded	Pyramid-folded
1	Qualitative	1V	1 FF	1	1
2	Qualitative	2V	-	2	2
4	Qualitative	4V	-	-	4
5	Qualitative	5V	-	-	-
6	Qualitative	-	-	-	6
40	Ashless	-	40 FF	40	40
41	Ashless	-	41 FF	-	41
42	Ashless	-	-	-	42
113	Wet strengthened	113V	-	-	-
114	Wet strengthened	114V	-	-	-
-	Kieselguhr paper	287 ½	-	-	-
-	Qualitative	512 ½	-	-	-
520 a	General purpose	520 a ½	-	-	-
520 b II	General purpose	520 b FF	-	-	-
540	Hardened ashless	-	-	-	540
-	Qualitative	-	-	-	-
-	Qualitative	593 ½	-	-	-
-	Qualitative	594 ½	-	-	-
595	Qualitative	595 ½	-	-	-
597	Qualitative	597 ½	-	-	-
598	Qualitative	598 ½	-	-	-
602 h	Qualitative	602 h ½	-	-	-
602 eh	Qualitative	602 eh ½	-	-	-
-	Qualitative	604 ½	-	-	-
-	Qualitative	0790 ½	-	-	-
-	Qualitative	802	-	-	-
858	General purpose	0858 ½	0858 FF	-	-
-	Qualitative	0860 ½	-	-	-
1573	Wet strengthened	1573 ½	-	-	-
1574	Wet strengthened	1574 ½	-	-	-
-	Qualitative	2555 ½	-	-	-

### **Grade 1V and 1 FF (11 µm\*)**

A folded filter paper for routine applications with medium retention and flow rate. Covers a wide range of laboratory applications and is frequently used for clarifying liquids.

### **Grade 2V (8 µm\*)**

Widely used for general purpose filtration. Has excellent particle retention and a good filtration speed and loading capacity.

### **Grade 4V (25 µm\*)**

Extremely fast filtering with excellent retention of coarse particles and gelatinous precipitates such as ferric hydroxide and aluminum hydroxide.

### **Grade 5V (2.5 µm\*)**

The maximum degree of fine particle filtration in the qualitative range. Capable of retaining the fine precipitates encountered in chemical analysis. Slow flow rate. Excellent clarifying filter for cloudy suspensions and for water and soil analysis.

### **Grade 6**

Twice as fast as Grade 5 with similar fine particle retention. Often specified for boiler water analysis applications.

### **Grade 40 and 40 FF**

The classic general purpose ashless filter paper with medium speed and retention. Typical applications include gravimetric analysis for numerous components in cements, clays, iron, and steel products; as a primary filter for separating solid matter from aqueous extracts in general soil analysis; quantitative determination of sediments in milk, and as a pure analytical grade clean-up filter for solutions prior to AA spectrometry. Also used as a high-purity filter in the collection of trace elements and radionuclides from the atmosphere.

### **Grade 41 and 41 FF**

The fastest ashless filter paper, recommended for analytical procedures involving coarse particles or gelatinous precipitates (e.g. iron or aluminum hydroxides). Also used in quantitative air pollution analysis as a paper tape for impregnation when determining gaseous compounds at high flow rates.

### **Grade 42**

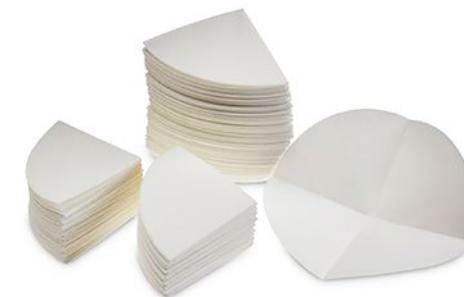
Used for critical gravimetric analysis with the finest particle retention of all cellulose filter papers. Typical analytical precipitates include barium sulfate, metastannic acid, and finely precipitated calcium carbonate.

### **Grade 113V (30 µm\*)**

Very thick and strong filter with creped surface for extremely high loading capacity, particularly in folded form. Fastest flow rate of any qualitative grade. Excellent for coarse particles and gelatinous precipitates.

### **Grade 114V (25 µm\*)**

Strong filter with very fast flow rate. Excellent for coarse particles and gelatinous precipitates. Smooth surface.



Quadrant flat folded filter papers

\* Particle retention rating at 98% efficiency.

### **Grade 287 ½**

Kieselguhr paper with a medium to slow flow rate. Additional adsorption effect (e.g. for the separation of very fine semi-colloidal turbidity, for clarifying milk serum, starch solutions, soil suspensions, or sugar-containing solutions prior to polarimetry or refractometry).

### **Grade 512 ½**

Low phosphate papers approximately 1.5 ppm phosphate, for the filtration of calcium lactate extracts from soil samples for the determination of K and P according to Egnér, Riehm and Lederle

### **Grade 520 a ½ (15–18 µm\*)**

A thin paper with great wet strength and a very high flow rate. Frequently used in technical applications such as the filtration of viscous liquids and emulsions (e.g. sweetened juices, spirits and syrups, resin solutions, oils or plant extracts).

### **Grade 520 b FF**

A filter paper with high wet strength offering a very high flow rate.

### **Grade 540**

A general purpose hardened ashless filter paper with medium retention and flow rate. Extremely pure and strong with a hard surface. High chemical resistance to strong acid and alkali. Frequently used in the gravimetric analysis of metals in acid/alkali solutions and in collecting hydroxides after precipitation by strong alkalis.

### **Grade 593 ½ (5 µm\*)**

A standard grade filter paper for fine precipitates.

### **Grade 594 ½ (4 µm\*)**

A standard grade filter paper for fine precipitates.

### **Grade 595 ½ (4–7 µm\*)**

A thin filter paper, medium-fast with medium to fine particle retention. Used for many routine analytical applications in different industries (e.g. particle separation from food extracts or filtration of solids from digested environmental samples for ICP/AAS analysis).

### **Grade 597 ½ (4–7 µm\*)**

A medium fast filter paper with medium to fine particle retention. Used for a wide variety of analytical routine applications in different industries like food testing (e.g. determination of fat content) or removal of carbon dioxide and turbidity from beverages (e.g. beer analysis).

### **Grade 598 ½ (8–10 µm\*)**

A thick filter paper with high loading capacity. Combines medium retention with medium-fast to quick filtration speed.



Pyramid folded filter papers

\* Particle retention rating at 98% efficiency.

### **Grade 602 h ½ (< 2 µm\*)**

A dense filter paper for collecting very small particles and removing fine precipitates. Used in sample preparation (e.g. in the beverage industry for residual sugar determination, acidic spectra, refractometric analysis, and HPLC).

### **Grade 602 eh ½ (2 µm\*)**

A qualitative filter paper for very fine precipitates..

### **Grade 604 ½ (25 µm\*)**

Grade 604½ qualitative filter paper for coarse precipitates.

### **Grade 802**

A fluted filter for use with a conical filter funnel, offering fast filtration and high loading capacity for analysis involving coarse particles or gelatinous precipitates.

The filter is wet-strengthened and for normal qualitative application it will not introduce any significant impurities into the filtrate. However, it is not recommended for Kjeldahl nitrogen analysis.

### **Grade 0858 ½ and 858 FF (7–12 µm\*)**

Medium retention and flow rate with a grained surface. A universal filter paper used for the filtration of extracts, oils, beer, syrups, etc., also suitable for use in filter presses or for the aspiration of liquids.

### **Grade 1573 ½ (12–25 µm\*)**

A fast filter paper with high wet strength. It has a very smooth surface, making it easy to scrape or wash off precipitate. Resistant against: sulfuric and nitric acid solutions (up to 40% at 50°C), hydrochloric (up to 10% at 100°C, 20% at 60°C, 25% at 20°C), alkalis (up to 10% at 20°C).

### **Grade 1574 ½ (7–12 µm\*)**

A medium fast filter paper with high wet strength. This paper has the same chemical resistance characteristics as Grade 1573 ½ (see above).

### **Grade 2555 ½ (12 µm\*)**

A medium fast filter paper. Used for the filtration of the mash for the determination of the extract in malt and wort and for removing carbon dioxide from beer.

### **Grade 0790 ½**

Acid-washed paper with ash content of approximately 0.01%, low magnesium, and phosphorus for the determination of trace elements (Mg, Mn, Co, Cu, Mo, B).



Cone folded filter papers

\* Particle retention rating at 98% efficiency.

## Technical specifications

### Fluted grades

Grade	Description	Typical particle retention in liquid (µm) <sup>1</sup>	Filtration speed (approx) herzberg (s)	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Typical water flow rate (mL/min) <sup>2</sup>	Nominal ash content (%) <sup>3</sup>
1V	Medium flow	11	-	180	87	57	0.06
2V	-	8	-	190	97	38	-
4V	Very fast	25	-	210	92	247	0.06
5V	Slow	2.5	-	200	92	5	-
113V	Creped	30	-	420	125	774	-
114V	-	25	-	190	75	333	-
287 ½	Kieselguhr	-	330	360	154	-	-
520 a ½	Very fast, creped, high wet strength	15-18	17.5	300	90	-	-
520 b FF	Very fast, wet strength, extra thick	20	30	500	155	-	-
593 ½	Medium to slow	5	450	170	85	-	-
594 ½	Slow	4	800	150	75	-	-
595 ½	Medium fast, thin	4-7	80	150	68	-	-
597 ½	Medium fast	4-7	70	180	85	-	-
598 ½	Medium fast, thick	8-10	50	320	140	-	-
602 h ½	Slow, dense	< 2	375	160	84	-	-
602 eh ½	Very slow, very dense	2	3000	150	85	-	-
604 ½	Fast	25	50	190	80	-	-
802	Fast	-	-	-	73	-	-
0858 ½	Medium fast, grained	7-12	55	170	75	-	-
0860 ½	Medium fast, smooth	12	60	170	75	-	-
1573 ½	Fast, smooth	12-25	25	170	88	-	-
1574 ½	Medium fast, very low fiber release	7-12	85	160	90	-	-
2555 ½	Medium fast	12	55	170	75	-	-

<sup>1</sup> Particle retention rating at 98% efficiency

<sup>2</sup> For 9 cm diameter

<sup>3</sup> Ash is determined by ignition of the cellulose filter at 900°C in air

## Ordering information

### Filter papers—fluted grades

Dimensions (mm)	Catalog number								Quantity /pack
	Grade 1V	Grade 2V	Grade 4V	Grade 5V	Grade 113V	Grade 114V	Grade 287 ½	Grade 520 a ½	
110	–	–	–	1205-110	–	–	–	–	100
125	1201-125	1202-125	1204-125	–	1213-125	1214-125	–	–	100
125	–	–	–	–	–	–	10310244	–	50
150	–	–	–	–	–	–	10310245	–	50
150	1201-150	1202-150	1204-150	–	1213-150	1214-150	–	–	100
185	–	–	–	–	–	–	10310247	–	50
185	1201-185	1202-185	1204-0185	1205-185	1213-185	1214-185	–	–	100
240	1201-240	1202-240	1204-240	–	1213-240	1214-240	–	10331451	100
270	1201-270	1202-270	1204-270	–	1213-270	–	–	–	100
320	1201-320	1202-320	1204-320	–	1213-320	1214-320	–	–	100
385	–	1202-385	–	–	–	–	–	–	100
400	–	1202-400	–	–	–	–	–	–	100
500	–	1202-500	–	–	1213-500	–	–	10331456	100

## Ordering information

### Filter papers—fluted grades

Dimensions (mm)	Catalog number							Quantity /pack
	Grade 520 b FF	Grade 593 ½	Grade 594 ½	Grade 595 ½	Grade 597 ½	Grade 598 ½	Grade 602 h ½	
70	–	–	–	10311641	10311841	–	–	100
90	–	–	–	10311642	10311842	–	10312642	100
110	–	–	–	10311643	10311843	–	–	100
125	–	–	–	–	–	10312244	–	50
125	–	–	–	10311644	10311844	–	10312644	100
150	–	–	–	10311645	10311845	–	10312645	100
185	–	–	–	–	–	10312247	–	50
185	–	10311447	10311547	10311647	10311847	–	10312647	100
210	–	–	–	10311649	–	–	–	100
240	10331551	–	–	–	–	10312251	–	50
240	–	10311451	–	10311651	10311851	–	10312651	100
270	–	–	–	10311652	10311852	–	–	100
320	10331553	–	–	–	–	–	–	50
320	–	–	–	10311653	10311853	–	–	100
385	10331554	–	–	–	–	–	–	50
385	–	–	–	10311654	10311854	–	–	100
500	10331556	–	–	–	–	10312256	–	50
500	–	–	–	10311656	10311856	–	–	100
600	10331558	–	–	–	–	–	–	50

## Ordering information

### Filter papers—fluted grades

Dimensions (mm)	Catalog number							Quantity /pack
	Grade 602 eh ½	Grade 604 ½	Grade 0858 ½	Grade 0860 ½	Grade 1573 ½	Grade 1574 ½	Grade 2555 ½	
110	–	–	–	–	–	10314843	–	100
125	10312544	10312744	–	–	10314744	10314844	–	100
150	10312545	10312745	10334345	–	10314745	–	–	100
185	–	10312747	10334347	10334547	10314747	–	10313947	100
240	–	10312751	10334351	10334551	10314751	–	10313951	100
270	–	–	10334352	–	10314752	–	–	100
320	–	10312753	10334353	10334553	10314753	–	10313953	100
<b>Sheets</b>								
100 mm × 300 mm	–	–	–	10334500	–	–	–	500
570 mm × 870 mm	–	–	10334346	–	–	–	–	100
670 mm × 770mm	–	–	10334435	–	–	–	–	100

## Ordering information

### Quantitative filter papers—ashless fluted grades

Dimensions (mm)	Catalog number		Quantity /pack
	Grade 589/1 ½	Grade 589/2 ½	
110	–	10300143	100
150	10300045	10300145	100

For further information on these grades see Quantitative Filter Papers section.

## Ordering information

### Filter papers—wet strengthened fluted grades

Dimensions (mm)	Grade 589/1 ½	Grade 589/2 ½	Quantity /pack
125	Grade 802	5802-125	100
150	Grade 802	5802-150	100
185	Grade 802	5802-185	100
240	Grade 802	5802-240	100
240	Grade 802	5802-6698	1000
320	Grade 802	5802-320	100
385	Grade 802	5802-385	100



## Ordering information

### Filter papers quadrant folded

Grade	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Nominal ash content (%) <sup>1</sup>
1 FF	180	87	0.06
40 FF	210	95	0.007
41 FF	215	85	0.007
0858 FF	170	75	–

<sup>1</sup> Ash is determined by ignition of the cellulose filter at 900°C in air



44 FF quadrant flat folded filter papers

## Ordering information

### Filter papers quadrant folded

Diameter (mm)	Description	Catalog number	Quantity/pack
110	Grade 1 FF Quadrant	10380404	500
125	Grade 1 FF Quadrant	10380405	500
150	Grade 1 FF Quadrant	10380406	500
110	Grade 40 FF Quadrant	10380004	500
125	Grade 40 FF Quadrant	10380005	500
150	Grade 40 FF Quadrant	10380006	500
110	Grade 41 FF Quadrant	10380204	500
125	Grade 41 FF Quadrant	10380205	500
150	Grade 41 FF Quadrant	10380206	500
185	Grade 0858 FF Quadrant	10334348	100

## Ordering information

### Filter papers—pyramid folded and cone grades

Grade	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Nominal ash content (%) <sup>1</sup>
1	180	87	0.06
4	210	92	0.06
6	180	100	0.15
40	210	95	0.007
41	215	85	0.007
42	200	100	0.007
540	160	85	0.005

<sup>1</sup> Ash is determined by ignition of the cellulose filter at 900°C in air

## Ordering information

### Filter papers—pyramid folded grades

Diameter (mm)	Grade	Catalog number	Quantity/pack
90	1	1001-10218	10000
90	42	989610137	1000
90	540	1540-10123	1000
110	1	1001-10116	10000
110	2	1002-10219	10000
110	4	989810116	1000
110	41	989510116	1000
110	42	989610116	1000
110	540	1540-10124	1000
125	1	989710112	1000
125	4	989810112	1000
125	6	9891-128	1000
125	40	9892-128	1000
125	41	989510112	1000
125	42	989610112	1000



Pyramid folded filter papers

## Ordering information

### Filter papers—cone folded grades

Diameter (mm)	Grade	Catalog number	Quantity/pack
110	1	990110116	1000
110	2	1002-10240	1000
110	40	990010116	1000
125	40	990010112	1000



Cone folded filter papers

The above table is an example of products set-up; please contact us at [scientific.support@cytiva.com](mailto:scientific.support@cytiva.com) for a full listing of available products.

# Application specific filter papers

Cytiva offers Whatman™ cellulose filter papers for specific applications. The product range includes filter papers for use in soil analysis and for the sugar industry.

## Grade 0048

Filter mat made from a mixture of cellulose and polyester. This mat is used for optically testing baby food (artificial milk) for textile fibers.

## Grade 72

Composite cellulose/glass filter loaded with activated carbon. Used to absorb radioactive iodine in air pollution monitoring and in nuclear installations.

## Grade 71

Similar to Grade 72 but has a higher level of activated carbon.

## Grade 8 ruled filter paper

A white filter paper with printed green lines for optical assessment (5 mm intervals). For routine investigations of foreign substances in a variety of sample types.

## Grade 1450CV

Filter paper for the identification of undissolved dyes in the textile industry.

## Grade 0965

A coarse filter mat with high wet strength.

## Grade 287 ½

Kieselguhr paper with a medium to slow flow rate. Additional adsorption effect (e.g. for the separation of very fine semi-colloidal turbidity, for clarifying milk serum, starch solutions, soil suspensions, or sugar-containing solutions prior to polarimetry or refractometry). Fluted.

## Grade 2555 ½

A medium fast filter paper. Used for the filtration of the mash for the determination of the extract in malt and wort and for removing carbon dioxide from beer. Fluted.



Application filter papers

## Soil analysis filter papers

### Grade 0790 ½

Acid-washed paper with ash content of approximately 0.01%, low magnesium, and phosphorus for the determination of trace elements (Mg, Mn, Co, Cu, Mo, B). Fluted.

### Grade 512 ½

Low phosphate papers approximately 1.5 ppm phosphate, for the filtration of calcium lactate extracts from soil samples for the determination of K and P according to Egnér, Riehm and Lederle. Fluted.

## Sugar and food industry filter papers

### Grade 3459

A creped filter paper, Grade 3459 has good retentivity at a relatively high filtration speed. Used for the clarifying filtration of:

- Dried beet pulp extracts
- Beet juice after the addition of lead acetate for subsequent polarimetric sugar determination
- Grade 3459 is specifically designed for the Venema unit (lead acetate method)

## Technical specifications

### Application specific filters

Grade	Properties	Filtration speed (approx) herzberg (s)	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )
<b>Soil analysis filter papers</b>				
0790 ½	Low Mg and P	225	–	84
512 ½	Low phosphate	375	–	84
<b>Specially for the venema unit</b>				
3459	Fast, creped	55	–	75
<b>Malt and beer filter</b>				
2555 ½	Medium fast	55	–	75
<b>Food industry mat (cellulose/polyester)</b>				
0048	–	–	0.86	130
<b>Activated carbon loaded paper</b>				
72	–	–	–	195
71	–	–	702-898	160-230
<b>Kieselguhr paper</b>				
287 ½	Kieselguhr	330	360	154
<b>Filter mat</b>				
0965	–	–	250	30
<b>Identification of undissolved dyes</b>				
1450CV	–	30	–	120
<b>Routine investigations</b>				
8	–	–	–	65

## Ordering information

### Application specific filters

Dimensions (mm)	Catalog number							Quantity /pack
	Grade 0048	Grade 72	Grade 71	Grade 0965	Grade 1450CV	Grade 8	Grade 3459	
<b>Filter circles</b>								
32	10348903	-	-	-	-	-	-	1000
45	-	-	-	-	-	10347004	-	100
47	-	1872-047	-	-	-	-	-	100
50	-	1872-050	-	-	-	-	-	100
55	-	1872-055	-	-	-	-	-	100
60	-	1872-060	-	-	-	-	-	100
70	-	-	-	-	-	10347008	-	100
75	-	-	-	-	-	10347033	-	100
90	-	-	-	-	10313209	-	-	50
90	-	-	-	-	-	10347009	-	100
110	-	-	-	10340810	-	-	-	100
230	-	-	-	-	-	-	10316619	1000

## Ordering information

### Application specific filters (continuation)

Diameter (mm)	Catalog number				Quantity/pack
	Grade 287 ½	Grade 512 ½	Grade 0790 ½	Grade 2555 ½	
<b>Folded filters</b>					
110	-	10310643	-	-	100
125	10310244	-	-	-	50
150	10310245	-	-	-	50
150	-	10310645	10301645	-	100
185	10310247	10301647	-	-	50
185	-	10310647	10301647	10313947	100
240	-	-	-	10313951	100
320	-	-	-	10313953	100
<b>Sheets</b>					
1060 mm × 560 mm	-	-	10390046	-	100

# Seed germination testing papers

Seed testing papers are made from pure cellulose without any additives and do not contain any substances which could influence the growth of the seeds. The constant water absorption of the papers ensures the continuous provision of the required amount of water.

The contrast of the color seed testing papers makes evaluation easier, particularly for seeds with fine white rootlets or under artificial light. This makes work easier, improves the results, and saves time. The dyes used have been thoroughly investigated and have no influence on the growth of the seeds.

Seed testing papers are available for both the pleated paper (PP) method and the top of paper (TP) method.



Seed germination testing papers, pleated strips

## Product selection

### Seed germination testing papers

Grade	Description	Nominal thickness (µm)	Nominal weight (g/m <sup>2</sup> )
<b>PP method</b>			
3014	Pleated strips, white*	0.22	113
3236	Pleated strips, white*	0.22	110
<b>TP method</b>			
597	For Petri dishes or Jacobsen/Copenhagen tanks, white	0.18	85
598	For Petri dishes or Jacobsen/Copenhagen tanks, white	0.32	140
3621	Blotter, light blue	1.44	710
3633	Blotter, light blue	0.65	300
3644	Blotter, blue	1.4	720
3645	Yellow	0.35	165

\* 50 double pleats

## Applications

### Seed germination testing papers

Grade	Description
597, 598	Small seeds (e.g. grasses, flowers)
3014, 3236	Medium-large and coated seeds (e.g. sugar beet, fodder beet, grain, sunflower, rapeseed, mustard)
3014	Particularly sensitive seeds
3645	Seeds with small white rootlets

## Ordering information

### Seed germination testing papers

Dimensions (mm)	Grade	Catalog number	Color	Description	Quantity/pack
<b>Circles</b>					
70	597	10311808	-	Circles	100
85	3645	10342555	Yellow	Circles	100
90	597	10311809	-	Circles	100
90	598	10312209	-	Circles	100
90	181	2181-090	White	Circles	100
60	-	1872-060	-	-	-
<b>Sheets</b>					
100 × 100	3645	10342500	-	Sheets	1000
105 × 190	3645	10342596	Yellow	Sheets	1000
110 × 170	3645	10342583	Yellow	Sheets	100
110 × 170	3645	10342594	-	Sheets	1000
115 × 115	3645	10342595	-	Sheets	1000
140 × 200	3644	10342580	Blue	Sheets	1000
140 × 200	3621	10342579	White	Sheets	1000
280 × 340	3644	10342582	-	Sheets	100
420 × 594	3644	10342581	-	Sheets	50
450 × 690	3645	10342570	Yellow	Sheets	100
<b>Pleated strips</b>					
110 × 20	3014	10344672	White	Double pleated strips, without wrap strips	1000
110 × 20	3014	10344676	White	Double pleated strips, with wrap strips	1000
110 × 20	3236	10345572	Grey	Double pleated strips, without wrap strips	1000
110 × 20	3236	10345576	Grey	Double pleated strips, with wrap strips	1000
110 × 20	3236	10345573	Grey	Double pleated strips	500



Qualitative filter papers, Grade 597

# Glass microfiber filters

Whatman™ glass microfiber filters are manufactured from 100% borosilicate glass and are available with or without binder. These depth filters combine fast flow rates with high loading capacity and the retention of very fine particles, extending into the sub-micron range. Glass microfiber filters can be used at temperatures up to 550°C and are excellent for use in applications involving air filtration and for gravimetric analysis of volatile materials where ignition is involved.

Glass microfiber filters have a fine capillary structure and can absorb significantly larger quantities of water than an equivalent cellulose filter, making them suitable for spot tests and liquid scintillation counting methods. The filters can also be made completely transparent for subsequent microscopic examination.

The particle loading capacity of a filtration system can be greatly increased by using a prefilter. Glass microfiber filters such as GF/B or GF/D are recommended because of the low resistance to fluid flow and high particle loading capacity. Multigrade GMF 150 is particularly valuable for the prefiltration of larger volumes and solutions that are normally difficult to filter.



Grade EPM 2000 air sampling filter

## Glass microfiber and quartz filters: trace element composition

Typical values (µg/g paper)

	QM-A*	EPM 2000	934-AH™	GF/A and GF/C™
Arsenic (As)	< 1	< 1	24	5
Beryllium (Be)	< 1	< 1	< 1	< 1
Cobalt (Co)	< 1	1	< 1	< 1
Cadmium (Cd)	< 1	< 1	< 1	< 1
Copper (Cu)	< 1	5	3	< 1
Lead (Pb)	< 1	3	9	5
Manganese (Mn)	2	20	18	6
Mercury (Hg)	< 1	< 1	< 1	< 1
Nickel (Ni)	1	1	3	1
Selenium (Se)	< 3	< 3	< 3	< 3
Silver (Ag)	< 1	< 1	< 1	< 1
Thallium (Tl)	< 1	< 1	< 1	< 1

Typical composition based on ICP-MS analysis

\* Trace element report can be downloaded from the Cytiva website for each lot of QM-A

# Standard binder-free glass microfiber filter papers

## Grade GF/A (1.6 $\mu\text{m}^*$ )

This grade filter paper offers fine particle retention and high flow rate, as well as good loading capacity.

- Used for high-efficiency general purpose laboratory filtration, including water pollution monitoring of effluents, for filtration of water, algae and bacteria cultures, food stuff analyses, protein filtration, and radioimmunoassay of weak  $\beta$  emitters.
- Recommended for gravimetric determination of airborne particulates, stack sampling, and absorption methods of air pollution monitoring.

Grade GF/A card-mounted filters are used in static sample and personal air sampler applications. These aerosol sampling and particulate monitoring filters provide high flow rates and minimal sample interference.

## Grade GF/B (1.0 $\mu\text{m}^*$ )

Three times thicker than GF/A with higher wet strength and significantly increased loading capacity. Combines fine particle retention with good flow rate. Particularly useful where liquid clarification or solids quantification is required for heavily-loaded, fine particulate suspensions. Can be used as a finely retentive membrane prefilter. Used in LSC techniques where high loading capacity is required.

## Grade GF/C™ (1.2 $\mu\text{m}^*$ )

Combines fine particle retention with good flow rate. The standard filter in many parts of the world for the collection of suspended solids in potable water and natural and industrial wastes. Fast and efficient clarification of aqueous liquids containing low to medium levels of fine particulates. Widely used for cell harvesting, liquid scintillation counting, and binding assays where more loading capacity is required.

Ready-to-use (RTU) formats available for total suspended solids (TSS) and total dissolved solids (TDS). (See page 60).

## Grade GF/D (2.7 $\mu\text{m}^*$ )

Considerably faster in flow rate and overall filtration speed than cellulose filter papers of similar particle retention. The filter is thick and consequently exhibits a high loading capacity. Designed as a membrane prefilter and available in sizes to fit most holders.

- GF/D will provide good protection for finely retentive membranes.
- Can be used in combination with GF/B to provide very efficient graded prefilter protection for membranes.

## Grade GF/F (0.7 $\mu\text{m}^*$ )

This high-efficiency filter will retain fine particles down to 0.7  $\mu\text{m}$ . Unlike membrane filters with a comparable retention value, it has a very rapid flow rate and an extremely high loading capacity.

Because of the tight specification of 0.6  $\mu\text{m}$ —0.8  $\mu\text{m}$  particle retention and pure borosilicate glass structure, GF/F is the material upon which the EPA Method TCLP 1311 for Toxicity Characteristic Leaching Procedure was developed.

Recommended for nucleic acid binding and purification. Very effective in filtering finely precipitated proteins, GF/F can be used in conjunction with GF/D as a prefilter for the successful clarification of extremely difficult biochemical solutions and fluids, and nucleic acids.

\* Particle retention rating at 98% efficiency.



Binder-free glass microfiber filters, Grade GF/C™



Binder-free glass microfiber filters, Grade GF/F

## Grade 934-AH™ (1.5 µm\*)

The fine particle retention of this popular grade is superior for its high retention efficiency at high flow rates and its high loading capacity. This is a smooth surface, high retention borosilicate glass microfiber filter, which has been pre-fired and withstands temperatures over 550°C. Grade 934-AH™ is used for a wide range of laboratory applications.

- Used for determining total suspended solids in water, removal of turbidity, and filtration of bacterial cultures.
- Recommended for water pollution monitoring, cell harvesting, liquid scintillation counting, and air pollution monitoring.

Ready-to-use (RTU) formats are available for Total Suspended Solid (TSS), Total Dissolved Solids (TDS) and Volatile Suspended Solids (VSS). See page 60.



Grade 934-AH™ filters

## Grade EPM 2000

EPM 2000 has been selected by the U.S. Environmental Protection Agency (EPA) for use in high volume air sampling equipment that collects atmospheric particulates and aerosols. It is manufactured from 100% pure borosilicate glass of special purity, and pre-fired to enable the detailed chemical analysis of trace pollutants with the minimum of interference or background.

\* Particle retention rating at 98% efficiency.



Grade EPM 2000 air sampling filter

## Technical specifications

Binder-less Glass microfiber filter

Grade	Minimum retention efficiency in air (% @ 0.3 µm)	Typical retention efficiency in air (% @ 0.3 µm)	Typical particle retention in liquid (µm) <sup>1</sup>	Nominal air flow (s/100 mL/in <sup>2</sup> )	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Maximum recommended temperature (°C)	Typical water flow rate (mL/min) <sup>2</sup>
GF/A	≥ 99.85	≥ 99.99	1.6	4.3	260	53	550	143
GF/B	–	–	1.0	12	675	143	550	81
GF/C™	–	–	1.2	6.7	260	53	550	105
GF/D	–	–	2.7	2.6	675	121	550	681
GF/F	–	–	0.7	19	420	75	550	41
934-AH™	–	–	1.5	3.7	435	64	550	341
EPM 2000	≥ 99.85	≥ 99.99	–	5.6	450	85	550	–

<sup>1</sup> Particle retention rating at 98% efficiency

<sup>2</sup> Normalized for 9 cm diameter. Measured under gravity for comparative purposes

## Ordering information

### Binder-free glass microfiber grades

Dimensions (mm)	Catalog number							Quantity /pack
	Grade GF/A	Grade GF/B	Grade GF/C™	Grade GF/D	Grade GF/F	Grade 934-AH™	EPM 2000	
<b>Filter circles</b>								
7	-	-	-	1823-007	-	-	-	100
10	-	-	-	1823-010	-	-	-	100
13	1820-8013	-	-	-	-	-	-	100
15	-	-	-	-	1825-015	-	-	100
21	1820-021	1821-021	1822-021	1823-021	1825-021	1827-021	-	100
24	1820-024	1821-024	1822-024	1823-024	1825-024	1827-024	-	100
25	1820-025	1821-025	1822-025	1823-025	1825-025	1827-025	-	100
25	-	-	1822-6580	-	-	-	-	400
28	-	-	-	-	-	1827-028	-	100
30	-	-	-	-	-	1827-030	-	100
32	18208296 <sup>4</sup>	-	1822-320	-	-	1827-032	-	100
34	1820900086 <sup>4</sup>	-	-	-	-	-	-	80
34	1820-10026 <sup>4</sup>	-	-	-	-	-	-	100
35	-	-	-	1823-035	-	1827-035	-	100
37	1820-037	1821-037	1822-037	-	1825-037	1827-037	-	100
42.5	1820-042	1821-042	1822-042	1823-042	1825-042	1827-042	-	100
47	1820-047	1821-047	1822-047	1823-047	1825-047	1827-047	1882-047	100
50	1820-050	-	1822-050	-	-	-	-	100
55	1820-055	1821-055	1822-055	1823-055	1825-055	1827-055	-	100
60	1820-061 <sup>3</sup>	-	-	-	-	-	-	50
60	1820-060	1821-060	-	-	-	-	-	100
70	1820-070	1821-070	1822-070	1823-070	1825-070	1827-070	-	100
81	1820-6537	-	-	-	-	-	-	100
82	-	-	-	-	-	1827-082	-	100
85	-	-	-	-	-	1827-085	-	100
90	1820-090	1821-090 <sup>1</sup>	1822-090	1823-090 <sup>1</sup>	1825-090 <sup>1</sup>	1827-090	-	100
100	-	-	1822-100	-	-	-	-	100
100	-	-	1822-9916 <sup>2</sup>	-	-	-	-	100
105	-	-	-	-	-	1827-105	-	100
110	1820-110	1821-110 <sup>1</sup>	1822-110	1823-110 <sup>1</sup>	1825-110 <sup>1</sup>	1827-110	-	100
125	1820-125	1821-125 <sup>1</sup>	1822-125	1823-125 <sup>1</sup>	1825-125 <sup>1</sup>	1827-125	-	100
142	-	-	-	1823-142 <sup>1</sup>	1825-142 <sup>1</sup>	-	-	100
150	1820-150	1821-150 <sup>1</sup>	1822-150	1823-150 <sup>1</sup>	1825-150 <sup>1</sup>	1827-150	-	100
185	-	1821-185 <sup>1</sup>	1822-185	-	-	1827-185	-	100
240	1820-240	-	-	-	-	1827-240	-	100
257	-	-	-	1823-257	1825-257	-	-	25
293	-	-	-	-	1825-293	-	-	25
320	-	-	-	-	-	1827-320	-	100

\* Particle retention rating at 98% efficiency

<sup>1</sup> 25 per box

<sup>2</sup> Individually bagged

<sup>3</sup> With reinforced rim

<sup>4</sup> Filter in holder for personal air samplers

## Ordering information

Binder-free glass microfiber grades (continuation)

Dimensions (mm)	Catalog number							Quantity /pack
	Grade GF/A	Grade GF/B	Grade GF/C™	Grade GF/D	Grade GF/F	Grade 934-AH™	EPM 2000	
<b>Filter sheets</b>								
102 × 254	-	-	1822-849	-	-	-	-	50
460 × 570	-	1821-914	-	-	-	-	-	5
460 × 570	1820-915	1821-915	1822-915	1823-915	1825-915	-	-	25
2" × 12"	-	-	-	-	-	1827-808	-	100
2.25" × 12.25"	-	1821-271	-	-	-	-	-	100
8" × 10"	1820-866	-	1822-866	-	-	1827-866	-	100
8" × 10" (prenumbered)	-	-	-	-	-	-	1882-866	100
12" × 15"	-	-	-	-	-	1827-889	-	100
19" × 28"	-	-	-	-	-	1827-957	-	100
50 mm × 87 mm	1820-10026	-	-	-	-	-	-	100
50 mm × 87 mm	1820900086	-	-	-	-	-	-	80

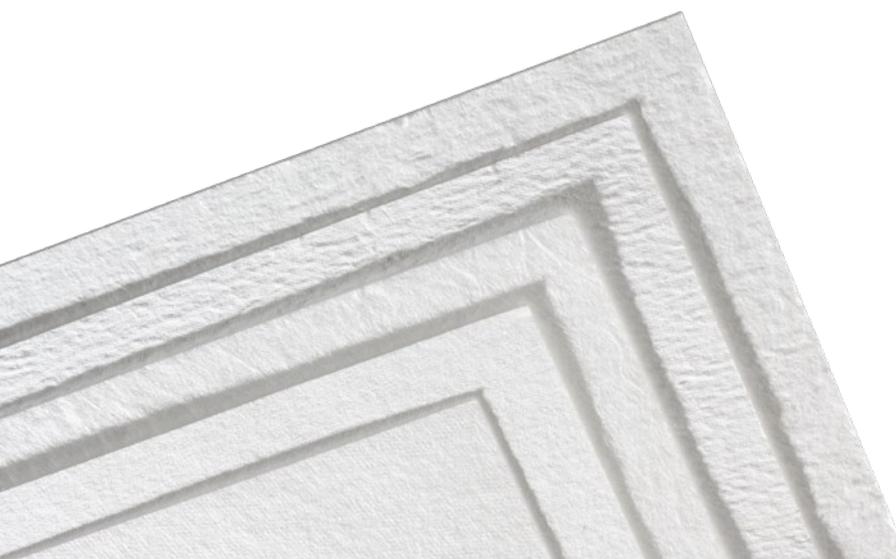
\* Particle retention rating at 98% efficiency

<sup>1</sup> 25 per box

<sup>2</sup> Individually bagged

<sup>3</sup> With reinforced rim

<sup>4</sup> Filter in holder for personal air samplers



Binder-free glass microfiber filter sheets

# Multigrade GMF 150

GMF 150 is a multilayer glass microfiber filter with a coarse top layer meshed with a finer layer. Manufactured from 100% borosilicate glass microfiber, the filter is binder free. It is an excellent prefilter for higher particulate loading capacity with faster flow rates, extending the life of the filter.



Multigrade GMF 150 grades filter

## Multilayer design delivers greater filtration efficiency

GMF 150 represents a new dimension in separation science leading to faster and more cost-effective filtration. In application, the GMF 150 traps larger particles in the pores or on the surface of the coarse layer while the medium sized particles are caught in the interface meshing. The smaller particles are netted in the interstices of the fine layer.

## Technical specifications

Multigrade GMF 150 grades

Grade	Description	Typical particle retention in liquid (µm) <sup>1</sup>	Nominal air flow (s/100 mL/in)	Nominal thickness (µm)	Nominal basis weight (g/m)	Typical water flow rate (mL/min) <sup>2</sup>	Maximum recommended temperature (°C)
GMF 150 1 µm	Multilayer	> 1	4	730	145	222	550
GMF 150 2 µm	Multilayer	> 2	1.6	750	145	887	550

<sup>1</sup> Particle retention rating at 98% efficiency

<sup>2</sup> Normalized for 9 cm diameter. Measured under gravity for comparative purposes

## Ordering information

Multigrade GMF 150 grades

Diameter (mm)	Catalog number		Quantity/pack
	1 µm	2 µm	
47	1841-047	1842-047	40
90	-	1842-090	40
90	1841-090	-	20

# Whatman™ acid-treated low metal TCLP filter papers

Toxicity Characteristic Leaching Procedure (TCLP) is an analytical test designed to determine the leaching potential in a landfill for hazardous organic and inorganic contaminants that could potentially migrate into groundwater, threatening drinking water sources.

## Used for EPA Method 1311

The TCLP Filter is manufactured using a binder-free borosilicate glass microfiber with a particle retention rating of 0.6 to 0.8 µm.

These acid treated, low metal filters are available in a variety of diameters. The 90 mm filter is required for volatile samples and used with a Zero Headspace Extractor.

The 142 mm filter is typically used with nonvolatile samples in an approved jar.

## Technical specifications

Acid treated low metal TCLP filters

Nominal air flow (s/100 mL/in <sup>2</sup> )	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Maximum recommended temperature (°C)	Typical particle retention in liquid (µm)	Typical water flow rate (mL/min)
19	420	75	550	0.7	60

## Ordering information

Acid treated low metal TCLP filters

Diameter (mm)	Catalog number	Quantity/pack
47	1810-047	100
90	1810-090	50
90	5925-090	100
110	1810-110	50
125	1810-125	50
142	1810-142	50
142	5925-142	100
150	1810-150	50



TCLP testing filters

# Glass microfiber filter papers with binder

## Grade GF 6: inorganic binder

Good retention for very fine particles. This filter is used for:

- water pollution applications
- removing protein from difficult-to-filter beers
- determination of chlorophyll and phytoplankton residues
- determination of filterable substances and the residue on ignition (dry weight)
- analysis of aggressive media (e.g. acidic gases)
- scintillation measurements
- determination of the elemental iron content in the presence of iron oxides

## Grade GF 8: inorganic binder

This glass fiber filter is used in the filtration of coarse particles. Frequently used in:

- environmental analysis
- determination of PCB, DDE, DDT, furans and dioxins in the air
- pollution measurements in industrial, urban and populated areas, cement factories, iron and steel industry
- dust measurements in the workplace
- determination of the dust fraction in technical gases
- testing the effectiveness of dust collecting

## Grade GF 9: inorganic binder

Used in similar applications to GF 8.

## Grade GF 10: organic binder

This filter with extreme mechanical stability and temperature resistance up to 180°C is used as a weighing aid for infrared weighing and as a roll filter in automatic air filtration units.

## Grade GF 92: inorganic binder

This filter is used as a membrane prefilter in applications such as:

- determination of crop protection agent residues by GC or HPLC
- cold sludge determination of beer
- soot separation before gas analyzers
- as roll filters in automatic air filtration units



Grade GF 8 glass microfiber filters with binder

## Grade F319-04: organic binder

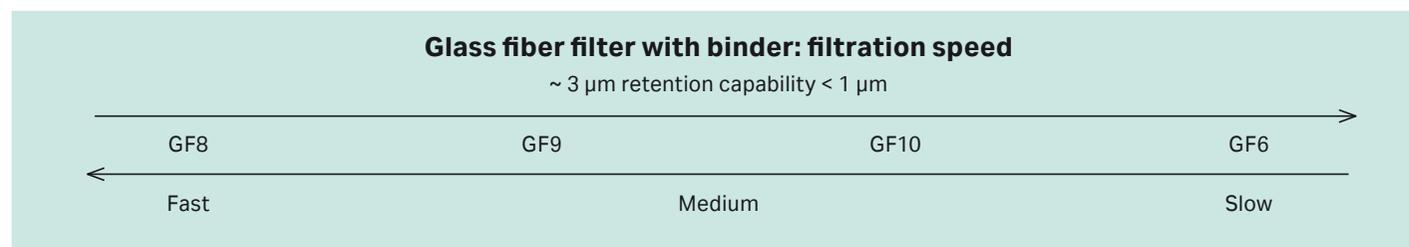
Cambridge filter pad F319-04 meets the requirements of Standard ISO3308:2012.

## Grade HGF61: organic binder

This glass fiber paper has excellent mechanical strength and it can retain < 99% air particulate matter which make it very suitable as a filter tape in continuous air monitoring. The grade is also used as venting filter due to its water-repellent feature.

## Grade HGF65: organic binder and inorganic binder

This glass is very similar to HGF61. It can retain > 99% air particulate matter @ 0.3  $\mu\text{m}$ . It is mainly used as filter tape in continuous air monitoring and as venting filter in industrial applications.



## Technical specifications

Glass microfiber filter papers with binder

Grade	Nominal air flow (s/100 mL/in <sup>2</sup> )	Nominal air flow (s/100 mL/1.56 cm <sup>2</sup> )	Nominal thickness ( $\mu\text{m}$ )	Nominal basis weight (g/m <sup>2</sup> )	Filtration speed	Operating temperature (°C)
GF 6	40	-	350	80	Slow	< 500
GF 8	-	12	350	80	Fast	< 500
GF 9	-	27	350	70	Medium	< 500
GF 10	-	12	350	70	Medium	< 180
GF 92	-	27	350	70	Medium	< 500
HGF61	-	-	285	54	-	-
HGF65	-	-	280	54	-	-
F319-04	-	-	1300	215	-	-



HGF61 glass fiber tape

## Ordering information

Glass microfiber filter papers with binder

Dimensions (mm)	Catalog number								Quantity /pack
	GF 6	GF 8	GF 9	GF 10	GF 92	HGF61	HGF65	F319-04	
<b>Filter circles</b>									
25	10370018	-	-	-	-	-	-	-	200
42	-	-	-	-	10421019	-	-	-	200
44	-	-	-	-	-	-	-	97039654	960
47	10370019	10370119	-	10370319	10421026	-	-	-	200
50	10370002	-	10370202	10370302	10421030	-	-	-	200
55	10370003	-	-	-	-	-	-	9703900241	100
70	10370004	-	-	-	-	-	-	-	100
90	10370005	10370105	10370205	10370305	-	-	-	-	100
92	-	-	-	-	-	-	-	97039944	100
100	10370020	-	-	10370320	10421043	-	-	-	100
110	10370006	-	10370206	-	-	-	-	-	100
125	10370007	-	-	-	-	-	-	-	100
135	-	-	-	-	10421057	-	-	-	100
142	-	-	-	-	10421060	-	-	-	100
150	10370008	-	-	10370308	-	-	-	-	100
185	10370010	-	-	-	-	-	-	-	100
200	10370011	10370111	-	-	-	-	-	-	100
240	10370012	-	-	-	-	-	-	-	100
<b>Filter sheets</b>									
60 × 90	-	10370172	-	-	-	-	-	-	100
610 × 620	10370050	-	-	-	-	-	-	-	100
<b>Filter reels</b>									
30 mm × 13 m	-	-	-	-	-	-	95039860	-	1
30 mm × 20 m	-	-	-	-	-	1830-6236	-	-	1
30 mm × 100 m	-	-	-	-	-	1830-640	-	-	1
40 mm × 42 m	-	-	-	10370393*	-	-	-	-	1
60 mm × 42 m	-	-	-	10370391*	-	-	-	-	1
600 mm × 228 m	-	-	-	10370434	-	-	-	-	1

\* Core 28 mm

# Quartz fiber filter papers

## Grade QM-A

These high-purity quartz (SiO<sub>2</sub>) microfiber filters are used for air sampling in acidic gases, stacks, flues, and aerosols, particularly at high temperatures up to 800°C and in PM2.5/PM10 and trace element analysis.

- Due to the low level of alkaline earth metals, artifact products of sulfates and nitrates (from SO<sub>2</sub> and NO<sub>2</sub>) are virtually eliminated.
- QM-A, sequentially numbered according to EPA standards, is suitable for most applications.
- Grade QM-A filter papers are pre-fired.

## Grade QM-B

QM-B is a thicker quartz fiber filter than QM-A. It has higher loading capacity and is suitable for air sampling.

## Grade QM-C

QM-C is made of 100% silica microfiber without any additive or binder. It is pre-ignited and has a temperature resistance up to 1200°C. QM-C has very low trace metals (Cr, Ar, Pb, Cd, Ni, Zn) and it can address critical challenges in heavy metal analysis of air particulate matter and high temperature testing.

## Grade QM-H

This is a pure quartz fiber filter with low heavy metal content, which can be used at temperatures over 900°C.



Grade QM-A filter paper circles

## Technical specifications

Quartz fiber filter grades

Grade	Minimum retention efficiency in air (% @ 0.3 µm)	Typical retention efficiency in air (% @ 0.3 µm)	Nominal air flow (s/100 mL/in <sup>2</sup> )	Nominal thickness (µm)	Nominal basis weight (g/m <sup>2</sup> )	Maximum recommended temperature (°C)
QM-A	≥ 99.95	≥ 99.99	6.3	475	85	800
QM-B	≥ 99.95	≥ 99.99	12	950	170	800
QM-C	≥ 99.95	≥ 99.99	19	475	85	1200
QM-H	-	≥ 99.97	-	430	85	900

## Ordering information

### Quartz fiber filter grades

Diameter (mm)	Catalog number				Quantity/pack
	QM-A	QM-B	QM-C	QM-H	
<b>Filter circles</b>					
25	1851-025	-	-	-	100
32	1851-032	-	-	-	100
37	-	-	-	1853-037-50	50
37	1851-037	-	1855-037	-	100
40	-	1852-040	-	-	50
42	-	1852-042	-	-	50
45	-	-	1855-045	-	100
47	-	-	-	1853-047-50	50
47	1851-047	-	1855-047	-	100
50	-	-	-	1853-050-50	50
50	1851-050	-	1855-050	-	100
55	1851-055	-	-	-	100
70	-	-	1855-070	-	100
82	1851-082	-	1855-082	-	100
85	1851-085	-	1855-085	-	100
90	-	-	-	1853-090-50	50
90	1851-090	-	1855-090	-	100
101.6	1851-101	-	-	-	100
110	1851-110	-	1855-110	-	100
118	1851-118	-	-	-	100
150	-	-	-	1853-150-50	50
150	1851-150	-	1855-150	-	100
<b>Filter sheets</b>					
8" x 10"	1851-8866 (prenumbered)	-	1855-866	-	100
8" x 10"	1851-865	-	1855-865	-	25

# Ready-to-use (RTU) glass fiber filters for solids

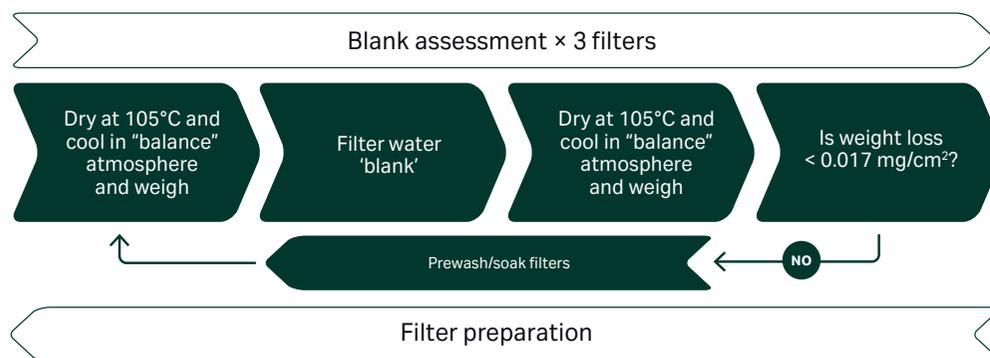
Solids testing, a key measurement in water quality and wastewater analysis, includes testing for total solids (TS), total dissolved solids (TDS), total suspended solids (TSS) and volatile suspended solids (VSS). It can be challenging for a lab staff to maintain accuracy and daily productivity under time pressure. Whatman™ RTU filters help lab staff simplify filter preparation steps in solids measurement, streamlining workflows and saving time. The RTU series filters are pretreated (washing, drying/ignition and weighing) to ensure weight loss less than 4% or 0.5 mg, whichever is less. 934-AH™ RTU filters meet the requirements of SM2540C/D/E, and GF/C™ RTU filters conform to EN872. The RTU filter family includes an economy range which is washed and dried but not weighed.



934AH RTU tray

## Filter preparation workflows

### EN872



### Standard method 2540



## Instruction for pan identification

Reading the barcode with a scanner, the weight of filter and the Pan ID can be automatically loaded into an Microsoft Excel™ file or a lab management system.



Example of filter weights of a whole box

	Pad ID	Box ID	Weight	Unit
1	B0535335	B2002404	0.4310	G
2	B0535336	B2002404	0.4353	G
3	B0535337	B2002404	0.4311	G
4	B0535338	B2002404	0.4311	G
5	B0535339	B2002404	0.4350	G
6	B0535340	B2002404	0.4295	G
7	B0535341	B2002404	0.4277	G
8	B0535342	B2002404	0.4350	G
9	B0535343	B2002404	0.4365	G
10	B0535344	B2002404	0.4321	G
11	B0535345	B2002404	0.4302	G
12	B0535346	B2002404	0.4381	G

Input Box ID "xxxxxxx" on [cytiva.com/documents/RTU](http://cytiva.com/documents/RTU), filter weights of a whole box can be downloaded in a Microsoft Excel file.

## Instruction of use 934-AH™ ready-to-use filter for total suspended solids analysis

1. Each pre-treated 934-AH™ RTU filter comes in an aluminum pan, with the filter weight clearly noted. Open a box and take a 934-AH™ RTU filter out from the box
2. Place the 934-AH™ RTU filter on a 3-piece funnel or a funnel of the vacuum filtration apparatus and seal the filter to the funnel by wetting with a small amount of water. Then, filter your sample\* and finally, wash the filter with three aliquots of 10 mL reagent grade water.
3. Remove the filter, return it to the aluminum weigh pan and dry it to constant weight at 103°C to 105°C. To obtain the weight of total suspended solids, subtract the weight of the filter indicated on the pan label from the final weight. For volatile solids analysis, filter the sample with 934-AH™ RTU VSS filter. After the measurement of total suspended solids, ignite the filter at 550°C for 15 min in a muffle furnace. The weight loss is the weight of total suspended volatile solids.

## Technical specifications

### Ready-to-use glass fiber filters

	GF/C™ RTU	934-AH™ RTU	934-AH™ RTU for volatiles	934-AH™ RTU double weigh
Pre-washed, dried, cooled, and weighed	●	●	●	●
Barcoded aluminum pans to download filter weight	●	●	●	●
Box barcoded to download weights of all filters contained	●	●	●	●
Pre-fired at 550°C			●	
Certified filter mass loss the lesser of 0.5 mg or 4% after Standard Method 2540 parts C, D and E preparatory workflow		●	●	●
Certified mass loss of less than 0.017 mg/cm <sup>2</sup> after EN 872 preparatory workflow	●			
Economy option available (washed and dried without weighing or barcoding)	●	●	●	
Drying and weighing steps repeated and documented twice to conform to process in US EPA Lab Standard Method 2540 parts C and D				●

## Ordering information

### Ready-to-use (RTU) filters

Diameter (mm)	Catalog number							Quantity/pack
	934-AH™ RTU	934-AH™ RTU VSS	934-AH™ RTU VSS economy*	GF/C™ RTU	GF/C™ RTU economy**	934-AH™ RTU double weigh	934-AH™ RTU economy**	
35	–	3827-035	4827-035	–	–	–	–	100
42.5	9907-042	3827-042	4827-042	–	–	–	–	100
47	9907-047	3827-047	4827-047	3822-047	2822-047	9927-047	2827-047	100
47	9907-9436†	–	–	–	–	–	–	100
55	9907-055	–	–	–	–	–	–	100
70	9907-070	3827-070	4827-070	3822-070	2822-070	9927-070	–	100
90	9907-090	3827-090	4827-090	3822-090	2822-090	9927-090	–	100

\* Pre-rinsed and ignited

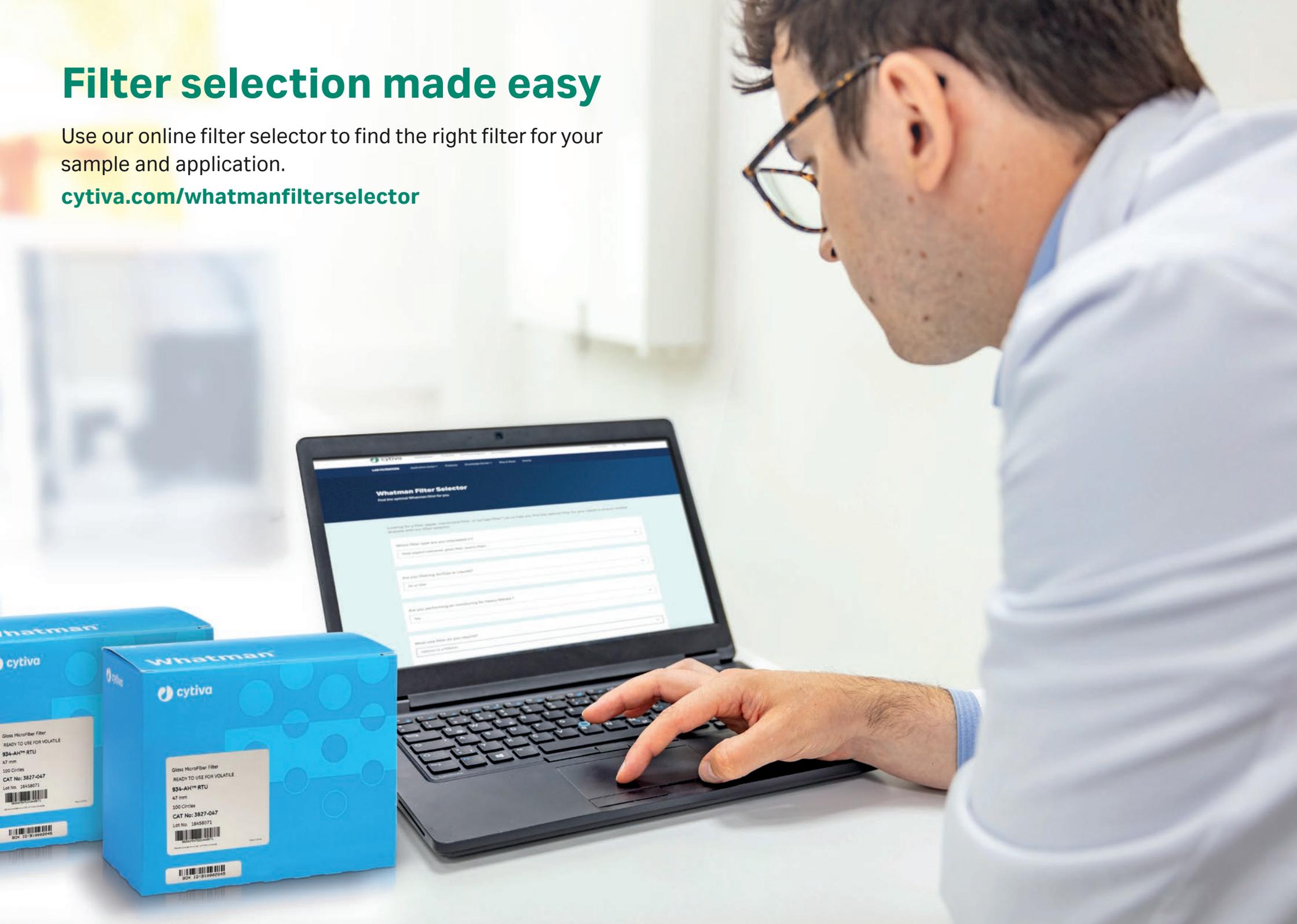
\*\* Pre-rinsed and dried

† Weigh to 5-digit place

# Filter selection made easy

Use our online filter selector to find the right filter for your sample and application.

[cytiva.com/whatmanfilterselector](https://cytiva.com/whatmanfilterselector)



# 02

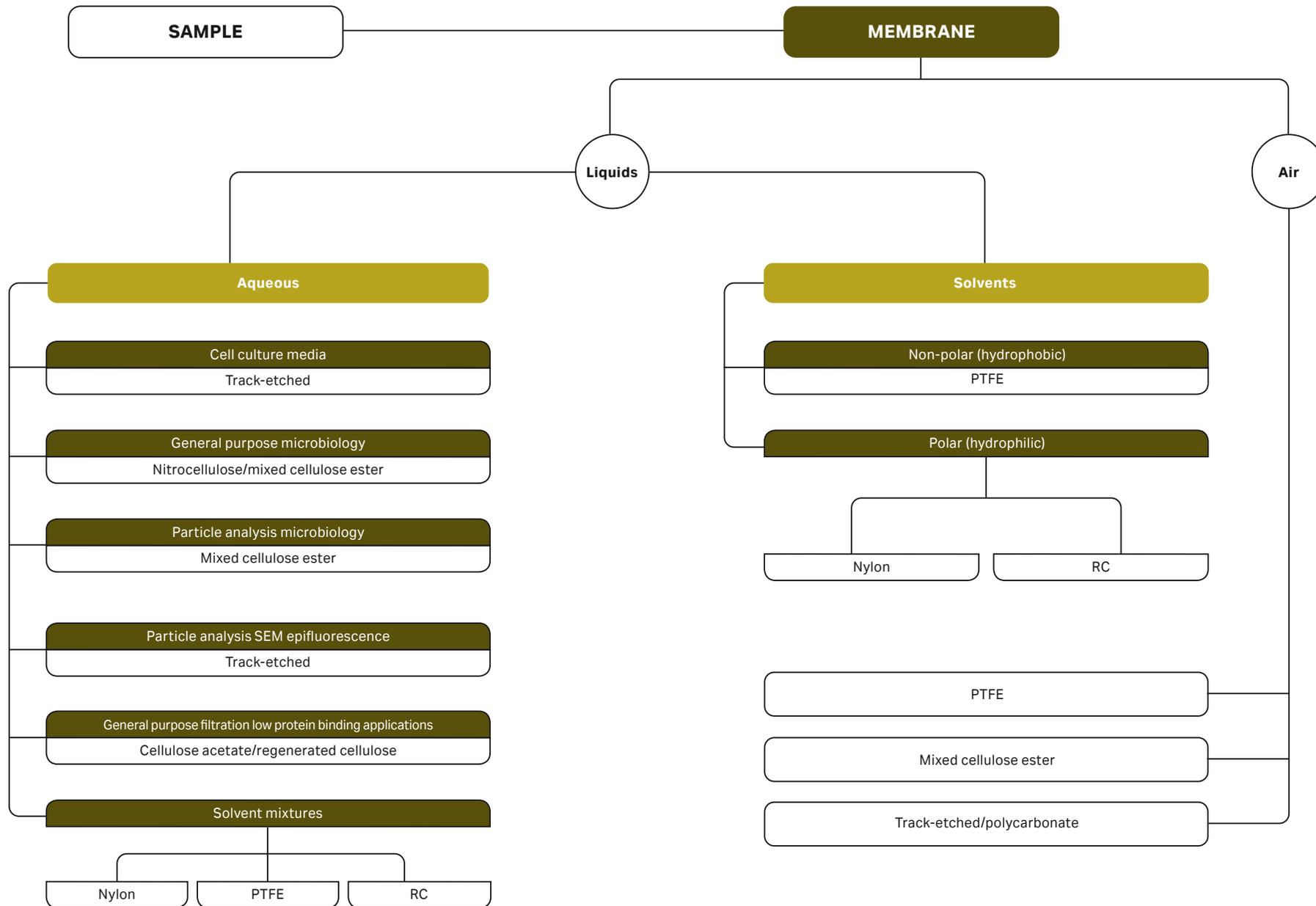
# Membrane filters

**Our membrane filters offer accurately controlled pore size distribution with high strength and flexibility to ensure reproducibility and consistency. Membranes are available in a range of pore sizes and formats, including sterile and autoclave packs and colored and gridded forms for specialized applications.**

<b>Quick pick reference chart .....</b>	<b>66</b>
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# Quick pick reference chart



# Track-etched polycarbonate membranes

We manufacture Whatman™ track-etched membranes using proprietary technology to produce a precision membrane filter with closely controlled pore size distribution.

These membranes include Cyclopure™ polycarbonate, Nuclepore™ polycarbonate, chemotaxis membranes, black polycarbonate, and polycarbonate membranes for cell culture.

## Cyclopure™ polycarbonate membranes

Membranes are produced from a pure polymeric film and give exceptional chemical cleanliness. They are free of contaminants, have low tare weight, minimum water adsorption, and very low levels of nonspecific protein binding.

The polycarbonate membranes are hydrophilic and are available in a choice of diameters and pore sizes.

### Features and benefits

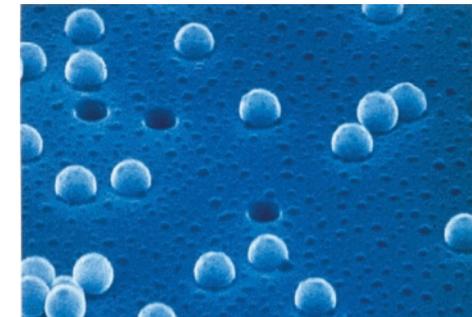
- Low affinity for stains provides higher optical contrast, making visibility under a microscope easy.
- True surface capture provides easy examination of samples and short analysis times.
- Totally transparent membranes are available.
- Negligible absorption and adsorption of filtrate; nonhygroscopic.
- Low tare weights.
- No particle shedding provides ultra clean filtrate.
- Biologically inert.

### Typical applications

- **Air monitoring**  
Trace elements (chemicals, radioactivity) and particulate analysis (dust, pollens, and airborne particles)
- **Analytical methods**  
Gravimetric analysis, densitometry, emission spectroscopy, X-ray fluorescence, and infrared analysis
- **Water analysis**  
Absorbable organic halides (AOX), direct count of microorganisms, marine biology and dissolved phosphates, nitrates, and ammonia analysis
- **Blood filtration and cell analysis**  
Red blood cells (RBC) deformability, leukocyte removal, RBC filtration and plasmapheresis, chemotaxis, cytology, and cell culture



Cyclopure™ PC polycarbonate membrane filters



Microscope image of the surface area of Cyclopure™ PC polycarbonate membrane filters

- **General filtration**  
Particulate and bacteria removal, cross flow filtration, HPLC sample preparation, and solution filtration
- **Microscopy**  
Electron microscopy, epifluorescence microscopy, and direct optical microscopy
- **Microorganism analysis**  
Direct total microbial count, harvesting, concentration, fractionation, yeast, molds, *Giardia*, *Legionella*, coliform, and canine microfilaria
- **Nucleic acid studies**  
Alkaline elution and DNA fragment fractionation
- **Oceanographic studies**  
Transparent polycarbonate membrane filters provide a tool for studying planktonic organisms. These ultra thin transparent membranes are strong yet flexible, allowing for planktonic samples to be filtered and the membranes to be mounted directly onto microscope slides.
- **Healthcare**  
*Biosensors*—as a barrier offering controlled diffusion for biological reagents and electrochemical detectors  
*Diagnostic assays*—for flow control, sample preparation, blood separation, and capture of latex microparticles  
*Cell biology*—for cell culture, chemotaxis, and cytological analyses (e.g. direct staining, isotopic, and fluorescence based assays)

## Technical specifications

### Cyclopore™ polycarbonate membranes

Thickness	7–20 μm
Weight	0.7–2.0 mg/cm <sup>2</sup>
Maximum service temperature	140°C
Porosity (void volume)	4–20%
Ash weight	0.6 μg/cm <sup>2</sup>
Pore density	1 × 10 <sup>5</sup> –6 × 10 <sup>8</sup> pores/cm <sup>2</sup>
Opacity	Translucent
Autoclavable	30 minutes at 121°C
Specific gravity	1.21 g/cm <sup>3</sup>
Flammability	Slow burn
Fiber releasing	No
Leachables	Negligible
Biological compatibility	Inert

## Ordering information

### Cyclopore™ polycarbonate membrane circles

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
13	0.4	10417701	Polycarbonate	100
25	0.1	7060-2501	Polycarbonate	100
25	0.2	10417606	Polycarbonate	100
25	0.4	10417706	Polycarbonate	100
25	2.0	7060-2511	Polycarbonate	100
25	5.0	7060-2513	Polycarbonate	100
25	5.0	7062-2513	Polycarbonate, clear	100
25	8.0	7060-2514	Polycarbonate	100
25	12.0	10418552	Polycarbonate	100
47	0.1	7060-4701	Polycarbonate	100
47	0.2	10417612	Polycarbonate	100
47	0.4	10417712	Polycarbonate	100
47	1.0	7060-4710	Polycarbonate*	100
47	1.0	7091-4710	Polycarbonate, thin clear	100
47	3.0	7060-4712	Polycarbonate	100
47	5.0	7060-4713	Polycarbonate	100
47	8.0	7060-4714	Polycarbonate	100
47	10.0	10418450	Polycarbonate	100
47	12.0	10418550	Polycarbonate	100

\* Transparent also available as Special Clear

Other sizes and formats are available upon request.

# Cell culture and chemotaxis applications

## Track-etched polycarbonate membranes for cell culture applications

### Features and benefits

- For the analysis of cell migration toward a chemical stimulus
- Thin and uniform; cylindrical pores facilitate rapid cell migration
- Reduces incubation time and the need to sterilize
- Offered without the standard wetting agent (PVP-free membranes) for increased cellular adhesion (e.g. neutrophil chemotaxis)



Chemotaxis membranes

### Ordering information

#### Cell culture polycarbonate membrane circles

Diameter (mm)	Pore size ( $\mu\text{m}$ )	Catalog number	Surface	Quantity/pack
13	3.0	10418301	Standard	100
13	5.0	10417401	Standard	100
13	5.0	10418101	PVP-free	100
13	8.0	10417501	Standard	100
13	8.0	150446	PVP-free	100
25	2.0	10418806	Standard	100
25	3.0	10418306	Standard	100
25	5.0	10417406	Standard	100
25	8.0	10417506	Standard	100
25 × 80	5.0	155845	PVP-free	100

# Nuclepore™ polycarbonate membranes

Nuclepore™ track-etched polycarbonate membranes are manufactured from high-quality polycarbonate film and have sharply defined pore sizes, high flow rates, and excellent chemical and thermal resistance. The membranes have a smooth flat surface and exhibit very low levels of extractables.

## Features and benefits

- Low protein binding and low extractables, minimizing sample contamination
- High chemical resistance and good thermal stability for a wide range of samples
- Low, consistent ash and tare weights
- Smooth flat surface for good visibility of particles

## Applications

- Epifluorescence microscopy
- Environmental analysis
- Cell biology
- eDNA
- EPA testing
- Fuel testing
- Bioassays
- Parasitology
- Air analysis
- Water microbiology

## Ordering information

Nuclepore™ polycarbonate membrane circles

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
<b>Filter circles</b>				
13	0.015	110401	Polycarbonate	100
13	0.1	110405	Polycarbonate	100
13	0.2	10417001	Polycarbonate	100
13	0.4	10417101	Polycarbonate	100
13	0.8	10417301	Polycarbonate	100
13	1.0	10418701	Polycarbonate	100



Nuclepore™ polycarbonate membranes

## Ordering information

### Nuclepore™ polycarbonate membrane circles (continuation)

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
13	3.0	10418301	Polycarbonate	100
13	5.0	10417401	Polycarbonate	100
13	8.0	10417501	Polycarbonate	100
13	8.0	150446	Polycarbonate PVP-free*	100
13	10.0	10418401	Polycarbonate	100
13	12.0	10418501	Polycarbonate	100
19	0.3	800307	Polycarbonate	100
19	0.05	800308	Polycarbonate	100
19	0.1	800309	Polycarbonate	100
19	0.2	10417004	Polycarbonate	100
19	0.4	10417104	Polycarbonate	100
19	0.8	10417304	Polycarbonate	100
19	1.0	10418704	Polycarbonate	100
25	0.015	110401	Polycarbonate	100
25	0.03	110405	Polycarbonate	100
25	0.05	110603	Polycarbonate	100
25	0.08	110604	Polycarbonate	100
25	0.1	110605	Polycarbonate	100
25	0.2	10417006	Polycarbonate	100
25	0.4	10417106	Polycarbonate	100
25	0.6	10417206	Polycarbonate	100
25	0.8	10417306	Polycarbonate	100
25	1.0	10418706	Polycarbonate	100
25	2.0	10418806	Polycarbonate	100
25	3.0	10418306	Polycarbonate	100
25	5.0	10417406	Polycarbonate	100
25	8.0	10417506	Polycarbonate	100
25	10.0	10418406	Polycarbonate	100
25	12.0	10418506	Polycarbonate	100
25	0.4	10418606	Polycarbonate AOX†	100
37	0.8	10417309	Polycarbonate	100
47	0.015	111101	Polycarbonate	100
47	0.05	111103	Polycarbonate	100
47	0.08	111104	Polycarbonate	100

\* PVP-free—hydrophobic

† AOX—suitable for AOX (Absorbable Organic Halogens) analysis

## Ordering information

### Nuclepore™ polycarbonate membrane circles (continuation)

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
47	0.1	111105	Polycarbonate	100
47	0.2	10417012	Polycarbonate	100
47	0.4	10417112	Polycarbonate	100
47	0.6	10417212	Polycarbonate	100
47	0.8	10417312	Polycarbonate	100
47	1.0	10418712	Polycarbonate	100
47	2.0	10418812	Polycarbonate	100
47	3.0	10418312	Polycarbonate	100
47	5.0	10417412	Polycarbonate	100
47	8.0	10417512	Polycarbonate	100
47	10.0	10418412	Polycarbonate	100
47	12.0	10418512	Polycarbonate	100
47	0.4	10418612	Polycarbonate AOX <sup>†</sup>	100
50	0.2	10417014	Polycarbonate	100
50	0.4	10417114	Polycarbonate	100
50	5.0	10417414	Polycarbonate	100
50	12.0	10418514	Polycarbonate	100
76	0.05	111503	Polycarbonate	100
90	0.05	111703	Polycarbonate	25
90	0.1	111705	Polycarbonate	25
90	0.2	10417018	Polycarbonate	25
90	0.4	10417118	Polycarbonate	25
90	1.0	10418718	Polycarbonate	25
90	2.0	10418818	Polycarbonate	25
90	3.0	10418318	Polycarbonate	25
142	0.08	112104	Polycarbonate	25
142	0.1	112105	Polycarbonate	25
142	0.2	10417031	Polycarbonate	25
142	1.0	10418731	Polycarbonate	25
293	1.0	10418739	Polycarbonate	25
<b>Filter sheets</b>				
8 × 10"	0.03	113502	Polycarbonate	25
8 × 10"	0.2	10417050	Polycarbonate	25
19 × 42 mm	5.0	10417451	Polycarbonate	100

<sup>†</sup> AOX—suitable for AOX (Absorbable Organic Halogens) analysis

Other sizes and formats are available upon request.

# Cyclopure™ black polycarbonate membranes

Black Cyclopure™ membranes are excellent for epifluorescence and other microscopy applications requiring a contrasting background. The polycarbonate membrane is used to filter the sample and is then used directly for analysis. The dark membrane gives lower background fluorescence and improves the sensitivity of the test. Suitable for Legionella testing.

## Technical specifications

### Cyclopure™ black polycarbonate membranes

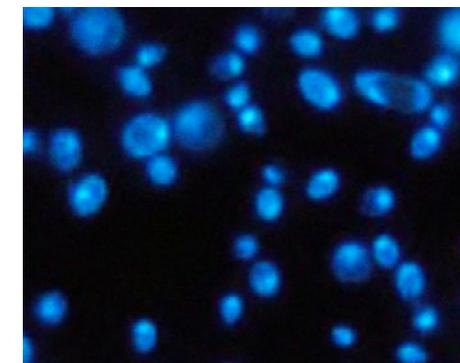
Thickness	7–20 µm
Weight	0.7–2.0 mg/cm <sup>2</sup>
Maximum service temperature	140°C
Porosity (void volume)	13%
Ash weight	20.6 µg/cm <sup>2</sup>
Pore density	1 × 10 <sup>5</sup> –6 × 10 <sup>8</sup> pores/cm <sup>2</sup>
Autoclavable	30 minutes at 121°C
Flammability	Slow burn
Fiber releasing	No
Leachables	Negligible
Biological compatibility	Inert

## Ordering information

### Cyclopure™ black polycarbonate membranes

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
25	0.2	7063-2502	Polycarbonate	100
25	0.4	7063-2504	Polycarbonate	100
47	0.2	7063-4702	Polycarbonate	100

Other sizes and formats are available upon request.



Yeast cells on Black Cyclopure™ with DAPI Stain



Cyclopure™ PC black polycarbonate membrane filters

# Nuclepore™ black polycarbonate membranes

## Membranes for use with epifluorescence microscopy

Nuclepore™ black dyed polycarbonate membranes are high performance membranes suited for applications using epifluorescence microscopy. Black membranes greatly reduce background fluorescence, which results in improved microorganism and particulate visibility.

Using these membranes in combination with epifluorescence techniques, rapid enumeration of viable and nonviable microorganisms and particulate matter can be conducted in 30 minutes or less. Conventional culturing methods require incubation times of more than 24 hours. Use black track-etched membranes with epifluorescence techniques to achieve rapid, direct enumeration of microorganisms.



Nuclepore™ black polycarbonate membranes

### Features and benefits

- Polycarbonate track-etched membrane dyed black with Irgalan
- Flat, smooth surface to assure surface capture of microorganisms and particles
- Extremely low nonspecific absorption

### Applications

- Potable water
- Ultra pure water
- Food and dairy
- Wine and beverages
- Clinical
- Electronics
- Legionella testing

### Technical specifications

#### Nuclepore™ black polycarbonate membrane circles

Thickness	7–22 µm
Rated pore size	0.015 µm–15 µm
Rated pore density	1 × 10 <sup>5</sup> –6 × 10 <sup>5</sup> pores/cm
Surface texture	Flat and smooth
Opacity	Translucent
Hydrophobic/hydrophilic	Both
Fiber releasing	No

### Ordering information

#### Nuclepore™ black polycarbonate membrane circles

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
25	0.2	110656	Polycarbonate	100
25	0.4	110657	Polycarbonate	100
25	0.8	110659	Polycarbonate	100
47	0.2	111156	Polycarbonate	100

Other sizes and formats are available upon request.

# Anopore™ inorganic membranes

The Anopore™ inorganic membrane (Anodisc™) is an excellent choice for a wide range of laboratory filtration applications. This material has a precise, nondeformable honeycomb pore structure with no lateral crossover between individual pores. Anopore™ membranes filter at precisely the stated cut-off, allowing no larger sized particles to pass through the membrane. Composed of a high-purity alumina matrix that is manufactured electrochemically, the membrane exhibits low protein binding is nontoxic, and supports cellular growth.

The precise pore structure and narrow pore size distribution of the Anopore™ membrane ensure a high level of particle removal efficiency. Microorganisms and particulate material are captured on the surface of the membrane for subsequent analysis by light or electron microscopy. When wet, the membrane is virtually transparent, so retained particles do not need to be transferred to another surface before microscopic examination.

The membrane is hydrophilic and is compatible with most solvents and aqueous material. No monomers, plasticizers, adhesives, surfactants or wetting agents are used in the manufacturing process, which removes sample contamination and ensures low protein binding and minimal loss of sample.

The Anopore™ membrane is supplied in the form of Anodisc™ membrane filters. Select from unsupported or peripherally bonded to an annular polypropylene ring for ease of handling (except the 13 mm diameter disc). Anopore™ membranes are suitable for both vacuum and pressure filtration.

Anopore™ is available in three nominal pore sizes: 0.02 µm, 0.1 µm and 0.2 µm, and in three diameters: 13 mm, 25 mm and 47 mm.

## Features and benefits

- High pore density and narrow pore size distribution make it an extremely precise membrane.
- Wide solvent compatibility reduces the need to stock a variety of membranes in the laboratory.
- Minimized use of additives in the manufacturing process ensures minimal extractables and no sample contamination.
- Extremely low protein binding minimizes sample loss.
- Virtually transparent when wet, making it suitable for microscopy studies.

## Applications

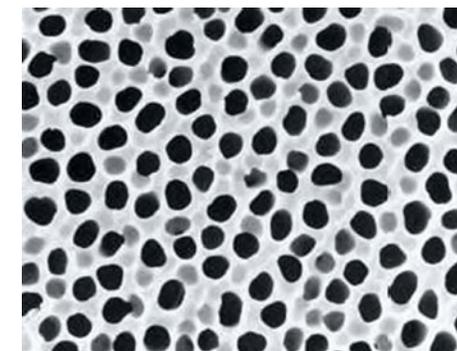
- HPLC mobile phase filtration and degassing
- Ultra cleaning of solvents
- Gravimetric analysis
- Liposome extrusion
- Scanning electron microscopy studies
- Bacterial analysis by epifluorescence light microscopy
- Micrometer and nanometer filtration
- Metal nanorods formation



Anodisc™ circle with support ring



Anopore™ inorganic membranes without support ring



Anodisc™ pore structure

## Technical specifications

### Anopore™ inorganic membranes

	Anodisc™ 13	Anodisc™ 25	Anodisc™ 47
Average membrane thickness	60 µm	60 µm	60 µm
Membrane diameter	13 mm	21 mm	43 mm
Membrane type	Anopore™ aluminum oxide	Anopore™ aluminum oxide	Anopore™ aluminum oxide
Support ring material	None	Polypropylene	Polypropylene
Construction process	N/A	Thermal weld	Thermal weld
Protein adsorption	Low	Low	Low
pH range	3.5–9.5	3.5–9.5	3.5–9.5
Maximum service temperature*	400°C*, unsupported	40°C, supported	40°C, supported; 400°C, unsupported
Porosity	25–50%	25–50%	25–50%
Autoclavable	Yes	No	Yes, unsupported
Refractive index	1.6	1.6	1.6

\* Polypropylene support ring limits maximum service temperature to 40°C. Supported Anodisc™ not autoclavable.

## Ordering information

### Anopore™ inorganic membrane circles

Diameter (mm)	Membrane	Pore size (µm)	Catalog number	Hydrophilic	Protein binding	Solvent resistance	Quantity/ pack
13	Anodisc™ 13*	0.02	6809-7003	Yes	Low	Very good	100
13	Anodisc™ 13*	0.1	6809-7013	Yes	Low	Very good	100
13	Anodisc™ 13*	0.2	6809-7023	Yes	Low	Very good	100
25	Anodisc™ 25	0.02	6809-6002	Yes	Low	Very good	50
25	Anodisc™ 25	0.1	6809-6012	Yes	Low	Very good	50
25	Anodisc™ 25	0.2	6809-6022	Yes	Low	Very good	50
47	Anodisc™ 47*	0.02	6809-5502	Yes	Low	Very good	50
47	Anodisc™ 47	0.02	6809-5002	Yes	Low	Very good	50
47	Anodisc™ 47	0.1	6809-5012	Yes	Low	Very good	50
47	Anodisc™ 47*	0.2	6809-5522	Yes	Low	Very good	50
47	Anodisc™ 47	0.2	6809-5022	Yes	Low	Very good	50

\* Without support ring

# Cellulosic membranes

## Regenerated cellulose membranes

Regenerated cellulose membranes are made of pure cellulose without wetting agents to provide a membrane with broad chemical compatibility that can be used with aqueous solutions or organic solvents. Combined with low extractable and low binding characteristics, regenerated cellulose membranes are well-suited for sample preparation and mobile filtration for HPLC applications and as well as proteinaceous solutions.



Regenerated cellulose membrane filter circles

### Features and benefits

- Spontaneously wetting, very good wet strength
- Extremely chemically resistant; suitable for aqueous and organic solutions
- Hydrophilic
- Mechanically stable with low protein binding
- Sterilizable by all common methods
- Low extractable levels to minimize sample contamination

### Technical specifications

Regenerated cellulose membranes

Membrane type	Pore size (µm)	Thickness (µm)	Water flow rate $\Delta p = 0.9$ bar (s/100 mL/12.5 cm <sup>2</sup> )	Air flow rate $\Delta p = 3$ mbar (s/100 mL)	Bubble point (bar)
RC 58	0.2	75	14	–	3.7
RC 55	0.45	75	26	–	3.5
RC 60	1.0	70	3	12.5	0.8

## Ordering information

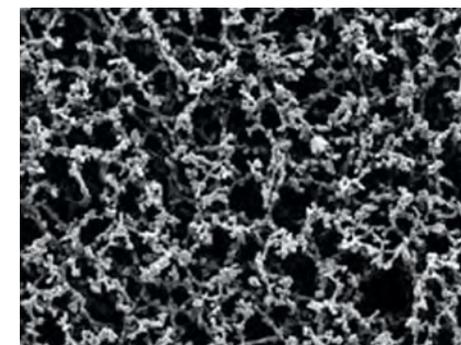
### Regenerated cellulose membrane circles

Dimensions (mm)	Membrane type	Pore size (µm)	Catalog number	Quantity/pack
<b>Filter circles</b>				
25	RC 55	0.45	10410206	100
47	RC 55	0.45	10410212	100
50	RC 55	0.45	10410214	100
100	RC 55	0.45	10410219	25
110	RC 55	0.45	10410224	25
142	RC 55	0.45	10410229	25
47	RC 58	0.2	10410312	100
50	RC 58	0.2	10410314	100
100	RC 58	0.2	10410319	25
47	RC 60	1	10410012	100
50	RC 60	1	10410014	100
<b>Filter sheets</b>				
300 × 600	RC 58	0.2	10410380	5

## Cellulose acetate membranes

**Cellulose acetate membranes, made from pure cellulose acetate, are suitable for biological and clinical analysis, sterility tests, and scintillation measurements.**

Cellulose acetate membrane filters exhibit very low protein binding capacity. They are hydrophilic, therefore suitable for aqueous and alcoholic media. The cellulose acetate membranes have improved solvent resistance, particularly to low molecular weight alcohols, and increased heat resistance. With high physical strength, the membrane filters can be used up to 180°C, are suitable for hot gases, and can be sterilized by all methods without sacrificing the integrity of the membrane.



Cellulose acetate membrane (Type ST 68, 0.8 µm)

## Technical specifications

### Cellulose acetate membranes

Membrane type	Pore size (µm)	Thickness (µm)	Water flow rate $\Delta p = 0.9$ bar (s/100 mL/12.5 cm <sup>2</sup> )	Bubble point (psi)	Bubble point (bar)
OE 66	0.2	115	26	58	4
OE 67	0.45	115	12	45	3.1
ST 68	0.8	140	16	21.7	1.5
ST 69	1.2	140	12	13	0.9

## Ordering information

### Cellulose acetate membranes

Dimensions (mm)	Membrane type	Pore size (µm)	Catalog number	Quantity/pack
<b>Filter circles</b>				
25	OE 66	0.2	10404106	100
47	OE 66	0.2	10404112	100
50	OE 66	0.2	10404114	100
110	OE 66	0.2	10404126	50
142	OE 66	0.2	10404131	25
293	OE 66	0.2	10404139	25
13	OE 67	0.45	10404001	100
25	OE 67	0.45	10404006	100
47	OE 67	0.45	10404012	100
50	OE 67	0.45	10404014	100
<b>85</b>	OE 67	0.45	10404044	50
110	OE 67	0.45	10404026	50
142	OE 67	0.45	10404031	25
47	ST 68	0.8	10403112	100
47	ST 69	1.2	10403012	100
<b>Filter sheets</b>				
300 × 600	OE 66	0.2	10404180	5

# Cellulose nitrate membranes

**Recommended for most routine applications, this membrane is manufactured under strictly controlled conditions. Cellulose nitrate membrane filters provide a very narrow pore size distribution, high flow rate and low levels of extractables.**

## Higher strength and flexibility

Most membranes are inherently brittle and difficult to handle; it is not uncommon for filters to be damaged during loading into holders or while in use. Cellulose nitrate membrane filters have improved flexibility and are made to tolerate rough handling, loading and autoclaving without sacrificing integrity. These membranes are among the strongest of their type available, as measured and compared by burst pressure tests.

## Low extractable levels

The level of extractables in membrane filters has become more important with advances in filtration and adsorption techniques. In particular, pharmaceutical, immunological and biomedical tissue culture and trace analysis applications can be adversely affected by high extractable levels. Cellulose nitrate membrane filters have a low level of extractables, generally below that of other membranes of a similar type.

## Narrow pore size distribution

One of the major features of membrane filters is the narrow distribution of pore sizes. The rated pore size of these membranes is closely managed due to our advanced manufacturing and control system. Additionally, the batch-to-batch variation is minimized, providing more consistent laboratory results.

## Increased temperature stability

Membrane filters are normally autoclaved at 121°C without loss of integrity. Cellulose nitrate membranes are supplied as circles, sheets, or reels.

## Reduced shrinkage

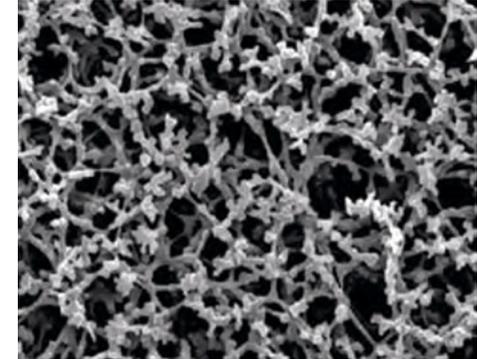
Membranes exhibit a low shrinkage during autoclaving. Excessive shrinkage can cause problems during autoclaving and is often the cause of membranes tearing in their holders after autoclaving. It may also cause a reduction in flow rate and total throughput.

## Features and benefits

- Narrow pore size distribution for improved surface capture and analysis
- Low levels of extractables to ensure sample integrity

## Applications

- Sample preparation
- Microbiological studies
- Filtration of aqueous solutions



Cellulose acetate membrane (Type ST 68, 0.8 µm)

## Filter types

### White plain filters

This is the standard membrane filter for the majority of laboratory applications involving particles and cells in the range of 0.1 µm to 12.0 µm. The residue after filtration is found to be almost completely on the surface of the membrane and allows physical recovery of deposits and microscopic examination.

### Gridded filters

Gridded filters make it easier to count particles, microorganisms and colonies. If a gridded membrane is required, please see mixed cellulose ester membranes.

## Technical specifications

### Cellulose nitrate membranes

Thickness	105–140 µm
Weight	3.6–5.5 mg/cm <sup>2</sup>
Maximum service temperature	80°C
Porosity	66–84%
Steam autoclavable	Yes
Hydrophilic	Yes

## Typical applications

### Cellulose nitrate membranes

Field of application	Pore size (µm)
<b>General</b>	
Microfiltration	0.1
Ultracleaning	0.1
Sterilizing*	0.2
Bulk bacterial removal	0.45
Analytical precipitates	0.65
Clarifying filtration	1.0
Particle removal	5.0

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2 µm or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).

## Typical applications

### Cellulose nitrate membranes (continuation)

Field of application	Pore size (µm)
<b>Water microbiology and analysis</b>	
Bacterial colony count	0.45 (gridded)—see mixed cellulose ester membranes
Sediment analysis	0.45
Suspended particles	5.0
<b>Air pollution monitoring</b>	
Asbestos monitoring (NIOSH)	0.8
<b>Food and beverage QC</b>	
<i>E. coli</i> and coliforms	0.45 (gridded)—see mixed cellulose ester membranes
Total bacteria count	0.2 (gridded)—see mixed cellulose ester membranes
<b>Tissue culture</b>	
Mycoplasma removal	0.1
Sterile* filtration	0.2

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2 µm or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).

## Ordering information

### Cellulose nitrate membranes

Dimensions (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
<b>Filter circles</b>				
13	0.2	7182-001	Plain (white)	100
13	0.45	7184-001	Plain (white)	100
25	0.1	7181-002	Plain (white)	100
25	0.2	7182-002	Plain (white)	100
25	0.45	10401106	Plain (white)	100
25	0.45	7184-002	Plain (white)	100
25	0.8	7188-002	Plain (white)	100
25	1.0	7190-002	Plain (white)	100
25	3.0	7193-002	Plain (white)	100
25	5.0	7195-002	Plain (white)	100
25	5.0	10400206	Plain (white)	100
25	8.0	10400106	Plain (white)	100
37	0.8	7188-003	Plain (white)	100
47	0.1	7181-004	Plain (white)	100

## Ordering information

### Cellulose nitrate membranes (continuation)

Dimensions (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
47	0.1	10402012	Plain (white)	100
47	0.2	7182-004	Plain (white)	100
47	0.2	10401312	Plain (white)	100
47	0.2	10401320	Plain (white)	50
47	0.45	7184-004	Plain (white)	100
47	0.45	10401170	Plain (white), sterile	100
47	0.45	10401112	Plain (white)	100
47	0.65	7186-004	Plain (white)	100
47	0.8	7188-004	Plain (white)	100
47	1.0	7190-004	Plain (white)	100
47	3.0	7193-004	Plain (white)	100
47	5.0	7195-004	Plain (white)	100
47	5.0	10400212	Plain (white)	100
47	8.0	10400112	Plain (white)	100
47	12.0	10400012	Plain (white)	100
50	0.1	10402014	Plain (white)	100
50	0.2	10401314	Plain (white)	100
50	0.45	10401114	Plain (white)	100
50	0.45	7184-005	Plain (white)	100
50	1.2	7191-005	Plain (white)	100
50	5.0	10400214	Plain (white)	100
50	8.0	10400114	Plain (white)	100
50	8.0	10405079	Plain (white), with hydrophobic rim	100
50	12.0	10400014	Plain (white)	100
85	0.45	10401122	Plain (white)	50
90	0.2	7182-009	Plain (white)	25
90	0.45	10401118	Plain (white)	50
90	0.45	7184-009	Plain (white)	25
90	0.8	7188-009	Plain (white)	25
90	5.0	7195-009	Plain (white)	25
100	0.45	10401121	Plain (white)	50
110	0.45	10401126	Plain (white)	50
142	0.2	7182-014	Plain (white)	25
142	0.45	7184-014	Plain (white)	25
142	0.45	10401131	Plain (white)	25
142	1.2	7191-014	Plain (white)	25

# Mixed cellulose ester membranes

Mixed cellulose ester membranes are composed of cellulose acetate and cellulose nitrate. They characteristically have a smoother, more uniform surface than pure nitrocellulose filters, and the cellulose acetate in the composition provides better characteristics for handling with forceps or placing into filter funnels. Mixed cellulose ester membranes are well-suited for particle counting, microbiological examination, and environmental monitoring applications.

## Eased counting process

When counting microbial colonies, particulate or fibers, select a colored membrane to provide a good contrasting background.

## Plain or gridded

Mixed cellulose ester membrane is available in a variety of diameters and colors, plain or with gridlines. Many microbiological techniques use gridlines to assist in keeping track while counting colonies, or as a way to estimate total counts. Grid lines use a nontoxic ink in a unique broken pattern designed to neither inhibit nor enhance colony growth. Select plain membrane for most other environmental methods that require no gridlines or rely on the graticule in the microscope eyepiece.

## Sterile filters

Mixed cellulose ester membranes are available in non-sterile and sterile packaging. Choose from individual sealed discs of membrane or dispenser pack compatible with the eButler Membrane Dispenser.

## Features and benefits

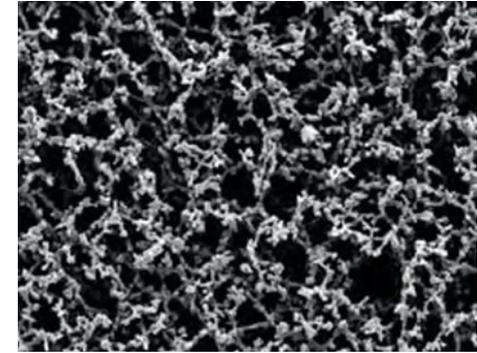
- Sterile options available for microbiology or critical applications.
- Color selection provides excellent contrast for easier colony or particulate counting.
- Grid lines are nontoxic and do not inhibit bacterial growth, ensuring sample integrity.
- Biologically inert with good thermal stability.
- Microporous structure of membrane gives high flow rates and high particulate-loading capacity.

## Applications

The membrane is particularly effective in applications requiring higher flow rates and larger volume filtration, including clarification or sterilization\* of aqueous solutions, particulate analysis and removal, air monitoring and microbial analysis. Other applications include:

- Cytology
- HPLC samples (aqueous)
- Biological assays
- Food microbiology, including enumeration of *E. coli* in foods
- Bacteriological studies
- Particle counting from liquids and aerosols
- Yeasts and molds

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2  $\mu\text{m}$  or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).



Mixed cellulose ester membrane

## MembraClear

The MembraClear PCM filter is designed for asbestos sampling for examination by phase contrast microscopy. Asbestos sampling isolates these fibers from circulating air to determine concentrations.

## Technical specifications

### Mixed cellulose ester membranes

Burst strength	> 10 psi
Weight	4.3–5.0 mg/cm <sup>2</sup>
Maximum service temperature	130°C
Porosity	74–77%
Steam autoclavable	Yes
Solvent resistance	Medium
Protein binding	Medium

## Product selection

### Mixed cellulose ester membranes

Membrane type	Pore size (µm)	Thickness (µm)	Water flow rate Δp = 0.9 bar (s/100 mL/12.5 cm <sup>2</sup> )	Air flow rate Δp = 3 mbar (s/100 mL)	Bubble point (psi)	Bubble point (bar)
<b>ME product range</b>						
ME 24	0.2	135	20	–	53.6	3.7
ME 25	0.45	145	12.5	–	40.6	2.8
ME 26	0.6	135	48	21	27.6	1.9
ME 27	0.8	140	2.8	11.6	18.8	1.3
ME 28	1.2	140	2	9.3	11.6	0.8
ME 29	3	150	1.2	6.7	10.2	0.7

## Ordering information

### Mixed cellulose ester membranes

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
<b>ME range—ME 24, plain</b>				
25	0.2	10401706	Plain	100
47	0.2	10401712	Plain	100
47	0.2	10401770	Plain	100
50	0.2	10401714	Plain	100
50	0.2	10401772	Plain, sterile	100
100	0.2	10401721	Plain	50
110	0.2	10401726	Plain	50
142	0.2	10401731	Plain	25
<b>ME range—ME 25, plain</b>				
25	0.45	10401606	Plain	100
47	0.45	10401612	Plain	100
47	0.45	10401670	Plain	100
50	0.45	10401614	Plain	100
50	0.45	10401672	Plain	100
50	0.45	10401664	Plain, low C	100
90	0.45	10401618	Plain	50
100	0.45	10401621	Plain	50
110	0.45	10401626	Plain	50
142	0.45	10401631	Plain	25
<b>ME range—ME 26, plain</b>				
25	0.6	10401506	Plain	100
47	0.6	10401512	Plain	100
50	0.6	10401514	Plain	100
<b>ME range—ME 27, plain</b>				
25	0.8	10400906	Plain	100
37	0.8	10400909	Plain	100
47	0.8	10400912	Plain	100
50	0.8	10400914	Plain	100
100	0.8	10400921	Plain	50
<b>ME range—ME 28, plain</b>				
25	1.2	10400806	Plain	100
47	1.2	10400812	Plain	100
50	1.2	10400814	Plain	100
100	1.2	10400821	Plain	50

## Ordering information

### Mixed cellulose ester membranes (continuation)

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
<b>ME range—ME 29, plain</b>				
25	3	10400706	Plain	100
47	3	10400712	Plain	100
50	3	10400714	Plain	100
50	3	10400772	Plain, sterile	100
<b>ME range—ME 24, gridded</b>				
47	0.2	10406970	White/black grid 3.1 mm, sterile	100
47	0.2	10408712	White/black grid 3.1 mm, sterile, for Membrane-Butler	400
50	0.2	10406972	White/black grid 3.1 mm, sterile	100
50	0.2	10408714	White/black grid 3.1 mm, sterile, for Membrane-Butler	400
<b>ME range—ME 25, gridded</b>				
47	0.45	10406812	White/black grid 3.1 mm	100
47	0.45	10407970	White/black grid 3.1 mm, sterile	100
47	0.45	10406871	White/black grid 3.1 mm, sterile	1000
47	0.45	10406512	White/black grid 5 mm	100
47	0.45	10409770	Black/white grid 3.1 mm, sterile	100
47	0.45	10409771	Black/white grid 3.1 mm, sterile	1000
47	0.45	10409414	Green/black grid 3.1 mm	1000
50	0.45	10406814	White/black grid 3.1 mm	100
50	0.45	10406572	White/black grid 5 mm, sterile	100
50	0.45	10409714	Black/white grid 3.1 mm	100
50	0.45	10409772	Black/white grid 3.1 mm, sterile	100
<b>ME range—ME 26, gridded</b>				
50	0.6	10409814	Black/white grid 3.1 mm	100
<b>ME range—ME 27, gridded</b>				
47	0.8	10408970	White/black grid 3.1 mm, sterile	100
47	0.8	10409970	White/black grid 3.1 mm with pad, sterile	100
50	0.8	10405672	Green/black grid 3.1 mm, sterile	100
<b>ME range—ME 28, gridded</b>				
50	1.2	10408472	Green/black grid 3.1 mm, sterile	100
<b>MembraClear</b>				
25	-	7141-025	Plain	100
47	-	7141-047	Plain	100

# PTFE membranes

Polytetrafluoroethylene (PTFE) membranes are chemically stable and inert. They are suitable for applications involving aggressive organic solvents, strong acids and alkalis. PTFE membranes are particularly suitable for preparing samples for HPLC analysis. This hydrophobic membrane is laminated onto a nonwoven polypropylene support web, providing strength and handling, making it an excellent choice for venting culture vessels or delivering filtered air or gas to instrumentation. Thermal stability allows filtration or environmental sampling up to 120°C.

## Chemically stable and inert

PTFE is the membrane of choice for use with aggressive solvents, liquids, and gases that can attack other membranes. It is resistant to most acids, alkalis, and solvents.

## Applications

One of the major applications for the PTFE membrane is the clarification of corrosives, solvents, and aggressive fluids. With excellent chemical compatibility and low extractables, PTFE membrane is a good choice for HPLC mobile phase or sample filtration where any solid particles can cause permanent damage to the column. PTFE membrane is often used for venting, filtration of air or gas, or pump protection. Choose 1.0 and 5.0 µm pore sizes for better air flow in systems with less risk of direct fluid interface. Select 0.2 or 0.45 µm for applications where aerosol and direct fluid contact are possible, such as between fluid traps and pumps or house vacuum. For critical applications where sterile<sup>1</sup> venting is required, choose 0.2µm pore size.

## WTP and TE membrane ranges

WTP membranes use a polypropylene grid as the support material whereas the TE range uses a randomly arranged polypropylene support material.

## Technical specifications

### PTFE membranes

Membrane type	Nominal thickness (µm)	Porosity (%)	Liquid flow rate Δp = 0.9 bar (s/100 mL/12.5 cm <sup>2</sup> )	Liquid flow rate @ 10 psi vacuum (mL/min/cm <sup>2</sup> )	Air flow rate Δp = 3 mbar (s/100 mL)	Air flow rate @ 10 psi vacuum (L/min/cm <sup>2</sup> )	Bubble point (psi)	Bubble point (bar <sup>†</sup> )	Max. temp. (°C)
<b>TE range</b>									
0.2 µm (TE 35)	240	-	24*	-	70	-	19	1.31	100
0.45 µm (TE 36)	220	-	12*	-	60	-	10.9	0.75	100
1.0 µm (TE 37)	275	-	5.4*	-	24	-	5.9	0.41	100
5.0 µm (TE 38)	265	-	2.2*	-	3.5	-	1	0.07	100
<b>WTP range</b>									
0.2 µm	130	72	-	61.4**	-	4.5	14.1	0.97	120
0.5 µm	120	74	-	110**	-	7.5	8.5	0.59	120
1.0 µm	90	76	-	445**	-	17	4.3	0.3	120

\* Measured with ethanol

\*\* Measured with acetone

† Measured using 2-propanol

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2 µm or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).



PTFE Membrane Filters—TE Range

## Ordering information

### PTFE membrane circles

Diameter (mm)	Pore size (µm)	Catalog number	Quantity/pack
<b>WTP range</b>			
25	0.2	7582-002	100
25	1.0	7590-002	100
47	0.2	7582-004	100
47	0.5	7585-004	100
47	1.0	7590-004	100
<b>TE range—TE 35</b>			
25	0.2	10411405	50
47	0.2	10411411	50
50	0.2	10411413	50
<b>TE range—TE 36</b>			
25	0.45	10411305	50
47	0.45	10411311	50
50	0.45	10411313	50
<b>TE range—TE 37</b>			
25	1.0	10411205	50
47	1.0	10411211	50
50	1.0	10411213	50
<b>TE range—TE 38</b>			
37	5.0	10411108	50
47	5.0	10411111	50
50	5.0	10411113	50
90	5.0	10411116	25
150	5.0	10411130	25

# PM 2.5 air monitoring membrane

**A high-purity, thin PTFE membrane in a sequentially numbered, chemically resistant polypropylene support ring for PM 2.5 ambient air monitoring. Whatman™ PM 2.5 membranes have low tare mass for accurate gravimetric determinations.**

**The PM 2.5 PTFE membranes are manufactured under clean room conditions. These chemically resistant, low chemical background filters permit sensitive, interference-free determinations. No glues or adhesives are used in making these products.**

## Statement of conformance

PTFE Filters for EPA PM 2.5 Reference Method. Under the requirements of 40 U.S. Code of Federal Regulations (CFR) Part 50, Appendix L, shown below, the manufacturer must perform the following tests as listed.

Any filter manufacturer or vendor who sells or offers to sell filters specifically identified for use with this PM 2.5 reference method shall certify that the required number of filters from each lot (0.1% or 10, whichever is greater) offered for sale have been tested as specified and meet 90% of each of the design and performance specifications:

- Loose, surface particle contamination (drop test—weight loss stability)
- Temperature stability (temperature—weight loss stability)

Any filter manufacturer or vendor who sells or offers to sell filters specifically identified for use with this PM 2.5 reference method shall certify that a minimum number of 50 filters from each lot of filters offered for sale have been tested as specified for the following tests and meet 90% of each of the design and performance specifications:

- Filter type
- Filter diameter
- Filter thickness
- Filter pore size
- Support ring width
- Support ring thickness (total)
- Maximum pressure drop (clean filter)
- Maximum moisture pickup
- Collection efficiency
- Alkalinity
- Special requirements

These include trace metal analysis by X-ray fluorescence (XRF) and visual inspection for defects such as pinholes, support ring separation, chaff or flashing, loose material, discoloration, filter nonuniformity or any other obvious filter defect.

Every manufactured lot that is offered for sale, and is identified for use with the PM 2.5 reference method, conforms to EPA acceptance criteria.



PM 2.5 Air Monitoring Membrane Filters

## Technical specifications

PTFE filters for use in US EPA PM 2.5 ambient air monitoring

Property	Test method	Unit of measure	Value	Range
Filter media	N/A	N/A	PTFE	–
Filter thickness	–	µm	40	± 10
Filter diameter	Template	mm	46.2	± 0.25
Filter pore size	ASTM f 316-94	µm	2.0	Maximum
Support ring media	N/A	N/A	Polypropylene	–
Total support ring thickness	–	mm	0.38	± 0.04
Support ring width	Template	mm	3.68	± 0.00–0.51
Particle retention (0.3 µm)	ASTM D 2986-95a	%	99.7	Minimum
Pressure drop (0.3 µm) @ 16.67 L/min	ASTM D 2986-95a	cm water	30	Maximum
Alkalinity	Section 2.12 EPA/600/R-94/038b	µeq/g of filter	< 25	Maximum
Temperature weight loss stability	As above	µg	< 20	Maximum
Drop test weight loss stability	As above	µg	< 20	Maximum
Moisture weight gain stability	As above	µg	< 10	Maximum

## Maximum trace element concentration by X-ray fluorescence

Ion	ng/cm <sup>2</sup>										
Al	94.4	Sc	7.2	Ni	3.0	Br	2.0	Pd	9.6	Cs	25
Si	32.8	ti	13.8	Cu	2.8	Rb	2.0	Ag	9.6	Ba	32.2
P	22.6	V	4.8	Zn	2.2	Sr	2.2	Cd	10.8	La	87.6
S	13.4	Cr	2.2	Ga	1.8	Y	14.6	Sn	15.2	W	5
Cl	9.4	Mn	2.2	Ge	3.0	Zr	13.2	Sb	14.4	Au	4.4
K	5.6	Fe	5.8	As	2.8	Mo	11.6	Te	16.2	Hg	4.4
Ca	8.2	Co	4.0	Se	1.6	Rh	9.4	I	18.6	Pb	4.8

## Ordering information

PM 2.5 air monitoring membrane circles

Diameter (mm)	Pore size (µm)	Catalog number	Description	Quantity/pack
46.2	2.0	7592-104	With support ring, sequentially numbered	50

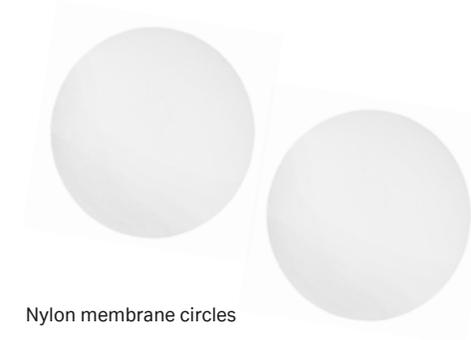
# Nylon membranes

High-quality nylon membranes are suitable for filtering aqueous solutions and most organic solvents. The membranes are suitable for use with a wide range of biological preparations and can be used where other membranes are unsuitable or difficult to use.

Nylon membranes are hydrophilic, eliminating the need for wetting agents that could be extracted when filtering aqueous solutions. The membranes are flexible, durable and tear resistant, and can be autoclaved at 135°C.

## Applications

- Filtration of aqueous and organic mobile phases
- Vacuum degassing
- Filtration of tissue culture media, microbiological media, buffers, and solutions



Nylon membrane circles

## Technical specifications

### Nylon membranes

Pore size (µm)	Thickness (µm)	Fiber releasing	Water flow rate @ 5 psi	Bubble point (psi)	Maximum temperature (°C)
0.2	150–187	No	> 50 mL/min	40–49	135
0.45	150–187	No	> 60 mL/min	34–42	135
0.8	137–200	No	> 180 mL/min	> 13	135
1.0	–	–	–	–	135

## Ordering information

### Nylon membrane circles

Diameter (mm)	Pore size (µm)	Catalog number	Quantity/pack
13	0.2	7402-001	100
13	0.45	7404-001	100
25	0.2	7402-002	100
25	0.45	7404-002	100
47	0.2	7402-004	100
47	0.45	7404-004	100
47	0.8	7408-004	100
47	1.0	7410-004	100
90	0.2	7402-009	50
90	0.45	7404-009	50

# Polyamide membranes

Polyamide membranes, made from pure polyamide, are the recommended filter for clarification and sterile\* filtration.

Polyamide membrane filters are mechanically very strong and exhibit excellent wet strength and dry strength. They are hydrophilic, therefore suitable for aqueous and organic solutions, and can be used up to 135°C.

## Applications

- Filtration of aqueous and organic mobile phases
- Vacuum degassing
- Filtration of tissue culture media, microbiological media, buffers, and solutions



Polyamide membrane circles

## Technical specifications

Polyamide membranes

Pore size (µm)	Nominal thickness (µm)	Water flow rate $\Delta p = 3$ mbar (bar) (mL/min/cm <sup>2</sup> )	Air flow rate $\Delta p = 0.9$ bar (mL/min/cm <sup>2</sup> )	Bubble point (bar)	Maximum temperature (°C)
0.2 (NL 16)	110	10	10	4.2	135
0.45 (NL 17)	110	20	20	2.8	135

## Ordering information

Polyamide membrane circles

Diameter (mm)	Pore size (µm)	Catalog number	Membrane type	Quantity/pack
25	0.2	10414006	NL 16	100
25	0.45	10414106	NL 17	100
47	0.2	10414012	NL 16	100
47	0.45	10414112	NL 17	100
50	0.2	10414014	NL 16	100
50	0.45	10414114	NL 17	100

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2 µm or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).

# Unsure on the best filter to use for your analytical method?

Here at Cytiva we have developed a 'standards and methods tool' to help you select the optimal filter for your requirements.

[cytiva.com/methodstool](https://www.cytiva.com/methodstool)

The image shows a person with a beard looking at a tablet displaying the Cytiva 'standards and methods tool' website. The screen shows a search for 'HPLC' and a table of results. A hand is pointing at the table.

Method #	Method name	Sample Type	Analytical Technique	Recommended filter	Buy now
AOAC 2004.07	Vitamin B6	Infant formula	HPLC	Puradisc Nylon, 0.45um	Buy now
AOAC 2005.06	Saxitoxin - STX Gr	Live and raw bivalve mollusci	HPLC	Puradisc PES, 0.45um	Buy now
AOAC 2011.02	Saxit	Bivalve molluscs	HPLC	Puradisc Nylon, 0.2um	Buy now
AOAC 2011.02		Bivalve molluscs	HPLC	Puradisc Nylon, 0.2um	Buy now
AOAC 2011.02		Bivalve molluscs	HPLC	Puradisc Nylon, 0.2um	Buy now
AOAC 2011.02		Bivalve molluscs	HPLC	Puradisc Nylon, 0.2um	Buy now
AOAC 2011.02	GTX1 - S		HPLC	Puradisc Nylon, 0.2um	Buy now
AOAC 2011.02	GTX2 - STX		HPLC	Puradisc Nylon, 0.2um	Buy now

# 03

# Filtration hardware and accessories

**Filter holders and accessories are designed for convenience and precision. Vacuum funnels are well suited for filtration in a range of applications. Funnels and bases have precision ground faces to ensure secure clamping and integral sealing, and graduated funnels have clearly printed scales. All glassware is 100% borosilicate glass and can be easily disassembled for cleaning, loading, and autoclaving.**

**A choice of filter supports is available depending on the intended application. The stainless steel screen is advised for proteinaceous solutions and glass frit types are recommended for general filtration and for biological analyses.**

**Syringe type holders are suited for filtering or clearing small amounts of liquid where a replaceable or removable filter is desired. Filter holders for pressure filtration are available in a variety of formats and sizes to accommodate a range of filter diameters.**

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# Glass microfiber filter accessories

## 3-piece filter funnel

The increased use of high-efficiency glass microfiber filters in modern laboratories has created a demand for simple and effective filter-holding systems. 3-Piece Filter Funnels have been designed to complement the range of fine particle retention, rapid flow rate glass microfiber filters.

### Functional design

Three-piece construction. The funnel is quickly dismantled, ready for the insertion of a new filter. The glass sealing flanges of the funnel and reservoir are ground flat to ensure a good filter seal.

### Positive filter clamping

All retained solids are deposited within the filter circle. Edge clamping prevents peripheral loss and possible passage of solution around, rather than through, the filter circle.

### Simple to clean

The parts can be quickly and efficiently cleaned because of the simplicity of the design.

### A choice of plates

For quick and easy filtration, 3-piece filter funnels are available with a choice of plates. They also come in several sizes to match your needs.

- **Acrylic plate:** Supplied as standard. Suitable for filtration of most aqueous solutions. Maximum working temperature 65°C.
- **Polypropylene plate:** Optional accessory. Recommended for most acids (except concentrated nitric acid and fuming sulfuric acid) at room temperature. Suitable for most alcohols, glycols, ethers, and ketones. Maximum working temperature 100°C.
- **PTFE plate:** Optional accessory. For virtually all common acids, alkalis and solvents at temperatures up to 100°C. Maximum working temperature 200°C.



3- piece filter funnel

## Ordering information

### 3-piece filter funnel

Filter dimensions (mm)	Catalog number	Reservoir volume (mL)	Effective filtration diameter (mm)	Effective filtration area (cm <sup>2</sup> )	Filter support plate diameter (mm)	Filter funnel height (cm)
25	1950-002	16	16	2	30	13.6
47	1950-004	36	32	8	47	12.1
70	1950-007	115	50	19.6	70	15.9
70	1950-017	210	50	19.6	70	20.8
70	1950-027	400	50	19.6	70	30
90	1950-009	200	70	38.5	90	17.9
125	1950-012	530	92	66.5	125	22

## Ordering information

### 3-piece filter funnel accessories

Dimensions (mm)	Catalog number			
	Polypropylene plates	PTFE plates	Replacement reservoirs	
47	-	1950-114	-	-
70	-	1950-117	1950-207*	1950-217***
90	1950-109	-	1950-209**	-

\* 115 mL

\*\* 200 mL

\*\*\* 210 mL

# Glass vacuum filtration devices

**Glass vacuum filtration devices come in two general styles: glass filtration assemblies and glass filter funnels. Both styles use a clamp to hold the upper funnel to the lower base, tightly sealing the filter in between to prevent fluid bypass. Borosilicate glass provides chemical compatibility and smooth surfaces for thorough cleaning. Selection of filter support is influenced by the nature of the fluid being filtered. Low particulate and low viscosity fluids filter well through in integrated porous glass support while high particulate, viscous or aggressive solvents may require a removable glass or stainless steel frit to allow for more aggressive cleaning procedures and/or better chemical compatibility.**

## Glass filtration assemblies

Glass filtration assemblies are designed in three pieces: upper funnel, lower base, and flask.

- Ideal for mobile phase filtration for analytical chemistry applications
- Selected for chemistry applications requiring minimized contact with multiple materials of construction
- Filter directly into a glass flask that can be removed and covered for analysis of filtrate, or retrieve filter for analysis of particulate collected
- Can be used for microbiological analysis by membrane filter (MF) technique

## Glass filter funnels

Filter funnels are designed in two pieces: upper funnel and lower base with stopper.

- Suitable for microbiological analysis by MF technique of water, beverages, pharmaceuticals, and personal care products.
- Versatile design allows individual filtration using a traditional side-arm Erlenmeyer flask or installation into a traditional 3- or 6-place manifold systems
- Variety of funnel sizes and membrane diameters to suit a range of applications from particulate and residue analysis to precipitation and biochemical studies



Glass filtration assembly



Glass filter funnel

## Technical specifications

### Glass vacuum filtration devices

Upper funnel, lower base, and flask	Borosilicate glass
Cap	Silicone
Frit	Glass D2
Sieve	Stainless steel, PTFE coated
Seals	PTFE and silicone
Clamps	Aluminum and stainless steel
Hose connection	POM, thread RD14

## Ordering information

### Glass vacuum filtration devices

Catalog number	Format; system	Membrane diameter	Funnel volume	Flask volume or Stopper size	Filter support
1960-002	Filter funnel	24-25 mm	25 mL	#5 Stopper	Integrated glass frit
1960-052	Filter funnel	24-25 mm	25 mL	#5 Stopper	Stainless steel with PTFE gasket
1960-032	Filter funnel	24-25 mm	50 mL	#5 Stopper	Integrated glass frit
1960-004	Filter funnel	47-50 mm	300 mL	#8 stopper	Integrated glass frit
1960-054	Filter funnel	47-50 mm	300 mL	#8 stopper	Stainless steel with PTFE gasket
1961-054	Filter funnel	-	300 mL	-	-
1960-009	Filter funnel	90 mm	1000 mL	#8 stopper	Integrated glass frit
10441000	Filter funnel; GV 025/0	24-25 mm	60 mL	-	Glass frit with PTFE centering ring
10441200	Filtration assembly	24-25 mm	60 mL	500 mL	Glass frit with PTFE centering ring
10442000	Filter funnel; GV 050/0	47-50 mm	250 mL	-	Glass frit with PTFE centering ring
10442100*	Filter funnel; GV 050/1	47-50 mm	250 mL	-	PTFE coated sieve with PTFE centering ring
10442200*	Filtration assembly	47-50 mm	250 mL	1 L	Glass frit with PTFE centering ring
10442300*	Filtration assembly	47-50 mm	250 mL	1 L	PTFE coated sieve with PTFE centering ring
10443000	Filter funnel; GV100/0	100 mm	500 mL	-	Glass frit with PTFE centering ring
10443100	Filter funnel; GV 100/1	100 mm	500 mL	-	PTFE coated sieve with PTFE centering ring

\* Supplied with silicone cap with air inlet



Different Glass Vacuum filtration devices

## Ordering information

### Accessories and spare parts

Catalog number	Description	Spare part for	Quantity/pack
1961-054	Upper funnel, 300 mL, glass	1960-004; 1960-054	1
10441001	Upper funnel, 60 mL, glass for GV 025	10441000; 10441200	1
10441002	Lower base, 25 mm, glass for GV 025	10441000	1
10441003	Glass frit for GV 025	10441000; 10441200	1
10441004	PTFE Centering ring, for GV 025	10441000; 10441200	1
10441005	Clamp, for GV 025	10441000; 10441200	1
10441201	Lower base assembly with tubing and NS 29 joint for GV 025	10441200	1
10441203	Flask with NS 29 joint for GV 025	10441200	1
10440004	Clamp, for GV 050	10442000; 10442100; 10442200; 10442300	1
10442001	Upper Funnel, 250 mL for GV 050	10442000; 10442100; 10442200; 10442300	1
10442002	Lower base, 50 mm for GV 050	10442000; 10442100	1
10442003	Glass frit for GV 050	10442000; 10442100; 10442200; 10442300	1
10442004	PTFE Centering ring, for GV 050	10442000; 10442100; 10442200; 10442300	1
10442006	Cover, silicone for GV 050	10442000; 10442100; 10442200; 10442300	1
10442101	Sieve, PTFE-coated stainless steel for GV 050	10442000; 10442100	1
10442212	Lower base assembly with tubing connection and NS 45 joint for GV 050	10442300	1
10442213	Flask with NS 45 joint for GV 050	10442300	1
10443001	Upper Funnel, 500 mL for GV 100	10443000; 10443100	1
10443002	Lower base, 100 mL for GV 100	10443000; 10443100	1
10443003	Glass frit, for GV 100	10443000	1
10443004	PTFE centering ring with 2 silicon o-rings for GV 100	10443000	1
10443005	Clamp with silicone o-ring for GV 100	10443000; 10443100	1
10443101	PTFE-coated support sieve, for GV 100	10443100	1
10443102	PTFE centering ring with 2 silicon o-rings for GV 100	10443100	1
10446004	Rubber stopper for GV 100	10443000; 10443100	1

## SF 100 Suction Flask

SF 100 Suction flask, 1000 mL with tubing nozzle, vacuum filtration apparatus accessories.

### Technical specifications

Vacuum filtration—SF 100 Suction Flask

#### Apparatus selection

Parameter	SF 100 Suction Flask
Capacity	1000 mL
Pack size	1 piece

### Ordering information

SF 100 Suction Flask

Catalog number	Description	Quantity/pack
10477600	SF 100 Suction flask	1
10471700	SV Vacuum tubing, 1 meter	1 piece



SF 100 Suction Flask

# Vacuum filtration equipment

## MV 050 series

The MV series vacuum filtration equipment is made of stainless steel, providing broad chemical compatibility and ease of cleaning for years of service.

The durable construction provides flexibility of use up to 200°C and is compatible with a variety of filtration media including glass microfiber, membrane or layered filtration.

### Applications

- Microbiology (e.g. *Escherichia coli* detection), biochemistry, hydrobiology
- Food and beverage testing, (e.g. cold sludge in beer), pharmaceuticals, cosmetics, water, wastewater
- Residue analysis, precipitate analysis, contamination tests.

### Technical specifications

Vacuum filtration—MV 050 series

#### Apparatus selection

Filter size	47/50 mm
Filter volume	100 or 500 mL
Filter area	12.5 cm <sup>2</sup>
Prefilter	40 mm diameter
Vacuum connection	Rubber stopper
Filter support	Sieve (frit as accessory)

#### Materials selection

Upper and lower parts	Stainless steel 1.4301
Cover	Stainless steel 1.4301
Frit	Stainless steel 1.4571
Sieve	Stainless steel 1.4301
Seals	PTFE and silicone
Clamps	Aluminum



MV 050/0



MV 050A/0

## Ordering information

### MV 050 series

Catalog number	Description	Quantity/pack
10440000	MV050/0 vacuum filtration apparatus, stainless steel, 500 mL, 47/50 mm	1
10440020	MV050A/0 vacuum filtration apparatus with rapid closure clamp, stainless steel, 500 mL, 47/50 mm	1

## Ordering information

### Accessories and spare parts

Catalog number	Description	Spare part for	Quantity/pack
10440001	Funnel, 500 mL	MV050/0	1
10440003	Support screen, stainless steel	MV050/0; MV050A/0	1
10440004	Clamp, aluminum	MV050/0	1
10440006	O-ring, silicone for lid	MV050/0; MV050A/0	1
10440102	Gasket, PTFE, sealing for support screen	MV050/0; MV050A/0	1
10471700	SV006 Vacuum tubing, 1 meter		1
10477600	SF Suction Flask		1

# Multiple vacuum filtration apparatus

## AS 300 and 600 series

The stainless steel manifold and manifold assemblies for three or six filtration units are fitted with stainless steel units. The apparatus can be autoclaved and sterilized by dry heat at up to 180°C. It is suitable for vacuum operation, not intended for positive pressure applications.

### Applications

- Microbiological quality control
- Residue analyses
- Serial filtration carried out rapidly and easily with a common drainage outlet

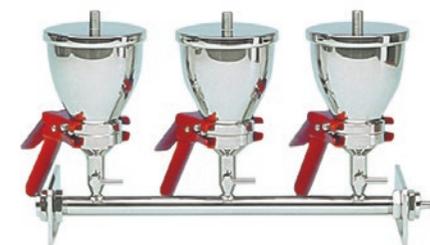
### Technical specifications

AS 300 and 600 series—multiple vacuum filtration apparatus

#### Apparatus selection

Filter size	47/50 mm
Filter volume	100 or 500 mL
Manifold	3 or 6 stopcocks and lower parts for individual choice of filter units
Filter support	Sieve (frit as accessory)
Vacuum connection	Tubing nozzle 9 mm (inside diameter)

*Multiple filtration apparatus complete and ready for use. Filters and prefilters sold separately.*



AS 300/3 showing standard clamp closure



AS 610/3 showing rapid clamp closure



Stainless steel 3-place manifold

## Ordering information

### Multiple vacuum filtration apparatus

Catalog number	Description	Quantity/pack
10445850	AS300/5 manifold assembly, stainless steel 100 mL, standard clamp closure	1
10445830	AS300/3 manifold assembly, stainless steel 500 mL, standard clamp closure	1
10445835*	AS310/3 manifold assembly, stainless steel 500 mL, rapid clamp closure	1
10498761**	Stainless steel filter funnel 3-place manifold, use with up to three manifold assemblies	1
<b>Six-place filtration</b>		
10444850	AS600/5 manifold assembly, stainless steel 100 mL, standard clamp closure	1
10444830	AS600/3 manifold assembly, stainless steel 500 mL, standard clamp closure	1
10444835*	AS610/3 manifold assembly, stainless steel 500 mL, rapid clamp closure	1
10498762**	Stainless steel filter funnel 6-place manifold, use with up to six manifold assemblies	1

\* With rapid closure clamp

\*\* Recommended for use with funnels and #8 stopper, funnels not included

## Ordering information

### Spare parts

Catalog number	Description	Spare part for	Quantity/pack
10440003	Support screen, stainless steel	10445850; 10445830; 10445835; 10444850; 10444830; 10444835	1
10440004	Clamp, aluminum	10445850; 10445830; 10444850; 10444830	1
10440102	Gasket, PTFE, sealing for support screen	10445850; 10445830; 10445835; 10444850; 10444830; 10444835	1
10471700	SV006 Vacuum tubing, 1 meter	10445850; 10445830; 10445835; 10444850; 10444830; 10444835	1
10464103	Steel frit with ring	10445850; 10445830; 10445835; 10444850; 10444830; 10444835	1
10440001	Funnel, 500 mL	10445830; 10445835; 10444830; 10444835	1
10440006	O-ring, silicone for lid	10445830; 10445835; 10444830; 10444835	1

# Inline and syringe type filter holders

## Stainless steel filter holders

Stainless steel filter holders provide broad compatibility in a durable stainless steel housing for repeated cleaning and reuse. The housings accommodate a range of filter media for applications that include particulate removal, venting, HPLC sample prep, clarification or sterilization.\* These housings are well suited for applications for which retrieval of the membrane filter and concentrated particulate is essential. Autoclave with membrane in place for applications requiring a sterile device.

Syringe filter holders have female Luer lock inlets and male Luer outlets compatible with typical syringes. Inline holders have hose barb inlet and outlet for tubing connections. Knurled edges assist in tightening and loosening the devices.

## Ordering information

### Stainless steel filter holders

Filter diameter (mm)	Catalog number	Description	Quantity/pack
<b>Membrane holders</b>			
13	1980-001	Stainless steel syringe filter holder	1
25	1980-002	Stainless steel syringe filter holder	1
25	10460100	FM025/0 stainless steel, syringe filter holder*	1
50	10464100	ML050/0 stainless steel, inline filter holder	1

\* Filter supports for 10460100 are not removeable from the holder



Syringe type holders

## Polysulfone filter holders

Durable polysulfone plastic construction provides moderate chemical compatibility with lighter weight than stainless steel filter holders. Polysulfone filter holders are often used for clarification, sterilization\*, venting applications and particulate removal or collection from aqueous or air or gas streams. FP025/1 25 mm size is available only as a syringe filter holder with female Luer lock (FLL) inlet and male Luer (ML) outlet. FP050 is available with either FLL inlet and MLL outlet or hosebarb inlet and outlet.

### Ordering information

#### Polysulfone filter holders

Filter diameter (mm)	Catalog number	Description	Quantity/pack
25	10461000	FP025/1: FLL inlet, ML outlet	10
50	10461100	FP050/0; FLL inlet, hose barb outlet	1
50	10461200	FP050/0; FLL inlet, hose barb outlet	5
50	10461300	FP050/1; hose barb inlet and outlet	1
50	10461400	FP050/1; hose barb inlet and outlet	5

FLL—Female Luer lock

ML—Male Luer lock

### Ordering information

#### Spare parts

Catalog number	Description	Spare part for	Quantity/pack
10453007	Connector hose barb (9 mm) with 3/8" MNPT	10464100	1
10464103	Support frit, stainless steel	10464100	1
10461118	Hose barb connection	10461100; 10461200; 10461300; 10461400	1
10450009	O-ring, silicone for membrane seal	10461100; 10461200; 10461300; 10461400	1

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2  $\mu\text{m}$  or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).



Polysulfone filter holders

## Pop-Top and Swin-Lok plastic filter holders

Cost effective, reusable filter holders for general filtration applications, especially when retrieval of the membrane is required. Simple easy filtration using typical syringes.

### 13 mm Pop-Top syringe filter holder

- Unique sealing design requires no additional gasket.
- Inexpensive alternative to 13 mm stainless steel filter holders.

### 25 mm Swin-Lok filter holder

- Chemically compatible polypropylene construction is suitable for solvent filtration and HPLC applications.
- Tabs on assembly ring and base assist with secure tightening of the device.
- Inlaid o-ring and anti-twist tabs on inlet cap assure leak-free sealing without damage to the filter.

### 47 mm Swin-Lok filter holder

- Durable polycarbonate construction with matching, bidirectional filter support.
- Inlaid o-ring and anti-twist tabs on inlet cap assure leak-free sealing without filter damage.
- Flat sealing gasket and tightening ridges assist tightening of assembly ring for secure seal of filter to prevent bypass.



Pop-Top and Swin-Lok plastic filter holders

## Technical specifications

### Pop-Top and Swin-Lok plastic filter holders

Materials	13 mm Pop-Top	25 mm Swin-Lok	47 mm Swin-Lok
Holder	Polycarbonate	Polypropylene	Polycarbonate
Maximum operating temperature and pressure	38°C at 3.5 bar (50 psi)	38°C at 3.5 bar (50 psi)	38°C at 3.5 bar (50 psi)
Autoclave sterilization	121°C at 15 psi for 15 min.	121°C at 15 psi for 15 min	121°C at 15 psi for 15 min
Size (cm)	2.7 OD × 2.7 H	3.5 OD × 3.7 H	6.0 OD × 6.5 H
Membrane size (mm)	13	25	47
Prefilter size (mm)	10	22	42
Filter surface area (cm <sup>2</sup> )	0.8	3.5	11.3
<b>Connection</b>			
Cap	Female Luer slip	Female Luer lock	Multipurpose: straight female Luer (accepts male Luer or 1/4" tubing) with threaded base (1/4" MNPT)
Base	Male Luer	Male Luer	Multipurpose: straight female Luer (accepts male Luer or 1/4" tubing) with threaded base (1/4" MNPT)

## Ordering information

### Pop-Top and Swin-Lok plastic filter holders

Diameter (mm)	Catalog number	Description	Quantity/pack
13	420100	Pop-Top holder	10
25	420200	Swin-Lok holder	10
47	420400	Swin-Lok holder	8

# Pressure filtration devices

Cytiva offers a line of analytical pressure filtration equipment with sample loading cylinders that provide flexibility for sample processing. The stainless steel construction provides broad compatibility. For particularly aggressive solvents and caustic materials, select the PTFE 142 mm device. Compatible for use with a range of filter media including paper, glass fiber and membrane filters.

## Applications

- Suitable for analysis of soils and other solids for which you need to use pressure to drive the fluid component through a filter medium to analyze chemical content of the filtrate.
- Subject solids loaded into the cylinder to various fluids to characterize the extractables leaching from the solid under study.
- Maintain pressure on a sample being filtered so that evaporation doesn't affect the content of the sample during filtration.
- Use for polymer solutions that require steady pressure over the length of filtration time.

## Technical specifications

### Pressure filtration devices

Series	Material	Seals	Max pressure* (bar)	Max temperature resistance (°C)	Filter diameter (mm)	Prefilter diameter (mm)
MD 050	Stainless steel	Silicone/PTFE	10/4	200	50	43
MD 142/5	Stainless steel	Silicone/PTFE	10/4	200	142	134
MD 142/7	PTFE	PTFE	3.5	200	142	134

\* With silicone o-ring/PTFE o-ring



142 mm pressure filtration holder, PTFE



142 mm pressure filtration holder, SS

## Ordering information

### Pressure filtration devices

Catalog number	Description	Quantity/pack
<b>Stainless steel</b>		
10450450	MD 050/4, 200 mL, 230 × 70 mm with rapid seal	1
10451610	MD 142/5/3, 2200 mL, 545 × 200 mm	1
<b>PTFE</b>		
10451710	MD 142/7/3, 1500 mL, 470 × 200 mm	1

## Ordering information

### Accessories and spare parts

Catalog number	Description	Spare part for	Quantity/pack
10450009	MD 050 o-ring, silicone for membrane seal	10450450	1
10450003	MD 050 support screen, stainless steel	10450450	1
10453001	Quick Closure Coupling for SV 003 c pressure hose (10471101)	10450450; 10451610; 10451710	1
10453007	Compression fitting, ferrule external diameter 9-11 mm, for pressure hoses	10450450; 10451610; 10451710	1
10471101	SV 003c pressure hose; maximum 10 bar; connector SVK/R 3/8"; ID 6mm; length 1.5 m	For use with connector 10453001	1
10450004	MD 050 support sieve	10450450	1
10451414	MD 142/5/3 closure clamp	10451610	1
10452003	MD 142 support screen	10451610; 10451710	1
10452004	MD 142 support sieve	10451610; 10451710	1
10452005	MD 142/5/3 back pressure sieve	10451610	1
10452006	MD 142 o-ring, silicone	10451610; 10451710	1

# Membrane prefilters and separators

The life of a membrane filter can be extended many times by placing a prefilter adjacent to or upstream of the membrane. The total particulate load challenging the membrane is considerably reduced thus allowing the membrane to operate efficiently.

Glass microfiber filters are used as prefilters for membranes. The outstanding properties of borosilicate glass microfibers mean the filters offer high loading capacity and retention of very fine particulates.

The Multigrade GMF 150, used as a prefilter, nearly doubles the volume of sample filtered compared to a single density prefilter. Compared to an unprotected membrane, the volume of sample filtered is three to seven times greater. Conventional prefilters cannot perform in the same way as the Multigrade GMF 150 simply because prefilters of a uniform density do not have the same loading capacity. For highly particulate loaded samples, the performance of GMF 150 filters is outstanding.

## Technical specifications

### Glass microfiber prefilter circles

Prefilter diameter (mm)	Pore size (µm)	Catalog number			Quantity/pack
		Multigrade GMF 150	Grade GF/B (fine)	Grade GF/D (coarse)	
10	2.7	-	-	1823-010	100
25	1.0	-	1821-025	-	100
25	2.7	-	-	1823-025	100
35	2.7	-	-	1823-035	100
37	1.0	-	1821-037	-	100
42.5	1.0	-	1821-042	-	100
42.5	2.7	-	-	1823-042	100
47	1.0	-	1821-047	-	100
47	2.0	1842-047	-	-	40
47	2.7	-	-	1823-047	100
90	1.0	1841-090	-	-	20
90	2.0	1842-090	-	-	20
90	1.0	-	1821-090	-	25
90	2.7	-	-	1823-090	25
125	1.0	-	1821-125	-	25
125	2.7	-	-	1823-125	25
142	2.7	-	-	1823-142	25
257	2.7	-	-	1823-257	25

For further information on these grades please refer to the Filter Papers section.



Glass Microfiber Filters, Binder Free

# Polyester drain discs

Use these drain discs with hardware where extra support is needed, or between membrane filters to improve flow rate and throughput. The polyester drain disc is binder free and has a thickness of 100 µm. It provides a flat surface to prevent filter tearing or rupturing of a filter when placed below, or used as a separator between membrane layers in serial stack filtration applications. This chemically inert support disc is available in a variety of diameters for use in a range of devices.

## Applications

- General laboratory microfiltration.
- Support for membranes such as polycarbonate track etched filters.
- For use under membrane filter to prevent imprinting of hardware support structure during filtration, facilitate sealing, and to aid in channeling fluid flow through entire effective filtration.
- Use between membrane filters to facilitate fluid flow between membrane layers.

## Ordering information

### Polyester drain discs

Diameter (mm)	Catalog number	Filter support	Quantity/pack
10	230300	Polyester	100
22	230500	Polyester	100
25	230600	Polyester	100
37	230800	Polyester	100
47	231100	Polyester	100
90	231200	Polyester	100
142	232310	Polyester	100
293	232300	Polyester	100



Polyester Drain Disc

## eButler membrane dispenser

### Aseptic dispense, clean workspace

The eButler membrane dispenser is an aseptic membrane filter dispenser that offers ways to boost lab productivity while minimizing waste and clutter. Designed to accept a continuous web of sterile, individually sealed membrane filters, it offers aseptic dispensing of each disc while containing the waste on spindles for easy clean up.

- Push-button or sensor dispense.
- Durable and easy-to-load guides are printed right on the equipment.
- Complete membrane selection of pores sizes, colors and 47 or 50 mm diameters is available.
- Membrane identification is easy to read with every dispense.
- Maintain a tidy workspace free of packaging material.

### Ordering information

#### eButler membrane dispenser

Catalog number	Description	Use	Quantity/pack
10477103	eButler membrane dispenser	Automatic dispense of filters	1



eButler membrane dispenser

# Accessories and vacuum filtration apparatus

## Vacuum pump

Vacuum pumps are typically used in laboratory settings to facilitate filtration with funnels and flasks or manifolds for microbiological examination, analytical mobile phase filtration, aspiration of tissue culture media, and various other filtration applications requiring vacuum draw.

## Features

- Diaphragm pump intended for use with fluid trap collection and compatible with systems filtering water or typical HPLC solvent filtration\*
- For intermittent use under ambient conditions (10°C–40°C)\*
- Lightweight and compact pump for easy movement around the lab while using minimal workspace on the benchtop or in the hood

## Witt's bottle WT 100

For filtrate collection in an inserted container. The bottle is made of borosilicate glass. It has a replaceable round lid and side-mounted tubing nozzle for vacuum tubing 8 mm (inside diameter).

## Forceps PZ 001

The stainless steel forceps with smooth angled jaws (104 mm long) are excellent for handling membrane filters. They are autoclavable and can be flame sterilized with ethanol.



Witt's Bottle WT 100 and Forceps PZ 001

\* This pump is not intended for fluid flow-through applications nor continuous pumping exceeding an hour of constant service

## Technical specifications

### Witt's bottle WT 100

Apparatus selection	Vacuum (mbar absolute)
Size	100 mm diameter
Height	160 mm
Capacity	1000 mL
Vacuum connection	Tubing nozzle 8 mm (inside diameter)

## Ordering information

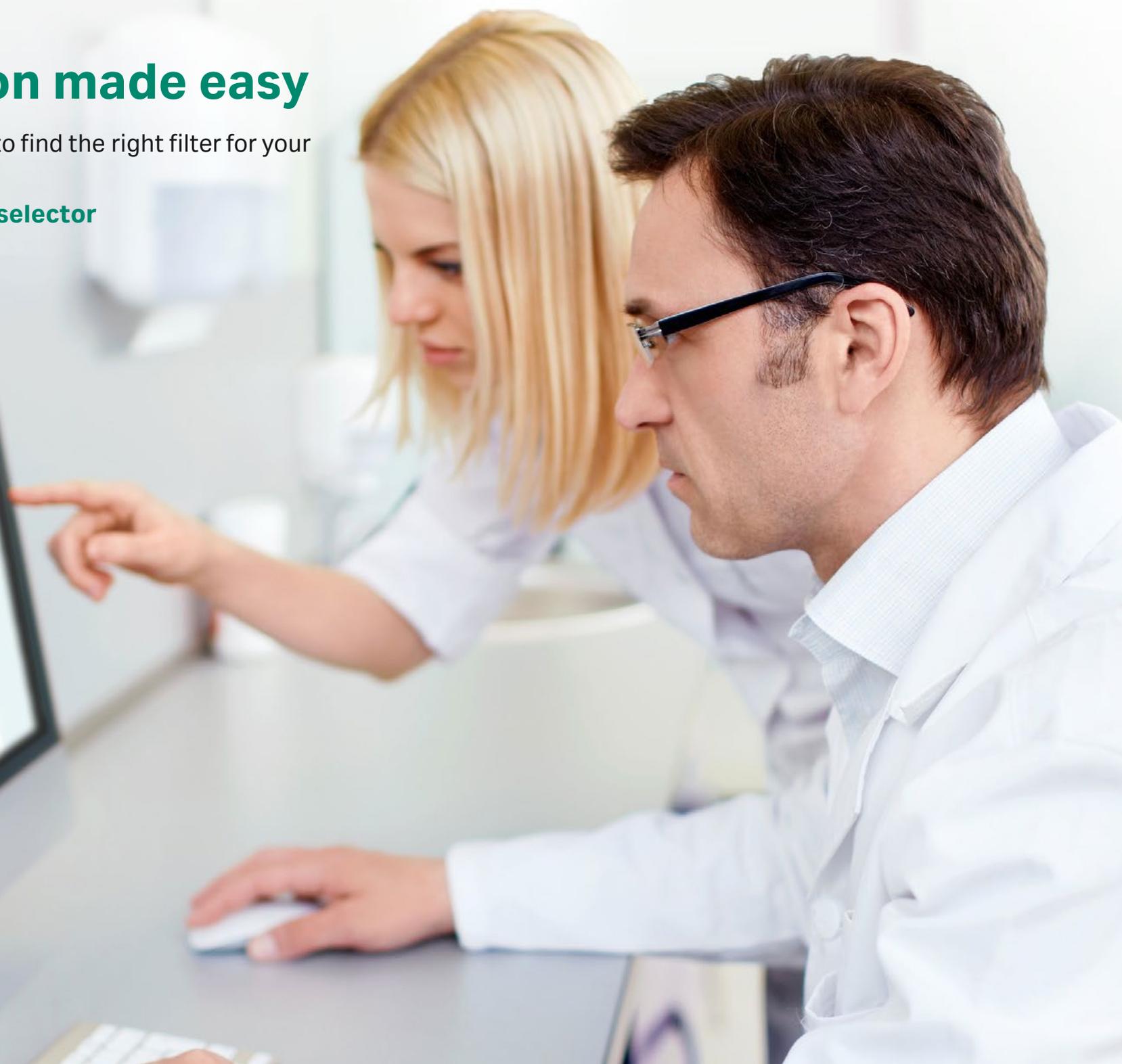
### Vacuum filtration apparatus accessories

Catalog number	Description	Quantity/pack
10477601	WT 100 Witt's flask, 1000 mL with tubing nozzle	1
10477600	SF 100 suction flask, 1000 mL with tubing nozzle	1
10471700	SV 006 vacuum tubing, 1 m length	1
10477602	PZ 001 forceps, stainless steel	1

# Filter selection made easy

Use our online filter selector to find the right filter for your sample and application.

[cytiva.com/whatmanfilterselector](https://www.cytiva.com/whatmanfilterselector)



# 04

# Filtration devices

**Disposable filtration devices are suitable for many types of samples and applications. They are available in a wide variety of membrane choices with polypropylene or polycarbonate housing, and utilize the most advanced construction methods and design features.**

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# Syringe filter selection guide

		Solvents											
		Aqueous											
		Hydrophilic					Hydrophobic						
		CN	CA	PES	GMF	NYL	PVDF	ANP	RC	H-PTFE	DpPP*	PP*	PTFE <sup>†</sup>
<b>High performance</b> The workhorse of the lab, these syringe filters deliver premium quality with efficiency to meet most analytical needs, from basic to advanced.	<b>Anotop™ syringe filters</b>							✓					
	<b>Puradisc™ syringe filters</b>	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
<b>Difficult filtration</b> For use with high-particulate and viscous samples, these syringe filters contain two or more filter layers to allow efficient filtration without blockage for a cost-effective and efficient solution.	<b>Anotop™ Plus syringe filters</b>							✓					
	<b>Whatman GD/X™ syringe filters</b>		✓	✓	✓	✓	✓		✓		✓	✓	✓
	<b>GD/XP</b>			✓		✓	✓				✓	✓	✓
<b>Automated systems</b> These sturdy syringe filters are compatible with most high throughput and/or dissolution systems.	<b>Roby</b>				✓	✓			✓				
	<b>850-DS</b>			✓	✓	✓	✓						✓
<b>Application specific</b> Dedicated uses: HPLC, IC and LC with certification; bioethanol and protein purification production; environmental samples prior to COD/DOC analysis.	<b>Anotop™ IC syringe filters</b>							✓					
	<b>Anotop™ LC syringe filters</b>							✓					
	<b>Puradisc™ Aqua syringe filters</b>		✓										
	<b>SPARTAN™ Certified syringe filters</b>								✓				
	<b>Protein Prep</b>								✓				
<b>All-in-One</b> Integrated devices include the collection receptacle to save time, reduce waste and reduce sample handling	<b>Autovial™ syringeless filters</b>		✓	✓	✓	✓	✓					✓	✓
	<b>UniPrep™ syringeless filters</b>				✓	✓	✓						✓
	<b>Mini-UniPrep™ syringeless filters</b>			✓	✓	✓	✓		✓		✓	✓	✓
	<b>Mini-UniPrep™ G2 syringeless filters</b>				✓	✓	✓		✓			✓	✓
<b>Advantage</b> Reliable quality, economical portfolio for basic applications.	<b>Uniflo™ syringe filters</b>			✓	✓	✓	✓			✓			✓
<b>Mobile phase</b> Inline filter devices for degassing solutions used as the carrier phase in analytical equipment.	<b>Aqueous IFD</b>					✓							
	<b>Solvent IFD</b>											✓	

ANP = Anopore™  
CA = Cellulose acetate  
CN = Cellulose nitrate

DpPP = Polypropylene depth filter  
GMF = Glass microfiber  
NYL = Nylon

PES = Polyethersulfone  
PP = Polypropylene  
H-PTFE = Hydrophilic Polytetrafluoroethylene

PTFE = Polytetrafluoroethylene  
PVDF = Polyvinylidene difluoride  
RC = Regenerated cellulose

\* Mildly Hydrophobic can be used for aqueous sample but exhibits elevated water breakthrough  
† Select PTFE for applications where prevention of water intrusion is critical

Visit [cytiva.com](https://www.cytiva.com) for additional selection guidance.

# Filter diameter and recommended volume

Syringe filters/Diameter	Puradisc™	Anotop™	Whatman GD/X™	GD/XP	Anotop™ Plus	Roby	850-DS	Puradisc™ Aqua	Anotop™ IC	Anotop™ LC	Spartan Certified	ProteinPrep	Uniflo™
4 mm for sample volume < 2 mL	●												
10 mm for sample volume 2 to 10 mL		●			●				●	●			
13 mm for sample volume 2 to 10 mL	●		●	●							●	●	●
25 mm for sample volume 10 to ~100 mL	●	●	●	●	●	●	●		●	●			●
30 mm for sample volume 10 to ~100 mL	●							●			●	●	

# Device media characteristics and properties

**The right choice of filter media for any given application or analytical technique is critical for optimal performance. Chemical compatibility, hydrophilic or hydrophobic nature, low extractables, low protein binding, high loading capacity (for high particulate samples) are all characteristics that need to be considered in filter media selection. Use the descriptions below to help guide your selection of the most appropriate solution for your sample type, application or technique.**

## **Cellulose acetate (CA)**

A hydrophilic membrane which exhibits very low protein binding characteristics. Generally used in applications involving filtration of proteinaceous suspensions, either for recovery or for analysis of proteins, amino acids etc. Limited compatibility with organic solvent, but can be used with some alcohols.

## **Cellulose nitrate (CN)**

A hydrophilic membrane, generally used for aqueous samples though may be used with some organic solvents such as aliphatic hydrocarbons. Not generally recommended for applications where low protein binding characteristics and maximum recovery of proteins or amino acids are required.

## **Nylon/polyamide (NYL)**

A hydrophilic membrane with resistance to a broad range of organic solvents and suitable for use with high pH samples. Not generally recommended for applications where low protein binding characteristics and maximum recovery of proteins or amino acids are required.

## **Polyethersulfone (PES)**

A hydrophilic membrane exhibiting low protein binding and low extractables. Suitable for filtration of aqueous samples and some compatible organic solvents. Especially well-suited for aqueous sample preparation where low protein binding is important, and for HPLCA sample preparation of aqueous suspensions.

## **Polyvinylidene difluoride (PVDF)**

A hydrophilic membrane with good general chemical compatibility to a broad range of organic solvents and exhibiting low protein binding. Useful for filtering aqueous/organic suspensions, especially where minimal protein binding is required.

### **Polytetrafluoroethylene (PTFE)**

A hydrophobic membrane that is resistant to most organic solvents as well as strong acids and bases. Generally low protein binding and low in extractables. Main applications are the filtration of non-aqueous samples, especially where an inert nature and good chemical resistance are required such as for strong, aggressive organic solvents. Prior to filtering aggressive aqueous solutions, the membrane must be prewet with a water-miscible solvent such as methanol or IPA in order to allow aqueous suspension to pass.

### **Hydrophilic polytetrafluoroethylene (H-PTFE)**

A hydrophilic membrane that offers broad chemical resistance, low protein binding and low extractables and can be used for both aqueous and aggressive organic solvents. The inert nature and low extractables of hydrophilic PTFE makes it particularly suitable for uHPLC/HPLC sample preparation where a variety of different sample types may need to be prepared, as well as for many other applications requiring broad chemical resistance.

### **Regenerated cellulose (RC)**

A hydrophilic membrane that is resistant to a very wide range of solvents and exhibits low protein binding characteristics. The broad chemical resistance and low extractable nature of regenerated cellulose makes it an excellent choice for general HPLC sample preparation of samples suspended in either aqueous or organic solvents. The low protein binding character suits applications where minimal binding and maximizing recovery of proteins and amino acids are important.

### **Polypropylene (PP)**

A mildly hydrophobic membrane that offer broad chemical resistance to many organic solvents. Especially suited to filtration of aqueous/organic solvent suspensions.

### **Polypropylene depth filter (DpPP)**

A mildly hydrophobic filter with excellent flow rates and loading capacity and is compatible with both aqueous and organic solvents. This media is a good choice where increased loading capacity is required such as general clarification of samples.

### **Anopore™ (ANP)**

Anopore™, the membrane used in Anotop™ filters, is a hydrophilic membrane with excellent organic solvent compatibility, an inert nature and low extractables, making it very suitable for use with both aqueous and organic samples. The membrane has a well-defined pore structure and very narrow pore-size distribution making it especially suitable for critical applications and sample preparation. Not suitable for use with very acidic or very basic samples.

### **Glass microfiber/glass fiber (GMF/GF)**

Offers very broad chemical compatibility with organic solvents and strong acids (apart from hydrofluoric acid) and bases due to the inherent inert nature of glass microfiber. The physical structure of the glass microfiber filter matrix offers a combination of good loading capacity and high flow rates when compared to membrane filter media. Especially suited to use either as a prefilter or for general clarification of samples with high levels of particulates.

# Syringe filters

Disposable syringe filter devices provide fast and efficient filtration of aqueous and organic solutions. With a wide variety of membrane filters and polypropylene or polycarbonate housing, syringe filters are made with advanced methods and design features. These syringe filters are suitable for numerous applications in pharmaceutical, environmental, biotechnology, food and beverage, and agricultural testing laboratories.

Syringe filters are composed of either pure polypropylene or polycarbonate housing, and heat sealed without the use of glues or sealants.

## Product option overview

### Syringe filters

Syringe filter	Membrane	Diameter (mm)	Features
Puradisc™	CA, CN, RC, PTFE, H-PTFE, Nylon, PP, DpPP, PES, PVDF, GMF	4, 13, 25, 30	High Performance filters with the most options for membranes, diameters and applications
Anotop™	Anopore™	10, 25	Contains proprietary alumina-based membrane, extremely small pore size
Whatman GD/X™	CA, PTFE, Nylon, PP, PES, PVDF, GMF, RC	13, 25	Contains proprietary Whatman™ GMF150 prefiltration stack
GD/XP	Nylon, PVDF, PP, PES, PTFE, DpPP	25	Contains proprietary polypropylene prefiltration stack, suitable for inorganic ion analysis
Anotop™ Plus	Anotop™	10, 25	Contains proprietary alumina-based membrane, extremely small pore size with added benefit of GMF prefilter
Roby	Nylon, RC, GMF	25	Designed to be compatible with the major dissolution test systems
850-DS	PTFE, Nylon, PES, PVDF, GMF	25 (plate of 8)	Designed for use on Agilent 850-DS Dissolution Autosamplers
Puradisc™ Aqua	CA	30	Filter environmental samples prior to COD and DOC analysis
IC	Anopore™	10, 25	Designed for ion chromatography
LC	Anopore™	10, 25	Designed for low UV-absorbing extractables
HPLC Certified (Spartan)	RC	13, 30	Certified for low UV-absorbing extractables
ProteinPrep	RC	13, 30	For use with ÄKTA™ systems and protein samples
Whatman Uniflo™	Nylon, PES, PVDF, PTFE, H-PTFE	13, 25, 30	Advantage of Whatman™ performance, maximum value

CA—Cellulose acetate  
 CN—Cellulose nitrate  
 GMF—Glass Microfiber  
 PES—Polyethersulfone  
 PP—Polypropylene

PTFE—Polytetrafluoroethylene  
 H-PTFE—hydrophilic polytetrafluoroethylene  
 PVDF—Polyvinylidene difluoride  
 RC—Regenerated Cellulose  
 DpPP—Polypropylene depth filter

## Safety

These safety guidelines are applicable to ALL syringe filters.

Syringe use can result in high pressure. The smaller the syringe, the higher the pressure that can be generated. As a general guide, the following pressures can be obtained by hand with the syringes indicated:

- 20 mL: 30 psi (2 bar)
- 10 mL: 50 psi (3.4 bar)
- 5 mL: 75 psi (5.2 bar)
- 3 mL: 100 psi (6.9 bar)
- 1 mL: 150 psi (10.3 bar)

Individual users should determine the pressure they generate by hand with a specific size syringe and take appropriate safety precautions not to exceed the recommended rating for the device used. If the limitations are exceeded, the device may burst.

See appendix section for summary of typical properties, product availability and application guidance.

# High performance syringe filters

## Puradisc™ syringe filters

Puradisc™ syringe filters combine premium quality with high performance. They are used for the quick, efficient filtration of samples up to 100 mL volume.

Puradisc™ filters are produced from pigment-free polypropylene or polycarbonate with standard inlet (female Luer lock) and outlet (male Luer) connections (unless otherwise stated). Options include a sterile, medical-grade blister pack for critical applications and a special tube tip outlet that allows the sample to be accurately dispensed into a micro-vial, removing air lock.

### Features and benefits

- Pigment-free polypropylene (polycarbonate for Puradisc™ 30 mm and Puradisc™ Aqua filters)
- Standard inlet and outlet Luer connectors
- Optional sterile, medical-grade blister pack
- Tube-tip format (optional) for accurate dispensing into a micro-vial
- Choice of membrane or glass microfiber filter media
- Choice of filter sizes (4, 13, 25 or 30 mm) to minimize sample loss
- Sterile\* option for critical applications
- Wide range of membranes to suit different sample types

## Puradisc™ 4 filters

### Features

- 4 mm diameter syringe filter
- Sample volume up to 2 mL
- Low hold-up volume < 10 µL ensures maximum sample recovery
- Tube-tip format (optional)

### Applications

- High performance liquid chromatography (HPLC) samples containing low solid content: filtration will improve column life.
- Capillary electrophoresis (CE) samples: filtration will remove spurious peaks.
- Sterile\* filtration of low volume samples.
- UV/Vis samples: filter directly into cuvette using tube tip.
- Refractometry: filter samples to prevent damage to instrument optics and improve accuracy of results.
- Minimizes nonspecific binding to membrane (due to small membrane size).

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2 µm or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).

## Puradisc™ 13 filters

### Features

- 13 mm diameter syringe filter
- Sample volume up to 10 mL
- Low hold-up volume < 25 µL ensures maximum sample recovery
- Glass microfiber option available
- Tube-tip format (optional)

### Applications

- Biological sample preparation
- HPLC sample preparation



Puradisc™ 13 syringe filters with tube tip

## Puradisc™ 25 filters

### Features

- 25 mm diameter syringe filter
- Sample volume up to 100 mL
- Low hold-up volumes for maximum sample recovery
- Glass microfiber option available

### Applications

- HPLC aqueous sample preparation
- Biological sample preparation
- Buffer solutions
- Salt solutions
- Tissue culture media
- Irrigation solutions
- Sterile\* isolation



Puradisc™ 25 syringe filters

## Puradisc™ 30 filters

### Features

- 30 mm diameter
- Larger filtration area (44% greater in comparison with 25 mm)
- Designed for aqueous and non-aqueous samples



Puradisc™ 30 syringe filters

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2 µm or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).

## Technical specifications

### Puradisc™ syringe filters

	Puradisc™ 4	Puradisc™ 13	Puradisc™ 25	Puradisc™ 30
Housing	Polypropylene	Polypropylene	Polypropylene	Polycarbonate/Polypropylene
Filtration area	0.2 cm <sup>2</sup>	1.3 cm <sup>2</sup>	4.2 cm <sup>2</sup>	5.7 cm <sup>2</sup>
Maximum pressure	75 psi (5.2 bar)	75 psi (5.2 bar)	75 psi (5.2 bar)	100 psi (6.9 bar)
Volume hold-up full housing with air purge	< 10 µL	< 25 µL	< 100 µL	< 50 µL
Dimensions	10.1 × 23.5 mm	16.3 × 19.8 mm	22.9 × 28.4 mm	26 × 34 mm
Weight	0.55 g	0.95 g	2.7 g	4.7 g
Volume throughput	Up to 2 mL	Up to 10 mL	Up to 100 mL	Up to 100 mL
Inlet connection	Female Luer lock	Female Luer lock	Female Luer lock	Female Luer lock
Outlet connection	Male Luer	Male Luer	Male Luer	Male Luer
Sterilization	Autoclave at 121°C (131°C max)			

## Ordering information

### Puradisc™ 4 mm syringe filters

Pore size (µm)	Catalog number			Quantity/pack
	Nylon	PVDF	PTFE	
<b>Nonsterile with tube tip</b>				
0.2	-	6777-0402	-	50
0.45	-	6777-0404	-	50
<b>Sterile without tube tip</b>				
0.2	6786-0402	6791-0402	-	50
<b>Nonsterile without tube tip</b>				
0.2	6789-0402	6779-0402	6784-0402	100
0.2	6790-0402	6792-0402	6783-0402	500
0.45	6789-0404	6779-0404	6784-0404	100
0.45	6790-0404	6792-0404	6783-0404	500

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

## Ordering information

### Puradisc™ 13 mm syringe filters (nonsterile)

Pore size (µm)	Catalog Number									Quantity/pack
	CA	Nylon	PES	PVDF	PP	PTFE	GMF	RC	H-PTFE	
<b>With tube tip</b>										
0.2	-	-	-	6777-1302	-	6775-1302	-	-	-	50
0.2	-	-	-	-	-	10463703	-	-	-	100
0.45	-	-	-	6777-1304	-	6775-1304	-	-	-	50
0.45	-	-	-	-	-	10463713	-	-	-	100
<b>Without tube tip</b>										
0.1	-	6789-1301	-	-	-	6784-1301	-	-	-	100
0.2	-	6789-1302	6782-1302	6779-1302	6788-1302	6784-1302	-	6756-1302	6772-1302	100
0.2	-	6790-1302	-	6792-1302	6785-1302	6783-1302	-	6757-1302	6773-1302	500
0.2	-	6768-1302	-	6765-1302	-	6766-1302	-	6758-1302	6774-1302	2000
0.45	6771-1304	6789-1304	6782-1304	6779-1304	6788-1304	6784-1304	-	6756-1304	6772-1304	100
0.45	-	6790-1304	6781-1304	6792-1304	6785-1304	6783-1304	6818-1304	6757-1304	6773-1304	500
0.45	-	6768-1304	-	6765-1304	-	6766-1304	-	6758-1304	6774-1304	2000
1.0	-	-	-	-	-	6784-1310	-	-	-	100
5.0	-	-	-	-	-	6784-1350	-	-	-	100
GF/F 0.7*	-	-	-	-	-	-	6825-1307	-	-	100
GF/B 1.0*	-	-	-	-	-	-	6821-1310	-	-	100
GF/C™ 1.2*	-	-	-	-	-	-	6822-1312	-	-	100
GF/A 1.6*	-	-	-	-	-	-	6820-1316	-	-	100
GF/A 1.6	-	-	-	-	-	-	6806-1316	-	-	500
GF/D 2.7*	-	-	-	-	-	-	6823-1327	-	-	100
934-AH™ 1.5*	-	-	-	-	-	-	6827-1315	-	-	100

\* Particle retention rating

CA—Cellulose acetate

GMF—Glass microfiber

PES—Polyethersulfone

PP—Polypropylene

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

RC—Regenerated cellulose

H-PTFE—Hydrophilic PTFE

## Ordering information

Puradisc™ 13 mm syringe filters (sterile)

Pore size (µm)	Catalog number			Quantity/pack
	PVDF	PES	RC	
<b>Without tube tip</b>				
0.2	6791-1302	6780-1302	10462940	50
0.45	6791-1304	6780-1304	-	50
<b>With tube tip</b>				
0.2	6778-1302	-	10462945	50

PES—Polyethersulfone

PVDF—Polyvinylidene difluoride

RC—Regenerated cellulose



## Ordering information

### Puradisc™ 25 mm syringe filters

Pore size (µm)	Catalog Number									Quantity/pack
	Nylon	PES	PVDF	PP	PTFE	H-PTFE	GMF	DpPP	RC	
<b>Sterile</b>										
0.2	-	6780-2502	-	-	-	-	-	-	-	50
0.2	-	6794-2512	-	-	-	-	-	-	-	1000
0.45	-	6780-2504	-	-	-	-	-	-	-	50
0.45	-	6794-2514	-	-	-	-	-	-	-	1000
1.0	-	6780-2510	-	-	-	-	-	-	-	50
<b>Nonsterile</b>										
0.1	-	-	-	-	6784-2501	-	-	-	-	50
0.1	-	-	-	-	6798-2501	-	-	-	-	1000
0.2	6750-2502	-	6746-2502	6786-2502	6784-2502	6772-2502	-	-	6756-2502	50
0.2	6751-2502	6781-2502	6747-2502	6788-2502	6785-2502	6773-2502	-	-	6757-2502	200
0.2	6753-2502	6794-2502	-	6790-2502	6798-2502	6774-2502	-	-	6758-2502	1000
0.45	6750-2504	-	6746-2504	-	6784-2504	6772-2504	-	6786-2504	6756-2504	50
0.45	6751-2504	6781-2504	6747-2504	-	6785-2504	6773-2504	-	6788-2504	6757-2504	200
0.45	6752-2504	-	-	-	-	-	-	-	-	500
0.45	6753-2504	6794-2504	6749-2504	-	6798-2504	6774-2504	-	6790-2504	6758-2504	1000
0.7 GF/F*	-	-	-	-	-	-	6825-2517	-	-	50
0.7 GF/F*	-	-	-	-	-	-	6825-2527	-	-	200
0.7 GF/F*	-	-	-	-	-	-	6787-2520	-	-	1000
1.0	6750-2510	-	-	-	6784-2510	-	-	-	-	50
1.0	6751-2510	6781-2510	-	-	-	-	-	-	-	200
1.0	6753-2510	6794-2510	-	-	6798-2510	-	-	-	-	1000
1.0 GD 1*	-	-	-	-	-	-	6783-2510	-	-	100
1.0 GD 1*	-	-	-	-	-	-	6792-2510	-	-	1000
2.0 GD 2*	-	-	-	-	-	-	6783-2520	-	-	100

\* Particle retention rating

DpPP—Polypropylene depth filter

GD—Graded density

GMF—Glass microfiber

H-PTFE = Hydrophilic PTFE

PES—Polyethersulfone

PP—Polypropylene

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

RC = Regenerated cellulose

## Ordering information

### Puradisc™ 30 mm syringe filters

Media/housing	Catalog number					Connection in/out	Quantity/pack
	CA / PC	CN / PC	PTFE/PP	PTFE/PC	RC/PP		
Pore size (µm)							
0.2	10462200*	-	10463500*	-	-	FLL/ML	50
0.2	10462701	-	-	-	10462960*	FLL/ML	50
0.2	10462205*, **	-	-	-	-	FLL/MLL	50
0.2	10462710	-	10463503	-	-	FLL/ML	100
0.2	10462700	-	10463505	10462300*	-	FLL/ML	500
0.2	10462206	-	-	-	-	FLL/MLL	500
0.45	10462100*	-	-	-	10462950*	FLL/ML	50
0.45	10462601	-	-	-	-	FLL/ML	50
0.45	10462610	-	10463513	-	-	FLL/ML	100
0.45	10462600	-	10463515	-	-	FLL/ML	500
0.8	10462241	-	-	-	-	FLL/ML	50
0.8	10462240*	-	-	-	-	FLL/ML	50
0.8	10462243	-	-	-	-	FLL/ML	500
1.0	-	-	10463523	-	-	FLL/ML	100
1.0	-	-	10463525	-	-	FLL/ML	500
1.2	10462260*	-	-	-	-	FLL/ML	50
1.2	10462261	-	-	-	-	FLL/ML	50
1.2	10462263	-	-	-	-	FLL/ML	500
5.0	-	10462000*	-	-	-	FLL/ML	50
5.0	-	10462520	-	-	-	FLL/ML	50
5.0	-	10462510	10463533*	-	-	FLL/ML	100
5.0	-	10462500	10463535	-	-	FLL/ML	500

\* Sterile

\*\* Endotoxin-free according to LAL test (USPXXII), sensitivity: 0.25 EU/mL

CA—Cellulose acetate  
 CN—Cellulose nitrate  
 FLL—Female Luer lock  
 ML—Male Luer  
 MLL—Male Luer lock  
 PC—Polycarbonate  
 PP—Polypropylene  
 RC—Regenerated cellulose



Puradisc™ syringe filters

# Puradisc™ 30 mm GF92

The Puradisc™ 30 mm GF92 range of syringe filters has been designed for the prefiltration of difficult-to-filter aqueous or organic solutions containing particles.

## Ordering information

Puradisc™ 30 mm GF92 filters

Diameter (mm)	Pore size $\mu\text{m}$	Catalog number	Media/housing	Connection (in/out)	Color code	Quantity/pack
30	> 1.0	10463545	GF92/PP	FLL/ML	Natural	500
30	> 1.0	10463543	GF92/PP	FLL/ML	Natural	100

FLL—Female Luer lock

GF—Glass fiber

ML—Male Luer

PP—Polypropylene

# Anotop™ syringe filters

Filters contain the proprietary alumina-based Anopore™ membrane and are supplied in three pore sizes. Anotop™ filters can be used with most organic solvents and aqueous materials.

## Anotop™ 10 filters

### Features and benefits

- 10 mm diameter syringe filter
- Inorganic membrane
- Capillary pore structure
- Low protein binding
- Filters sample volume up to 10 mL
- Low hold-up volume < 20  $\mu\text{L}$  ensures maximum sample recovery
- Sterile formats are available for critical applications

## Anotop™ 25 filters

### Features

- 25 mm diameter syringe filter
- Filters sample volume up to 100 mL

### Applications

- Cold sterilization\* of growth media
- Phage and virus filtration
- Removal of high molecular weight proteins or polymers
- Liposome extrusion
- Filtration of solvents for spectroanalysis and analytical sample preparation

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2  $\mu\text{m}$  or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).



Anotop™ 10 syringe filters, sterile

## Technical specifications

### Anotop™ syringe filters

	Anotop™ 10	Anotop™ 25
Housing	Polypropylene	Polypropylene
Filtration area	0.78 cm <sup>2</sup>	4.78 cm <sup>2</sup>
Maximum pressure	100 psi (6.9 bar)	100 psi (6.9 bar)
Volume hold-up	< 20 µL	< 150 µL
Prefilter type	N/A	N/A
Membrane diameter	10 mm	25 mm
Membrane type	Anopore™	Anopore™
Average membrane thickness	60 µm	60 µm
Device width	15.4 mm	36.8 mm
Device length	18.5 mm	26.3 mm
Device shape	Hexagonal	Hexagonal
Construction process	Thermal weld	Thermal weld
Inlet connection	Female Luer lock	Female Luer lock
Outlet connection	Male Luer	Male Luer
Protein adsorption	Low	Low
Extractable materials	Low	Low
Cytotoxicity	Non-cytotoxic	Non-cytotoxic



Anotop™ 25 syringe filters

## Ordering information

### Anotop™ syringe filters

Pore size (µm)	Media	Catalog number	Quantity/pack
<b>Anotop™ 10</b>			
0.02	Anopore™	6809-1002	50
0.1	Anopore™	6809-1012	50
0.2	Anopore™	6809-1022	50
0.02	Anopore™, sterile	6809-1102	50
0.1	Anopore™, sterile	6809-1112	50
0.2	Anopore™, sterile	6809-1122	50
<b>Anotop™ 25</b>			
0.02	Anopore™	6809-2002	50
0.1	Anopore™	6809-2012	50
0.2	Anopore™	6809-2022	50
0.2	Anopore™	6809-2024	200
0.02	Anopore™, sterile	6809-2102	50
0.1	Anopore™, sterile	6809-2112	50
0.2	Anopore™, sterile	6809-2122	50

# Difficult to filter

## Whatman GD/X™ syringe filters

The Whatman GD/X™ range is specifically designed for difficult to filter, high particulate loaded samples. Constructed of a pigment-free polypropylene housing with a prefiltration stack of Whatman™ GMF 150 (graded density) and GF/F glass microfiber media, these filters remove sample contamination and allow you to filter even the most difficult samples with less hand pressure. GD/X syringe filters can process three to seven times more sample volume than standard syringe filters.

GMF 150 and GF/F are produced from 100% borosilicate glass microfiber. Graded density GMF 150 medium has a coarse top layer meshed with a fine bottom layer that retains particles to 1.0 µm. A GF/F filter then retains particles down to 0.7 µm. The prefilter stack ends with a final membrane.

The filter construction facilitates exceptional loading capacity with fast flow rates. This prevents the build up of back pressure typically caused by the blocking of an unprotected membrane.

### Features and benefits

- 13 mm devices for samples up to 10 mL and 25 mm devices for samples greater than 10 mL. The volume of sample that can be filtered through each filter depends on the characteristics of the sample.
- Sterile options.
- Pigment-free polypropylene housing.
- Prefiltration stack of Whatman™ GMF 150 (graded density) and GF/F glass microfiber media.
- Minimizes sample contamination.
- Requires less hand pressure, even with the most difficult samples.
- Processes three to seven times more sample volume.

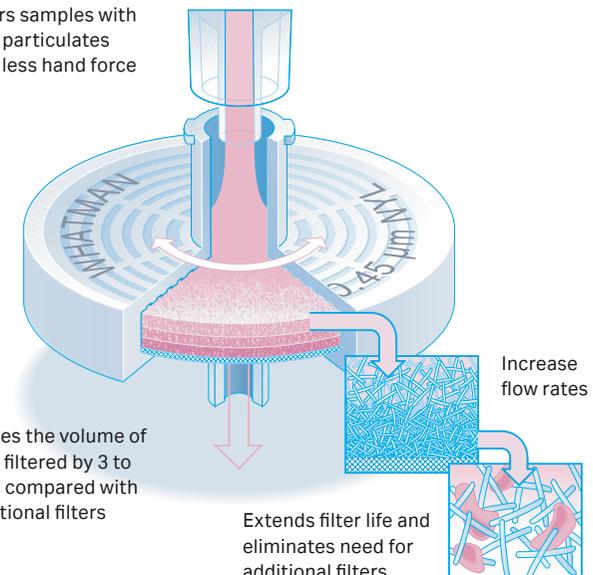
### Applications

Whatman GD/X™ syringe filters are excellent for heavily particulate-laden samples found in:

- Dissolution testing
- Content uniformity testing
- Concentration analysis
- Routine sample preparation
- Food analysis
- Environmental samples
- Composite assay



Filters samples with high particulates with less hand force



## Technical specifications

### Whatman GD/X™ syringe filters

	Whatman GD/X™ 13 mm	Whatman GD/X™ 25 mm
Housing	Polypropylene (pigment free)	Polypropylene (pigment free)
Filtration area	1.3 cm <sup>2</sup>	4.6 cm <sup>2</sup>
Maximum pressure	100 psi (6.9 bar)	75 psi (5.2 bar)
Volume hold-up*—full housing	0.5 mL	1.4 mL
—with air purge	50 µL (approx)	250 µL (approx)
Dimensions*	20.8 × 30.0 mm	20.8 × 30.0 mm
Weight	3 g (approx)	3 g (approx)
Flow direction	Flow should enter from the inlet	Flow should enter from the inlet
Inlet connection	Female Luer lock	Female Luer lock
Outlet connection	Male Luer	Male Luer
Sterilization	Autoclave at 121°C (131°C max) at 15 psi (1 bar) for 20 min	Autoclave at 121°C (131°C max) at 15 psi (1 bar) for 20 min
Glass microfiber prefiltration media	100% borosilicate glass fiber GMF 150 10 µm: 1 µm GF/F 0.7 µm	100% borosilicate glass fiber GMF 150 10 µm: 1 µm GF/F 0.7 µm

\* Housings are the same size but the filtration size is smaller

## Ordering information

### Whatman GD/X™ syringe filters

Pore size (µm)	Catalog number	Media	Quantity/pack
<b>Whatman GD/X™ 13 mm—nonsterile</b>			
0.2	6880-1302	CA	150
0.45	6880-1304	CA	150
0.2	6870-1302	Nylon	150
0.2	6871-1302	Nylon	1500
0.45	6870-1304	Nylon	150
0.45	6871-1304	Nylon	1500
0.2	6876-1302	PES	150
0.45	6876-1304	PES	150
0.2	6872-1302	PVDF	150
0.45	6872-1304	PVDF	150
0.45	6873-1304	PVDF	1500
0.2	6878-1302	PP***	150
0.45	6878-1304	PP***	150
0.2	6874-1302	PTFE	150
0.2	6875-1302	PTFE	1500
0.45	6874-1304	PTFE	150
0.45	6875-1304	PTFE	1500
1.6*	6882-1316	GF/A**	150
1.0*	6884-1310	GF/B**	150
1.2*	6886-1312	GF/C™**	150
2.7*	6888-1327	GF/D**	150
0.7*	6890-1307	GF/F**	150
0.45*	6894-1304	GMF	150
<b>Whatman GD/X™ 25 mm—nonsterile</b>			
0.45	6882-2504	RC	150
0.2	6888-2502	RC	1500
0.45	6883-2504	RC	1500
0.2	6880-2502	CA	150
0.45	6880-2504	CA	150
0.45	6881-2504	CA	1500
0.2	6869-2502	Nylon high charge (positive)	150
0.45	6869-2504	Nylon high charge (positive)	150
0.2	6870-2502	Nylon	150
0.2	6871-2502	Nylon	1500
0.45	6870-2504	Nylon	150

\* Glass microfiber particle retention rating

\*\* Contains GMF 150 without the GF/F prefilter

\*\*\* Mildly hydrophobic

CA—Cellulose acetate

GF—Glass fiber

GMF - Glass microfiber

PES—Polyethersulfone

PP—Polypropylene

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

RC—Regenerated cellulose

## Ordering information

### Whatman GD/X™ syringe filters

Pore size (µm)	Catalog number	Media	Quantity/pack
<b>Whatman GD/X™ 25 mm—nonsterile (continuation)</b>			
0.45	6871-2504	Nylon	1500
5.0	6870-2550	Nylon	150
5.0	6871-2550	Nylon	1500
0.2	6876-2502	PES	150
0.2	6905-2502	PES	1500
0.45	6876-2504	PES	150
0.45	6905-2504	PES	1500
0.2	6872-2502	PVDF	150
0.2	6873-2502	PVDF	1500
0.45	6872-2504	PVDF	150
0.45	6873-2504	PVDF	1500
0.2	6878-2502	PP	150
0.45	6878-2504	PP	150
0.45	6879-2504	PP	1500
0.2	6874-2502	PTFE	150
0.2	6875-2502	PTFE	1500
0.45	6874-2504	PTFE	150
0.45	6875-2504	PTFE	1500
1.6*	6882-2516	GF/A**	150
1.6*	6883-2516	GF/A**	1500
1.0*	6884-2510	GF/B**	150
1.2*	6886-2512	GF/C <sup>TM</sup> ***	150
2.7*	6888-2527	GF/D**	150
0.7*	6890-2507	GF/F**	150
0.7*	6891-2507	GF/F**	1500
0.45*	6894-2504	GMF**	150
0.45*	6895-2504	GMF**	1500
1.5*	6892-2515	934-AH <sup>TM</sup> ***	150
<b>Whatman GD/X™ 25 mm—sterile</b>			
0.2	6896-2502	PES	50
0.45	6896-2504	PES	50
0.2	6900-2502	PVDF	50
0.45	6900-2504	PVDF	50
0.45*	6902-2504	GMF**	50
0.2	6901-2502	CA	50
0.45	6901-2504	CA	50

\* Glass microfiber particle retention rating

\*\* Contains GMF 150 without the GF/F prefilter

\*\*\* Mildly hydrophobic

CA—Cellulose acetate

GF—Glass fiber

GMF - Glass microfiber

PES—Polyethersulfone

PP—Polypropylene

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

RC—Regenerated cellulose

# GD/XP syringe filters

GD/XP disposable syringe filters are suitable for use with samples that require inorganic ion analysis, as levels of ion extractables are minimized. They are also an alternative choice for users requiring a filter that exhibits extremely low protein binding characteristics.

GD/XP syringe filters contain a two-layer prefilter stack comprised of 20 µm and 5 µm polypropylene filters. The last stage of filtration is by membrane, which is positioned below the prefilter stack.

## Applications

- HPLC sample preparation
- Trace metal analysis
- Sample preparation prior to determination of dissolved heavy metals

## Technical specifications

### GD/XP syringe filters

	GD/PX 13 mm
Housing	Polypropylene (pigment free)
Filtration area	4.6 cm <sup>2</sup>
Maximum pressure	75 psi (5.2 bar)
Volume hold-up full housing with air purge	1.4 mL 250 µL (approx)
Dimensions	20.8 × 30.0 mm
Weight	3 g (approx)
Flow direction	Flow should enter from the inlet
Inlet connection	Female Luer lock
Outlet connection	Male Luer
Sterilization	Autoclave at 121°C (131°C max) at 15 psi (1 bar) for 20 min
Prefiltration media	PP 20 µm: 5 µm

## Ordering information

### GD/XP syringe filters

Diameter (mm)	Pore size (µm)	Catalog number	Media	Hydrophilic	Quantity/pack
25	0.45	6970-2504	Nylon	Yes	150
25	0.45	6971-2504	Nylon	Yes	1500
25	0.45	6994-2504	PES	Yes	150
25	0.45	6995-2504	PES	Yes	1500
25	0.45	6972-2504	PVDF	Yes	150
25	0.45	6973-2504	PVDF	Yes	1500
25	0.45	6978-2504	PP	No	150
25	0.45	6992-2504	DpPP	No	150
25	0.45	6974-2504	PTFE	No	150
25	0.45	6993-2504	DpPP	No	1500

*DpPP*—Polypropylene depth filter

*PES*—Polyethersulfone

*PP*—Polypropylene

*PVDF*—Polyvinylidene difluoride

*PTFE*—Polytetrafluoroethylene



# Anotop™ 10 and Anotop™ 25 Plus

The Anotop™ Plus syringe filter offers the added benefit of an integral glass microfiber prefilter. This unit enables difficult and hard-to-filter solutions to be filtered without adversely affecting the filtration efficiency of the final membrane. This can remove the need for sample clean-up or expensive and time-consuming sequential filtration.

## Applications

- Filtration of tissue culture media
- Clean-up of difficult samples
- Filtration of colloidal material
- Removal of mycoplasma
- HPLC sample preparation
- Biological sample preparation

## Technical specifications

### Anotop™ syringe filters

	Anotop™ 10 Plus	Anotop™ 25 Plus
Housing	Polypropylene	Polypropylene
Filtration area	0.78 cm <sup>2</sup>	4.78 cm <sup>2</sup>
Maximum pressure	100 psi (6.9 bar)	100 psi (6.9 bar)
Volume hold-up	< 30 µL	< 200 µL
Prefilter type	Glass microfiber (binderless)	Glass microfiber (binderless)
Membrane diameter	10 mm	25 mm
Membrane type	Anopore™	Anopore™
Average membrane thickness	60 µm	60 µm
Device width	15.4 mm	36.8 mm
Device length	18.5 mm	26.3 mm
Device shape	Hexagonal	Hexagonal
Construction process	Thermal weld	Thermal weld
Inlet connection	Female Luer lock	Female Luer lock
Outlet connection	Male Luer	Male Luer
Protein adsorption	Medium/High	Medium/High
Extractable materials	Low	Low
Cytotoxicity	Non-cytotoxic	Non-cytotoxic



Anotop™ Plus syringe filters



Anotop™ 25 Plus Syringe Filters

## Ordering information

### Anotop™ syringe filters

Pore size (µm)	Media	Catalog number	Quantity/pack
<b>Anotop™ 10 Plus</b>			
0.02	Anopore™ with prefilter	6809-3002	50
0.1	Anopore™ with prefilter	6809-3012	50
0.2	Anopore™ with prefilter	6809-3022	50
0.02	Anopore™ with prefilter, sterile	6809-3102	50
0.1	Anopore™ with prefilter, sterile	6809-3112	50
0.2	Anopore™ with prefilter, sterile	6809-3122	50
<b>Anotop™ 25 Plus</b>			
0.02	Anopore™ with prefilter	6809-4002	50
0.1	Anopore™ with prefilter	6809-4012	50
0.2	Anopore™ with prefilter	6809-4022	50
0.02	Anopore™ with prefilter, sterile	6809-4102	50
0.1	Anopore™ with prefilter, sterile	6809-4112	50
0.2	Anopore™ with prefilter, sterile	6809-4122	50
0.2	Anopore™ with prefilter	6809-4024	200

# Filters for automated systems

## Roby 25 for robotic systems

Roby 25 syringe filters for robotic systems were developed specifically for automated sample filtration and are available with various membranes. For difficult-to-filter samples, Roby syringe filters are also available with an integral glass fiber prefilter.

The filter housing is made from mechanically stable polypropylene. The external geometry of the filter housing ensures simple and smooth filter transport from the storage turntable to the filtration site and easy filter changing.

### Features and benefits

- Optimized for automatic dissolution test systems
- Optimized for SOTAX™, Caliper (Zymark™), Varian™, and Erweka™ tablet tester systems
- Mechanically stable polypropylene
- Easy filter changing
- Ensures simple and smooth filter transport

### Applications

- Fine filtration of samples in the automatic tablet dissolution test
- Method development with the Roby 25 Filter Validation Kit



Roby Automated Filter Validation Kit

# Roby 25 Filter Validation Kit

The Roby 25 Filter Validation Kit includes step-by-step instructions for essential selection tests. Instructions include all important properties in an at-a-glance format.

## Features

- **Five types of filters:** five tubes each with 25 filters
- Filter validation protocol with filter selection aid



Roby 25 filters

## Ordering information

Roby 25 syringe filters for automation

Diameter (mm)	Pore size (µm)	Description	Catalog number	Media/ housing	Connection in/out	Color code	Quantity/ pack
25	0.45	Roby 25 NL	10463803	NYL/PP	FLL/ML	Yellow	200 <sup>1</sup>
25	0.45	Roby 25 NL	10463802	NYL/PP	FLL/ML	Yellow	1000
25	0.45	Roby 25 RC	10463806	RC/PP	FLL/ML	Translucent brown	1000
25	0.45	Roby 25 RC-GF92	10463809	RC-GF/PP	FLL/ML	Brown	200 <sup>1</sup>
25	0.45	Roby 25 RC-GF92	10463808	RC-GF/PP	FLL/ML	Brown	1000
25	0.7	Roby 25/GF55	10463814	GF/PP	FLL/ML	Natural	200 <sup>1</sup>
25	0.7	Roby 25/GF55	10463815	GF/PP	FLL/ML	Natural	1000
25	1.0	Roby 25/GF92	10463801	GF/PP	FLL/ML	Natural	200 <sup>1</sup>
25	1.0	Roby 25/GF92	10463800	GF/PP	FLL/ML	Natural	1000
25	–	Filter Validation Kit <sup>2</sup>	10463898	–	FLL/ML	–	1

<sup>1</sup> 8 tubes with 25 pieces each

<sup>2</sup> Filter Validation Kit includes: Roby 25 NL; Roby 25/RC; Roby 25/RC-GF92; Roby 25/GF55; Roby 25/GF92

ML—Male Luer

FLL—Female Luer lock

NYL—Nylon

PP—Polypropylene

RC—Regenerated cellulose

# 850-DS Channel Filter Plate

The 850-DS 8-Channel Filter Plate is a disposable plate for use in the Agilent™ 850-DS Dissolution Sampling Station, used for automated sample preparation in dissolution testing.

## Automated dissolution sample preparation for increased productivity

The filter plates are exclusively designed for use with the optional filter module on the Agilent 850-DS Dissolution Sampling Station to simplify filter replacement between timepoints. Reliable alignment of the liquid path increases productivity in two ways: First, by reducing the risk of jamming, and second, by reducing leaks that may occur with manual sampling or other dissolution sample preparation systems.

Save time and eliminate errors associated with manual sampling. Use 850-DS 8-channel filter plates in your Agilent™ 850-DS Dissolution Sampling Station.

- **Automated processing:** up to 8 samples simultaneously
- **Readily available:** in a wide range of pore sizes and materials

850-DS 8-channel filter plates have been developed in conjunction with Agilent™. They are available in a wide range of pore sizes and materials.

## Ordering information

### 850-DS 8-Channel Filter Plate

Pore size (µm)	Media	Catalog number	Quantity / pack
0.45	PTFE	7707-3000	50
0.45	Nylon	7707-3100	50
0.45	PES	7707-3200	50
0.7	GMF	7707-3300	50
0.2	PTFE	7707-3400	50
0.2	Nylon	7707-3500	50
0.2	PES	7707-3600	50
0.2	PVDF	7707-3700	50
0.45	PVDF	7707-3800	50
1.0	GMF	7707-3900	50



850-DS 8-Channel Filter Plate

# Application Specific Syringe Filters

## Puradisc™ Aqua filters

Puradisc™ Aqua syringe filters are specifically designed for filtration of environmental samples prior to Chemical Oxygen Demand (COD) and Dissolved Organic Carbon (DOC) analysis. The membranes used in these devices are prewashed prior to assembly of the filters to reduce the organic carbon level.

### Ordering information

Puradisc™ Aqua syringe filters

Pore size (µm)	Catalog number	Media/housing	Connection in/out	Color code	Quantity/pack
0.45	10462656	CA/PC	FLL/ML	White	50
0.45	10462655	CA/PC	FLL/ML	White	100
0.45	10462650	CA/PC	FLL/ML	White	500

CA—Cellulose acetate PC—Polycarbonate

FLL—Female Luer lock

ML—Male Luer

## Anotop™ IC filters

Anotop™ IC syringe filters for the preparation of samples for subsequent ion chromatography (IC) and HPLC analysis ensure very low levels of anion leaching.

### Features and benefits

- 10 mm and 25 mm diameter syringe filters
- Each batch certified for IC
- Enhanced consistency of analytical results
- Extended column life
- Certified low levels of anion leaching for improved results

### Applications

- Ion chromatography sample preparation
- HPLC sample preparation



Puradisc™ Aqua filters



Anotop™ IC syringe filter

# Anotop™ LC filters

Use Anotop™ LC syringe filters for simple and effective preparation of samples prior to HPLC. These syringe filters preserve the life of your column by efficiently removing particulates from your analytical samples. Because the Anotop™ LC syringe filter is made from pigment-free polypropylene and the Anopore™ inorganic membrane, you can be sure that after filtration the level of extractable UV absorbing compounds is minimal.

## Features

- Better consistency of analytical results and longer column life
- Extremely low levels of UV absorbing compounds for better HPLC results
- Easy to use with a wide range of sample types



Anotop™ LC syringe filter

## Technical specifications

### Anotop™ syringe filters

	Anotop™ 10 IC filters	Anotop™ 10 LC filters	Anotop™ 25 IC filters	Anotop™ 25 LC filters
Housing	Polypropylene	Polypropylene (pigment free)	Polypropylene	Polypropylene (pigment free)
Filtration area	0.78 cm <sup>2</sup>	0.78 cm <sup>2</sup>	4.78 cm <sup>2</sup>	4.78 cm <sup>2</sup>
Maximum pressure	100 psi (6.9 bar)	100 psi (6.9 bar)	100 psi (6.9 bar)	100 psi (6.9 bar)
Volume hold-up with air purge	< 20 µL	< 20 µL	< 150 µL	< 150 µL
Membrane diameter	10 mm	10 mm	25 mm	25 mm
Construction process	Thermal weld	Thermal weld	Thermal weld	Thermal weld
Extractable materials	Negligible	Negligible	Negligible	Negligible
Average membrane thickness	60 µm	60 µm	60 µm	60 µm
Device width	15.4 mm	15.4 mm	36.8 mm	36.8 mm
Device length	18.5 mm	18.5 mm	26.3 mm	26.3 mm
Inlet connection	Female Luer lock	Female Luer lock	Female Luer lock	Female Luer lock
Outlet connection	Male Luer	Male Luer	Male Luer	Male Luer
Membrane type	Anopore™	Anopore™	Anopore™	Anopore™

## Technical specifications

### Anotop™ IC syringe filters

Anion	Level (ppb)	Anion	Level (ppb)
Fluoride	< 10	Phosphate	< 75
Chloride	< 15	Nitrite	< 30
Bromide	< 20	Nitrate	< 30
Sulfate	< 30	-	-

Typical average anion leaching levels in 18 MΩ × cm (MegaOhm × cm) water at 20°C

## Ordering information

### Anotop™ IC and Anotop™ LC syringe filters

Pore size (µm)	Membrane	Catalog number	Quantity / pack
<b>Anotop™ 10 IC</b>			
0.2	Anopore™	6809-9233	100
0.2	Anopore™	6809-9234	200
<b>Anotop™ 25 IC</b>			
0.2	Anopore™	6809-9244	200
<b>Anotop™ 10 IC blister</b>			
0.2	Anopore™	6809-9232	50
0.2	Anopore™	6809-9235	250
<b>Anotop™ 10 LC</b>			
0.2	Anopore™	2001-0100	100
0.2	Anopore™	2001-0200	200
<b>Anotop™ 25 LC</b>			
0.2	Anopore™	2002-5100	100
0.2	Anopore™	2002-5200	200

# SPARTAN™ HPLC certified syringe filters

SPARTAN™ syringe filters ensure reproducible results from the filtration of organic or aqueous solutions for HPLC. For batch-to-batch consistency, the SPARTAN™ range of filters is tested and certified for the absence of UV-absorbing substances at wavelengths of 210 and 254 nm with water, methanol, and acetonitrile.

## Features and benefits

- Ready-to-use filter unit with a hydrophilic, low protein-binding membrane made of regenerated cellulose.
- Excellent chemical resistance against the standard aqueous and organic HPLC solvents.
- 13 mm diameter with extremely low dead volume < 10 µL.
- Use for any application requiring a chemically resistant, hydrophilic, low protein-binding membrane.
- Documented batch-to-batch quality and consistency ensure reproducible results.
- 13 mm diameter with Mini-Tip outlet is excellent for filtration into very small sample bottles.

## Applications

- Filtration of organic and aqueous solutions in HPLC with reproducible results
- Purification of aqueous and organic solutions
- Filtration of protein solutions

## Ordering information

SPARTAN™ HPLC certified syringe filters

Diameter (mm)	Pore size (µm)	Catalog number	Membrane/ housing material	Connection (in/out)	Color code	Quantity/pack
13	0.2	10463040	RC/PP	FLL/Mini-tip	Dark brown	100
13	0.2	10463042	RC/PP	FLL/Mini-tip	Dark brown	500
13	0.2	10463100	RC/PP	FLL/ML	Dark brown	100
13	0.2	10463102	RC/PP	FLL/ML	Dark brown	500
13	0.45	10463030	RC/PP	FLL/Mini-tip	Light brown	100
13	0.45	10463032	RC/PP	FLL/Mini-tip	Light brown	500
13	0.45	10463110	RC/PP	FLL/ML	Light brown	100
13	0.45	10463112	RC/PP	FLL/ML	Light brown	500
30	0.2	10463062	RC/PP	FLL/ML	Dark brown	500
30	0.45	10463053	RC/PP	FLL/ML	Light brown	50
30	0.45	10463052	RC/PP	FLL/ML	Light brown	500

FLL—Female Luer lock  
ML—Male Luer

PP—Polypropylene  
RC—Regenerated cellulose

## Technical tip

Download your SPARTAN™ 13 and 30 batch certificate from the Internet to document the purity of each batch.

To download, visit [cytiva.com/support/quality/certificates](http://cytiva.com/support/quality/certificates). Enter the lot number, and you will receive the lot-specific chromatogram and test conditions.



SPARTAN™ 30 mm syringe filter

# Protein Prep syringe filter for ÄKTA™ systems

Sample preparation with the Protein Prep syringe filter for ÄKTA™ systems



ÄKTA™ start system

**Sample**  
(from cell lysis and centrifugation)

**Filtration with syringe filter**  
To remove particles and microorganisms



**The sample can be injected into the system**



**Protein Prep syringe filter for ÄKTA™ systems**

- 13 mm or 30 mm diameter
- 0.2 µm or 0.45 µm pore size

**Tips for choosing the right filter**

- Use 13 mm diameter filter for sample volumes < 10 mL
- Use 0.2 µm pore size filter if the particle size of the chromatography resin is < 30 µm

## Ordering information

Protein Prep syringe filter for ÄKTA™ systems

Diameter	Pore size (µm)	Catalog number	Quantity/pack
13	0.2	150	10463103
13	0.45	150	10463113
30	0.2	150	10463043
30	0.45	150	10463033

# All-in-one filters and filter vials

Whatman™ all-in-one syringeless filters and filter vials are preassembled, convenient filtration devices for removing particulates from samples. They replace syringe-coupled filtration devices with a single disposable unit, making sample preparation easier, faster, and more efficient.

## Mini-UniPrep™ integrated syringeless filters and filter vials

The Mini-UniPrep™ preassembled filtration device consists of a 0.4 mL capacity chamber and a plunger. The plunger contains a filtration membrane at one end and a preattached cap and septum at the other. The plunger is pressed through the sample in the outer chamber and positive pressure forces the filtrate into the reservoir of the plunger. Air escapes through the vent hole until the locking ring is engaged, providing an air-tight seal. Within seconds, the Mini-UniPrep™ can be placed into any autosampler able to contain 2 mL vials for injection into your instrument.

The device can be used either manually or with a compressor unit. The multicompressor can process up to six samples at one time, further improving sample processing time and reducing the risk of hand stress. The Mini-UniPrep™ device is designed to fit into any autosampler accommodating 12 × 32 mm vials. Alternatively, the septum can be pierced with a needle and the sample drawn off for manual injection into an analyzer.

### Features and benefits

- All-in-one filtration process allows you to process sample loads in one-third of the time.
- Wide range of membrane choices from 0.2 and 0.45 µm pore sizes to meet specific sample application requirements.
- Compatible with most major autosamplers.
- Fewer consumables are required, reducing costs by up to 40%.

### Applications

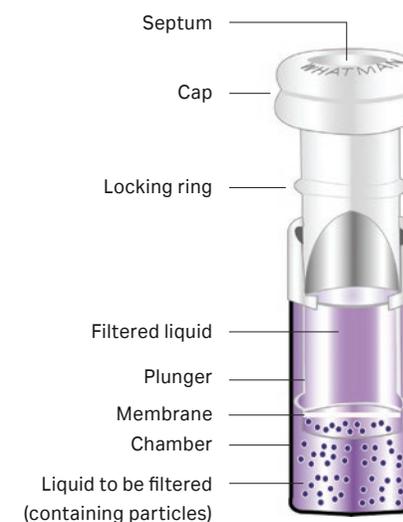
- Routine HPLC/UHPLC analysis
- Composite assays
- Content uniformity
- Protein precipitation
- Solubility testing
- Dissolution testing
- Sample filtration

### A variety of Mini-UniPrep™ filters to meet your needs

- Amber Mini-UniPrep™ is available for customers who need to filter light-sensitive samples.
- Slit septa Mini-UniPrep™ is available for customers using robotics to maximize throughput.



Mini-UniPrep™ syringeless filters



## Amber Mini-UniPrep™ filter vial

Protects samples from UV damage

### Features and benefits

- Amber colorant prevents photodegradation of light sensitive samples.
- Same colorant used in pharmaceutical containers designed to meet United States Pharmacopeia specifications for light resistance.
- Translucent amber chamber and plunger enable easy visual inspection.

### Applications

- Use with any compound that requires protection from light, such as catecholamines or vitamins.



Mini-UniPrep™  
multi-compressor



Mini-UniPrep™  
multi-compressor tray

## Slit septa Mini-UniPrep™ filter vial

For high-throughput automation

### Features and benefits

- Slit septum cap enables Mini-UniPrep™ use with current robotics on HPLC instruments for high throughput automation.
- Durable yet flexible slit septum cap has been specially designed for instruments with sensitive sampling needs. Sample evaporation is minimal.
- Pre-slit septa allows easier needle penetration.

### Applications

- Use with standard robotics on HPLC instruments with sensitive needles, allowing for higher throughput.



Mini-UniPrep™ in an HPLC  
autosampler



Amber Mini-UniPrep™ filter vial

## Selection

### Mini-UniPrep™ filtering media

Sample type	Suitable Mini-UniPrep™ media
High particulate laden liquids	Glass microfiber (GMF)
Aqueous/organic samples in 3 to 10 pH range	Nylon (NYL)
General filtration media/solvent based samples	Polypropylene (PP)
Chemically aggressive solutions	Polytetrafluoroethylene (PTFE)
Biological samples requiring low protein binding media	Regenerated cellulose (RC) or polyethersulfone (PES)
Aqueous/organic solvents, low nonspecific protein binding media	Polyvinylidene difluoride (PVDF) or regenerated cellulose (RC)
Aqueous/organic solvents, high flow and loading capacity	Polypropylene depth filter, non-woven PP fibers

## Technical specifications

### Mini-UniPrep™ integrated syringeless filters and filter vials

Sample type	Suitable Mini-UniPrep™ media
Dimensions	Equivalent in size to 12 × 32 mm vials
Materials of construction	
Housing and cap	Polypropylene
Filter media	As specified
Septa	PTFE coated silicone rubber
Filtering capacity	0.4 mL
Nominal force needed to compress	Approximately 18 lbs/8.2 kg
Maximum operating temperature	120°F (50°C)



## Ordering information

### Mini-UniPrep™ integrated syringeless filters and filter vials

Pore size (µm)	Catalog number	Media	Quantity/pack
<b>Standard cap—translucent housing</b>			
0.2	UN203NPENYL	Nylon	100
0.2	UN503NPENYL	Nylon	1000
0.45	UN203NPUNYL	Nylon	100
0.45	UN503NPUNYL	Nylon	1000
0.2	UN203NPEPES	PES	100
0.45	UN203NPUPES	PES	100
0.45	UN503NPUPES	PES	1000
0.2	UN203NPEAQU	PVDF	100
0.2	UN503NPEAQU	PVDF	1000
0.45	UN203NPUAQU	PVDF	100
0.45	UN503NPUAQU	PVDF	1000
0.2	UN203NPERC	RC	100
0.2	UN503NPERC	RC	1000
0.45	UN203NPURC	RC	100
0.45	UN503NPURC	RC	1000
0.2	UN203NPEORG	PTFE	100
0.2	UN503NPEORG	PTFE	1000
0.45	UN203NPUORG	PTFE	100
0.45	UN503NPUORG	PTFE	1000
0.2	UN203NPEPP	PP	100
0.2	UN503NPEPP	PP	1000
0.45	UN203NPUPP	PP	100
0.45	UN503NPUPP	PP	1000
0.45	UN203NPUDPP	DpPP	100
0.45	UN503NPUDPP	DpPP	1000
0.45	UN203NPUGMF	GMF	100
0.45	UN503NPUGMF	GMF	1000
<b>Accessories: multi-compressor</b>			
–	MUPMCPBC8	Mini-UniPrep™ multi-compressor 1/pack comes with one tray	
–	MUPMCBT8	Mini-UniPrep™ multi-compressor tray 1/pack	

PES—Polyethersulfone

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

RC—Regenerated cellulose

DpPP—Polypropylene depth filter

GMF—Glass microfiber

PP—Polypropylene

## Ordering information

### Mini-UniPrep™ integrated syringeless filters and filter vials (continuation)

Pore size (µm)	Catalog number	Media	Quantity/pack
<b>Slit septum cap, translucent housing</b>			
0.2	US203NPENYL	Nylon	100
0.2	US503NPENYL	Nylon	1000
0.45	US203NPUNYL	Nylon	100
0.2	US203NPEPES	PES	100
0.2	US503NPEPES	PES	1000
0.45	US203NPUPES	PES	100
0.2	US203NPEAQU	PVDF	100
0.2	US503NPEAQU	PVDF	1000
0.45	US203NPUAQU	PVDF	100
0.45	US503NPUAQU	PVDF	1000
0.2	US203NPEORG	PTFE	100
0.2	US503NPEORG	PTFE	1000
0.45	US203NPUORG	PTFE	100
0.45	US503NPUORG	PTFE	1000
0.2	US203NPEPP	PP	100
0.2	US503NPEPP	PP	1000
0.45	US203NPUPP	PP	100
0.45	US503NPUPP	PP	1000
0.45	US203NPUDPP	DpPP	100
0.45	US503NPUDPP	DpPP	1000
0.45	US203NPUGMF	GMF	100
0.45	US503NPUGMF	GMF	1000
<b>Amber housing (for light sensitive samples), standard cap</b>			
0.2	UN203APENYL	Nylon	100
0.45	UN203APUNYL	Nylon	100
0.2	UN203APEPES	PES	100
0.45	UN203APUPES	PES	100
0.2	UN203APEAQU	PVDF	100
0.45	UN203APUAQU	PVDF	100
0.2	UN203APEORG	PTFE	100
0.45	UN203APUORG	PTFE	100
0.2	UN203APEPP	PP	100
0.45	UN203APUPP	PP	100
0.45	UN203APUDPP	DpPP	100
0.45	UN203APUGMF	GMF	100
<b>Amber housing (for light sensitive samples), slit septum cap</b>			
0.45	US203APUNYL	Nylon	100

PES—Polyethersulfone

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

RC—Regenerated cellulose

DpPP—Polypropylene depth filter

GMF—Glass microfiber

PP—Polypropylene

# Mini-UniPrep™ G2 integrated syringeless filters and glass vials

The Mini-UniPrep™ G2 includes an integral borosilicate glass vial housed within the plunger and a borosilicate glass chamber for holding the unfiltered liquid. It offers the same great Mini-UniPrep™ performance while minimizing the risk of extractable compounds from a plastic housing that might otherwise leach into your sample.

## Technical specifications

### Mini-UniPrep™ G2 integrated syringeless filters and glass vials

Dimensions	Once compressed, equivalent in size to 12 mm × 32 mm vial
Materials of construction	Chamber: Borosilicate glass Polypropylene (PP) Polytetrafluoroethylene (PTFE) Regenerated cellulose (RC) or polyethersulfone (PES) Polyvinylidene difluoride (PVDF) or regenerated cellulose (RC) Polypropylene depth filter, non-woven PP fibers
Maximum operating temp.	50°C (122°F)
Filtering capacity	Chamber (unfiltered sample): 500 µL Inner storage vial (filtered sample): 330 µL Recommended minimum filtering volume: 220 µL placed in the chamber to obtain 50 µL in inner storage vial
Nominal force needed to compress	Approx. 11.3 kg (25 lbs)
Autosampler compatibility	Any autosampler that accommodates standard 12 mm × 32 mm profile vials
Autosampler needle height adjustment	5 mm from bottom of Mini-UniPrep™ G2.

## Liquid storage capacity

Volume (µL)	Height of liquid in inner glass reservoir (mm)
50	4.3
100	7.0
150	10.3
200	12.4
250	15.4
300	18.4
350	21.4
410 (max.)	25.0



## Ordering information

### Mini-UniPrep™ G2 integrated syringeless filters and glass vials

Pore size (µm)	Membrane	Housing	Cap	Catalog number, 100 pack	Catalog number, 1000 pack	Catalog number, starter pack*
0.2	PTFE	Translucent	Normal	GN203NPEORG	GN503NPEORG	GN203NPEORGSP
0.2	PTFE	Translucent	Slit septum	GS203NPEORG	GS503NPEORG	GS203NPEORGSP
0.2	PTFE	Amber	Normal	GN203APEORG	–	GN203APEORGSP
0.45	PTFE	Translucent	Normal	GN203NPUORG	GN503NPUORG	GN203NPUORGSP
0.45	PTFE	Translucent	Slit septum	GS203NPUORG	GS503NPUORG	GS203NPUORGSP
0.2	PVDF	Translucent	Normal	GN203NPEAQU	GN503NPEAQU	GN203NPEAQUSP
0.2	PVDF	Translucent	Slit septum	GS203NPEAQU	GS503NPEAQU	GS203NPEAQUSP
0.2	PVDF	Amber	Normal	GN203APEAQU	–	GN203APEAQUSP
0.45	PVDF	Translucent	Normal	GN203NPUAQU	GN503NPUAQU	GN203NPUAQUSP
0.45	PVDF	Translucent	Slit septum	GS203NPUAQU	GS503NPUAQU	GS203NPUAQUSP
0.2	RC	Translucent	Normal	GN203NPERC	GN503NPERC	GN203NPERCSP
0.45	RC	Translucent	Normal	GN203NPURC	GN503NPURC	GN203NPURCSP
0.2	Nylon	Translucent	Normal	GN203NPENYL	GN503NPENYL	GN203NPENYLSP
0.2	Nylon	Translucent	Slit septum	GS203NPENYL	GS503NPENYL	GS203NPENYLSP
0.2	PP	Translucent	Normal	GN203NPEPP	GN503NPEPP	GN203NPEPPSP
0.2	PP	Translucent	Slit septum	GS203NPEPP	–	GS203NPEPPSP
0.45	Glass fiber	Translucent	Normal	GN203NPUGMF	GN503NPUGMF	GN203NPUGMFSP
0.45	Glass fiber	Translucent	Slit septum	GS203NPUGMF	–	GS203NPUGMFSP
<b>Hand compressor</b>						
Mini-UniPrep™ G2 hand compressor 1/pack						MUPG2HCPWC1
<b>Multi-compressor</b>						
Mini-UniPrep™ G2 multi-compressor 1/pack, comes with one tray						MUPG2MCPWC8
Mini-UniPrep™ G2 multi-compressor tray 1/pack						MUPG2MCWT8

\* Starter pack includes 100 filters with hand compressor

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

RC—Regenerated cellulose

PP—Polypropylene

# UniPrep™ filter vials

UniPrep™ filter vials are preassembled filtration devices for the filtration and storage of laboratory samples. These devices are quick and easy to use and feature a plunger, filter, and vial in one unit. They replace syringe-coupled filtration devices with single, disposable units.

UniPrep™ devices consist of two parts: a test tube and a filter-plunger. The design incorporates a prefilter and a membrane into the tip of the plunger. When the filter-plunger is pressed through the liquid placed in the test tube, positive pressure forces the filtrate up into the reservoir of the filter-plunger.

UniPrep™ devices function in a similar way to the Mini-UniPrep™. However, UniPrep™ does not contain a septum in the cap and can be used to filter larger volumes (1 to 5 mL).

## Features and benefits

- Integral storage vial saves time and minimizes laboratory waste.
- Built-in glass fiber prefilter means even difficult samples are quick and easy to prepare.
- Choice of membranes for wide sample compatibility.

## Applications

- Sample preparation (e.g. prior to preparative HPLC)
- Difficult-to-filter samples
- Quick filtration of samples

The UniPrep™ filter vial is selected based on compatibility with the sample in use. In manual operation, the tip is brought into contact with the liquid, and then the filter plunger is slowly pushed into the test tube until it stops at the bottom. The UniPrep™ is emptied either by decanting into a sample or autosampler vial or by drawing the filtered sample into a syringe for manual injection into an instrument.

UniPrep™ membranes are available in a range of media for various applications.

- **GMF:** Layered glass microfiber depth filter for use with samples containing aqueous or organic solvents (indicated pore size is the particle retention rating)
- **NYL:** Naturally hydrophilic membrane for filtration of samples containing aqueous or organic solvents with a pH range of 3-10
- **PTFE:** Chemically inert PTFE membrane for filtration of samples containing > 50% organic solvent
- **PVDF:** Low protein binding membrane for filtration of samples with aqueous or aqueous/organic solvent composition



UniPrep™ Syringeless Filters

## Technical specifications

### UniPrep™ filter vials

Housing	Polypropylene
Filtration area	0.3 cm <sup>2</sup>
Capacity	1-5 mL
Volume hold-up	50 µL
Prefilter	Glass fiber
Sterilization	Autoclave: 121°C at 15 psi (1 bar) for 20 min

## Ordering information

### UniPrep™ filter vials

Pore size (µm)	Catalog number	Media	Quantity/pack
0.2	UN113ENYL	Nylon	50
0.45	UN113UNYL	Nylon	50
0.45	UN113UAQU	PVDF	50
0.45	UN513UAQU	PVDF	1000
0.2	UN113EORG	PTFE	50
0.45	UN113UORG	PTFE	50
0.45	UN513UORG	PTFE	1000
0.45*	UN113UGMF	GMF	50

\* Particle retention rating

GMF—Glass microfiber

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

# Autovial™ filter vials

Autovial™ filter vials are preassembled filtration devices for removing particulates from samples. They replace syringe-coupled filtration devices with single, disposable units.

Autovial™ devices are comprised of two parts: a graduated filter barrel and a plunger. The proven design features an integral filter, built-in air purge and a support stand that protects the recessed slip-Luer tip. They are available in a 5 mL and 12 mL volume capacity.

The Autovial™ filter is selected according to membrane compatibility with the sample. In practice, the sample is poured into the 5 mL or 12 mL capacity filter barrel. A plunger is inserted into the barrel until the bottom is securely in place; there is a gap of air between the sample and plunger. Then, the tip of the Autovial™ is placed into the mouth of an autosampler vial or container and the plunger compressed. Filtration begins immediately. As the plunger is compressed until it reaches the bottom, the membrane is purged with air for maximum sample recovery. For direct instrument injection, a needle is placed on the Autovial™ slip-Luer outlet.

## Features and benefits

- Single unit convenience: unit is pre-assembled and easy to load.
- Choice of filter media for compatibility with a wide range of sample types.
- Excellent for hazardous samples. Self-contained device removes the risk of filter pop-off.
- Built-in air purge maximizes sample recovery.
- Sterile option is available to maintain sample integrity.
- Glass fiber or polypropylene prefilter is available in selected 12 mL vials for difficult-to-filter samples.

Autovial™ membranes are available in a range of filter materials for various applications.

- **CA:** Low nonspecific protein binding and high loading capacity membrane for biological solutions
- **GMF:** Glass microfiber depth filter for samples in aqueous or organic solutions
- **NYL:** Nylon membrane for aqueous and organic samples within a pH range of 3 to 10
- **PES:** Low nonspecific protein binding membrane for samples in aqueous solutions
- **PP:** Hydrophobic membrane, resistant to a wide range of organic solvents
- **PTFE:** For samples with > 50% organic solvent
- **PVDF:** Low nonspecific protein binding membrane for samples in aqueous solutions and/ or organic solvents



Autovial™ syringeless filters



## Technical specifications

### Autovial™ filter vials

	Autovial™ 5	Autovial™ 12
Housing	Polypropylene	Polypropylene
Filtration area	1.7 cm <sup>2</sup>	3.0 cm <sup>2</sup>
Capacity	5 mL	12 mL
Volume hold-up	30 µL	140 µL
Outlet connection	Male slip Luer	Male slip Luer
Sterilization	Autoclave at 121°C for 20 min	Autoclave at 121°C for 20 min

## Ordering information

### Autovial™ filter vials

Pore size (µm)	Catalog number	Media	Sterile	Quantity / pack
<b>Autovial™ 5—no prefilter</b>				
0.45	AV115NPUNYL**	Nylon	No	50
0.45	AV115NPUAQU**	PVDF	No	50
0.2	AV115NPEORG**	PTFE	No	50
0.45	AV115NPUORG**	PTFE	No	50
0.45*	AV115UGMF**	GMF	No	50
<b>Autovial™ 12—with glass prefilter</b>				
0.45	AV125UCA	CA	No	50
0.2	AV125ENAO	Nylon	No	50
0.45	AV125UNAO	Nylon	No	50
0.45	AV525UNAO	Nylon	No	1000
0.45	AV125NPUSU**	PES	No	50
0.2	AV125EAQU	PVDF	No	50
0.45	AV125UAQU	PVDF	No	50
0.45	AV525UAQU	PVDF	No	1000
0.45	AV125NPUAQU**	PVDF	No	50
0.2	AV125EORG	PTFE	No	50
0.45	AV125UORG	PTFE	No	50
0.45	AV525UORG	PTFE	No	1000
0.45*	AV125UGMF	GMF	No	50
<b>Autovial™ 12—with polypropylene prefilter</b>				
0.2	AV125EPP	PP	No	50
0.45	AV125UPP	PP	No	50

\* Particle retention rating

\*\* No prefilters

CA—Cellulose acetate

GMF—Glass microfiber

PES—Polyethersulfone

PP—Polypropylene

PTFE—Polytetrafluoroethylene

PVDF—Polyvinylidene difluoride

# Advantage syringe filters

## Uniflo™ syringe filters

Uniflo™ Syringe Filters are disposable filters designed to provide clean filtrate from small volumes up to 100 mL. They are available in a variety of membrane choices with a polypropylene overmold housing. Uniflo™ syringe filters are available with:

- 13 mm, 25 mm or 30 mm diameters
- 0.2 µm or 0.45 µm pore sizes
- Sterile or non-sterile options
- Laser etched printing on the filter for easy identification



Whatman Uniflo™ syringe filters

Filter media	Typical application
Nylon	Aqueous and/or organic samples; hydrophilic
PES	Aqueous samples
PTFE	Organic based samples Hydrophobic membrane
PVDF	Aqueous and/or organic based samples; low protein binding membrane
H-PTFE	Aqueous and/or aggressive organic solvents; hydrophilic

## Integrity test data

Description	Pore size (µm)	Minimum bubble point (psi)
Nylon	0.2	29.0
Nylon	0.45	20.0
Polyethersulfone	0.2	40.0
Polyethersulfone	0.45	33.0
Polytetrafluoroethylene*	0.2	10.0
Polytetrafluoroethylene*	0.45	6.0
Polyvinylidene Difluoride	0.2	39.0
Polyvinylidene Difluoride	0.45	17.5
Hydrophilic Polytetrafluoroethylene	0.2	49
Hydrophilic Polytetrafluoroethylene	0.45	28

\* Bubble point determined with 95% Isopropyl Alcohol (IPA) (v/v), all others determined with water.

## Technical specifications

### Uniflo™ syringe filters

	Uniflo™ 13 mm	Uniflo™ 25 mm	Uniflo™ 30mm w/GF prefilter syringe filter
Dimensions	19.6 mm × 16.9 mm	24.5 mm × 29.2 mm	24.5 mm × 24.5 mm
Filtration area	0.88 cm <sup>2</sup>	3.45 cm <sup>2</sup>	4.98 cm <sup>2</sup>
Operating pressure	65.2 psi	65.2 psi	67.5 psi
Housing	Polypropylene	Polypropylene	Polypropylene
Volume hold up	≤ 50 µL after air purge	≤ 100 µL after air purge	≤ 200 µL after air purge
Flow direction	Flow should enter from inlet	Flow should enter from inlet	Flow should enter from inlet
Inlet connectors	Female Luer Lock	Female Luer Lock	Female Luer Lock
Outlet connectors	Male slip Luer	Male slip Luer	Male slip Luer
Sterilization	Autoclave at 121°C at 15 psi for 20 minutes	Autoclave at 121°C at 15 psi for 20 minutes	Autoclave at 121°C at 15 psi for 20 minutes
Biosafe	Polymer grade and membrane types meet the USP test requirements (for Class VI Plastics)	Polymer grade and membrane types meet the USP test requirements (for Class VI Plastics)	Polymer grade and membrane types meet the USP test requirements (for class VI plastics)
Prefiltration media	N/A	N/A	100% borosilicate glass



Whatman Uniflo™ syringe filters

## Ordering information

### Uniflo™ syringe filters

Diameter (mm)	Sterility	Pore size (µm)	Membrane	Catalog number	Quantity/pack
13	Nonsterile	0.2	PVDF	9909-1302	500
13	Nonsterile	0.45	PVDF	9909-1304	500
13	Nonsterile	0.2	Nylon	9910-1302	500
13	Nonsterile	0.45	Nylon	9910-1304	500
13	Nonsterile	0.2	PTFE	9911-1302	500
13	Nonsterile	0.45	PTFE	9911-1304	500
13	Nonsterile	0.2	H-PTFE	9920-1302	100
13	Nonsterile	0.2	H-PTFE	9921-1302	500
13	Nonsterile	0.45	H-PTFE	9920-1304	100
13	Nonsterile	0.45	H-PTFE	9921-1304	500
13	Nonsterile	0.2	PES	9912-1302	500
13	Nonsterile	0.45	PES	9912-1304	500
25	Nonsterile	0.2	PVDF	9909-2502	500
25	Nonsterile	0.45	PVDF	9917-2504	100
25	Nonsterile	0.45	PVDF	9909-2504	500
25	Nonsterile	0.2	Nylon	9910-2502	500
25	Nonsterile	0.45	Nylon	9918-2504	100
25	Nonsterile	0.45	Nylon	9910-2504	500
25	Nonsterile	0.2	PTFE	9911-2502	500
25	Nonsterile	0.45	PTFE	9911-2504	500
25	Nonsterile	0.2	H-PTFE	9920-2502	100
25	Nonsterile	0.2	H-PTFE	9921-2502	500
25	Nonsterile	0.45	H-PTFE	9920-2504	100
25	Nonsterile	0.45	H-PTFE	9921-2504	500
25	Nonsterile	0.2	PES	9912-2502	500
25	Nonsterile	0.45	PES	9912-2504	500
13	Sterile	0.2	PES	9916-1302	100
13	Sterile	0.45	PES	9916-1304	100
25	Sterile	0.2	PVDF	9913-2502	45
25	Sterile	0.45	PVDF	9913-2504	45
25	Sterile	0.2	PES	9914-2502	45
25	Sterile	0.45	PES	9914-2504	45
25	Sterile	0.2	PES	9915-2502	200
25	Sterile	0.45	PES	9915-2504	200

PTFE—Polytetrafluoroethylene  
PVDF—Polyvinylidene difluoride

PES—Polyethersulfone  
H-PTFE—Hydrophilic polytetrafluoroethylene

## Ordering information

### Uniflo™ syringe filters (continuation)

Diameter (mm)	Sterility	Pore size (µm)	Membrane	Catalog number	Quantity/pack
30 mm with GF prefilter	Non-sterile	0.2	PES	9923-3002	100
30 mm with GF prefilter	Non-sterile	0.45	PES	9923-3004	100
30 mm with GF prefilter	Non-sterile	0.2	PES	9924-3002	500
30 mm with GF prefilter	Non-sterile	0.45	PES	9924-3004	500
30 mm with GF prefilter	Non-sterile	0.2	PVDF	9925-3002	100
30 mm with GF prefilter	Non-sterile	0.45	PVDF	9925-3004	100
30 mm with GF prefilter	Non-sterile	0.2	PVDF	9926-3002	500
30 mm with GF prefilter	Non-sterile	0.45	PVDF	9926-3004	500
30 mm with GF prefilter	Non-sterile	0.2	PTFE	9927-3002	100
30 mm with GF prefilter	Non-sterile	0.45	PTFE	9927-3004	100
30 mm with GF prefilter	Non-sterile	0.2	PTFE	9928-3002	500
30 mm with GF prefilter	Non-sterile	0.45	PTFE	9928-3004	500
30 mm with GF prefilter	Non-sterile	0.2	Nylon	9929-3002	100
30 mm with GF prefilter	Non-sterile	0.45	Nylon	9929-3004	100
30 mm with GF prefilter	Non-sterile	0.2	Nylon	9930-3002	500
30 mm with GF prefilter	Non-sterile	0.45	Nylon	9930-3004	500
30 mm with GF prefilter	Non-sterile	0.2	H-PTFE	9931-3002	100
30 mm with GF prefilter	Non-sterile	0.45	H-PTFE	9931-3004	100
30 mm with GF prefilter	Non-sterile	0.2	H-PTFE	9932-3002	500
30 mm with GF prefilter	Non-sterile	0.45	H-PTFE	9932-3004	500

PTFE—Polytetrafluoroethylene  
PVDF—Polyvinylidene difluoride

PES—Polyethersulfone  
H-PTFE – Hydrphilic polytetrafluoroethylene

# Filtration Polycap, Polydisc and PolyVENT membrane and application decision chart

	Aqueous						Solvent				
	PES	GMF/ PES	Quartz/ Nylon	GMF/ Nylon	Nylon	PP	Depth PP	PTFE	Desiccant or Carbon/PTFE	Carbon/ GMF	GMF
<b>Mobile phase</b> Inline filter devices for degassing aqueous or solvent solutions used as the carrier phase in analytical equipment	-	-	-	-	Aqueous IFD	Solvent IFD	-	-	-	-	-
<b>Aqueous</b> Filtration of water-based solutions like buffers, growth media, and reagents	Polycap TC	Polydisc AS Polydisc SPF Polycap SPF	-	Polycap AS	-	-	Polydisc HD Polycap HD	-	-	-	-
<b>Solvent</b> Filtration of solutions such as alcohols, organic solvents, cleaning solvents, oils and polymers	-	-	-	-	-	-	Polydisc HD Polycap HD	Polydisc TF Polycap TF ReZist™	-	-	-
<b>Venting/inline gas filtration</b> Equipment protection, exhaust filtration, and venting of culture vessels, incubators, lyophilizers, hoods and pumps	-	-	-	-	-	-	-	PolyVENT	-	-	-
<b>Vacuum protection</b> Vacuum protection from particulate and/or water-intrusion in applications involving aspiration, vacuum filtration, pumps and house vacuum	-	-	-	-	-	-	-	VACU-GUARD 50/60	VACU-GUARD 150	Carbon CAP	HEPA-VENT HEPA-CAP
<b>Ground-water</b> Filtration of particulate in surface and deep-well water samples prior to total dissolved metals analysis	Polycap GW	-	Polydisc GW	-	-	-	-	-	-	-	-

PES = Polyethersulfone  
GMF = Glass microfiber

PP = Polypropylene  
PTFE = Polytetrafluoroethylene

# Mobile phase filtration

**Inline filters feature high-purity polypropylene housings to maintain sample purity and are available with a choice of filtration media to suit a range of aqueous and organic samples.**

## Inline filter/degasser

**Inline Filter/Degassers (IFD) connect directly into an HPLC line to simultaneously filter and degas the mobile phase as it is being used. The Aqueous IFD provides pure filtration of aqueous based HPLC mobile phases while the Solvent IFD is used with organically based HPLC mobile phases. Aqueous IFD is designed to work with mobile phases containing at least 20% aqueous component.**

**The Aqueous IFD has a 0.2 µm hydrophilic nylon membrane for use with aqueous-based mobile phases. Solvent IFD has a 0.2 µm high-flow polypropylene membrane for mobile phases containing organic solvents. Both devices have a polypropylene housing, the circumference of which is sealed by a security ring, fittings to accommodate 1/16" to 1/8" tubing and an air vent on the inlet with Luer lock cap to enable priming.**

**The inline filters work on the principle of "bubble point"—the point of pressure at which gases will pass through a wet membrane. If pressure is maintained below the bubble point, the gas will not pass through the membrane and is trapped by the particular filter device.**

### Features and benefits

- Faster than traditional methods of mobile phase preparation, saving time in the laboratory
- Enhanced laboratory safety
- No need to purchase expensive degassing equipment
- Rugged, chemically resistant polypropylene construction
- Air vent on inlet with Luer lock cap
- Integrity-testable (bubble point method)

### Applications

- HPLC analysis
- Pharmaceutical research
- Analytical chemistry



Inline filter/degassers (IFD)

## Technical specifications

### Aqueous IFD and Solvent IFD

	Aqueous IFD	Solvent IFD
Bubble point*		
bar	2.9 (a)	0.76 (b)
psi	42 (a)	11.0 (b)
Maximum flow rate**	2.5 mL/min	2.5 mL/min
Filtration area	16 cm <sup>2</sup>	16 cm <sup>2</sup>

\* Typical values determined with (a) water and (b) isopropanol

\*\* For effective gas bubble removal in HPLC

## Ordering information

### Aqueous IFD and Solvent IFD

Diameter	Pore size (µm)	Catalog number	Description	Media	Quantity/pack
50	0.2	6726-5002	Aqueous IFD <sup>1</sup>	Nylon	10
50	0.2	6726-5002A	Aqueous IFD <sup>2</sup>	Nylon	10
50	0.2	6725-5002	Solvent IFD <sup>1</sup>	PP	10
50	0.2	6725-5002A	Solvent IFD <sup>2</sup>	PP	10

<sup>1</sup> Standard catalog numbers include O-rings: 1/32-5/32; accepts different diameter tubing 0.8-4 mm

<sup>2</sup> Catalog numbers with suffix A are non-o-ring style and accept 1/8 tubing only

PP—Polypropylene

# Polydisc filters

**Polydisc 50 mm inline disc filters are designed for larger volume sample filtration in the laboratory, at a pilot plant, or in manufacturing. Sample volumes up to 1 liter can be filtered with one device. Polydisc devices can be used in conjunction with a syringe or connected inline via stepped hose barbs.**

**Polydisc filters feature a high-purity polypropylene housing and are available with a choice of filtration media to suit aqueous and organic samples. The devices are autoclavable and gamma irradiated options are available.**

## Polydisc AS

The Polydisc AS (Aqueous Solution) family of 50 mm filter devices features a high throughput polyethersulfone membrane, which has low protein binding. These devices are suitable for filtration of buffers, media and post-fermentation sample preparation. A glass microfiber prefilter extends the life of the membrane and effectively filters heavily contaminated samples. Each Polydisc AS device has a cap on the outlet and is sealed in its own clear blister pack, gamma irradiated, and secured in a protective shelf pack.

### Features and benefits

- Gamma irradiated, 25-40 kGy. No EtO residuals
- Barbed hose connections fit multiple tubing sizes
- Integrity-testable (bubble point method)
- Lightweight (11.5 g); avoids collapse of tubing, which can be caused by heavy filter devices

### Applications

- Tissue culture media
- Reagent preparation
- Buffer clarification
- Fermentation broth
- Particle counting solutions



Polydisc AS filters

## Technical specifications

### Polydisc AS

Pore size (µm)*	Inline connection	Filling volume (µL)	Prefilter/media	Filtration area (cm <sup>2</sup> )	Water flow rate mL/min at 0.7 bar (10 psi)
0.2	6–10 mm ID hose	540	GMF/PES	16	150
0.45	6–10 mm ID hose	540	GMF/PES	16	225

\* Liquid rating. Retention efficiency in gas streams is significantly higher

GMF—Glass microfiber

PES—Polyethersulfone

## Ordering information

### Polydisc AS

Pore size (µm)	Catalog number	Prefilter/media	Quantity/pack
<b>Gamma irradiated</b>			
0.2	6724-5002	GMF/PES	10
0.45	6724-5045	GMF/PES	10
<b>Nonsterile</b>			
0.45	6724-5145	GMF/PES	50

## Polydisc TF and ReZist™

This device features a PTFE membrane, which is suitable for chemically aggressive solutions, reagents, and organic solvents. This lightweight unit is particularly suitable for protective vents and for inline filtration and isolation applications. The 1 µm device features a polypropylene prefilter for use with heavily contaminated samples.

### Features and benefits

- Solvent-resistant membrane
- Chemical-resistant housing
- Hydrophobic PTFE membrane
- Autoclavable (121°C at 15 psi for 20 min.)
- Integrity-testable (bubble point or water breakthrough pressure “in situ” methods)
- Biosafe
- Lightweight (11.5 g for Polydisc and 17.9 g for ReZist™); avoids tubing collapse, which can be caused by heavy filter devices

### Applications

- Pharmaceutical: vents and inline applications
- Biotech: vents and exhausts for growth environments, inline filtration of gases
- Laboratory: filtration of solvents and reagents, drying gases
- Electronics: photoresists, solvents, gases for research

## Technical specifications

### Polydisc TF

Pore size (µm)	Integrity test data* IPA bubble point		Water breakthrough		Flow rates** methanol mL/min at 0.7 bar (10 psi)	Air SLPM at 0.2 bar (3 psi)
	(bar)	(psi)	(bar)	(psi)		
0.1	1.7	25	3.4	50	200	8
0.2	0.9	13	2.1	30	400	16
0.45	0.5	7	1.1	16	700	24
1.0	0.2	3	0.3	5	900	30

\* Refers to sterilization by filtration for small sample use which is an industry term for filters of pore size 0.2 µm or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing – Current Good Manufacturing Practice Section IX, Part B (September 2004).

\*\* Typical values



Polydisc inline filters, TF

## Ordering information

### Polydisc TF and ReZist™

Pore size (µm)	Media	Catalog number	Sterile	Quantity/pack
<b>Polydisc TF</b>				
0.1	PTFE	6720-5001	No	10
0.2	PTFE	6720-5002	No	10
0.45	PTFE	6720-5045	No	10
1.0	PTFE*	6721-5010	No	10
<b>ReZist™ filter 50 mm, sterile</b>				
0.2	PTFE	10463607	Yes	10
0.2	PTFE	10463608	No	10
0.2	PTFE	10463609	No	50

\* With PP prefilter

Inline connection 6-10 mm ID hose

PTFE—Polytetrafluoroethylene



Polydisc ReZist™ filter

## Polydisc HD

Excellent flow rate characteristics for filtering large volumes to 1 liter of aqueous and solvent samples. Polydisc HD (Heavy Duty) is available in 5 and 10 µm retention ratings.

### Features and benefits

- All polypropylene unit for aqueous and solvent samples
- Broad solvent compatibility

### Applications

- Large volume sample preparation



Polydisc HD filter

## Technical specifications

### Polydisc HD

Pore size (µm)*	Filling volume (µL)	Air flow rate SLPM at 1.0 bar (14.5 psi)	Filtration area (cm <sup>2</sup> )	Water flow rate mL/min at 1.0 bar (14.5 psi)
5.0	540	110	16	1500
10.0	540	140	16	2200

\* Liquid rating. Retention efficiency in gas streams is significantly higher

## Ordering information

### Polydisc HD

Pore size (µm)	Catalog number	Media	Quantity/pack
5.0	6728-5050	Polypropylene	10
10.0	6728-5100	Polypropylene	10
5.0	2227	Polypropylene	50
10.0	2228	Polypropylene	50

## Polydisc GW

Polydisc GW (Ground Water) is specifically designed for sample preparation of ground water samples for the analysis of dissolved heavy metals. It is an aqueous filter with low background values for the determination of trace elements. Each pack contains a certificate.

Polydisc GW features simplify the preparation of aqueous solutions for the analysis of dissolved heavy metals.

- Large filter surface
- Quartz fiber prefilter
- Membrane filter in sandwich arrangement
- High dirt loading capacity

## Technical specifications

### Polydisc GW

Housing	Polypropylene
Membrane type	Nylon
Prefilter	100% quartz fiber
Filtration diameter	52 mm
Filtration area	20.4 cm <sup>2</sup>
Dead volume	220 µL
Filling volume	540 µL
Maximum pressure	4.5 bar (65 psi)
Connections	Tubing nozzle 6-14 mm i.d. hose
Maximum operating temperature	80°C

## Ordering information

### Polydisc GW 50 mm

Pore size (µm)	Catalog number	Prefilter/media	Quantity/pack
0.45	10463400	Quartz fiber/nylon	20
0.45	10463401	Quartz fiber/nylon	50

*Inline connection—Polydisc GW accepts 6-14 mm i.d. hose*



Polydisc GW filters

## Polydisc SPF

Filtering serum requires removing proteins, lipids, salts, and other cell debris. This range of particulate matter is effectively handled with multilayer prefilters to facilitate downstream work and to avoid clogging later serum filters.

Polydisc SPF stacks a high-flow, hydrophilic PES membrane with a high particle-loading GMF filter to clean out particulates from serum and reduce stress on the final-stage serum filters.

### Features and benefits

- High-throughput, inline prefilters for use upstream of serum filters
- GMF prefilter captures large particles and cell debris while PES stack removes remaining particles and bacteria larger than 1 µm
- Designed to extend the life of downstream serum filters
- Effective for microbiology and tissue culture, immunoassays, virology, and diagnostic controls
- 6 to 10 mm i.d. hose connection

### Technical specifications

#### Polydisc SPF

Prefilter material	Glass Microfiber (GMF)
Diameter	50 mm
Housing	Polypropylene (PP)
Connections	Tubing nozzle 6-10 mm i.d. hose
Filtration area	16 cm <sup>2</sup>
Filling volume	540 µL

### Ordering information

#### Polydisc SPF

Pore size (µm)	Catalog number	Prefilter/media	Membrane	Quantity/pack
1.0	6724-5000	Glass Microfiber (GMF)	1.0 µm PES	10

PES—Polyethersulfone



Polydisc SPF Filters

# Capsule filters

Whether you are conducting research, pilot manufacturing or filtering large volumes or hard-to-filter samples, Cytiva has a Whatman™ capsule to fit your needs.

## Polycap AS

Polycap AS (Aqueous Solution) is recommended for filtering aqueous solutions. It combines a glass microfiber (GMF) prefilter and a nylon membrane, prolonging the life of the filter and allowing larger volumes and difficult samples to be filtered easily.

### Features and benefits

- First layer (GMF) acts as a prefilter to ensure longer membrane (0.2, 0.45, and 1.0 µm) life and higher filtration efficiency.
- Nylon membrane layer is inherently hydrophilic, has low extractables, is biosafe, and has excellent flow rates.
- Ultra-clean, containing no surfactant or mold release agents.
- Housing is thermally fused (no glues, adhesives or extraneous materials).
- Integrity-testable by bubble point, pressure decay, or forward flow methods.
- Provides highly effective filtration area in a small size.
- Autoclavable; some options provided gamma irradiated.
- Manufactured in clean room facilities under ISO Quality Systems.

### Applications

- Admixtures
- Biologicals
- Buffers
- Cleaning/rinsing solutions
- Enzymes
- Immunologicals
- Irrigation solutions
- Nutrients
- Reagent preparation
- Salt solutions
- Tissue culture media



Polycap AS capsule filter

## Technical specifications

### Polycap AS

Housing	Polypropylene
Vent	On inlet
Prefilter	Glass microfiber double laminated with polyolefin monofilament nonwoven
Membrane	Nylon
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Endotoxin level	LAL tested, $\leq 0.5$ EU/mL
Biosafety	Materials pass USP Class VI
Sterilization	Certain filter devices have been gamma irradiated*. Capsules may be autoclaved at 121°C at 15 psi for 20 min. However, an integrity test should be performed after autoclaving. Filling bell is not autoclavable but is detachable.
Nominal filtration area	36 mm capsule: $\sim 400$ cm <sup>2</sup> (62 in <sup>2</sup> ) 75 mm capsule: $\sim 820$ cm <sup>2</sup> (127 in <sup>2</sup> )
IPA bubble point	0.2 $\mu$ m membrane: $\geq 1.1$ bar (16 psi) 0.45 $\mu$ m membrane: $\geq 0.70$ bar (10 psi) 1.0 $\mu$ m membrane: $\geq 0.21$ bar (3 psi)

\* Nonsterile options offered

## Ordering information

### Polycap AS

Pore size ( $\mu$ m)	Catalog number	Media	Prefilter	Connections		Gamma irradiated	Quantity/pack
				Inlet	Outlet		
<b>Polycap AS 36</b>							
0.2	6708-3602	Nylon	GMF	1/2 SB	1/2 SB	Yes	1
0.2	6705-3602	Nylon	GMF	SB	SB	Yes	1
0.2	6709-3602	Nylon	GMF	MNPT	SB	Yes	1
0.2	2606T	Nylon	GMF	FNPT	FNPT	No	5
0.45	6705-36f04	Nylon	GMF	SB	SB	Yes	1
1.0	2608NS	Nylon	GMF	SB	SB	No	5
<b>Polycap AS 36 plus filling bell</b>							
0.2	6706-3602	Nylon	GMF	SB	SB	Yes	1
<b>Polycap AS 75</b>							
0.2	2706T	Nylon	GMF	FNPT	FNPT	No	5
0.45	2707NS	Nylon	GMF	SB	SB	No	5

FNPT—Female National Pipe Thread  
GMF—Glass microfiber filter

MNPT—Male National Pipe Thread  
1/2 SB—Stepped barb for 10-12 mm (3/8"-1/2") tubing

SB—Stepped barb for 6-10 mm (1/4"-3/8") tubing

## Polycap HD

Polycap HD provides an advantage in process applications as its performance characteristics fit between gross filters and microporous membrane filters used for final filtration.

### Features and benefits

- 100% polypropylene filter media, support system, and housing allows usage with a broad range of solutions, pH and temperature
- High flow and high retention capacity
- Materials of construction are FDA approved for food contact
- Autoclavable, 121°C at 15 psi for 20 min
- Manual vent with luer lock to bleed air from upstream or serve as an injection or sample port
- Available with a retention rating of 0.2, 0.45, 1.0, 5.0 or 10 µm and a variety of end- fitting configurations
- Manufactured in a Class 10,000 clean room in an ISO certified manufacturing plant

### Applications

- Buffers
- Clean air and gas equipment
- Cosmetics and personal care products
- General fine filtration
- Inks and pigments
- Photographic emulsions and make-up water
- Prefiltration for RO/UF/MF membranes
- Reagents
- Sample preparations
- Semiconductor and magnetic media
- Solvents



Polycap HD

## Technical specifications

### Polycap HD

Housing	Polypropylene
Vent	On inlet
Filter media	Polypropylene
Support system	Polypropylene
Biosafety	Materials pass USP Class VI
Nominal filtration area	36 mm capsule: ~ 400 cm <sup>2</sup> (62 in <sup>2</sup> ) 75 mm capsule: ~ 820 cm <sup>2</sup> (127 in <sup>2</sup> ) 150 mm capsule: ~ 1650 cm <sup>2</sup> (256 in <sup>2</sup> )
Autoclavable	121°C at 15 psi for 20 min
Maximum pressure	4.1 bar (60 psi)

## Ordering information

### Polycap HD (nonsterile)

Pore size (µm)	Catalog number	Media	Prefilter	Connections		Quantity/pack
				Inlet	Outlet	
<b>Polycap HD 36</b>						
0.2	2610T	PP	No	FNPT	FNPT	5
1.0	6703-3610	PP	No	SB	SB	1
1.0	2611	PP	No	SB	SB	5
1.0	2611T	PP	No	FNPT	FNPT	5
5.0	6703-3650	PP	No	SB	SB	1
5.0	2612T	PP	No	FNPT	FNPT	5
10.0	6703-3611	PP	No	SB	SB	1
10.0	2613T	PP	No	FNPT	FNPT	5
20.0	6703-3621	PP	No	SB	SB	1
20.0	2614T	PP	No	FNPT	FNPT	5
<b>Polycap HD 75</b>						
0.45	2710	PP	No	1/2 HB	1/2 HB	5
1.0	6703-7510	PP	No	1/2 SB	1/2 SB	1
1.0	2711T	PP	No	FNPT	FNPT	5
5.0	6703-7550	PP	No	1/2 SB	1/2 SB	1
5.0	2712M	PP	No	MNPT	MNPT	5
5.0	2712T	PP	No	FNPT	FNPT	5
10.0	6703-7511	PP	No	1/2 SB	1/2 SB	1
10.0	2713T	PP	No	FNPT	FNPT	5
10.0	2713	PP	No	HB	SB	5
20.0	6703-7521	PP	No	1/2 SB	1/2 SB	1
20	2714	PP	No	1/2 HB	1/2 HB	5
20.0	2714T	PP	No	FNPT	FNPT	5
<b>Polycap HD 150</b>						
0.45	2810	PP	No	1/2 HB	1/2 HB	5
0.45	2810T	PP	No	FNPT	FNPT	5
5.0	2812T	PP	No	FNPT	FNPT	5
10.0	2813T	PP	No	FNPT	FNPT	5
10.0	2813	PP	No	1/2 HB	1/2 HB	5
20.0	2814T	PP	No	FNPT	FNPT	5

FNPT—Female National Pipe Thread  
HB—1/2 Hose barb

MNPT—Male National Pipe Thread  
PP—Polypropylene

1/2 SB—Stepped barb for 10-12 mm (3/8"-1/2") tubing  
SB—Stepped barb for 6-10 mm (1/4"-3/8") tubing

## Polycap SPF

Serum is difficult to filter because it contains a high degree of loading of complex particulates, lipids, triglycerides, and lipoproteins that clog filters. When filtering serum without proper prefiltration, membrane filters clog rapidly. Polycap SPF incorporates three layers of media for effective filtration without clogging.

### Features and benefits

- Three layers of special media: fine and ultrafine glass microfiber (GMF) and polyethersulfone membrane
- Excellent for hard-to-filter solutions such as serums and protein solutions
- Autoclavable, 121°C at 15 psi for 20 min
- Manufactured under ISO manufacturing system
- Suitable for filtering serums, viral suspensions, nutrients, biologicals, immunologicals, enzymes, and buffers
- Prefilters help extend the life of the final filter

### Applications

- Biologicals
- Buffers
- Diagnostic standards
- Enzymes
- Immunologicals
- Nutrients
- Serum prefiltration
- Tissue culture media
- Viral suspensions



Polycap SPF

### Technical specifications

#### Polycap SPF

Housing	Polypropylene
Vent	On inlet
Prefilter	Two layers of glass microfiber
Membrane	Polyethersulfone (PES)
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Autoclavable	121°C at 15 psi for 20 min
Nominal filtration area	36 mm capsule: ~ 260 cm <sup>2</sup> (40 in <sup>2</sup> ), 75 mm capsule: ~ 535 cm <sup>2</sup> (83 in <sup>2</sup> ), 150 mm capsule: ~110cm <sup>2</sup> (170 in <sup>2</sup> )

### Ordering information

#### Polycap SPF (nonsterile)

Pore size (µm)	Catalog number	Media	Prefilter	Connections		Quantity/pack
				Inlet	Outlet	
<b>Polycap SPF 36</b>						
1.0	6705-3600	PES	GMF	SB	SB	1
<b>Polycap SPF 75</b>						
1.0	6705-7500	PES	GMF	SB	SB	1
<b>Polycap SPF 150</b>						
1.0	2820	PES	GMF	1/2 HB 1/2 HB	5	

GMF—Glass microfiber filter

PES—Polyethersulfone

SB—Stepped barb for 6-10 mm (1/4-3/8) tubing

## Polycap TC

Polycap TC (PES) is available with and without a filling bell. These disposable, dual layer polyethersulfone (PES) membrane filtration capsules provide efficient filtration for critical aqueous solutions.

The PES membrane is inherently hydrophilic, has low extractables, is biosafe, has excellent flow rates, and exhibits low protein binding.

### Features and benefits

- 100% integrity-tested during manufacturing; results are correlated to microbial retention
- Housing thermally fused (no surfactants or mold releasing agents)
- Integrity-testable by bubble point, pressure decay or forward flow methods
- Available in gamma irradiated and nonsterile versions with a filling bell option
- Manufactured in clean room facilities under ISO Quality Systems
- PES membrane protein adsorption characteristics:
  - HSA 0.4 µg/cm<sup>2</sup>
  - Insulin 2.0 µg/cm<sup>2</sup>
  - Gammaglobulin 1.5 µg/cm<sup>2</sup>

### Applications

- Aqueous solutions
- Biologicals
- Buffers
- Cleaning/rinsing solutions
- Enzymes
- High-quality water
- Particle counting solutions
- Reagent preparation
- Salt solutions
- Tissue culture media



Polycap TC capsule filters

## Technical specifications

### Polycap TC

Housing	Polypropylene
Vent	On inlet
Membrane	Polyethersulfone (PES)
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Flow direction	If there is a prefilter, it is located on the inlet side and flow should follow arrows
Endotoxin level	LAL tested, ≤ 0.5 EU/mL
Biosafety	Materials pass USP class VI
Autoclavable	Certain filter devices have been gamma irradiated*. Capsule may be autoclaved at 121°C at 15 psi for 20 min. However, an integrity test should be performed after autoclaving.
Nominal filtration area	36 mm capsule: ~ 440 cm <sup>2</sup> (72 in <sup>2</sup> ) 75 mm capsule: ~ 930 cm <sup>2</sup> (144 in <sup>2</sup> ) 150 mm capsule: ~ 1900 cm <sup>2</sup> (302 in <sup>2</sup> )
Water bubble point (final membrane)	0.1 µm ≥ 3.2 bar (46 psi) 0.2 µm ≥ 2.7 bar (40 psi) 0.45 µm ≥ 2.1 bar (30 psi) 1.0 µm ≥ 1.1 bar (16 psi)

\* Nonsterile options offered

## Ordering information

### Polycap TC

Pore size (µm)	Catalog number	Media	Connections		Gamma irradiated	Quantity/pack
			Inlet	Outlet		
<b>Polycap TC 36</b>						
0.2/0.1	6714-3601	PES	SB	SB	Yes	1
0.2/0.2	6714-3602	PES	SB	SB	Yes	1
0.2/0.2	2642	PES	SB	SB	No	5
	6714-3604	PES	SB	SB	Yes	1
<b>Polycap TC 36 plus filling bell</b>						
0.2/0.1	6715-3601	PES	SB	SB	Yes	1
0.2/0.2	6715-3602	PES	SB	SB	Yes	1
0.2/0.2	6716-3602	PES	MNPT	SB	Yes	1
0.65/0.45	6715-3604	PES	SB	SB	Yes	1
0.8/0.2	6715-3682	PES	SB	SB	Yes	1
<b>Polycap TC 75</b>						
0.2/0.1	6714-7501	PES	SB	SB	Yes	1
0.2/0.2	6714-7502	PES	SB	SB	Yes	1
0.65/0.45	6717-7504	PES	1/2 SB	1/2 SB	Yes	1
1.0/1.0	6717-7510	PES	1/2 SB	1/2 SB	Yes	1
<b>Polycap TC 75 plus filling bell</b>						
0.2/0.2	6715-7502	PES	SB	SB	Yes	1
0.8/0.2	6715-7582	PES	SB	SB	Yes	1
<b>Polycap TC 150</b>						
0.2/0.1	6717-9501	PES	1/2 SB	1/2 SB	Yes	1
0.2/0.2	6717-9502	PES	1/2 SB	1/2 SB	Yes	1
0.2/0.2	6704-9502	PES	1 1/2" Sanitary	1 1/2" Sanitary	No	5
0.65/0.45	6717-9504	PES	1/2 SB	1/2 SB	Yes	1
<b>Polycap TC 150 plus filling bell</b>						
0.2/0.2	6718-9502	PES	1/2 SB	1/2 SB	Yes	1
0.8/0.2	6718-9582	PES	1/2 SB	1/2 SB	Yes	1

MNPT—Male National Pipe Thread

PES—Polyethersulfone

1/2 SB—Stepped barb for 10-12 mm (3/8"-1/2") tubing

SB—Stepped barb for 6-10 mm (1/4"-3/8") tubing

## Polycap TF

Polycap TF filter capsules are made with durable, hydrophobic polytetrafluoroethylene (PTFE) membranes in a polypropylene housing and are designed for use with organic solvents and chemically aggressive solutions.

### Features and benefits

- Resistant to most solvents, autoclavable, and integrity-testable
- Available in 0.1, 0.2, 0.45, and 1.0 µm pore sizes
- 1.0 µm used for extended life and filtration of highly contaminated solutions
- Autoclavable at 121°C at 15 psi for 20 min
- Manufactured under very clean conditions in a Class 10 000 clean room and under ISO Quality Systems

### Applications

- Venting
- Inline filtration
- Isolation
- Electronics
- Pharmaceutical
- Biotech
- Laboratory
- Other uses



Polycap TF filter capsules

## Technical specifications

### Polycap TF

Housing	Polypropylene
Membrane	PTFE
Vent	On inlet
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Flow direction	Supported bi-directionally. certain applications may require orientation, i.e. vents.
Reverse flow only for low-pressure applications.	LAL tested, $\leq 0.5$ EU/mL
Biosafety	Materials pass USP Class VI
Autoclavable	May be autoclaved at 121°C at 15 psi for 20 min. Multiple autoclave cycles are possible. However, the responsibility for reuse is with the operator. The device should be protected from cross contamination. An integrity test should be performed after autoclaving.
Nominal filtration area	36 mm capsule: ~ 500 cm <sup>2</sup> (77 in <sup>2</sup> ) 75 mm capsule: ~ 1000 cm <sup>2</sup> (155 in <sup>2</sup> ) 150 mm capsule: ~ 2000 cm <sup>2</sup> (310 in <sup>2</sup> )
IPA bubble point	0.1 µm membrane: $\geq 1.6$ bar (23 psi) 0.2 µm membrane: $\geq 0.9$ bar (13 psi) 0.45 µm membrane: $\geq 0.5$ bar (7 psi) 1.0 µm membrane: $\geq 0.2$ bar (3 psi)

## Ordering information

### Polycap TF (nonsterile)

Pore size (µm)	Catalog number	Media	Connections		Quantity/pack
			Inlet	Outlet	
<b>Polycap TF 36</b>					
0.1	6711-3601	PTFE	MNPT	3/8 SB	1
0.2	6711-3602	PTFE	MNPT	3/8 SB	1
0.2	6710-3602	PTFE	1/2 SB	1/2 SB	1
0.2	6700-3602	PTFE	3/8 SB	3/8 SB	1
0.2	2601	PTFE	-	-	5
0.2	2601T	PTFE	FNPT	FNPT	5
0.45	6711-3604	PTFE	MNPT	3/8 SB	1
0.45	2602S	PTFE	1 1/2" Sanitary	1 1/2" Sanitary	5
1.0	6700-3610	PTFE	3/8 SB	3/8 SB	1
1.0	2603	PTFE	-	-	5
1.0	2603T	PTFE	FNPT	FNPT	5
<b>Polycap TF 75</b>					
0.1	6700-7501	PTFE	3/8 SB	3/8 SB	1
0.1	2700T	PTFE	FNPT	FNPT	5
0.2	6711-7502	PTFE	MNPT	3/8 SB	1
0.2	6710-7502	PTFE	1/2 SB	1/2 SB	1
0.2	6700-7502	PTFE	3/8 SB	3/8 SB	1
0.2	2702M	PTFE	MNPT	MNPT	5
0.2	2702T	PTFE	FNPT	FNPT	5
0.45	6700-7504	PTFE	3/8 SB	3/8 SB	1
0.45	2703T	PTFE	FNPT	FNPT	5
1.0	6701-7510	PTFE	1/2 SB	1/2 SB	1
<b>Polycap TF 150</b>					
0.1	2800T	PTFE	FNPT	FNPT	5
0.2	2802T	PTFE	FNPT	FNPT	5
0.2	2801	PTFE	1 1/2" Sanitary	1 1/2" Sanitary	5
0.45	2803T	PTFE	FNPT	FNPT	5
1.0	2804T	PTFE	FNPT	FNPT	5

FNPT—Female National Pipe Thread

MNPT—Male National Pipe Thread

PTFE—Polytetrafluoroethylene

1/2 SB—Stepped barb for 10-12 mm (3/8"-1/2") tubing

SB—Stepped barb for 6-10 mm (1/4"-3/8") tubing

## Polycap GW

The US Environmental Protection Agency (EPA) and local Departments for Environmental Protection protocols specify filtering ground water samples with a 0.45 µm filter when analyzing dissolved or suspended metals (EPA Method 3005). Specifically designed with field sampling in mind, the Whatman™ Polycap Ground Water sampling capsule can be used as a convenient inline filter unit.

### Features and benefits

- Connects directly to outlet of a sampling pump
- Easy to use
- Filtration membrane is encapsulated in durable polypropylene housing
- Large surface area is optimized to provide at least 600 cm<sup>2</sup> of effective filtration area to ensure rapid sample collection
- Housing components are thermally fused (no glues, adhesives, metals, epoxies, or extraneous materials)
- Suitable for filtration procedure outlined in EPA Method 3005 for ground water analysis
- Stepped hose barb fittings allow for connection with various size tubings
- Lot number printed on each unit for traceability

### Applications

- Filter ground water samples before dissolved metal analysis

### Technical specifications

#### Polycap GW

Housing	Polypropylene
Filter media	0.45 µm: PES filter
Inlet/outlet	1/4 to 3/8 in (6-9 mm) Stepped barb (SB)
Support system	Polypropylene
Vent	On inlet
Nominal filtration area	600 cm <sup>2</sup> (93 in <sup>2</sup> )
Wetting characteristics	Hydrophilic
Maximum pressure	60 psi (4.1 bar) Water flow rate at 1.0 bar (14.5 psi) 60 L/min
Flow direction	Flow should follow arrows

### Ordering information

#### Polycap GW

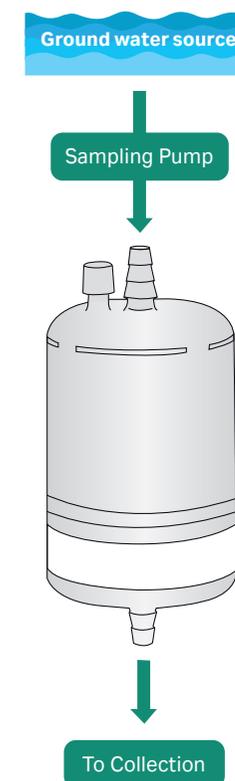
Pore size (µm)	Catalog number	Media	Connections		Quantity/pack
			Inlet	Outlet	
<b>Polycap GW 75</b>					
0.45	6714-6004	PES	SB	SB	1
0.45	6724-6004	PES	SB	SB	100

PES—Polyethersulfone

SB—Stepped barb for 6-10 mm (1/4"-3/8") tubing



Polycap GW



## Carbon Cap

This filter capsule is suitable for adsorption of organics from air and removal of color, organics, and chlorine from water.

Carbon Cap is filled with high-purity, high-efficiency, acid washed, granular-activated carbon and a pleated HEPA filter. It is made specially to meet the requirements for continuous column percolation purification processes.

### Features and benefits

- Carbon acts as an adsorption medium
- Pleated glass microfiber filter structure
- Retains 99.97% of particles greater than 0.3  $\mu\text{m}$
- Large surface area of activated carbon for effective operation
- Two sizes of capsules available to suit your specific application
- Removes noxious odors, oil mists, and contaminants
- Removes a potential health hazard from the workplace

### Applications

- Water, chemical, and reagent purification
- Compressed air lines and vacuum pumps
- Instrument outlet exhausts

### Technical specifications

#### Carbon Cap

Housing	Polypropylene
Filter media	Activated carbon with a pleated HEPA cartridge
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Surface area (activated carbon)	Carbon Cap 75 capsule: 26,000 m <sup>2</sup> Carbon Cap 150 capsule: 82,000 m <sup>2</sup>

### Ordering information

#### Carbon cap

Description	Catalog number	Quantity/pack
Carbon cap 75	6704-7500	1
Carbon cap 150	6704-1500	1



Carbon cap filters

# Venting filters

Venting filters are disposable devices designed and manufactured with a high-purity polypropylene housing to maintain sample purity. Products are available with a choice of filtration media to suit a range of venting applications. All seals are fused, with no glue, adhesive, metal, epoxy, or other extraneous materials used in construction.

## PolyVENT integral vent filters

PolyVENT filters are integral venting filters that work bidirectionally to prevent bacterial and other contaminants from entering vessels like incubators, bioreactors or fermentation tanks during draining or filling. With an integral PTFE filter membrane, PolyVENT acts as an industrial air filter media for sterilization\* of gases entering bioreactors such as fermentation tanks.

### Features and benefits

- 0.2 µm hydrophobic PTFE air filters are excellent industrial air filter media
- Testable by water breakthrough (WBT) test or bubble point testing
- Biosafe: all materials pass USP Class VI Test for Plastics
- Manufactured in clean room facilities
- Range of filtration areas from 4–2000 cm<sup>2</sup> to support filtration volumes as small as one liter and as large as a large tank vessel

### Applications

- Bioreactors
- Fermentation tanks
- Incubators



PolyVENT integral vent filters

\* Refers to sterilization by filtration for small sample use, which is an industry term for filters of pore size 0.2 µm or smaller as referenced in guidance such as EPA Guidance for Industry Sterile Drug Products Produced by Aseptic Processing — Current Good Manufacturing Practice Section IX, Part B (September 2004).

## Technical specifications

### PolyVENT venting filters

Housing	Polypropylene
Filter media	PTFE (polytetrafluoroethylene)
Pore size	0.2 µm
Vent	On inlet
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	29 psi (2 bar)—forward direction
Water breakthrough test	29 psi (2 bar)/15 seconds
Flow direction	Bidirectional
Biosafety	Materials pass USP Class VI
Autoclavable	Can be autoclaved at 121°C at 15 psi for 20 min. Multiple autoclave cycles are possible. However, the responsibility for reuse is with the operator. The device should be protected from cross contamination. An integrity test should be performed after autoclaving.
Nominal filtration area	36 mm capsule: ~ 500 cm <sup>2</sup> 75 mm capsule: ~ 1000 cm <sup>2</sup> 150 mm capsule: ~ 2000 cm <sup>2</sup> 50 mm disc: 16 cm <sup>2</sup> 25 mm disc: 4 cm <sup>2</sup>

## Ordering information

### PolyVENT venting filters

Pore size (µm)	Catalog number	Housing type	Connections		Media	Quantity/pack
			Inlet	Outlet		
<b>PolyVENT 36</b>						
0.2	6713-5036	Capsule	SB	SB	PTFE	1
0.2	2103	Capsule	1/2 SB	1/2 SB	PTFE	1
<b>PolyVENT 75</b>						
0.2	6713-1075	Capsule	1/2 SB	1/2 SB	PTFE	1
<b>PolyVENT 150</b>						
0.2	2107	Capsule	1/2 SB	1/2 SB	PTFE	1
0.2	2108	Capsule	1 1/2" Sanitary	1 1/2" Sanitary	PTFE	1
<b>PolyVENT discs</b>						
0.2	6713-0425	25 mm	FLL	ML	PTFE	50
0.2	6713-1650	50 mm	SB	SB	PTFE	10
0.2	6713-1651	50 mm	SB	SB	PTFE	100

FLL—Female Luer lock

ML—Male Luer lock

PTFE—Polytetrafluoroethylene

1/2 SB—Stepped barb for 10-12 mm (3/8"-1/2") tubing

SB—Stepped barb for 6-10 mm (1/4"-3/8") tubing

# HEPA-VENT and HEPA-CAP

HEPA filter media are used throughout the scientific, research, and industrial environments in a variety of air and gas filtration applications where high retention, dirt-holding capacity, and flow rates are required.

## Features and benefits

- Glass filter media strengthened by dual lamination with a tough polyester monofilament
- Retains 99.97% of all particles  $\geq 0.3 \mu\text{m}$  in air
- Durable polypropylene housing
- High flow rates with low pressure drops across filter media, ensuring clean air passing in and out of vessels
- Suitable for particulate removal from air and gases, prefilter for suction or to serve as inline filter
- Can be sterilized by autoclaving at 121°C at 15 psi for 20 min
- Available in a variety of end-fitting configurations
- Manufactured in clean room facilities under ISO Quality Systems
- Allows bidirectional flow
- Depth filter design allows for high loading capacity

## Applications

- Preventing bacterial, algal, or fungal contamination in fermentors or incubators
- Tissue culture applications
- Gas line filter
- Particulate removal from gases
- Prefilters for suction



HEPA-VENT and HEPA-CAP filters

## Technical specifications

### HEPA venting filters

Housing	Polypropylene
Filter media	Laminated hydrophobically treated glass microfiber
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)—capsule
Flow direction	Bidirectional
Biosafety	Materials pass USP Class VI
Autoclavable	Autoclave at 121 °C at 15 psi for 20 min
Nominal filtration area	36 mm capsule: ~ 625 cm <sup>2</sup> (97 in <sup>2</sup> ) 75 mm capsule: ~ 1300 cm <sup>2</sup> (201 in <sup>2</sup> ) 150 mm capsule: ~ 2590 cm <sup>2</sup> (402 in <sup>2</sup> ) 50 mm disc: 16 cm <sup>2</sup>

## Ordering information

### HEPA-VENT and HEPA-CAP filters

Pore size (µm)	Housing type	Connections		Quantity/pack
		Inlet	Outlet	
<b>HEPA-CAP 36</b>				
6702-3600	Capsule	1/4-3/8 SB	1/4-3/8 SB	1
2609T	Capsule	3/8 in. FNPT	3/8 in. FNPT	5
<b>HEPA-CAP 75</b>				
6702-7500	Capsule	3/8-1/2 in. SB	3/8-1/2 in. SB	1
2709T	Capsule	3/8 in. FNPT	3/8 in. FNPT	5
<b>HEPA-CAP 150</b>				
6702-9500	Capsule	3/8 in. FNPT	3/8 in. FNPT	1
2809T	Capsule	3/8 in. FNPT	3/8 in. FNPT	5
<b>HEPA-VENT disc filter</b>				
6723-5000	50 mm disc	1/4-3/8 SB	1/4-3/8 SB	10

FNPT—Female National Pipe Thread

1/2 SB—Stepped barb for 10-12 mm (3/8"-1/2") tubing

SB—Stepped barb for 6-10 mm (1/4"-3/8") tubing

# Vacuum protection filters

## VACU-GUARD vacuum protection filters

VACU-GUARD inline filters help protect your equipment from potentially damaging contaminants. Choose from disc and capsule formats, depending on your application.

### VACU-GUARD disc filter

#### Features and benefits

- Prevents fluid and aerosol contamination of vacuum pumps or aspiration suction systems while removing hazardous exhaust
- Flexible: designed for use with 6–10 or 10–12 mm i.d. tubing
- Biosafe: all materials pass USP Class VI Test for Plastics

#### Applications

- Protects vacuum pumps and systems from aerosols and particulate contamination

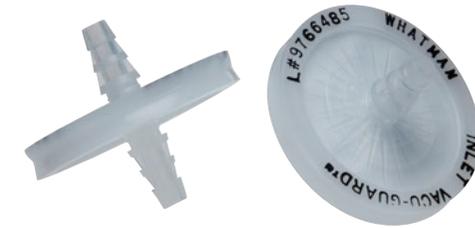
### VACU-GUARD 150 capsule filter

#### Features and benefits

- Choice of media: VACU-GUARD 150 capsule filters include all the features and benefits of standard VACU-GUARD disc filters, plus a range of media for specific applications.

#### Applications

- Added back-up protection: use as a backup between a cold trap and pump to protect against moisture and organic vapors if cold trap fails
- Activated carbon removes organic vapors from air
- Desiccant for use with high velocity acidic air



VACU-GUARD disc filters



VACU-GUARD 150 capsule filters

## Technical specifications

### VACU-GUARD inline disc filter — 50 and 60 mm

	50 mm	60 mm
Filtration area	16 cm <sup>2</sup>	25 cm <sup>2</sup>
Maximum operating pressure	1 bar (15 psi)	1 bar (15 psi)
Biosafety	All materials pass USP Class VI test for plastics	All materials pass USP Class VI test for plastics
Rated retention in air	99.99% particle retention for particles ≥ 0.1 µm	99.99% particle retention for particles ≥ 0.1 µm
Pore size (in liquid)	0.45 µm	0.45 µm
Housing	Polypropylene	Polypropylene
Filtration media	PTFE membrane	PTFE membrane
Connectors	1/4–3/8" (6–10 mm) SB (stepped barb) inlet and outlet	3/8–1/2" (10–12 mm) SB inlet and outlet
Flow rates (SLPM):		
2 psi (0.14 bar)*	15	27
4 psi (0.28 bar)*	27	57
6 psi (0.41 bar)*	38	83
10 psi (0.69 bar)*	53	139
Flow direction	Inlet to outlet	Inlet to outlet

\* Differential pressure

## Technical specifications

### VACU-GUARD 150 inline capsule filter

	Activated carbon	Desiccant
Chemical trap media	Activated carbon	Anhydrous calcium sulphate
Filter media	PTFE	PTFE
Surface area or weight (nominal)	82 000 m <sup>2</sup> (carbon)	318 g (desiccant)
Flow rates (SLPM) (nominal):		
0.1 bar (1.45 psi)*	210	280
0.5 bar (7.25 psi)*	450	600
Maximum operating pressure:		
Dry gas	4 bar (60 psi)	4 bar (60 psi)
Wet gas	1 bar (14 psi)	1 bar (14 psi)
Connectors:		
Inlet	Hose barb for 1/2" (12.7 mm) tube	Hose barb for 1/2" (12.7 mm) tube
Outlet	3/8–1/2" (10–12 mm) step barb	3/8–1/2" (10–12 mm) step barb

\* Differential pressure

Note: as with any chemical reaction, care should be used to determine the safety and usefulness of VACU-GUARD 150 products prior to routine use.

## Ordering information

### VACU-GUARD

Product	Catalog number	Quantity/pack
VACU-GUARD, 50 mm disc	6722-5000	10
VACU-GUARD, 60 mm disc	6722-5001	10
VACU-GUARD 150 capsule, activated carbon	6722-1001	1
VACU-GUARD 150 capsule, desiccant	6722-1002	1



# 05

# Microbiology products

We provide a broad range of high-quality membranes for applications that include:

- **microbiological quality control in food and beverage industries**
- **environmental analysis**
- **pharmaceutical quality control**
- **wastewater testing**

**Our products help you ensure that every person who uses your products is getting the highest quality and safest ingredients.**

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# Membrane filtration

## Microbiological recovery membranes

Our ME (mixed cellulose ester) and MicroPlus (cellulose nitrate) membrane filters are designed and tested in accordance with ISO 7704, ISO 8199 and ISO 11133 guidance. Each batch of membrane is tested to ensure high recoveries, excellent colony morphology and reliable, reproducible results.

### Features and benefits

- Economical
- Ready to use
- Hydrophilic, intended for aqueous solutions
- Sterile, individually packed or dispenser packaged for use with the eButler membrane dispenser
- Available in a range of colors, pore sizes, and diameters with a unique pattern grid line designed to neither enhance nor inhibit colony growth

For a wider choice of membranes, please refer to the Membrane Filters section.

### Ordering information

#### ME and MicroPlus membrane filters

Diameter (mm)	Catalog number	Description	Pore size (µm)	Color	Grid/color	Quantity/pack
<b>ME (mixed cellulose ester)</b>						
47	10407312	ME25/21 STL	0.45	White	3.1 mm/black	400
50	10407314	ME25/21 STL	0.45	White	3.1 mm/black	400
47	10406870	ME25/21 ST	0.45	White	3.1 mm/black	100
47	10406871	ME25/21 ST	0.45	White	3.1 mm/black	1000
47	10407332	ME25/31 STL	0.45	Black	3.1 mm/white	400
50	10406872	ME25/21 ST	0.45	White	3.1 mm/black	100
50	10407334	ME25/31 STL	0.45	Black	3.1 mm/white	400
47	10407370	ME25/41 STL	0.45	Green	3.1 mm/black	400
50	10407372	ME25/41 STL	0.45	Green	3.1 mm/black	400
47	10409470	ME25/41 ST	0.45	Green	3.1 mm/black	100
50	10409472	ME25/41 ST	0.45	Green	3.1 mm/black	100
47	10408712	ME24/21 STL	0.2	White	3.1 mm/black	400
50	10408714	ME24/21 STL	0.2	White	3.1 mm/black	400
50	10407324	ME25/20 STL	0.45	White	5.0 mm/black	400

\* With hydrophobic rim

ST—Single sterile packed

STL—Sterile, for use with eButler membrane dispenser



Sterile Cellulose ME25/21 MCE Membrane Filters

## Ordering information

### ME and MicroPlus membrane filters (continuation)

Diameter (mm)	Catalog number	Description	Pore size (µm)	Color	Grid/color	Quantity/pack
<b>ME (mixed cellulose ester) (continuation)</b>						
50	10408915	ME27/21 STL	0.8	White	3.1 mm/black	400
47	10407342	ME27/31 STL	0.8	Black	3.1 mm/white	400
50	10407615	ME27/41 STL	0.8	Green	3.1 mm/black	400
50	10409834	ME26/31 STL	0.6	Black	3.1 mm/white	400
<b>ME 24</b>						
47	10406970	ME24/21 ST	0.2	White	3.1 mm/black	100
47	10408712	ME24/21 STL	0.2	White	3.1 mm/black	400
50	10406972	ME24/21 ST	0.2	White	3.1 mm/black	100
50	10408714	ME24/21 STL	0.2	White	3.1 mm/black	400
<b>ME 25</b>						
47	10407970	ME25/51 ST*	0.45	White	3.1 mm/black	100
47	10406871	ME25/21 ST	0.45	White	3.1 mm/black	1000
47	10409770	ME25/31 ST	0.45	Black	3.1 mm/white	100
47	10409771	ME25/31 ST	0.45	Black	3.1 mm/white	1000
50	10406572	ME25/20 ST	0.45	White	5.0 mm/black	100
50	10409772	ME25/31 ST	0.45	Black	3.1 mm/white	100
<b>ME 27</b>						
47	10408970	ME27/21 ST	0.8	White	3.1 mm/black	100
47	10409970	ME27/61 ST with pad	0.8	White	3.1 mm/black	100
50	10405672	ME27/41 ST	0.8	Green	3.1 mm/black	100
<b>ME 28</b>						
50	10408472	ME28/41 ST	1.2	Green	3.1 mm/black	100
<b>MicroPlus (cellulose nitrate)</b>						
47	10407112	MicroPlus-21 STL	0.45	White	3.1 mm/black	100 × 4
50	10407114	MicroPlus-21 STL	0.45	White	3.1 mm/black	100 × 4
47	10407713	MicroPlus-21 ST	0.45	White	3.1 mm/black	100
50	10407714	MicroPlus-21 ST	0.45	White	3.1 mm/black	100
47	10407132	MicroPlus-31 STL	0.45	Black	3.1 mm/white	100 × 4
50	10407134	MicroPlus-31 STL	0.45	Black	3.1 mm/white	100 × 4
50	10407734	MicroPlus-31 ST	0.45	Black	3.1 mm/white	100
47	10407170	MicroPlus-41 STL	0.45	Green	3.1 mm/black	100 × 4
50	10407172	MicroPlus-41 STL	0.45	Green	3.1 mm/black	100 × 4

\* With hydrophobic rim

ST—Single sterile packed

STL—Sterile, for use with eButler membrane dispenser

# Polycarbonate membranes

## Cyclopore™ polycarbonate membranes

Black Cyclopore™ membranes are excellent for epifluorescence and other microscopy applications requiring a contrasting background. The polycarbonate membrane is used to filter the sample and is then used directly for analysis. The dark membrane gives lower background fluorescence and improves the sensitivity of the test.

Natural Cyclopore™ membranes are well suited for concentration of organisms and visualizing by transmission light and scanning emission microscopy. They are also effective for concentrate and elute microbiological methods prior to plating the concentrated sample onto agar. Concentrated samples can also be used for eDNA methods or other types of molecular detection. Meets the requirements for ISO 11731 *Legionella sp* testing.

See page 67 and 74 for details and ordering information.

## Nuclepore™ polycarbonate membranes

Nuclepore™ black dyed polycarbonate membranes are high performance membranes suited for applications using epifluorescence microscopy. Black membranes greatly reduce background fluorescence, which results in improved microorganism and particulate visibility.

Using these membranes in combination with epifluorescence techniques, rapid enumeration of viable and nonviable microorganisms and particulate matter can be conducted in 30 minutes or less. Conventional culturing methods require incubation times of more than 24 hours. Use black track-etched membranes with epifluorescence techniques to achieve rapid, direct enumeration of microorganisms.

Natural Nuclepore™ membranes are well suited for concentration of organisms and visualizing by transmission light and scanning emission microscopy. They are also effective for concentrate and elute microbiological methods prior to plating the concentrated sample onto agar. Concentrated samples can also be used for eDNA methods or other types of molecular detection. Meets the requirements for ISO 11731 *Legionella sp* testing.

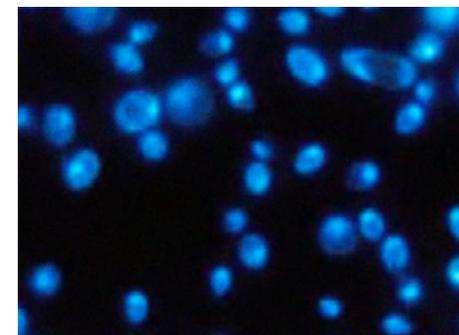
### Features and benefits

- Polycarbonate track-etched membrane dyed black with Irgalan Black
- Flat, smooth surface assures surface capture of microorganisms and particles
- Extremely low nonspecific absorption

See page 71 and 75 for details and ordering information.



Cyclopore™ PC Polycarbonate Black membrane filters



Yeast cells on Black Cyclopore™ with DAPI Stain

## eButler membrane dispenser

### Aseptic dispense, clean workspace

Dispense membrane filters quickly and easily while maintaining sterility.

- Push-button or sensor dispense.
- Durable and easy-to-load guides are printed right on the equipment.
- Complete membrane selection of pores sizes, colors and 47 or 50 mm diameters is available.
- Membrane identification is easy to read with every dispense.
- Maintain a tidy workspace free of packaging material.

See page 179 for details and ordering information.



eButler membrane dispenser

# Membrane filtration accessories

Cytiva offers a line of analytical funnels and vacuum filtration equipment for use in microbiological testing processes.

See page 101 for details and ordering information.

## Vacuum filtration equipment

### MV 050 series

The MV series vacuum filtration equipment is made of stainless steel, providing broad chemical compatibility and ease of cleaning for years of service.

The durable construction provides flexibility of use up to 200 °C and is compatible with a variety of filtration media including glass microfiber, membrane or layered filtration.

#### Applications

- Microbiology (e.g. *Escherichia coli* detection), biochemistry, hydrobiology
- Food and beverage testing, (e.g. cold sludge in beer), pharmaceuticals, cosmetics, water, wastewater
- Residue analysis, precipitate analysis, contamination tests.

See page 104 for details and ordering information.

### Multiple vacuum filtration apparatus

The stainless steel manifold and manifold assemblies for three or six filtration units are fitted with stainless steel units. The apparatus can be autoclaved and sterilized by dry heat at up to 180°C. It is suitable for vacuum operation, not intended for positive pressure applications.

#### Applications

- Microbiological quality control
- Residue analyses
- Serial filtration carried out rapidly and easily with a common drainage outlet

See page 106 for details and ordering information.



MV 050/0



AS 300/3

# Accessories and vacuum filtration apparatus

## Witt's bottle WT 100

For filtrate collection in an inserted container. The bottle is made of borosilicate glass. It has a replaceable round lid and side-mounted tubing nozzle for vacuum tubing 8 mm (inside diameter).

## Forceps PZ 001

The stainless steel forceps with smooth angled jaws (104 mm long) are excellent for handling membrane filters. They are autoclavable and can be flame sterilized with ethanol.

See page 120 for details and ordering information.

## SF 100 Suction Flask

SF 100 Suction Flask, 1000 mL with tubing nozzle, vacuum filtration apparatus accessories

See page 103 for details and ordering information.



Witt's Bottle WT 100 and Forceps PZ 001



SF 100 Suction Flask

06

# Specialty products

Separate the organic from the inorganic. Protect lab surfaces. Test the pH levels in swimming pools. Cytiva offers a range of specialty products to meet your specific testing requirements.

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# Chromatography papers

**Chromatography paper media are made from specially selected cotton cellulose. They are rigorously quality controlled for characteristics important to the chromatographer and to ensure uniformity within the grade.**

## Features and benefits

- Pure cellulose produced entirely from the highest quality cotton linters with no additives of any kind
- Manufactured and tested specifically for chromatographic techniques to ensure the wicking capability and uniformity of capillary action that are important in chemical separations
- Also widely used in protein and nucleic acid blotting

## Cellulose chromatography papers

### Grade 1 Chr

A smooth surface, 0.18 mm thick with a linear flow rate (water) of 130 mm/ 30 min. Good resolution for general analytical separations.

### Grade 2 Chr

Thickness 0.18 mm. Flow rate 115 mm/30 min. Slower than 1 Chr for higher resolution applications. Smooth surface. Particularly recommended for optical or radiometric scanning.

### Grade 3 Chr

A medium thickness paper (0.36 mm) with a flow rate of 130 mm/30 min. For general applications with medium/heavy solute loadings. Frequently used for separation of inorganic compounds and for electrophoresis.

### Grade 4 Chr

Thickness 0.21 mm. Flow rate 180 mm/30 min. Fastest of our thin papers. Recommended for routine and/or repetitive chromatography when loadings are relatively low. Smooth surface. Very suitable where speed is important and very high resolution is not required.

### Grade 17 Chr

A thick (0.92 mm) and highly absorbent paper with a very high flow rate of 190 mm/30 min. Suitable for the heaviest loadings and for preparative paper chromatography and electrophoresis.



Cellulose chromatography papers

**Grade 20 Chr**

Thickness 0.17 mm. Flow rate 85 mm/30 min. For maximum resolution, this grade gives the greatest possible separation of closely related compounds. Smooth surface. Recommended for separation of samples of unknown composition, with outstanding resolution at low loadings.

**Grade 31ET Chr**

Thickness 0.50 mm. Flow rate 225 mm/30 min. Extremely fast. Flow rate is the highest of all chromatography papers in the range. Thick paper with fairly soft surface. Principal application is in electrophoresis of large molecules.

**Grade 54 SFC**

Thin (0.18 mm) hardened paper with high speed (180 mm/30 min) and fair to good resolution. Recommended for routine chromatography. High wet strength.

**Grade 2668 Chr**

Thickness 0.9 mm. Flow rate 155 mm/10 min. For separation of relatively large molecules by electrophoresis.

**Grade 2727 Chr**

Thickness 1.40 mm. Flow rate 180 mm/30 min. For separation of very large amounts of substance.

**Grade SG81**

Thickness 0.27 mm. Flow rate 110 mm/30 min. Ion exchange chromatography paper combining cellulose and large pore silica gel. For enzyme assays to separate product from reactant by charge or polarity.

## Ordering information

### Cellulose chromatography paper

Dimensions	Catalog number											Quantity/ pack
	Grade 1 Chr	Grade 2 Chr	Grade 3 Chr	Grade 4 Chr	Grade 17 Chr	Grade 20 Chr	Grade 31ET Chr	Grade 54 SFC	Grade 2668 Chr	Grade 2727 Chr	Grade SG81	
<b>Circles</b>												
185 mm	-	-	-	-	-	-	-	-	-	10382514	-	100
<b>Sheets</b>												
2 × 5 cm	-	-	-	-	-	-	3031-901	-	-	-	-	1000
2.5 × 22 cm	-	-	-	-	3017-8793	-	-	-	-	-	-	100
7 × 9 cm	-	-	-	-	3017-820	-	-	-	-	-	-	100
10 × 30 cm	3001-845	-	-	-	-	-	-	-	-	-	-	100
19 × 19 cm	-	-	-	-	-	-	-	-	-	10382581	-	100
20 × 20 cm	3001-861	-	-	-	-	-	-	-	-	-	-	100
25 × 25 cm	3001-878	-	-	-	-	-	-	-	-	-	-	100
46 × 57 cm	-	-	-	-	3017-915	-	3031-915	-	-	-	3668-915	25
46 × 57 cm	3001-917	3002-917	3003-917	3004-917	3017-917	3020-917	-	-	-	-	-	100
46 × 57 cm	3001-918	-	-	-	-	-	-	-	-	-	-	500
58 × 60 cm	-	-	-	-	-	-	-	-	-	10382562	-	50
58 × 60 cm	-	3002-911	-	-	-	-	-	-	10382461	-	-	100
58 × 68 cm	3001-931	-	-	-	-	-	-	-	-	-	-	100
<b>Reels</b>												
1.0 cm × 100 m	3001-604	-	-	-	-	-	-	-	-	-	-	1
2.0 cm × 100 m	3001-614	-	-	3004-614	-	-	-	-	-	-	-	1
2.5 cm × 30 m	-	-	-	-	3017-621	-	-	-	-	-	-	1
2.5 cm × 110 m	-	-	-	-	-	-	-	-	-	-	3668-6871	1
3.0 cm × 100 m	3001-640	-	-	-	-	-	-	-	-	-	-	1
4.0 cm × 100 m	3001-652	-	-	-	-	-	-	-	-	-	-	1
5.0 cm × 100 m	3001-653	-	-	-	-	-	-	-	-	-	-	1
10.0 cm × 100 m	3001-672	-	-	-	-	-	-	-	-	-	-	1
15.0 cm × 100 m	3001-681	-	-	-	-	-	3031-681	-	-	-	-	1
1.5" × 300'	3001-651	-	-	-	-	-	-	3454-651	-	-	-	1
18" × 3800 m	300110115	-	-	-	-	-	-	-	-	-	-	1
<b>Strips</b>												
11 × 21.3 cm with 12 strips of 1.5 cm*	3001-964	-	-	-	-	-	-	-	-	-	-	100

\* 1 Chr sheet divided into 1.5 cm lanes for running up to 12 samples in parallel  
For details on 3MM Chr products please visit the Cytiva website: [cytiva.com](http://cytiva.com)

# Extraction thimbles

These thimbles are widely used in Soxhlet extraction units, providing a safe, convenient, and efficient method of solvent extraction from solids and semi-solids. Soxhlet extraction is a widely used technique for the analysis of fats or pesticides in foods and soil materials as well as in many other procedures that involve a solid-liquid extraction.

## Cellulose thimbles

### High-performance cellulose thimbles

Cellulose extraction thimbles are produced from high-quality alpha cellulose cotton linter and have excellent mechanical strength and retention. The high purity of the materials ensures reliable and reproducible analytical results.

Standard single thickness thimbles have a wall thickness of approximately 1 mm (10.0 µm nominal particle retention).

Double thickness thimbles have a wall thickness of approximately 2 mm (6.0 µm nominal particle retention) for applications where higher retention and increased wet or dry strength or rigidity are required.

### Standard cellulose thimbles

Thimbles of type 603 are made from high-quality cellulose, and 603 g thimbles are made from borosilicate glass fibers with an inorganic binder. For all automated extraction apparatus in common use, we offer thimbles whose dimensions are matched exactly to those of the thimble holders to ensure optimal fit.

## Technical specifications

### Standard thimbles

Grade	Material	Maximum temperature °C
603	Cellulose	130
603 g	Borosilicate glass fibers*	500

\* With inorganic binder



High performance cellulose extraction thimbles

### Thimble size selection guide

Thimble sizes should be selected carefully to fit extractors correctly. The different sizes represent the established practice of showing the internal diameter and overall length of the thimble in millimeters. Therefore, make an extra allowance for wall thickness when calculating external diameters. The thimble should pass through the narrower end of the upper extractor socket, allowing 1-2 mm clearance, and be 5-10 mm above the level of the top of the siphon tube.

## Ordering information

### High-performance cellulose thimbles

Dimensions (mm) <sup>*†</sup>	Catalog number	Quantity/pack
<b>Single thickness (nominal wall thickness = 1 mm)</b>		
10 × 50	2800-105	25
18 × 55	2800-185	25
19 × 90	2800-199	25
22 × 65	2800-226	25
22 × 80	2800-228	25
25 × 80	2800-258	25
25 × 90	2800-259	25
25 × 100	2800-250	25
26 × 60	2800-266**	25
26 × 100	2800-260	25
28 × 80	2800-288	25
28 × 100	2800-280	25
28 × 120	2800-282	25
30 × 80	2800-308	25
30 × 100	2800-300	25
33 × 80	2800-338	25
33 × 94	2800-339	25
33 × 100	2800-330	25
33 × 118	2800-331	25
37 × 130	2800-373	25
41 × 123	2800-412	25
43 × 123	2800-432	25
60 × 180	2800-608 <sup>#</sup>	25
<b>Double thickness (nominal wall thickness = 2 mm)</b>		
16 × 60	2810-166	25
22 × 80	2810-228	25
25 × 80	2810-258	25
26 × 60	2810-266	25
33 × 80	2810-338	25
33 × 94	2810-339	25
43 × 123	2810-432	25
90 × 200	2810-902	25

\* Internal diameter and external length

\*\* Fits Soxtec™ extractor

† See Thimble Size Selection Guide on p. XXX

# Nominal wall thickness 1.5 mm

## Ordering information

### Standard cellulose thimbles

Dimensions (mm)*†	Grade	Wall thickness (mm)	Catalog number	Quantity/pack
22 × 60	603	2.0	10350306	25
22 × 80	603	1.5	10350211	25
25 × 60	603	1.5	10350215	25
25 × 80	603	1.5	10350217	25
25 × 100	603	1.5	10350219	25
26 × 60	603	1.5	10350220	25
27 × 25 × 60	603T	1.0	10350416	25
27 × 80	603	1.5	10350223	25
28 × 60	603	1.5	10350225	25
28 × 80	603	1.5	10350226	25
28 × 100	603	1.5	10350227	25
30 × 80	603	1.5	10350234	25
30 × 100	603	1.5	10350236	25
33 × 60	603	1.5	10350238	25
33 × 80	603	1.5	10350240	25
33 × 31 × 80	603T	1.0	10350437	25
33 × 90	603	1.5	10350241	25
33 × 94	603	1.5	10350242	25
33 × 100	603	1.5	10350243	25
33 × 118	603	1.5	10350245	25
33 × 130	603	1.5	10350247	25
33 × 205	603	1.5	10350250	25
34 × 130	603	1.5	10350252	25
35 × 150	603	1.5	10350255	25
40 × 85	603	2.0	10350261	25
41 × 123	603	2.0	10350265	25
44 × 230	603	2.0	10350275	25
48 × 145	603	2.0	10350273	25
48 × 200	603	2.0	10350274	25
75 × 250	603	2.5	10350287	25
80 × 250	603	3.0	10350324	25

\* Internal diameter and external length

† See Thimble Size Selection Guide on p. 156

### Standard cellulose thimbles for DIONEX™ ASE

Extraction volume (mL)	Extraction system	Nominal wall thickness (mm)	Catalog number	Quantity/pack
11	200	1.0	10350106	25
22	200	1.0	10350108	25

# Glass and quartz thimbles

## High-purity glass microfiber thimbles

High-purity glass microfiber thimbles manufactured from 100% pure borosilicate glass are available for specialized applications. The thimbles are completely free of binders or additives and can be used at temperatures up to 500°C or when using solvents that are incompatible with cellulose thimbles. These thimbles are also used in pollution monitoring techniques (0.8 µm nominal particle retention). Typical thickness 1.7 mm.

### Features and benefits

- Available in a range of sizes and wall thicknesses to suit your application
- Designed to fit most commercially available Soxhlet extractors
- No binders are added

### Applications

- Smoke stack gas monitoring
- Soxhlet extraction
- Analyzing pesticide residues
- Determining oil or fat content of foods (e.g. french fries)
- Analysis of oil and grease in solid wastes

## Quartz microfiber thimbles

Made from high-purity quartz microfiber, this thimble can withstand high temperatures (up to 1000°C). Suitable for solvent extraction, dioxin detection and smoke stack gas sampling..

## Standard glass fiber thimbles

Thimbles of type 603 g are made from borosilicate glass fibers with inorganic binder. We also offer a selection of borosilicate glass thimbles without binder.



High-purity glass microfiber thimbles

## Ordering information

High-purity glass and quartz microfiber thimbles

Dimensions (mm)*	Catalog number	Quantity/pack
<b>Glass microfiber thimbles—Grade HP-GF</b>		
19 × 90	2814-199	25
25 × 90, tapered	2814-259	25
30 × 100	2814-300	25
43 × 123	2814-432	25
33 × 135	2814-533	25
<b>Quartz microfiber thimbles</b>		
25 × 90, tapered	2812-259	10
28 × 70, tapered	2812-287	10

\* See *Thimble Size Selection Guide* on p. XXX

## Ordering information

Standard glass microfiber thimbles

Dimensions (mm)*	Wall thickness (mm)	Catalog number	Quantity/pack
<b>Grade 603 g (glass fiber with inorganic binder)</b>			
10 × 38	1.0	10371103	25
16 × 50	1.0	10371005	25
19 × 90	1.0	10371007	25
22 × 80	1.5	10371011	25
23.8 × 68	1.5	10371114	25
25 × 100	1.5	10371019	25
28 × 60	1.5	10371025	25
30 × 100	1.5	10371036	25
33 × 94	1.5	10371042	25
33 × 100	1.5	10371043	25
33 × 118	1.5	10371045	25
35 × 150	1.5	10371055	25
44 × 230	1.5	10371075	25
<b>Glass microfiber (without binder)</b>			
30 × 80	–	2811-308	25

\* Internal diameter and external length

# Benchkote™ and Benchkote™ Plus Surface Protectors

**Benchkote™ is an absorbent, impermeable material designed to protect laboratory surfaces against hazardous spills. The material features a high-quality, smooth, absorbent Whatman™ paper, which quickly absorbs liquid spills, and a laminated polyethylene layer that prevents flow through to the working surface. After use, the sheet is incinerated or disposed of according to local regulations.**

## **Benchkote™ Plus**

**Benchkote™ Plus is a thicker, more absorbent material for more demanding applications and can absorb in excess of 0.75 liters of water per square meter.**

### **Features and benefits**

- Material is very strong, making it tear resistant, wet or dry.
- Smooth white surface can be written on with ink or pencil and lies flat.
- Suitable for saturation with disinfectant to protect benches where pathogens and other bacteria are present.
- Use polyethylene side up to collect deposits without absorption.
- Paper side quickly absorbs liquid spills, preventing liquids from going through to the work surface.
- Spillages are trapped in the absorbent paper.
- Benchkote™ can be incinerated after use; the polyethylene layer does not melt or drip but is rapidly consumed in the flames.

### **Applications**

- Containing radiochemical spillage and avoiding contamination.
- Recovering spillage of expensive materials.
- Protecting hard surfaces to lessen impact.
- Water or solvent wick for humidity chambers.
- Lining of chemical cabinets, laboratory bench drawers, and laboratory hoods.

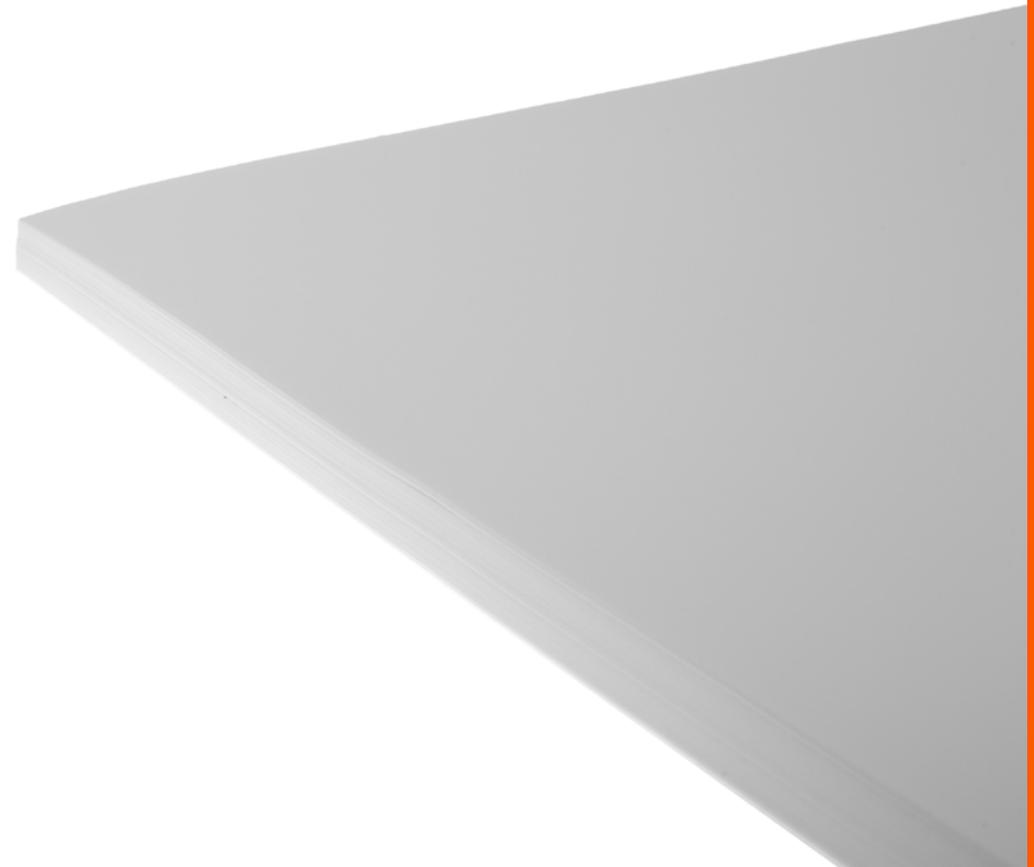


Benchkote™ Surface Protector

## Ordering information

### Benchkote™ surface protector

Dimensions (mm)	Catalog number	Description	Quantity/pack
<b>Benchkote™ surface protector</b>			
460 x 570	2300-594	Pad (NA)	1 (50 sheets)
460 x 570	2300-599	Pad (EU)	1 (50 sheets)
460 x 570	2300-916	Sheets	50
460 x 570	2300-917	Sheets	100
-	2300-004	A4 sheets	1000
460 mm x 50 m	2300-731	Reel	1
920 mm x 50 m	2300-772	Reel	1
<b>Benchkote™ Plus surface protector</b>			
460 x 570	2301-916	Sheets	50
500 x 600	2301-6150	Sheets	50
600 mm x 50 m	2301-6160	Reel	1



# Benchkote™ surface protector for lab-scale ÄKTA™ systems

Benchkote™ sheets for lab-scale ÄKTA™ systems protect the top buffer trays from buffer spillages and salt deposits.

## Features and benefits

- Simplify daily and weekly preventive maintenance of the top buffer tray of your ÄKTA™ systems.
- Smooth, absorbent paper quickly absorbs spills.
- Laminated polyethylene layer prevents flow-through to the working surface.
- Sizes that fit the top buffer tray on ÄKTA™ go, ÄKTA™ avant, ÄKTA pure™ and ÄKTA™ start protein purification systems.
- Offered in three convenient pack sizes: 10/pk, 25/pk and 50/pk sheets.
- Convenient and easy to use.

## Ordering information

Benchkote™ surface protector for ÄKTA™ systems

Dimensions (mm)	Catalog number	Description	Quantity/pack
<b>Benchkote™ sheet for ÄKTA™</b>			
420 × 300	2300-10060	Benchkote™ sheet for ÄKTA pure™	10
420 × 300	2300-10061	Benchkote™ sheet for ÄKTA pure™	25
420 × 300	2300-10062	Benchkote™ sheet for ÄKTA pure™	50
310 × 210	2300-10063	Benchkote™ sheet for ÄKTA™ start	10
310 × 210	2300-10064	Benchkote™ sheet for ÄKTA™ start	25
310 × 210	2300-10065	Benchkote™ sheet for ÄKTA™ start	50
520 × 500	2300-10072	Benchkote™ sheet for ÄKTA' avant	10
520 × 500	2300-10073	Benchkote™ sheet for ÄKTA™ avant	25
520 × 500	2300-10074	Benchkote™ sheet for ÄKTA™ avant	50
233 x 290	2300-10092	Benchkote™ sheets for AKTA™ go	10
233 x 290	2300-10093	Benchkote™ sheet for AKT™A go	25
233 x 290	2300-10094	Benchkote™ sheet for AKTA™ go	50

# Weighing papers

## Kjeldahl weighing boats

Transfer your samples completely loss-free by simply dropping the entire weighing boat containing the sample into the acid solution in the Kjeldahl flask/digestion tube.

### Features and benefits

- Excellent for weighing and transferring Kjeldahl samples safely and reliably
- Dissolves residue-free in the digestion solution without influencing the analytical results in any way
- Made from very low nitrogen parchment paper without any glue or additives

## Parchment paper

### Features and benefits

- Transparent and smooth
- Simplifies sample transfer
- Quantitative transfer from paper

## Technical specifications

### Weighing papers

Product	Grade	Nominal thickness (mm)	Nominal weight (g/m <sup>2</sup> )
Weighing boat, ≤ 0.07% N	609	0.07	80
Pergamyne paper	2122	0.03	40
Parchment paper, ≤ 0.05% N	B-2	0.04	43

## Ordering information

### Weighing papers

Dimensions (mm)	Grade	Catalog number	Description	Quantity / pack
55 × 10 × 10	609	10313032	Kjeldahl Weighing Boat	100
100 × 100	2122	10347893	Sheets	500
150 × 150	2122	10347890	Sheets	500
3" × 3"	B-2	10347671	Sheets	500
4" × 4"	B-2	10347672	Sheets	500
6" × 6"	B-2	10347673	Sheets	500
12" × 12"	B-2	10347670	Sheets	500



Kjeldahl analysis weighing boat

# Paper for ignition strength (IS) measurement

This certified Grade 2 is tested according to the procedure detailed in ASTM E 2187-09, Sections 9.3.1 and 9.3.2. The paper meets both the conditioned ( $26.1 \pm 0.5$  g, SD < 0.3 g) and dried ( $24.7 \pm 0.5$  g, SD < 0.3 g) weight requirements.

The lot-specific certificate can be downloaded from [cytiva.com/certificates](http://cytiva.com/certificates).

## Features and benefits

- Each lot is guaranteed to meet the ASTM E 2187-09 specifications.
- Simplifies testing process by removing lot suitability testing.
- Just condition and use.

## Ordering information

Paper for ignition strength (IS) measurement

Diameter (mm)	Catalog number	Grade	Quantity / pack
150	1002-147	Grade 2 (for IS testing)	100

## Ashless clippings

Whatman™ ashless filter aids enhance filtration speed by coagulating precipitates or suspensions to form a thick retentive “prefilter” layer on top of normal filter paper.

## Ordering information

Ashless clippings

Diameter (mm)	Catalog number	Quantity / pack
Ashless clippings	1703-050	500 gm

# pH Indicator and test papers

Whatman™ pH indicator and test papers combine ease of use with exceptional accuracy and consistency. The convenience of using indicator papers for the rapid determination of pH values has led to many applications in laboratories and industry.

## Features and benefits

- Instant pH readings
- Accurate for a wide range of routine pH testing
- Inexpensive
- Convenient and portable for field use

## pH indicators

### Strips type CF (color bonded dye system)

Individual plastic support strips carry four different segments of dye-impregnated indicator papers. The resulting combination of color differences gives an extremely clear and accurate visual pH value. All the dyes are chemically bonded to the paper and cannot be leached into solution; problems associated with contamination of the sample and resultant anomalous readings are avoided.

### Strips type CS (integral comparison chart)

Each test strip has a central segment of indicator dye and, printed alongside, eight or more different color segments marked with corresponding pH values for matching purposes.

The pH test value can be read off by direct comparison of the test strip color and the color bars. Excellent for colored solutions, when any changes in color of the paper stock are automatically cancelled out.

### Dispensers type TC (triple color band)

The strip has three separate indicator dye color bands. The individual combination of color change resulting from each test is compared with the color-coded comparison chart printed on the dispenser, giving improved speed and accuracy in reading.

### Dispensers type SR (standard range)

Tapes for this popular pH indicator dispenser are available in both full range and standard narrow ranges.

### Indicator books

The book format is particularly suitable for educational and industrial use. In schools they are economical because the amount of paper per student can be carefully controlled.



pH indicators

## Acid-alkali test papers

### Litmus blue and litmus red

These easy-to-use test papers facilitate a general test for acid or alkaline reaction. The change occurs around pH 5-8. They are particularly recommended for educational use.

### Congo red

This test paper changes color from blue to red in the range pH 3-5 for the determination of neutralization point in strong acid/weak alkali reactions.

### Phenolphthalein

This white paper changes to pink at pH 8.3 and becomes red at pH 10. It is useful for the determination of the neutralization point in weak acid/strong alkali reactions.

## Specialized test papers

### Lead acetate test paper

Used for detecting hydrogen sulfide, this rapid qualitative test paper, when wetted with distilled water, can detect as little as 5 ppm of  $H_2S$  in the atmosphere or in a gas stream. Hydrogen peroxide can be detected with this paper by preblackening the paper in  $H_2S$ . Concentrations as low as 4 ppm can be detected.

### Potassium iodide test paper

Used for detecting chlorine and other oxidizing agents. In acid solution, oxidizing agents react with the iodide in the test paper to liberate iodine. The paper will turn blue in the presence of an oxidizing agent (e.g.  $Cl_2$ ,  $Br_2$ ,  $H_2O_2$ ,  $HNO_2$  etc.).

### Universal indicator papers

Universal indicator papers have been impregnated with a mixture of several indicators. On contact with the sample solution they assume a particular color. A check against the color comparison table supplied allows the pH to be determined.

## Ordering information

### pH indicators and test papers

Dimensions (mm)	pH range	Catalog number	Description	Packaging	Quantity/pack
<b>Strips</b>					
6 × 80	0.0 to 14.0	2613-991	Color bonded	100 strips	100 strips
6 × 80	4.5 to 10.0	2614-991	Color bonded	100 strips	100 strips
6 × 85	0.0 to 14.0	10362000	Panpeha Plus, non bleeding	Strip, 4 sections	100
6 × 85	2.0 to 9.0	10362010	Panpeha Plus, non bleeding	Strip, 3 sections	100
9 × 85	0.0 to 14.0	10360005	Panpeha 112	–	200
11 × 100	1.0 to 12.0	2612-990	Integral comparison strip	200 strips	200 strips
11 × 100	1.8 to 3.8	2626-990	Integral comparison strip	200 strips	200 strips
11 × 100	3.8 to 5.5	2627-990	Integral comparison strip	200 strips	200 strips
11 × 100	5.2 to 6.8	2628-990	Integral comparison strip	200 strips	200 strips
11 × 100	6.0 to 8.1	2629-990	Integral comparison strip	200 strips	200 strips
11 × 100	8.0 to 9.7	2630-990	Integral comparison strip	200 strips	200 strips
11 × 100	9.5 to 12.0	2631-990	Integral comparison strip	200 strips	200 strips
<b>Dispensers (reel)</b>					
10 mm × 5 m	1.0 to 11.0	2611-628	Three colors	–	1
7 mm × 5 m	–	2600-201A	Litmus blue	–	1
7 mm × 5 m	–	2600-202A	Litmus red	–	1
7 mm × 5 m	–	2600-204A	Phenolphthalein	–	1
7 mm × 5 m	–	2602-500A	Potassium iodide	–	1
7 mm × 5 m	1.0 to 14.0	2600-100A	Standard full range	–	1
7 mm × 5 m	0.5 to 5.5	2600-101A	Standard narrow range	–	1
7 mm × 5 m	4.0 to 7.0	2600-102A	Standard narrow range	–	1
7 mm × 5 m	6.4 to 8.0	2600-103A	Standard narrow range	–	1
7 mm × 5 m	8.0 to 10.0	2600-104A	Standard narrow range	–	1
7 mm × 5 m	1.0 to 11.0	10362030	Panpeha	–	1
<b>Books</b>					
–	1.0 to 11.0	2600-500	–	–	1 carton*
–	–	2600-601	Litmus blue	10 books of 20 strips	1 carton*
–	–	2600-602	Litmus red	10 books of 20 strips	1 carton*
10 mm × 75 mm	0.0 to 12.0	10360300	Litmus blue	–	100

\* 1 carton contains 10 packs of 10 books, product is 20 strips per book

## Papers for healthcare applications

### Antibiotic assay discs

For determining the type of causal agent of infectious diseases and for checking their sensitivity to antibiotics and chemotherapeutic agents in vitro by means of the inhibition zone determination method. The antibiogram allows rational and selective chemotherapy.

The test discs can be coated with chemotherapeutic agents, placed on the inoculated nutrient agar and incubated. The size of the inhibition zone is a measure for the effectiveness of the substances.

### Ordering information

Antibiotic assay (AA) paper

Diameter (mm)	Catalog number	Quantity/pack
6	2017-006	1000
9	2017-009	1000
13	2017-013	1000

### Grade 470

Soft surface. For gelatinous samples. Used for the absorption of culture media, as a blotting paper, for electrophoresis, and amino acid chromatography.

### Ordering information

Papers for healthcare applications

Dimensions (mm)	Grade	Catalog number	Format	Quantity/pack
460 × 570	470	10318493	Sheets	100
1.5" × 450'	470	10539028	Reel	1
12.7	740E	10328170	Circles	1000
1.5" × 550'	740E	10539167	Reel	1

# Phase separator paper

Whatman™ 1PS phase separator is a high-grade filter paper impregnated with a stabilized silicone that renders it hydrophobic, retaining the aqueous phase and passing the solvent phase through.

## Features and benefits

- Ease of use—no special training required.
- Any number of separations can be processed together.
- Staff involvement in routine separations is at a minimum.

## Automatic cut-off, separatory funnel replacement

After being shaken, the mixed phases are simply poured directly into the 1PS circle, which is quadrant-folded in a funnel. The separation is extremely rapid so it is unnecessary to wait until the two phases have settled into separate layers. Droplets are automatically separated after only a few moments, giving a solvent phase completely free of the aqueous phase.

In many applications, 1PS can replace the use of separatory funnels. The solvent phase flows through the paper quickly and cleanly. It then stops automatically, leaving the aqueous phase completely in the paper. This feature is particularly important when carrying out a large number of routine solvent extractions at the same time. Samples can be shaken with solvent in stoppered conical flasks or test tubes and transferred directly to funnels containing 1PS.

## Unsupervised separation

A key benefit of the 1PS method is that cut-off is automatic and complete as soon as the solvent phase has passed through\*.

\* Water may break through upon prolonged standing.



1PS Phase separator papers

## Ordering information

### 1PS phase separators

Diameter (mm)	Catalog number	Quantity/pack
70	2200-070	100
90	2200-090	100
110	2200-110	100
125	2200-125	100
150	2200-150	100
185	2200-185	100
240	2200-240	100
270	2200-270	100

# Lens cleaning tissue

Lenses and other optical surfaces made from glass, quartz or plastic can be easily scratched if you do not clean them with a very soft surface. High-quality Whatman™ lens cleaning tissue provides the solution. The tissue is chemically pure and free from silicones and other additives. Most importantly, it can be relied on to safely remove surface moisture and grease.

## Features and benefits

- Soft texture will not damage lenses or optical surfaces.
- Chemically pure tissue is free from silicones and other additives.
- High absorbency ensures the safe removal of surface moisture and grease.
- Thickness 0.035 to 0.040 mm.
- Very strong and leaves no fibers.

## Ordering information

Lens cleaning tissues

Dimensions (mm)	Catalog number	Packaging	Quantity/pack
<b>Grade 105 (sheets)</b>			
100 × 150	2105-841	25 wallets of 25 sheets	25
200 × 300	2105-862	-	100
460 × 570	2105-918	-	500



Lens cleaning tissue

# Moisture testing papers

Moisture test paper for use when drying samples during moisture assessment.

## Ordering information

Moisture testing papers

Dimensions (mm)	Material	Catalog number	Quantity/pack
90	Borosilicate glass	5401-090E	100

# Filter selection made easy

Use our online Whatman™ filter selector to find the right filter for your sample and application.

[cytiva.com/whatmanfilterselector](https://cytiva.com/whatmanfilterselector)



# 07

# Diagnostic assay components

**Cytiva offers a wide selection of high performance, customizable components and solutions for immunoassay and molecular diagnostic applications. Our extensive product range includes components for lateral-flow and flow-through assays, track-etched membranes for microbiological applications and sample collection cards. Our team of support experts can help you select the best-suited technologies and optimize components for your diagnostic assay.**

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# Point-of-care immunoassays

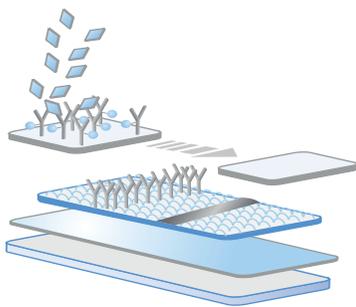
Rapid point-of-care (POC) tests are among the most widely used analytical technologies in diagnostics. Offering high performance, ease of use and cost effectiveness, diagnostic rapid tests can deliver semiquantitative or quantitative results. Point-of-care immunodiagnostic assays can include:

- Lateral-flow immunoassays
- Flow-through immunoassays
- Dipstick colorimetric assays

Cytiva provides a range of technology components for point-of-care immunodiagnostic assays. We produce a comprehensive range of cellulose and glass fiber substrates and nitrocellulose membranes to an assured quality, ensuring accurate and reproducible results.

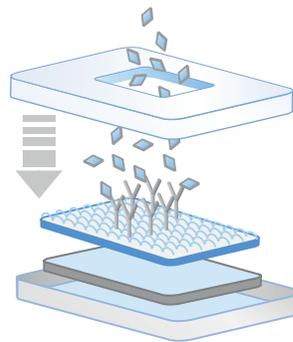
## Lateral-flow immunoassays

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## Flow-through immunoassays

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## Dipstick colorimetric assays

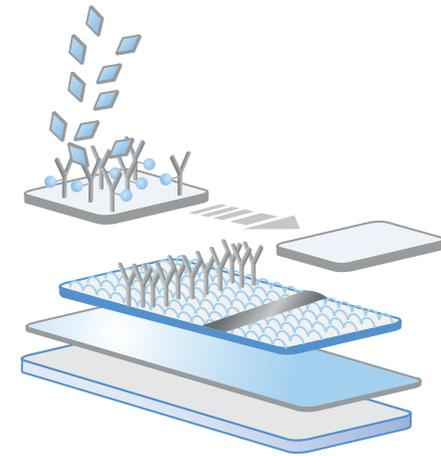
Cellulose pads.....	250
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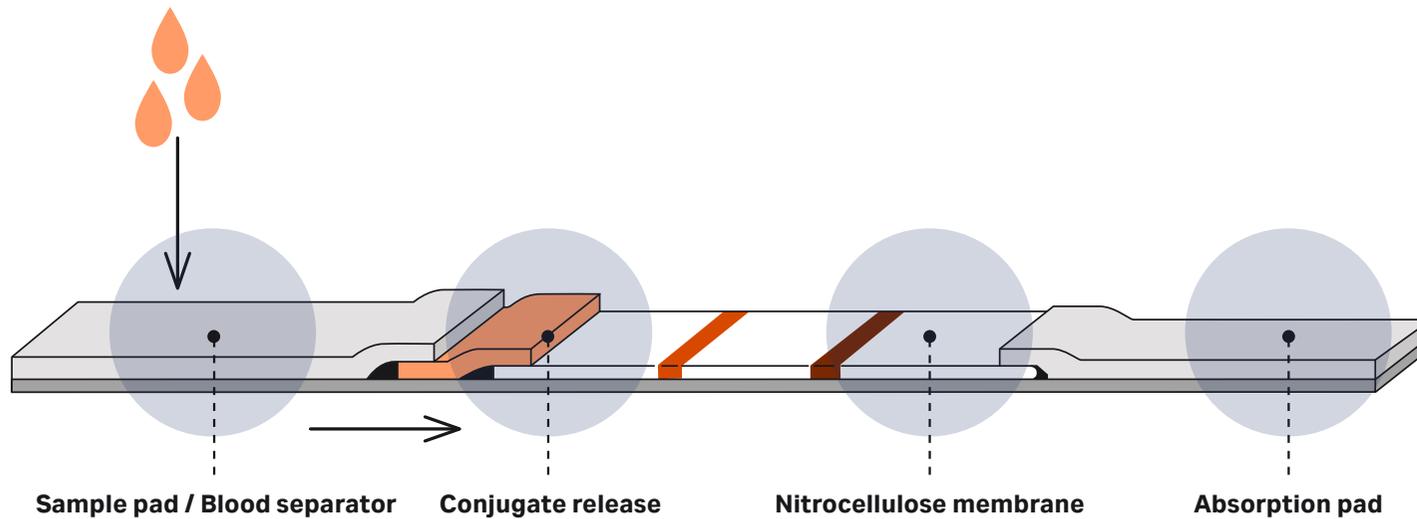
# Lateral-flow immunoassays

With a diverse array of products, Cytiva is one of the leading suppliers in lateral-flow technology. Our offering includes our wide range of blood separation products, conjugate release pads, nitrocellulose membranes, and absorbents.

Developments in lateral-flow immunoassay systems allow for single step assays that require only the addition of a sample. The sample flows through the device and comes into contact with dried reagents, usually a tagged secondary antibody. The antibody and analyte migrate to a capture zone of membrane-immobilized antibody. Any unreacted tagged antibody flows past the capture zone.



Lateral flow assay



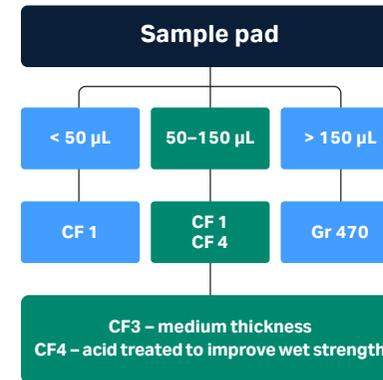
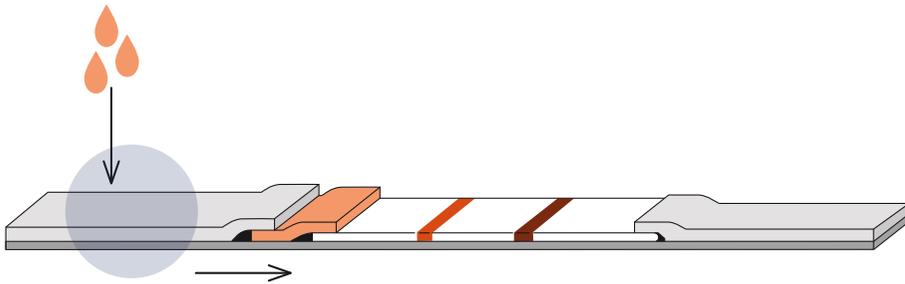
Components of a lateral flow immunoassay

## Sample pads for lateral-flow immunoassays

Sample pads begin the assay by transporting the sample from the point of application to the test components.

### Features and benefits

- Consistent absorbency and wicking rates: Ensures test-to-test reproducibility
- Product manufactured in controlled environments from highest-quality materials: No false results due to sample contamination
- Low protein binding: Minimal loss of analyte, so test sensitivity is maintained
- Naturally hydrophilic: Rapid rewetting after prolonged storage
- Wide range of thickness, absorbency and wicking rate
- Compatible with most styles of housings
- Minimal leakage along the strip: No contamination of test results



Sample pads selection tree

## Technical specifications

### Sample pads for lateral-flow immunoassays

Grade	Material	Properties	Thickness ( $\mu\text{m}$ @ 53kPA)	Wick-ing rate (s/4cm)	Water absorption (mg/cm <sup>2</sup> )
CF1	100% cotton linter light, thin grade suitable for small volume	A thin, smooth-surfaced cotton linter paper with a liner flow rate (water), suitable for small volumes.	176	187	16
CF3	100% cotton linter medium weight	A medium thick cotton linter paper, originally used for separation of inorganic compounds. Larger sample volume than CF1.	322	161	31
CF4	100% cotton linter medium weight	A medium thick cotton linter paper with acid treatment to improve wet strength and reduce trace impurity content. Similar weight and thick-ness to CF3 with faster wicking.	482	65	46
GR470	100% cotton linter medium weight	Untreated bound cellulose suitable for whole blood or serum. Performs well with one or two drops of whole blood.	840	77	78
Standard 14	Bound glass fiber	Untreated bound glass fiber for faster flow than cotton with lower sample retention. Higher absorption capacity than Standard 17.	355	23.1	50.9
Standard 17	Bound glass fiber	Untreated bound glass fiber for faster flow than cotton with lower sample retention. Greater tensile strength than Standard 14	370	34.5	44.9
GF/DVA	Bound glass fiber	Untreated bound glass fiber particularly suitable for saliva samples and raw milk samples	785	28.2	93
VF2	Bound glass fiber	Bound glass fiber used as a single or multiple layers for separation.	785	23.8	86.2

## Ordering information

### Sample pads for lateral-flow immunoassays

Grade	Description	Catalog number	Quantity/pack
CF1	22 mm × 50 m	8111-2250	1
CF3	22 mm × 50 m	8113-2250	1
CF4	22 mm × 50 m	8114-2250	1
STD 14	22 mm × 50 m	8133-2250	1
STD 17	22 mm × 50 m	8134-2250	1
LF1	17 mm × 50 m	8121-1750	1
MF1	22 mm × 50 m	8122-2250	1
VF2	17 mm × 50 m	8124-1750	1
Grade 470	22 mm × 50 m	10539995	1

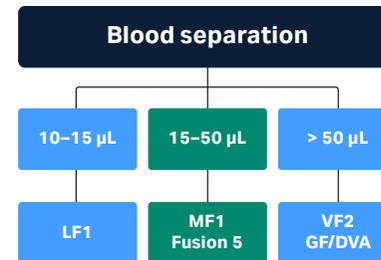
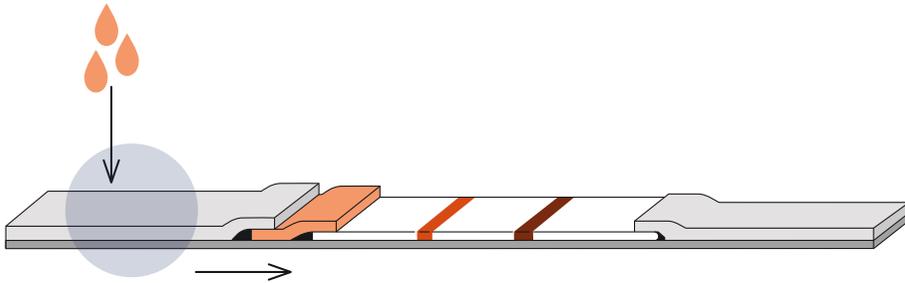
Other formats and sizes available – please enquire for more detail

## Blood separators for lateral-flow immunoassays

Cytiva offers a family of blood separators to meet the increasing demands and strict requirements of the rapid diagnostic market. These products enable whole blood analysis, with no red cell hemolysis.

### Features and benefits

- Separation in 30–120 seconds: Rapid assays save time
- No appreciable red cell hemolysis: Improved reproducibility
- Consistency of materials: Reliability
- Materials suitable for use in a range of tests: Flexibility in test optimization
- Choice of separation times: Allows for test optimization
- Separators appropriate for a range of blood volumes: Enhances the separation rate according to the volume of blood available



Blood separator selection tree

## Technical specifications

### Blood separators for lateral-flow immunoassays

Product	Properties	Thickness ( $\mu\text{m}$ @ 53kPA)	Wicking rate (s/4 cm)	Water absorption (mg/cm <sup>2</sup> )
GF/DVA	Bound glass fiber	785	28.2	93
LF1	May be used for lateral flow assays. Works well with one drop of whole blood	247	35.6	25.3
MF1	Used for lateral- or vertical-flow assays. Typically used for whole-blood volumes around 100 $\mu\text{L}$	367	29.7	39.4
VF2	Vertical separator used as single or multiple layers for separation of a wide range of blood volumes	785	23.8	86.2
Fusion 5	Can be used as a lateral flow blood separator with two drops of whole blood	370	43.9	42.3

## Ordering information

### Blood separators for lateral-flow immunoassays

Grade	Description	Catalog number	Quantity/pack
LF1	17 mm $\times$ 50 m	8121-1750	1
MF1	22 mm $\times$ 50 m	8122-2250	1
VF2	17 mm $\times$ 50 m	8124-1750	1
Fusion 5	22 mm $\times$ 50 m	8151-9915	1
GF/DVA	22 mm $\times$ 50 m	8145-2250	1

Other formats and sizes available – please enquire for more detail

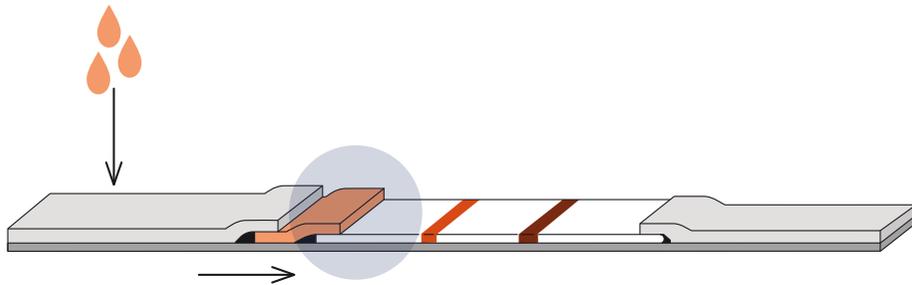
## Conjugate release pads for lateral-flow immunoassays

Conjugate release pads are critical to lateral-flow immunoassays. To ensure consistent performance, the conjugate must dry without damage or aggregation and release rapidly when the sample comes into contact with it.

Conjugate release pads do not require treatment prior to conjugate application, as they are inherently hydrophilic. The open structure of the material allows rapid penetration by both conjugate and sample.

### Features and benefits

- Higher level of conjugate release: Less waste means reduced reagent costs
- Higher capture line intensity, as more conjugate gets to the capture line: Improved sensitivity
- Pad rewets naturally and rapidly every time: Improved consistency



### Conjugate release

- Standard 14
- Standard 17
- Fusion 5
- Accuflow G
- Standard 17 has higher absorbency than Standard 14
- Fusion (sp) 5 can be used as a blood separator and conjugate release

## Technical specifications

### Conjugate release pads for lateral-flow immunoassays

Grade	Thickness ( $\mu\text{m}$ @ 53kPA)	Wicking rate (s/4 cm)	Water absorption ( $\text{mg}/\text{cm}^2$ )	Percent release of gold conjugate (after 90 s)
Standard 14	355	23.1	50.9	75
Standard 17	370	34.5	44.9	75
Fusion 5	370	43.9	42.3	> 94
Rapid 24	348	N/A	N/A	$\geq 80$
Rapid 27	370	N/A	N/A	$\geq 80$

## Ordering information

### Conjugate release pads for lateral-flow immunoassays

Grade	Description	Catalog number	Quantity/pack
Standard 14	22 mm $\times$ 50 m	8133-2250	1
Standard 17	22 mm $\times$ 50 m	8134-2250	1
Fusion 5	22 mm $\times$ 50 m	8151-9915	1
Rapid 24	22 mm $\times$ 50 m	8131-2250	1
Rapid 27	22 mm $\times$ 50 m	8132-2250	1
Accuflow G	20 mm $\times$ 75 m	10537200	1

Other widths are available: please contact your Cytiva representative for more information.

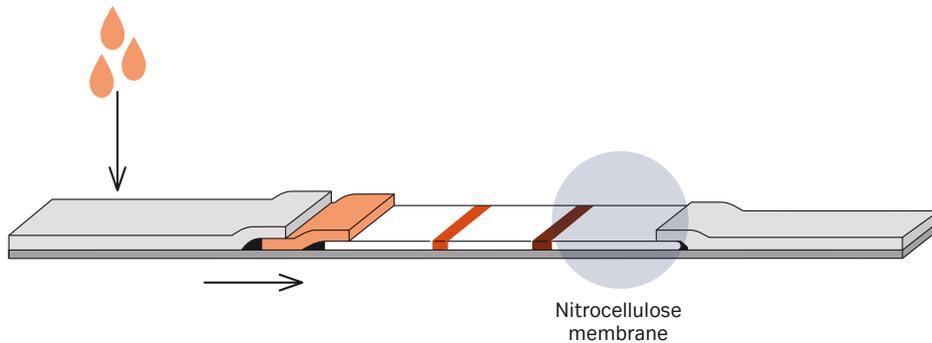


Conjugate release pads for lateral-flow immunoassays

## Membranes for lateral-flow immunoassays

Nitrocellulose membranes are a key functional component of lateral-flow immunoassays. The membrane must provide sufficient protein binding to produce a sharp and intense capture line, but at the same time the level of nonspecific background must be low enough for easy interpretation of the results.

Nitrocellulose membranes are available in a range of wicking rates and formulations. The wicking rate of a membrane has a significant impact on test sensitivity.



FF120HP membranes

### Features and benefits

- Backed membrane
- Increased mechanical strength of the membranes, simplifying use in reel-to-reel machines
- Direct contact is prevented between the nitrocellulose material and the adhesive from the lamination card where the test elements are mounted

### Unbacked membrane

- Enables assay suitability tests of both air and belt side of the membrane

## Membrane selection for lateral flow

A nitrocellulose membrane is a key part of any lateral flow immunoassay, vital to the sensitivity and specificity of your test. This guide highlights the benefits and differences of each product family to help simplify your selection process.

### Faster Flow, Higher Performance Membrane (FFHP)

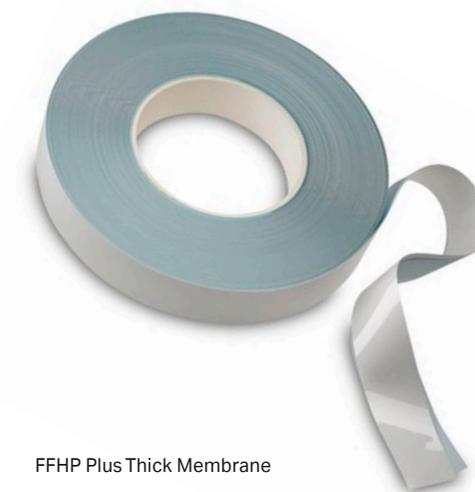
Description	A thinner membrane (200 µm thick including backing) with reduced surfactant content.
When to use	Quantificative assays or where you can reduce reagent dispensing to save cost on reagents. Designed for lateral flow assays.
Grade variants	FF80HP — 60-100 second flow FF120HP — 90-150 second flow FF170HP — 140-200 second flow

### Higher Surfactant Membrane (FFHP Plus)

Description	Higher surfactant membrane to overcome hydrophobic issues. 200 µm thick membrane incl. backing.
When to use	When using viscous samples and you wish to reduce reagent dispensing rates to save cost.
Grade variants	FF80HP PLUS — 60-100 second flow FF120HP PLUS — 90-150 second flow FF170HP PLUS — 140-200 second flow

### Thicker Membrane (FFHP Plus Thick)

Description	Thicker membrane (235 µm thick including backing) and higher surfactant content
When to use	Optimised for when looking for easy swap-out of competitor grades.
Grade variants	FF80HP PLUS THICK — 60-100 second flow; FF120HP PLUS THICK — 90-150 second flow; FF170HP PLUS THICK — 140-200 second flow;



FFHP Plus Thick Membrane

## Post-Treatment Membrane (Immunopore™)

Description	Structurally different membrane as treated with surfactant post-drying. 200 µm thick membrane.
When to use	When looking for more consistent membrane performance than wet-treated surfactant products.
Grade variants	Immunopore™ RP — 90-150 second flow Immunopore™ FP — 110-150 second flow Immunopore™ SP — 160-220 second flow

## High-Surfactant Membrane (Prima)

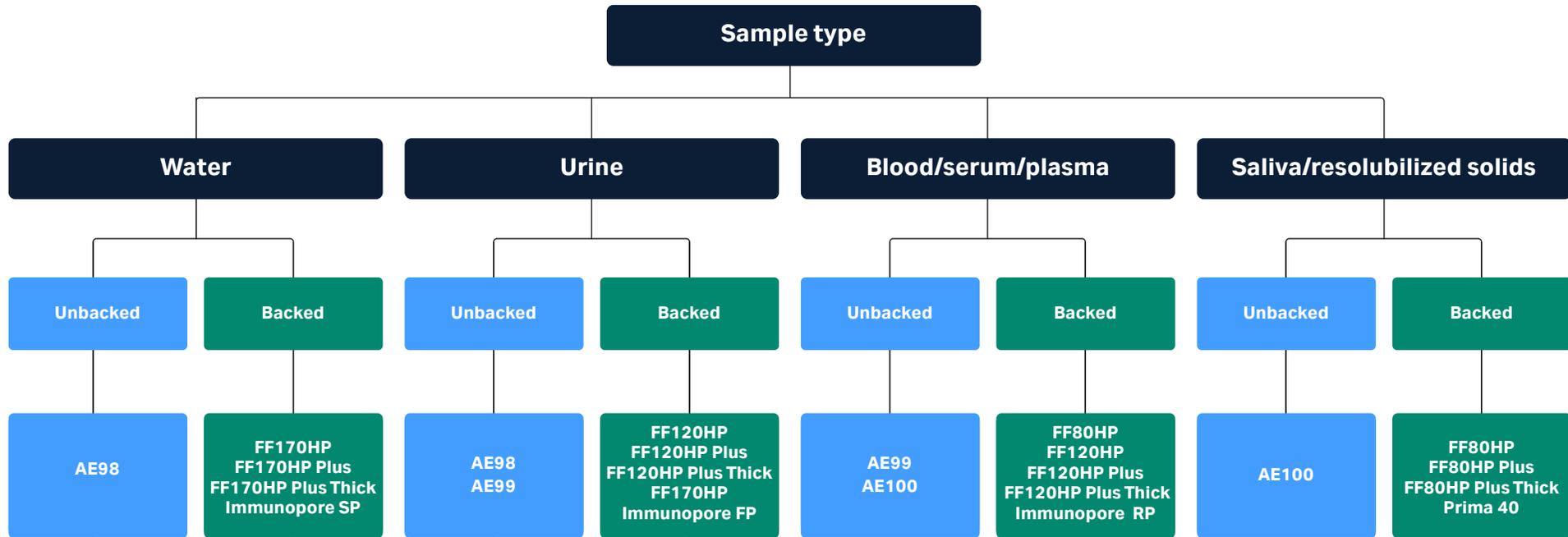
Description	High concentration surfactant nitrocellulose membrane. Note: Product may contain some surface dust, due to manufacturing process.
When to use	When you need a very quick flow membrane. Works very well with dairy.
Grade variants	Prima40 — 40 second flow Prima80 — 80 second flow Prima120 — 120 second flow

## Unbacked Membrane (AE)

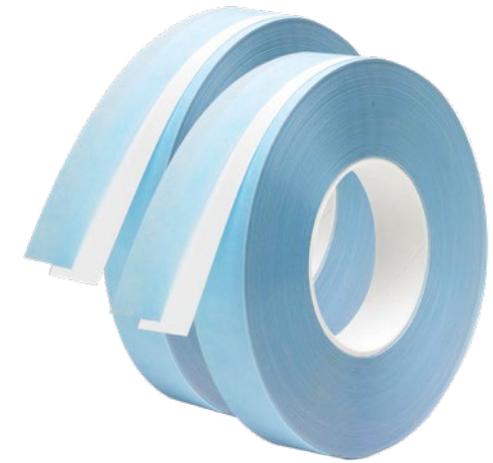
Description	Unbacked nitrocellulose, 120 µm thick
When to use	For experienced users as trickier to handle, typically available at lower cost.
Grade variants	AE100 — 90-120 second flow AE99 — 120-160 second flow AE98 — 160-210 second flow

**Note:** Flow time is measured by timing how long water takes to flow cross-web to completely fill 4 centimetres of membrane. This is an indication of how a sample will flow in your assay, but times with serum or other liquids will differ.

## Membrane selector according to sample type



- Test material side by side
- Note that unbacked membranes are more difficult to use for reel-to-reel applications
- This is only an example based on past experience, we encourage you to screen as many membranes as possible during development



FF120HP membranes

## Unbacked membranes

### AE nitrocellulose membranes

Constructed of 100% nitrocellulose, the AE membrane offers a higher level of purity and performance than that seen in post-treated materials. AE membranes have been used extensively since the development of the original lateral flow tests and have become a standard for manufacturers worldwide. There is a long history of success and experience for assay optimization using these products.

AE membranes are unbacked, which means either belt or air side of the membrane can be used.

### Technical specifications

#### AE nitrocellulose membranes

Grade	Capillary rise (s/4 cm)	Total caliper (µm)	Properties
AE98	160–210	120	An unsupported membrane that gives good line intensity for use with low-viscosity samples
AE99	120–160	120	A general-purpose membrane for use with most sample types giving a good combination of sensitivity with fast wicking
AE100	90–120	120	A very fast wicking membrane for use with highly viscous samples (e.g. undiluted serum)

### Ordering information

#### AE nitrocellulose membranes

Grade	Description	Catalog number	Quantity/pack
AE99	25 mm × 50 m	10548081	1
AE98	25 mm × 50 m	10549916	1
AE100	25 mm × 50 m	10549867	1

Other widths are available: please contact your Cytiva representative for more information.

## Backed membranes

### Immunopore™ nitrocellulose membranes

Immunopore™ membrane is a plastic-backed nitrocellulose membrane. A proprietary polymer is included in the membrane matrix to ensure rapid rewetting and low background signal, removing protein-binding interference commonly experienced with surfactants.

### Technical specifications

#### Immunopore™ nitrocellulose membranes

Grade	Capillary rise (s/4 cm)	Total caliper (μm)	Properties
Immunopore™ XP	65–85	200	Fastest-flowing membrane, for extremely viscous samples
Immunopore™ RP	90–150	200	Fast-flowing membrane, yielding shorter test times while still retaining excellent capture line intensity and reproducibility
Immunopore™ FP	140–200	200	Excellent general membrane that offers high capture line intensity coupled with fast flow/wicking rate
Immunopore™ SP	190–280	200	Highly suitable for use with low-viscosity samples when maximum capture line intensity is required

### Ordering information

#### Immunopore™ nitrocellulose membranes

Grade	Description	Catalog number	Quantity/pack
Immunopore™ XP	25 mm × 50 m	10549606	1
Immunopore™ RP	25 mm × 50 m	78356403	1
Immunopore™ FP	25 mm × 50 m	78336403	1
Immunopore™ SP	25 mm × 50 m	78316404	1

Other widths are available: please contact your Cytiva representative for more information

## Prima membranes

A membrane with a high concentration of surfactant, formulated for when you need a very quick membrane. Works especially well with dairy (sp) and other viscous samples.

**Note:** Product may contain some surface dust, due to manufacturing process.

## Technical specifications

Prima membranes

Grade	Capillary rise (s/4 cm)	Total caliper (µm)	Properties
Prima 40	38-52	200	Faster flowing membrane offered by Cytiva

## Ordering information

Prima membranes

Grade	Description	Catalog number	Quantity/pack
Prima 40	25 mm X 50 m	10549713	1

Other widths are available: please contact your Cytiva representative for more information.

## FFHP nitrocellulose membranes

FF High Performance (HP) membranes are part of the family of nitrocellulose membranes that are directly cast onto a plastic film. The FFHP membranes are a result of improved membrane casting procedures, which result in membranes with high reproducibility, enhanced intra- and inter-lot consistency and sharper lines. The surface is uniform without any unincorporated nitrocellulose powder, and the fine structure fiber distribution provides large internal surfaces for binding proteins.

### Features and benefits

- Backed membrane
- Increased mechanical strength of the membranes, simplifying use in reel-to-reel machines
- Direct contact is prevented between the nitrocellulose material and the adhesive from the lamination card where the test elements are mounted

### Technical specifications

#### FFHP nitrocellulose membranes

Grade	Capillary rise (s/4 cm)	Total caliper (µm)	Properties
FF80HP	60 – 100	200	A very fast wicking membrane for use with highly viscous samples (e.g. undiluted serum)
FF120HP	90 – 150	200	A general-purpose membrane for use with most sample types
FF170HP	140 – 200	200	A membrane for use with low viscosity samples
FF80HP Plus	60 – 100	200	A version of the FF80HP membrane with additional surfactant
FF120HP Plus	90 – 150	200	A version of the FF120HP membrane with additional surfactant
FF170HP Plus	140 – 200	200	A version of the FF170HP membrane with additional surfactant
FF80HP Plus Thick	60 – 100	235	A thicker version of the FF80HP Plus, to aid sample flow
FF120HP Plus Thick	90 – 150	235	A thicker version of the FF120HP Plus, to aid sample flow
FF170HP Plus Thick	140 – 200	235	A thicker version of the FF170HP Plus, to aid sample flow

## Ordering information

### Immunopore™ nitrocellulose membranes

Grade	Dimensions	Format	Catalog number	Quantity / pack
FF80HP	20 mm × 50 m	Reel	10547002	1
FF80HP	25 mm × 50 m	Reel	10547003	1
FF80HP	210 mm × 297 mm	A4 sheet	13549206	10
FF80HP	60 (25) mm × 300 mm	60mm Laminate Cards w/25 mm membrane	10547020	100
FF120HP	20 mm × 50 m	Reel	10547006	1
FF120HP	25 mm × 50 m	Reel	10547001	1
FF120HP	210 mm × 297 mm	A4 sheet	13549205	10
FF120HP	60 (25) mm × 300 mm	60mm Laminate Cards w/25 mm membrane	10547021	100
FF170HP	20 mm × 50 m	Reel	10547004	1
FF170HP	25 mm × 50 m	Reel	10547005	1
FF170HP	210 mm × 297 mm	A4 sheet	13549204	10
FF170HP	60 (25) mm × 300 mm	60mm Laminate Cards w/25 mm membrane	10547023	100
FF80HP Plus	20 mm × 100 m	Reel	10547121	1
FF80HP Plus	25 mm × 100 m	Reel	10547119	1
FF80HP Plus	210 mm × 297 mm	A4 sheet	10547118	10
FF80HP Plus	60 (25) mm × 300 mm	60mm Laminate Cards w/25 mm membrane	10547128	100
FF120HP Plus	20 mm × 100 m	Reel	10547126	1
FF120HP Plus	25 mm × 100 m	Reel	10547125	1
FF120HP Plus	210 mm × 297 mm	A4 sheet	10547117	10
FF120HP Plus	60 (25) mm × 300 mm	60mm Laminate Cards w/25 mm membrane	10547129	100
FF170HP Plus	20 mm × 100 m	Reel	10547122	1
FF170HP Plus	25 mm × 100 m	Reel	10547120	1
FF170HP Plus	210 mm × 297 mm	A4 sheet	10547116	10
FF170HP Plus	60 (25) mm × 300 mm	60mm Laminate Cards w/25 mm membrane	10547142	100
FF80HP Plus Thick	20 mm × 100 m	Reel	10547155	1
FF80HP Plus Thick	25 mm × 100 m	Reel	10547156	1
FF80HP Plus Thick	210 mm × 297 mm	A4 sheet	13547204	10
FF80HP Plus Thick	60 (25) mm × 300 mm	60mm Laminate Cards w/ 25mm membrane	10547154	25
FF120HP Plus Thick	20 mm × 100 m	Reel	10547152	1
FF120HP Plus Thick	25 mm × 100 m	Reel	10547149	1
FF120HP Plus Thick	210 mm × 297 mm	A4 sheet	13547200	10
FF120HP Plus Thick	60 (25) mm × 300 mm	60mm Laminate Cards w/25 mm membrane	13547202	25
FF170HP Plus Thick	20 mm × 100 m	Reel	10547153	1
FF170HP Plus Thick	25 mm × 100 m	Reel	10547147	1
FF170HP Plus Thick	210 mm × 297 mm	A4 sheet	13547201	1
FF170HP Plus Thick	60 (25) mm × 300 mm	60mm Laminate Cards w/25 mm membrane	13547203	25

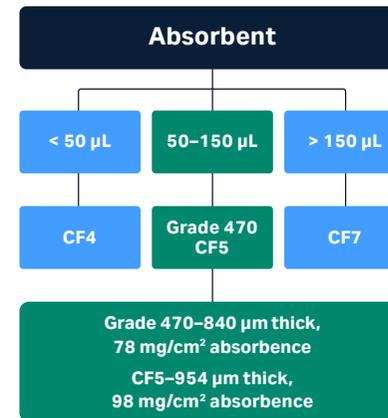
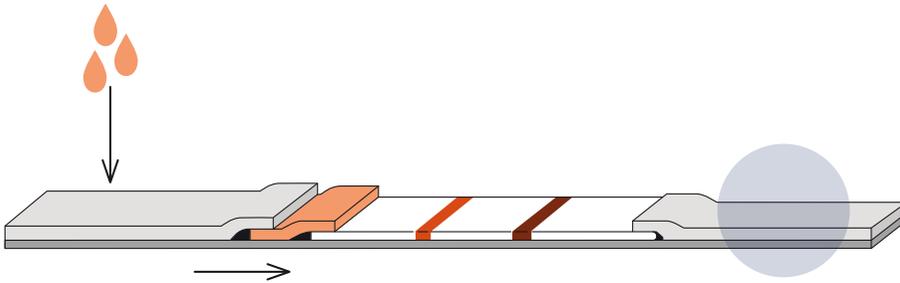
Other widths are available: please contact your Cytiva representative for more information.

## Absorption pads

Absorption pads at the downstream end of tests control sample flow along the strip. Cytive has developed pads with excellent wicking characteristics that consistent performance. Choosing an absorbent pad with sufficient capacity is an important consideration when designing an immunoassay.

### Features and benefits

- Consistent absorbency: Ensures test-to-test reproducibility
- Product manufactured in controlled environments from highest-quality materials: No false results due to contamination
- Naturally hydrophilic: Minimal loss of analyte, so test sensitivity is maintained
- Wide range of thickness, absorbency and wicking rate: Rapid rewetting after prolonged storage
- Minimal leakage along the strip: No contamination of test results



Absorption pads selection tree

## Technical specifications

### Absorption pads

Product	Material	Properties	Thickness ( $\mu\text{m}$ @ 53kPA)	Wicking rate (s/4 cm)	Water absorption (mg/cm <sup>2</sup> )
CF3	100% cotton linter	Medium weight	322	174.3	34.6
CF4	100% cotton linter	Medium weight	482	67.3	49.9
CF5	100% cotton linter	Medium weight	954	63.3	99.2
CF7	100% cotton linter	Thick material suitable for high sample volume	1873	35	252.3

## Ordering information

### Absorption pads

Grade	Description	Catalog number	Quantity/pack
CF3	22 mm $\times$ 50 m	8113-2250	1
CF4	22 mm $\times$ 50 m	8114-2250	1
CF5	22 mm $\times$ 50 m	8115-2250	1
CF7	22 mm $\times$ 50 m	8117-2250	1

Other widths are available: please contact your Cytiva representative for more information.



Absorbent pad CF4

# Lateral flow starter packs

Each starter kit contains a range of membrane grades to facilitate testing when developing a lateral flow test.

## Technical specifications

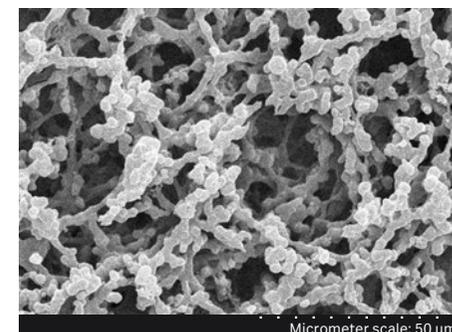
### Lateral flow starter packs

Component	Grade	Format	Quantity each
Blood separators/sample pad	MF1, LF1, Fusion 5, VF2, GF/DVA, CF1, CF3, CF4, Grade 470, ST14, ST17	A4 sheets	3
Conjugate release	ST14, ST17, Fusion 5	A4 sheets	3
Absorbent pad	CF3, CF4, CF5, CF7, Grade 470	A4 sheets	3
Nitrocellulose membrane	FF80HP, FF120HP, FF170HP, FF80HP Plus, FF120HP Plus, FF170HP Plus, FF80HP Plus Thick, FF120HP Plus Thick, FF170HP Plus Thick, Prima 40, Immunopore™ RP, Immunopore™ SP, Immunopore™ FP, Immunopore™ XP	A4 sheets	3

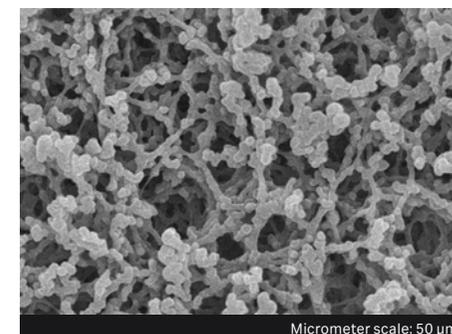
## Ordering information

### Lateral flow starter packs

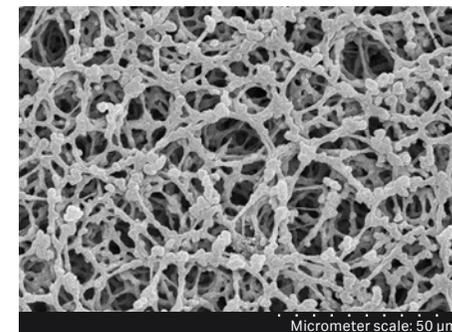
Name	Description	Catalog number
CF/GF starter pack	A sample pack containing all of our cellulose and glass fiber pads, including all blood separators, sample pads, conjugate pads and absorbent pads	29363634
Nitrocellulose membrane starter pack	A sample of all of our nitrocellulose grades for LFA	13549210
Combo starter pack	A pack containing both our CF/GF and nitrocellulose starter packs	29428668



FF80HP Plus Thick



FF120HP Plus Thick



FF170HP Plus Thick

# Flow-through immunoassays

In a flow-through immunoassay the sample is applied directly to the membrane surface and allowed to wick through the membrane into an absorbent paper below.

## Nitrocellulose membranes

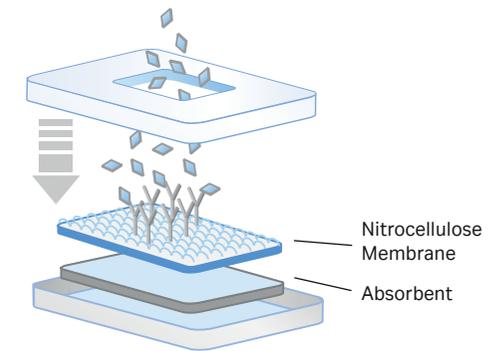
Small-pore unsupported membranes such as BA83 and BA85 can be used; they are highly sensitive small-pore membranes with large surface area and high protein binding capacity. However, they have to be carefully encapsulated, ensuring good contact between the membrane and the absorbent, to give good flow.

## Features and benefits

- Manufactured for vertical-flow assays: Removes problems caused by capillary rise
- Small pore structure: Accurate results; low nonspecific binding; greater sensitivity
- One hundred percent pure nitrocellulose: Provides high binding capacity

## Absorbents

The absorbents used for flow-through assays must wick quickly and be highly water absorbent. The volumes of liquids used in flow-through assays can be much higher than those in lateral flow. Thicker cellulose materials with fast wicking are therefore the material of choice.



Flow-through assay



Absorbent pad CF7

## Technical specifications

### Nitrocellulose membranes and absorbent pads

Grade	Description	Pore size (µm)	Thickness (µm @ 53kPA)	Wicking rate (s/4 cm)	Water absorption (mg/cm <sup>2</sup> )
BA 79	Membrane	0.10	120	–	–
BA 83	Membrane	0.20	120	–	–
BA 85	Membrane	0.45	120	–	–
CF4	Absorbent	–	482	67.3	49.9
CF5	Absorbent	–	954	63.3	99.2
CF6	Absorbent	–	1450	65	136.3
CF7	Absorbent	–	1873	35	252.3

## Ordering information

### Nitrocellulose membranes and absorbent pads

Grade	Dimensions	Description	Catalog number
BA79	–	BA Nitrocellulose Membrane	Please inquire
BA83	300 mm × 600 mm	BA Nitrocellulose Membrane	10401380
BA85	300 mm × 600 mm	BA Nitrocellulose Membrane	10401180
CF4	22 mm × 50 m	Absorbent	8114-2250
CF5	22 mm × 50 m	Absorbent	8115-2250
CF6	22 mm × 50 m	Absorbent	8116-2250
CF7	22 mm × 50 m	Absorbent	8117-2250

Other widths are available: please contact your Cytiva representative for more information.

# Dipstick colorimetric assays

Dipstick colorimetric assays, in which a cellulose pad is impregnated with a color reagent, are widely used in everything from urine testing to environmental assays. The base cellulose is a key part of the system, and the correct choice of absorbency, wicking rate, and wet strength are critical to producing a working assay. The Cytiva range of cellulose materials for dipstick colorimetric assays offers highly consistent and inert substrates for absorption of the active chemicals required for development of dipstick tests.

The purity of the cellulose base material coupled with our quality manufacturing practices make these papers an excellent choice for large-scale manufacturing.



Dipstick colorimetric assays

## Technical specifications

Dipstick colorimetric assays

Grade	Thickness ( $\mu\text{m}$ @ 53kPA)	Water absorption ( $\text{mg}/\text{cm}^2$ )
CF1	176	18.7
CF2	172	16.1
CF3	322	34.6
CF4	782	49.9
CF6	1450	136.3
CF7	1873	252.3

## Ordering information

Dipstick colorimetric assays

Grade	Dimensions	Catalog number	Pack/size
CF1	22 mm $\times$ 50 m	8111-2250	1
CF2	22 mm $\times$ 50 m	8112-2250	1
CF3	22 mm $\times$ 50 m	8113-2250	1
CF4	22 mm $\times$ 50 m	8114-2250	1
CF6	22 mm $\times$ 50 m	8116-2250	1
CF7	22 mm $\times$ 50 m	8117-2250	1

# Track-etched membranes for diagnostic applications

Cytiva provides a range of track-etched membranes (TEMs) whose advanced technical specifications make them an outstanding choice for a wide range of diagnostic applications.

TEMs have very tightly controlled pore size distribution. This allows for quantification of cells or microorganisms, which are captured on the membrane surface. TEMs are usually transparent at larger pore sizes, which allows complete transmission of light, ensuring excellent signal-to-noise ratio.

Choose Cyclopore™ or Nuclepore™ track-etched membranes for applications including:

- Cell capture
- Particle-capture assays
- Biosensors

Features	Benefits
Biologically inert	Whole cell assays can be performed.
Low protein binding and low extractables	There is no interference with assay results because of membrane.
Choice of surface properties (hydrophilic and hydrophobic version available)	Assays can be designed with the appropriate flow or retention characteristics.
Does not bind stains or labels	Gives lower background signal than traditional materials.
True surface capture on a flat, smooth surface	Cells or particles are highly visible or available for sample recovery by backflushing.
Low hold-up volume	Practically all the applied sample is available for analysis.
Controllable optical properties (transparent, translucent, and/or dyed)	The optical properties can be chosen to ensure excellent signal-to-noise ratio. Clear materials allow complete transmission of light, whereas dyed varieties block signal from behind the membrane.
PC or PET material	Allows easy attachment to a range of housings for design of components.



## Application examples

### Cell capture

Since TEMs have tightly controlled filtration characteristics, they can be used in cell capture applications. This application allows for easier identification of marked cells in a number of formats. The retention of cells upon the membrane surface allows cells to be stained and observed in a very clear environment. The improved resolution and accuracy have applications in any area of clinical chemistry in which cells are observed. The reduced likelihood of a false diagnosis also has a significant impact, especially in large-scale screening procedures.

### Particle-capture assays

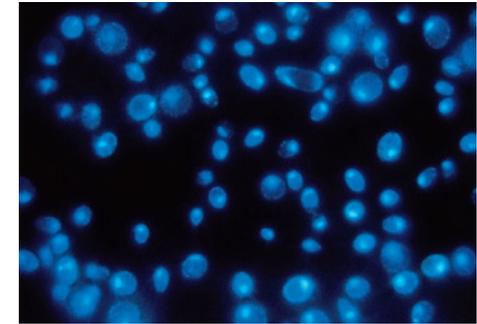
Using membranes for particle-capture tests is a relatively well-known technique. The usefulness of these assays can be enhanced by using dyed or fluorescent latex particles as a label. Such labels can produce a more sensitive or stable assay. Using a TEM for particle capture allows for a more specific capture reaction, and capturing the particles on the membrane surface rather than in the depth of the membrane matrix enhances sensitivity.

### Biosensors

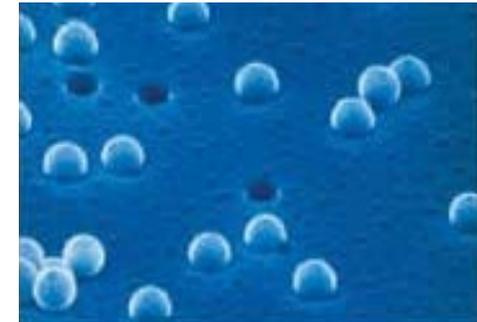
TEMs provide accurate flow control of diffusion properties in biosensor applications in which the membrane acts as a barrier to biological cells and controls their flow to the sensor. The membrane also serves as a barrier to many potential contaminants, improving the assay's specificity. In applications involving the presence of biochemical reagents to measure the reaction, the pores can be filled with the desired materials (e.g. antigen or enzymes). The complete biosensor can therefore be dried onto the membrane.

We offer a complete range of track-etched membranes manufactured using proprietary technology to produce a precision membrane filter with a closely controlled pore size distribution.

Please contact your Cytiva representative for more information about our track-etched membranes.



Yeast cells on Black Cyclopore™ with DAPI Stain



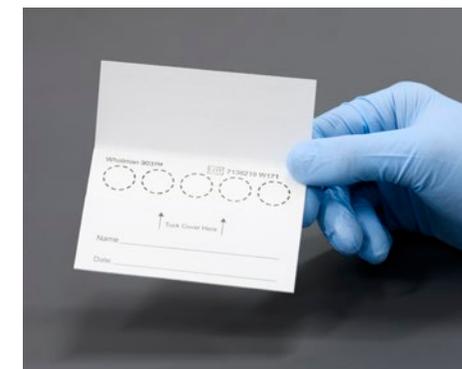
Electron micrograph of Cyclopore™ membrane with latex beads on surface

# Sample collection cards

**Whatman™ 903 Proteinsaver cards are non-chemically treated absorbent filter papers for easy, convenient collection and in-vitro storage of blood and other biological fluids. The 903 card can be transported and stored without refrigeration.**

## 903 cards

- Non-chemically treated paper
- DNA not bound to paper
- Used for collection and storage of blood or other biological fluids
- Does not require refrigeration



903 Proteinsaver Card

## Ordering information

### 903 Proteinsaver Card

Catalog number	Product name	Dimensions	Pack size	Regional availability	Description
10534612	903 Proteinsaver Card US		100/pk	Global	Provides wrap-around protection for the blood collection area. Custom code for USA.
10531018	903 Proteinsaver CardEU 5-spot		100/pk	Global	Provides wrap-around protection for the blood collection area. Custom code for Europe.
10534320	Proteinsaver Snap-Apart Card		100/pk	Global	4-spot filter paper section attached to paper parts that fully enclose the blood application area and provides IFU. To use, grab both ends of the carrier card and pull against each other to release the application region.
10534795	903 Simple Screening Card		1/pk	EMEA, NA, SA	5-spot card without the wrap-around protection. Also with limited demographic information
10530072	903 Perforated 5-circle Card		100/pk	EMEA, NA	5-spot cards without wrap-around protection. Cards have perforations applied around the circles to allow removal for testing, as opposed to punch extractions.
10530131	903 Perforated 5-circle		50/pk	Global	Same as 10530072 but 50/pack
10530138	Perforated 903 5-spot Card		20/pk	Global	Same as 10530072 but 20/pack
10534737	903 CDC Card		100/pk	EMEA, NA	Card made for US CDC agency testing.
10538018	CF12	58 × 58 cm	100/pk	Global	Card of CF12 filter paper cut in specified measurements.
10535097	CF12	210 × 297 mm	100/pk	Global	A4 sheet of CF12 filter paper cut in specified measurements.
10538017	CF12	46 × 57 cm	100/pk	EMEA, NA, SA	Card of CF12 filter paper cut in specified measurements.
10538019	CF12	8 × 10 in	100/pk	NA, SA	Card of CF12 filter paper cut in specified measurements.

## Popular catalog 903 Proteinsaver cards products

10534612–903 Proteinsaver US

Whatman™ 903 LOT 7136279 W171



↑ Tuck Cover Here ↑

Name: \_\_\_\_\_

Date: \_\_\_\_\_

10531018–903 Proteinsaver EU 5-spot

Whatman™ 903 LOT 7106278 W171



↑ Tuck Cover Here ↑

Name: \_\_\_\_\_

Date: \_\_\_\_\_

10530072–903 Perforated 5-circles





PLACE BARCODE HERE

Name: \_\_\_\_\_

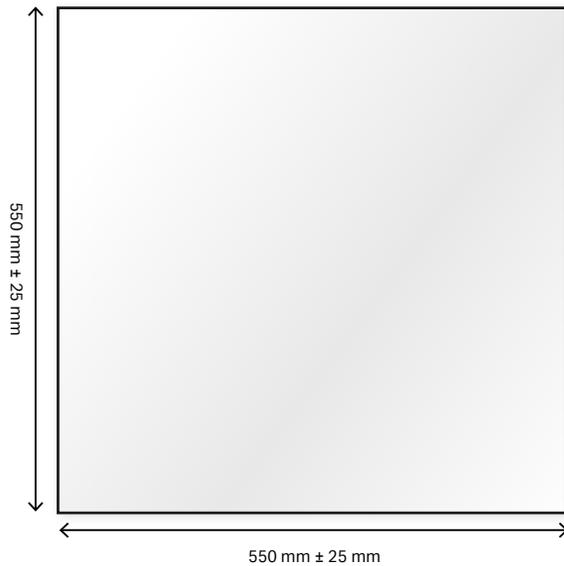
Date: \_\_\_\_\_

2020-01  
Whatman™ 903

 Cytiva  
Forrest Farm Industrial Estate  
Cardiff, CF14 7YT, UK

REF 10530072 Rev.AD  
LOT 7065717/W161

10538018–CF12 58 x 58 cm



10534320–903 Protein Snap-Apart

TO OPEN  
SNAP HERE



BIOHAZARD

TO OPEN  
SNAP HERE

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Protein Saver Snap-Apart**

**Whatman™**  
For Research Use Only  
Not for use in diagnostic procedure

 Cytiva  
Forrest Farm Industrial Estate  
Cardiff, CF14 7YT, UK

# Cytiva Diagnostic Services

Cytiva Diagnostic Services can accelerate your assay development and success, from concept to prototype.

The path from an idea or lab-based test to an approved rapid diagnostic test is challenging. There are technical, financial, and regulatory hurdles in developing a marketable lateral flow assay. Cytiva Diagnostic Services support early stage developers on their path to market by:

- Providing access to state-of-the-art infrastructure.
- Offering the benefit of over 40 years' experience in developing diagnostics.
- Accelerating progress between key development stages.

## Development expertise

- Method development
- Method transfer
- Method qualification
- Troubleshooting
- Full outsourcing of development

## IP protection and transparency

- Process transparency
- On-site access and participation during all development activities
- Method qualification
- Transfer back to customer of assay IP

## Infrastructure and materials

- Reference standard characterization
- Stability studies
- Lot release testing
- Raw material inspection testing

## Training and education

- Classroom, on-site, and online education
- Process, equipment and regulatory training
- Workshop format to work through specific issues

For more information about Cytiva Diagnostic Services, visit [cytiva.com/diagnosticservices](https://www.cytiva.com/diagnosticservices)



# 08

# Appendices

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# Filtration simplified

## Basic filtration concepts and terms

Selecting a filter with the appropriate properties can help you achieve accurate results and reach discovery faster. But with so many types of filters to choose from, how can you be sure you're making the right choice? Use this compilation of basic filtration concepts and terms as a handy reference to clarify the various options available to you to speed up your selection process.

### Ash content

Determined by ignition of the cellulose filter at 900°C in air. Minimizing ash content is essential in gravimetric applications and also a useful measure of the level of general purity.

### Chemical compatibility

It is very important to ensure that the structure of the filter media will not be impaired by exposure to certain chemicals. In addition, exposure to these chemicals should not cause the filter to shed fibers or particles, or add extractables. Length of exposure time, temperature, concentration, and applied pressure can all affect compatibility. Chemical compatibility charts are provided to aid your filter selection.

### Depth filters

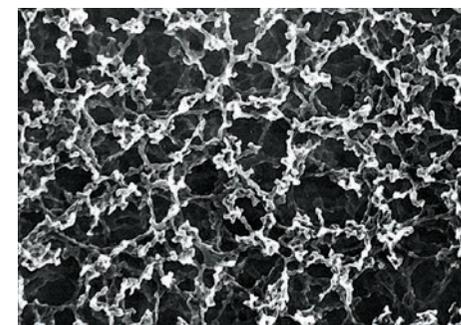
Depth filters are usually characterized as filters that retain particles on the surface and within the filter matrix. All conventional fibrous filters (whether manufactured from cellulose, borosilicate glass microfiber or other fibrous material) are depth filters and are normally characterized by good loading capacity.

### Hydrophilic

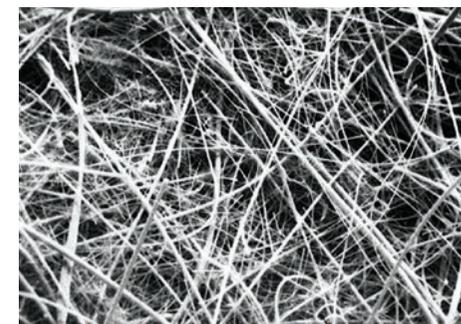
Hydrophilic filters possess an affinity for water and can be wetted with virtually any liquid. They are typically used for aqueous solutions and are compatible organic solvents.

### Hydrophobic

These filters repel water, and are thus best suited for filtering organic solvents as well as for venting and gas filtration applications.



Membrane filters allow the efficient retention of submicron particulates and organisms.



Glass microfiber filters are manufactured from 100% borosilicate glass.

### Liquid flow rate (including Herzberg method)

Under practical filtration conditions, the liquid flow rate will depend on a number of factors, many of which will be specific to the solid and/or liquid being filtered. In order to compare filter performances, a standardized set of conditions is required which will characterize liquid flow rate for a given filter without the complicating secondary effects derived from the presence of particulates.

Liquid flow rate can be quantified by a variety of methods. For example, the Herzberg flow rate test where prefiltered, deaerated water is applied to the test filter (effective area 10 cm<sup>2</sup>) at a constant hydrostatic head (10 cm) is commonly used. The rate of the flow is measured in seconds per 100 mL.

Flow rate can also be measured by the modified ASTM method which uses a quadrant folded filter held in a wire loop.

### Loading capacity

Loading capacity is the ability of a filter to load particulates into the fibrous matrix while maintaining a practical filtration speed and a workable pressure differential across the filter. In general, glass microfiber filters have a high loading capacity when compared with cellulose filters of the same retention rating and thickness. Membranes have inherently low loading capacity.

### Particle retention (air/gas)

Retention mechanisms for removing particulates from air or gas enable much higher efficiencies to be realized than those applicable to liquids. Efficiencies for air filtration are normally expressed as percent penetration or retention for a stated airborne particle size. The dioctyl phthalate (DOP) test is commonly used, wherein the filter is tested with an aerosol containing 0.3 µm particles.

### Particle retention (liquid)

In a filtration process, the particle retention efficiency of a depth-type filter is often expressed in terms of the particle size (in µm) at which a set level of the total number of particles initially testing the filter is obtained. It is customary to quote the retention levels at 98% efficiency to allow for secondary filtration effects.

### Pore size (membranes)

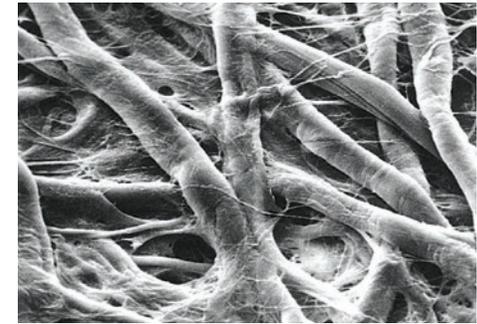
For membranes, the pore size, usually stated in micrometers (µm), is based upon bubble point. Pore size ratings are nominal for all membranes apart from those for track-etched and Anopore™ membranes. For track-etched and Anopore™ membranes the pore sizes are absolute, as these membranes have true pores (i.e. a top-to-bottom hole through the membrane).

### Prefilters

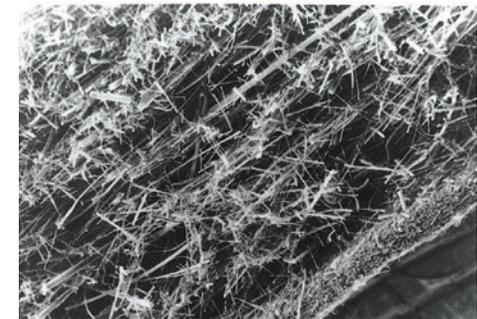
The life of a membrane filter can be extended many times by placing a prefilter upstream of the membrane. The total particulate load challenging the membrane is considerably reduced, thus allowing the membrane to operate efficiently.

### Screen or surface filters

Membrane filters are generally described as screen filters because particles are almost entirely trapped on the filter surface. The narrow effective pore size distribution of membrane filters is one of their major features.



Cellulose filter papers exhibit particle retention levels down to 2.5 µm.



Multigrade GMF 150 combines two filters in one for fast, effective, multilayered filtration.

# Basic filtration concepts and terms

## Filter papers

Qualitative and quantitative filter papers are, with few exceptions, manufactured from high-quality cotton linters that have been treated to achieve a minimum alpha cellulose content of 98%. These cellulose filter papers are used for general filtration and exhibit particle retention levels down to 2.5  $\mu\text{m}$ . There is a wide choice of retention and flow rate combinations to meet the needs of numerous laboratory applications. The different groups of filter paper types offer increasing degrees of purity, hardness and chemical resistance. Quantitative filter papers have extremely high purity to allow for analytical and gravimetric work.

## Glass microfiber filters (GMF)

The properties of borosilicate glass microfibers enable Cytiva to manufacture filters with retention levels extending into the submicron range. These depth filters combine fast flow rate with high loading capacity and retention of very fine particulates. Due to the high void volume exhibited by glass microfiber filters, the loading capacity is considerably higher than for a cellulose filter of similar retention. Glass microfiber filters must be used flat and should not be folded. Glass microfiber filters are manufactured from 100% borosilicate glass and most are completely binder-free. Binder-free glass microfiber filters will withstand temperatures up to 550°C and can therefore be used in gravimetric analysis where ignition is involved.

## Membrane filters

Unlike cellulose and glass microfiber depth filters, membrane filters are conventionally classified as surface filters because the filter matrix acts as a screen and retains particulates almost entirely on the smooth membrane surface. The retention levels for these filters extend down to 0.02  $\mu\text{m}$  and allow the efficient retention of sub-micron particulates and organisms. Water microbiology and air pollution monitoring are major applications for membranes.

## Standard circle funnel volumes

The maximum practical volume of the most popular circle sizes (quadrant folded) is given in the following chart. Membrane and glass microfiber filters are used flat.

Standard circle funnel volumes:

Diameter (cm)	Volume (mL)
9	15
11	20
12.5	35
15	75
18.5	135
24	300

## Types of filter holders

A filter matrix requires a suitable support structure to enable it to be used for the filtration of liquids or gases. One of the simplest forms of holder is the conical glass filter funnel into which a quadrant folded or fluted filter paper is placed (1). Some applications require additional motivating force for the solid particulate and liquid separation to occur (i.e. vacuum assisted filtration). This type of filtration can be carried out in a one-piece Büchner style funnel (2) where the filter is used flat on a perforated base sealed into the funnel. Due to the difficulties encountered in cleaning this type of funnel, the demountable 3-piece funnel was developed (3). 3-Piece Filter Funnel can be fully disassembled and enables the filter paper to be securely clamped between the support plate and filter reservoir flange. Membrane holders (4) incorporate either sealed-in sintered glass or removable stainless steel mesh supports for the membrane. Syringe and inline filters are also available. Large diameter membranes are typically used in pressure holders.

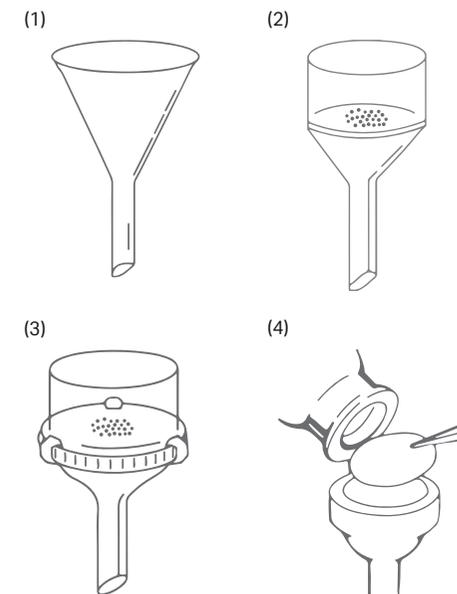
## Selecting the right filter

The selection of a laboratory filter depends on the conditions and objectives of the experiment or analytical procedure. The three most important characteristics of any laboratory filter are:

- Particle retention efficiency
- Fluid flow rate through the filter
- Loading capacity

In addition, according to the particular application, other important characteristics may require examination. For instance, wet strength, chemical resistance, purity and ash level may assume equal importance under certain circumstances.

The vacuum level placed across a filter will influence the flow rate; however, it is not a linear relationship. For example, for depth filters, it has been found that when the vacuum increases over about 5 cm Hg, no significant increase in flow rate occurs. Generally, the optimum vacuum level is between 2–5 cm Hg. The type of support under the filter can also play a significant role in the level of vacuum that can be applied to a fibrous material.



Examples of Filter Holders

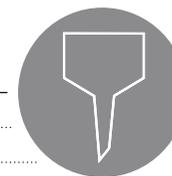
## Standard 58° or 60° funnels

Glass/polyethylene funnel diameter (mm)	Filter paper size (cm)
35	5.5
45	7.0
55	9.0
65	11.0
75	12.5
90	15.0
100	18.5
160	24.0
180	32.0
220	40.0
260	50.0



## Büchner funnel filter selection

Diameter (mm)	Perforated area (mm)	Filter paper size (mm)
43	32	42.5
63	42	55
83	60	75
100	77	90
114	95	110
126	105	125
151	135	150
186	160	185
253	213	240



## Typical particle sizes

		µm
Gelatinous precipitates	Metal hydroxides	25–40
	Precipitated silica	25–40
Crystalline precipitates	Ammonium phosphomolybdate	20
	Calcium oxalate	15
	Lead sulfate	10
	Barium sulfate (hot ppt.)	8
	Barium sulfate (cold ppt.)	3
Blood cells	Platelets	2–3
	Erythrocytes (average)	7
	Polymorphs	8–12
	Small lymphocytes	7–10
	Large lymphocytes	12–15
	Monocytes	16–22
Bacteria*	Cocci	0.5
	Bacilli	1.0 × (2.0–6.0)
	Serratia marcescens	0.5 × (0.5–1.0)
	Pneumococcus	1.0
	Bacillus tuberculosis	0.3 × (2.5–3.5)
	Amoeba	12–30
	Escherichia Coli	0.5 × (1.0–3.0)
	Smallest bacteria	0.22
Other microorganisms, etc.	Yeast cells	2.0–8.0
	Colloids	0.06–0.30
	Rye grass pollen	34
	Ragweed pollen	20
	Puffball spores	3.3

\* Where bacteria are rod-shaped, range of lengths is given in parentheses

# Glossary of terms

<b>A</b>	
Absolute filter rating	This rating refers to the size of particles retained by the filter at 100% efficiency. Particles larger than the specified size rating of the filter medium will not pass through that filter (e.g. particles larger than 0.2 µm will not pass through a filter with an absolute rating of 0.2 µm).
Activated carbon	Porous carbon with a large surface area that can adsorb certain organic chemicals.
Absorption	The amount of material taken up by the structure of the filter medium. Usually expressed as volume or mass per unit area of filter.
Adsorption	Retention of substances by loosely attaching to the surface of the filter.
Aerosol	A dispersion (suspension) of particles or droplets of liquid in air or gas.
Air filter	A filter that removes contamination (particles) from air or a gas. If the filter medium is hydrophobic it will also remove water based liquid from air streams.
Air lock	Liquid flow is prevented by the high pressure required to expel air trapped in the pore structure of a wet membrane.
Air venting filter	A filter that removes air from liquid or allows air to pass in or out of a closed container.
Ambient	The term used to present a generalized description of an environment. Usually room temperature (20-25°C) and standard atmospheric pressure.
Anisotropic membrane	A membrane in which the pore openings are larger on one side than the other. The membrane must be oriented correctly to obtain the best filtration characteristics.
Aseptic conditions	A test or operation performed in a sterile environment designed to prevent the introduction of bacteria.
Ash content	The amount of material remaining after a known mass of filter paper is completely combusted. Expressed as a %.
<b>B</b>	
Back pressure	A pressure downstream (outlet side) of the filter that creates resistance to flow of liquid or gas. This can result from closing a valve or entrapped air in a liquid system. This can also result from gradual blocking of the filter during use or to the resistance to flow caused by the filter itself. The amount of force required to move a sample through a filter increases as back pressure increases.
Bacterial retention	The number of microorganisms that a membrane filter will retain upstream with no passage through the membrane. Usually expressed as a log reduction in the number of organisms (CFU—colony forming units), from a defined starting concentration.
Basis weight	Weight of a sheet, usually expressed as g/m at a predefined level of moisture content or conditions of measurement.
Bubble point	The pressure at which air will pass through a wetted membrane filter. This pressure is correlated to the pore size of the membrane and thus this test can be used to confirm the pore size and integrity of a membrane or filter device.
Burst pressure	The pressure at which a membrane or filter device will rupture.
<b>C</b>	
Cold sterilization	Removal of bacteria by filtration, generally using a 0.2 µm filter to a pre-defined level. General definition is a log 10exp <sup>7</sup> reduction in CFU/mL.
<b>D</b>	
Depth filter	A filter that does not have a defined pore size or structure. Particles are entrapped or adsorbed both within and on the filter due to a random matrix or structure that creates a tortuous path through the filter.
Downstream (of the filter)	Any process occurring after the sample has passed through the filter positioned in the system.
Dry burst	The pressure required to burst a dry, unsupported area of filter paper using compressed air.

<b>E</b>	
EFA (effective filtration area)	The total area of the filter medium exposed to the flow of liquid or air, that is usable for filtration. This is usually designated in square centimeters (cm <sup>2</sup> ), square inches (in <sup>2</sup> ) or square feet (ft <sup>2</sup> ).
EtO sterilization	Chemical method of treating a material to render microorganisms non viable.
Extractables	Chemicals which may leach from a material such as a filter or filter device under certain conditions. Care should be taken to ensure that extractables do not interfere with the analysis.
<b>F</b>	
Filter medium	Permeable material that removes particles from a fluid that is passed through the material.
Filtrate	The liquid, air, or gas which has passed out of the filter.
Filtration	The process by which particles are removed from a fluid by passing it through a permeable material.
Flow rate	The volume of liquid or gas which flows through a filter or device at a specified pressure in a specified amount of time (e.g. 20 mL/min @ 30 psi).
<b>G</b>	
Grammage	Weight of a 1 m <sup>2</sup> sheet at a predefined level of moisture content or conditions of measurement.
Gurley porosity	Expression of air flow rate. Expressed as the time taken for a certain volume of air to pass through a specific filter area under a certain pressure.
<b>H</b>	
Hardened	Process of treating a cellulose paper to increase its strength.
HEPA filter	A High Efficiency Particulate Air filter that removes particles from an air stream to a defined level of efficiency.
Herzberg	The time taken to filter a defined volume of water through a filter area of 10 cm <sup>2</sup> at a constant, defined head of pressure.
Hold-up volume	The volume of liquid retained in a filter or housing (can be expressed with or without air purge).
Hydrophilic (water loving)	Having an affinity for water. A membrane which will wet with aqueous (water) solutions. Hydrophilic membranes are generally chosen for use with aqueous solutions.
Hydrophobic (water hating)	A membrane which will not readily wet with aqueous (water) solutions. It acts as a barrier to aqueous solutions but allows air to pass freely through it.
<b>K</b>	
Klemm	The time taken for a liquid flow front to travel a defined distance in the lateral plane of a defined width strip of test material while the sample is maintained either horizontally or vertically (e.g. Vertical Klemm of 40 seconds for 7.5 cm).
<b>L</b>	
Loading capacity	A characteristic of a filter that indicates the relationship between reduction in flow rate and volume throughput.
LRV (log reduction value)	A way of expressing the bacterial retention of a filter.
Luer fitting	A fitting made to connect components of systems together in the medical and scientific industries. These fittings have specific dimensions that allow them to withstand relatively high pressure.
<b>M</b>	
Micron	A measure of length equal to one millionth of a meter.

<b>N</b>	
Nominal filter retention (efficiency)	The particle size which is retained at a given % efficiency (often expressed at 98%). This is usually how depth filters are specified.
<b>P</b>	
Particle	A single piece of solid material which is small in relation to its environment. Normally characterized by its size and shape.
Pinched pleat	A pleat that is closed off by excessive pressure or crowding, thus reducing the effective filtration area.
Pleating	The folding process which provides a large surface area within a given volume of filter.
Pore	A hole or cavity.
Pore size (absolute)	The pore size at which a particle of defined size will be retained with an efficiency of 100% under specified conditions.
Pore size (nominal)	The pore size at which a particle of defined size will be retained with an efficiency below 100% (typically 90-98%).
Pore size rating	The diameter of a particle which normally will be retained by the filter. This applies whether the pore size rating is nominal or absolute.
Porosity	A measure of how porous a filter material is. Normally expressed as a percentage, it is the volume of the filter that is composed of pores compared to the total volume.
Prefilter	A filter for removing gross contamination before the substance being filtered passes through the final filter. This is used to extend the life of a small pore size filter.
<b>R</b>	
Radiation sterilized	Rendering microorganisms inactive by subjecting the object to be sterilized to a beam or field of concentrated energy.
Retention	The ability of a filter medium to hold back particles of a given size.
<b>S</b>	
Sterile	Free from living microorganisms to a defined level.
Sterilizing filter	A filter that removes bacteria to a specified level when used according to a specific method.
<b>T</b>	
Tensile strength	A measure of how much a material stretches and then breaks under tension. Test can be performed in different directions across the paper, wet or dry.
Thickness	Thickness of a sheet measured under defined compression force.
Throughput	The amount of fluid that will pass through a filter before the filter blocks or the flow rate is reduced to a point that is unacceptable.
<b>U</b>	
Upstream	Before the filter positioned in the system.

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<b>W</b>	
Water absorption	The amount of water absorbed by a sheet per square area.
Water breakthrough pressure	The pressure required to force water through the pores of a hydrophobic membrane.
Water flow rate	The rate of passage of clean (prefiltered) water through a filter of defined area under defined conditions of pressure or vacuum. The flow rate may be expressed as volume/time or as time for a defined volume to pass through the filter.
Wet burst	The pressure required to burst a wet, unsupported area of filter paper (uses water).
Wet strength	An indication of the strength of a sheet of material when wet. Tested by applying water pressure to an unsupported area of filter material.
Wicking rate	The rate of movement of a liquid, usually water, laterally through a sheet of filter material. The rate can be expressed as the time taken for liquid to move a certain distance or the distance moved in a certain time. The orientation of the material must be specified and can be either vertical or horizontal.

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# Trace element composition cellulose and glass microfiber filters

## Cellulose filters: trace element composition

Typical values (µg/g paper)

Grade	1	2	3	4	5	6	40	41	42	43	44	540	541	542
Aluminum	3.6	3.6	3.6	3.6	2.5	–	2.5	2.5	2.5	2.5	2.5	3.4	3.4	3.4
Antimony	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	–	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Arsenic	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	–	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Barium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	–	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Boron	< 1	< 1	< 1	< 1	< 1	–	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Calcium	27.5	27.5	27.5	27.5	8.3	–	8.3	8.3	8.3	8.3	8.3	14.7	14.7	14.7
Chromium	1	1	1	1	1.5	–	1.5	1.5	1.5	1.5	1.5	1.1	1.1	1.1
Copper	0.9	0.9	0.9	0.9	2	–	2	2	2	2	2	8.2	8.2	8.2
Iron	13.7	13.7	13.7	13.7	12	–	12	12	12	12	12	16.3	16.3	16.3
Lead	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	–	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Magnesium	21	21	21	21	4	–	4	4	4	4	4	3.3	3.3	3.3
Manganese	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	–	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Mercury	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	–	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Potassium	6.2	6.2	6.2	6.2	2.3	–	2.3	2.3	2.3	2.3	2.3	3.7	3.7	3.7
Silicon	8.8	8.8	8.8	8.8	6.2	–	6.2	6.2	6.2	6.2	6.2	< 6	< 6	< 6
Sodium	32.3	32.3	32.3	32.3	16.8	–	16.8	16.8	16.8	16.8	16.8	17	17	17
Zinc	58.3	58.3	58.3	58.3	64.5	–	64.5	64.5	64.5	64.5	64.5	87.8	87.8	87.8

## Glass microfiber and quartz filters: trace element composition

Typical values ( $\mu\text{g/g}$  paper)

	QM-A*	EPM 2000	934-AH™	GF/A and GF/C™
Arsenic (As)	< 1	< 1	24	5
Beryllium (Be)	< 1	< 1	< 1	< 1
Cobalt (Co)	< 1	1	< 1	< 1
Cadmium (Cd)	< 1	< 1	< 1	< 1
Copper (Cu)	< 1	5	3	< 1
Lead (Pb)	< 1	3	9	5
Manganese (Mn)	2	20	18	6
Mercury (Hg)	< 1	< 1	< 1	< 1
Nickel (Ni)	1	1	3	1
Selenium (Se)	< 3	< 3	< 3	< 3
Silver (Ag)	< 1	< 1	< 1	< 1
Thallium (Tl)	< 1	< 1	< 1	< 1

Typical composition based on ICP-MS analysis

\* Trace element report can be downloaded from the Cytiva website for each lot of QM-A



# Chemical compatibility of membranes and housings\*

Solvent	ANP	CA	CN	PC	PE	GMF	NYL	PP	DpPP	PES	H-PTFE	PTFE <sup>‡</sup>	PVDF	RC
Acetic acid, 5%	R	LR	R	R	–	R	R	R	R	R	R	R	R	R
Acetic acid, glacial	R	NR	NR	–	–	R	LR	R	R	R	R	R	R	NR
Acetone	R	NR	NR	NR	R	R	R	R	R	NR	R	R	NR	R
Acetonitrile	R	NR	NR	–	–	R	R	R	R	NR	R	R	R	R
Ammonia, 6 N	NR		NR	NR	LR	LR	R	R	R	R	R	R	LR	LR
Amyl acetate	LR	NR	NR	NR	R	R	R	R	R	LR	R	R	LR	R
Amyl alcohol	R	LR	LR	–	–	R	R	R	R	NR	R	R	R	R
Benzene <sup>†</sup>	R	R	R	NR	R	R	LR	NR	NR	R	R	R	R	R
Benzyl alcohol <sup>†</sup>	R	LR	LR	LR	R	R	LR	R	R	NR	R	R	R	R
Boric acid	R	R	R	R	R	R	LR	R	R	–	–	R	R	R
Butyl alcohol	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Butyl chloride <sup>†</sup>	–	–	–	–	–	R	NR	NR	NR	–	–	R	R	–
Carbon tetrachloride <sup>†</sup>	R	NR	R	LR	R	R	LR	NR	NR	NR	R	R	R	R
Chloroform <sup>†</sup>	R	NR	R	NR	R	R	NR	LR	LR	NR	R	R	R	R
Chlorobenzene <sup>†</sup>	R	–	LR	NR	–	R	NR	LR	–	NR	–	R	R	R
Citric acid	–	–	–	–	–	R	LR	R	–	R	–	R	R	R
Cresol	–	NR	R	–	–	R	NR	NR	NR	NR	–	R	NR	R
Cyclohexane	R	NR	NR	R	R	R	NR	NR	NR	NR	–	R	R	R
Cyclohexanone	R	NR	NR	–	–	R	NR	R	R	NR	R	R	R	R
Diethylacetamide	–	NR	NR	–	–	R	R	R	R	–	–	R	NR	R
Dimethylformamide	LR	NR	NR	–	–	R	R	R	R	NR	R	R	NR	LR
Dioxane	R	NR	NR	NR	R	R	R	R	R	LR	–	R	LR	R
DMSO	LR	NR	NR	NR	R	R	R	R	R	NR	R	R	LR	LR
Ethanol	R	R	NR	R	R	R	R	R	R	R	–	R	R	R
Ethers	R	LR	LR	R	R	R	R	NR	NR	R	R	R	LR	R
Ethyl acetate	R	NR	NR	NR	R	R	R	R	R	NR	R	R	NR	R
Ethylene glycol	R	LR	LR	R	R	R	R	R	R	R	R	R	R	R
Formaldehyde	LR	LR	R	R	R	R	R	LR	LR	R	R	R	R	LR

\* ANP = Anopore™; CA = Cellulose acetate; CN = Cellulose nitrate; DpPP = Polypropylene depth filter; GMF = Glass microfiber; NYL = Nylon; PC = Polycarbonate; PE = Polyester; PES = Polyethersulfone; PP = Polypropylene; H-PTFE = Hydrophilic Polytetrafluoroethylene; PTFE = Polytetrafluoroethylene; PVDF = Polyvinylidene difluoride; RC = Regenerated cellulose R = Resistant; LR = Limited Resistance; NR = Not Recommended.

<sup>†</sup> Short Term Resistance of Housing.

<sup>‡</sup> Membrane may need pre-wetting with isopropanol/methanol if filtering a polar liquid.

The above data is to be used as a guide only. Testing prior to application is recommended.

Solvent	ANP	CA	CN	PC	PE	GMF	NYL	PP	DpPP	PES	H-PTFE	PTFE <sup>‡</sup>	PVDF	RC
Freon TF	R	R	R	R	R	R	NR	NR	NR	R	–	R	R	–
Formic acid	–	LR	LR	–	–	R	NR	R	R	R	–	R	R	LR
Hexane	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Hydrochloric acid, conc.	NR	NR	NR	NR	NR	R	NR	LR	LR	R	R	R	R	NR
Hydrofluoric acid	–	NR	NR	–	–	NR	NR	LR	LR	–	–	R	R	NR
Isobutyl alcohol	R	LR	LR	R	R	R	R	R	R	–	R	R	R	R
Isopropyl alcohol	R	R	LR	–	–	R	R	R	R	–	R	R	R	R
Methanol	R	R	NR	R	R	R	R	R	R	R	R	R	R	R
Methyl ethyl ketone	R	LR	NR	NR	R	R	R	R	R	NR	R	R	NR	R
Methylene chloride <sup>†</sup>	R	NR	LR	–	–	R	NR	LR	LR	NR	R	R	R	R
Nitric acid, conc.	–	NR	NR	LR	NR	R	NR	NR	NR	NR	R	R	R	NR
Nitric acid, 6 N	–	LR	LR	–	–	R	NR	LR	LR	LR	R	R	R	LR
Nitrobenzene <sup>†</sup>	LR	NR	NR	NR	R	R	LR	R	R	NR	–	R	R	R
Pentane	R	R	R	R	R	R	R	NR	NR	R	–	R	R	R
Perchloroethylene	R	R	R	–	–	R	LR	NR	NR	NR	R	R	R	R
Phenol 0.5%	LR	LR	R	–	–	R	NR	R	R	NR	–	R	R	R
Pyridine	R	NR	NR	NR	R	R	LR	R	R	NR	R	R	NR	R
Sodium hydroxide, 6N	NR	NR	NR	NR	NR	NR	LR	R	R	R	R	R	NR	NR
Sulfuric acid, conc.	NR	NR	NR	NR	NR	R	NR	NR	NR	NR	R	R	NR	NR
Tetrahydrofuran	R	NR	NR	–	–	R	R	LR	LR	NR	R	R	R	R
Toluene <sup>†</sup>	R	LR	R	NR	R	R	LR	LR	LR	NR	R	R	R	R
Trichloroethane <sup>†</sup>	R	NR	LR	NR	R	R	LR	LR	LR	NR	R	R	R	R
Trichloroethylene <sup>†</sup>	R	–	R	–	–	R	NR	LR	LR	NR	R	R	R	R
Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Xylene <sup>†</sup>	R	R	R	–	–	R	LR	LR	LR	LR	R	R	R	R

\* ANP = Anopore™; CA = Cellulose acetate; CN = Cellulose nitrate; DpPP = Polypropylene depth filter; GMF = Glass microfiber; NYL = Nylon; PC = Polycarbonate; PE = Polyester; PES = Polyethersulfone; PP = Polypropylene; H-PTFE = Hydrophilic Polytetrafluoroethylene; PTFE = Polytetrafluoroethylene; PVDF = Polyvinylidene difluoride; RC = Regenerated cellulose R = Resistant; LR = Limited Resistance; NR = Not Recommended.

<sup>†</sup> Short Term Resistance of Housing.

<sup>‡</sup> Membrane may need pre-wetting with isopropanol/methanol if filtering a polar liquid.

The above data is to be used as a guide only. Testing prior to application is recommended.

Using an irregular chemical solvent? Consult our chemical compatibility table, and contact us for a free sample of the membrane most suitable for your application.

# Media characteristics selection guide

Filter Media		ANP	CA	CN	NYL	PP	DpPP	PES	PTFE	H-PTFE	PVDF	RC	GMF
Hydrophilic		●	●	●	●	○	○	●	○	●	●	●	N/A
Slightly Hydrophobic		○	○	○	○	●	●	○	○	○	○	○	N/A
Hydrophobic		○	○	○	○	○	○	○	●	○	○	○	N/A
Sample type	Aqueous	●	●	●	●	●	●	●		●	●	●	●
	Organic	●			●	●	●	●		●	●	●	●
Low protein binding typically		●	●						●	●	●	●	
Clean /low extractables		Low						Low	Low	Low		Low	
<b>Pore size</b>													
0.02 µm		●											
0.1 µm		●							●				
0.2 µm		●	●		●	●		●	●	●	●	●	
0.45 µm			●		●	●	●	●	●	●	●	●	●
0.7 µm													●
0.8 µm			●										
1 µm								●	●				●
1.2 µm			●										●
1.5 µm													
1.6 µm													●
2 µm													
2.7 µm													●
5 µm				●									

ANP = Anopore™  
 CA = Cellulose Acetate  
 CN = Cellulose Nitrate  
 NYL = Nylon

PP = Polypropylene  
 DpPP = Polypropylene depth filter  
 PES = Polyethersulfone  
 PTFE = Polytetrafluoroethylene

H-PTFE = Hydrophilic polytetrafluoroethylene  
 PVDF = Polyvinylidene difluoride  
 RC = Regenerated Cellulose  
 GMF = Glass microfibre

# Syringe filter diameter guide

Size	ANP	CA	CN	NYL	PP	DpPP	PES	PTFE	H-PTFE	PVDF	RC	GMF
4 mm Sterile				●						●		
4 mm Non-sterile				●				●		●		
10 mm Sterile	●											
10 mm Non-sterile	●											
13 mm Sterile							●			●	●	
13 mm Non-sterile		●		●	●	●	●	●	●	●	●	●
25 mm Sterile	●	●		●	●		●	●	●	●	●	●
25 mm Non-sterile	●	●					●			●		●
30 mm Sterile		●	●					●			●	
30 mm Non-sterile		●	●					●				

ANP = Anopore™

CA = Cellulose Acetate

CN = Cellulose Nitrate

NYL = Nylon

PP = Polypropylene

DpPP = Polypropylene depth filter

PES = Polyethersulfone

PTFE = Polytetrafluoroethylene

H-PTFE = Hydrophilic polytetrafluoroethylene

PVDF = Polyvinylidene difluoride

RC = Regenerated Cellulose

GMF = Glass microfibre

# Media selection for sample prep applications

Application/Membrane Type	Solvents											
	Aqueous											
	Hydrophilic							Hydrophobic				
	CN	CA	PES	GMF	NYL	PVDF	ANP	RC	H-PTFE	DpPP*	PP*	PTFE**
High particulate samples				●							●	
HPLC/uHPLC					●	●	●	●	●		●	●
Ion Chromatography (IC)							●					
Aggressive solvents							●	●	●	●	●	●
Ag/Bioethanol					●			●	●			
COD/TOC/DOC		●	●									
Trace metals analysis (ICP/AAS/ICP-MS)	●	●	●						●			
Colloidal material							●					
Nanoparticle filtration							●					
Protein analysis		●	●			●		●	●			
Biological sample prep	●	●	●	●		●		●	●		●	
Tissue culture medium/serum		●		●							●	
Mycoplasma/Viral removal							●					
Aspiration/vacuum protection**												●
Equipment protection (particulate, aerosols)**											●	●
Venting; air, flasks, bioreactors												●

\* Mildly Hydrophobic can be used for aqueous sample but exhibits elevated water breakthrough  
 \*\* Select PTFE for applications where prevention of water intrusion is critical

CN = Cellulose Nitrate  
 CA = Cellulose Acetate  
 PES = Polyethersulfone  
 GMF = Glass microfibre  
 NYL = Nylon  
 PVDF = Polyvinylidene difluoride  
 DpPP = Polypropylene depth filter  
 ANP = Anopore™

RC = Regenerated Cellulose  
 H-PTFE = Hydrophilic polytetrafluoroethylene  
 PP = Polypropylene  
 PTFE = Polytetrafluoroethylene

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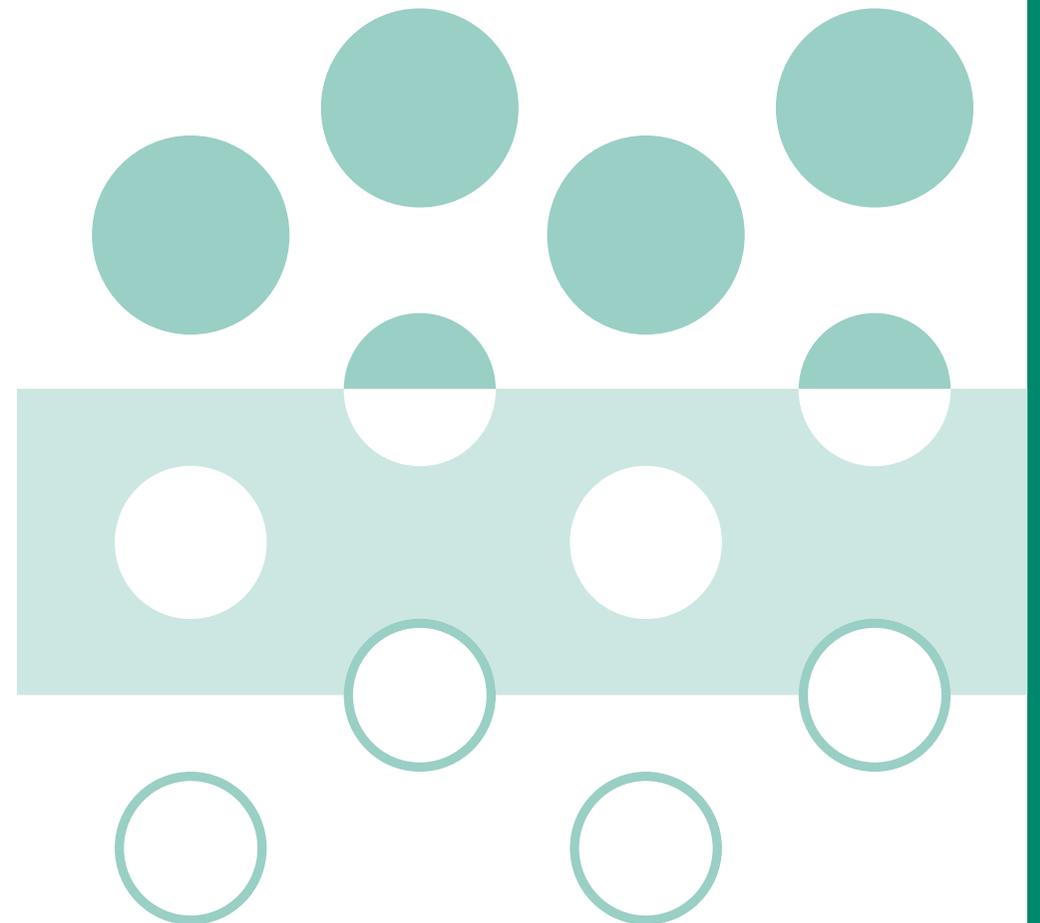
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