I.C.T, S.L.
INSTRUMENTACIÓN CIENTÍFICO TÉCNICA

Whatman®

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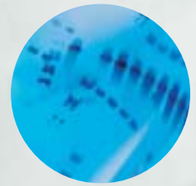
INSTRUMENTACIÓN CIENTÍFICO TÉCNICA

innovating
refining
defining

Welcome to Whatman, the world's leading developer of high-end laboratory separations products. From filter papers and filtration devices, to microbiology and chromatography products, Whatman innovation and solutions for life sciences, worldwide, enable scientists, engineers and medical staff to carry out their work more easily, quickly, accurately and safely. Whether it's for the analysis of target drug compounds in pharmaceuticals; the purification, isolation and identification of substances in food and beverage products; or the preparation of non-cellular samples for environmental applications, from sector to sector, country to country, Whatman has become the watchword for quality, reliability, trust and innovation.

1 clear united vision

Whatman is known throughout the world for its expertise in separations technology for analytical laboratories, bioscience and healthcare applications. Through quality assurance programs, automation, technical support, state-of-the-art manufacturing and dependable delivery, our goal is to provide superior solutions that are reliable, trusted, innovative and internationally competitive. By getting closer to our customers, focusing on key markets, channeling our experience and expertise into new areas and applying our thinking and technologies to develop new, quality-rich products, Whatman will continue to evolve and improve. Our recent acquisition of Schleicher & Schuell clearly demonstrates our determination to remain pivotal to the analytical and life sciences.



Genomics and Proteomics

Whatman products facilitate genomic studies of humans, animals, plants and microorganisms. Collection, storage and analysis of DNA benefit from our innovative FTA® range of products and CloneSaver® Cards. Our blotting membranes are used for protein analysis. Our other market leading product is the UNIFILTER® multiwell filtration plate for high-throughput nucleic acid sample preparation.

Basic Analytical Testing

In the vast and disparate world of analytical chemistry, Whatman products are considered the standard for basic laboratory processes that range from simple clarification to solvent extraction. Products ranging from filter papers, thimbles and Benchkote®, to membrane filters, phase separator papers and thin layer chromatography plates.

Environmental Monitoring

Whatman solutions are used extensively in EPA, ASTM and ISO protocols for environmental monitoring. Total suspended solids analysis methods for waste water, for example, require Whatman 934-AH® glass microfiber papers. Asbestos analysis is accomplished with Whatman Nuclepore® track-etched membranes. Our solutions, such as the FTA Filter Funnel, are also used to purify, isolate and identify organisms in fluids.

Pharmaceutical

Whatman helps pharmaceutical companies increase productivity. Mini-UniPrep™ Syringeless Filters reduce HPLC sample preparation time and consumables usage. DE52 ion-exchange resins are used for purification of critical therapeutics. Multiwell plates enable high-throughput sample preparation and screening in drug discovery. Our track-etched and Anopore® membranes are also vital to making liposomes for encasing and targeting drugs.

Food and Beverage

Quality control for food and beverage is a growing market for our filtration, monitors and media, and separations products. Partisil® HPLC columns are used for the analysis of caffeine by a major manufacturer, while GD/X® syringe filters enable the clarification of a leading orange juice brand. Our products are also used to discover disease states and harmful bacteria.

Whatman 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. To locate your nearest distributor, visit our web site: www.whatman.com

Or you can call our customer services team:

North America
1-800-WHATMAN

UK, Ireland, France, Spain, Portugal, Belgium, Italy and Greece
+44 (0) 1622 676670

Germany, Austria, Switzerland, Denmark, Finland, Holland, Norway, Sweden and Eastern Europe
+49 (0) 5564 204 100

Asia Pacific
+65 6534 0138

Japan
+81 (0) 3-5215-1240

Your regional distributor will then assist you with placing your order. When ordering, please specify:

- Catalog Number
- Brief Description
- Quantity

Call our customer services team

Go to www.whatman.com

2 easy ways to contact your local distributor

3 ways to use this guide

This catalog provides a wealth of products and general reference information, all presented in a way that simplifies the selection process. Choose from the three paths below to find the Whatman product that meets your specific requirements.

By Industry Application

Our new application finder on the following pages allows you to easily locate Whatman products by industry or application.

Application Finder

By 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.

Contents p 1

By Product/Catalog Number

Look up Whatman products by name or catalog number through the indices at the back of this catalog.

Indices p 262

application finder

BASIC LAB

Education, Commercial Labs
Basic laboratory filtration for educational purposes, quality control, analysis and R&D

NON-LIFE SCIENCES

Micro-Electronics
Products in process and for analysis in semiconductor production

Chemical Process Industries
The analysis of chemicals, polymers and petrochemicals

ENVIRONMENTAL MONITORING

Air
Analysis of air for biological and particulate contaminants

Water
Analysis of water (drinking and waste water) for biological and particulate contaminants

Others
Analysis of non-water/air (eg. fuel, soils, nuclear)

PHARMACEUTICAL, BIOTECHNOLOGY, MEDICAL RESEARCH, SPECIALTY CHEMICALS, LIFE SCIENCE RESEARCH

R&D
The discovery of new pharmaceutical therapeutic and biotech products for human and animal uses

Product Developement
Scale up of new products from R&D to clinical trials

Manufacturing Operations
Full scale production of pharmaceuticals and other products

FOOD AND BEVERAGE

QA/QC
Microbial and contaminant detection in food and beverage products

Operations
In process filtration in the production of food and beverage products

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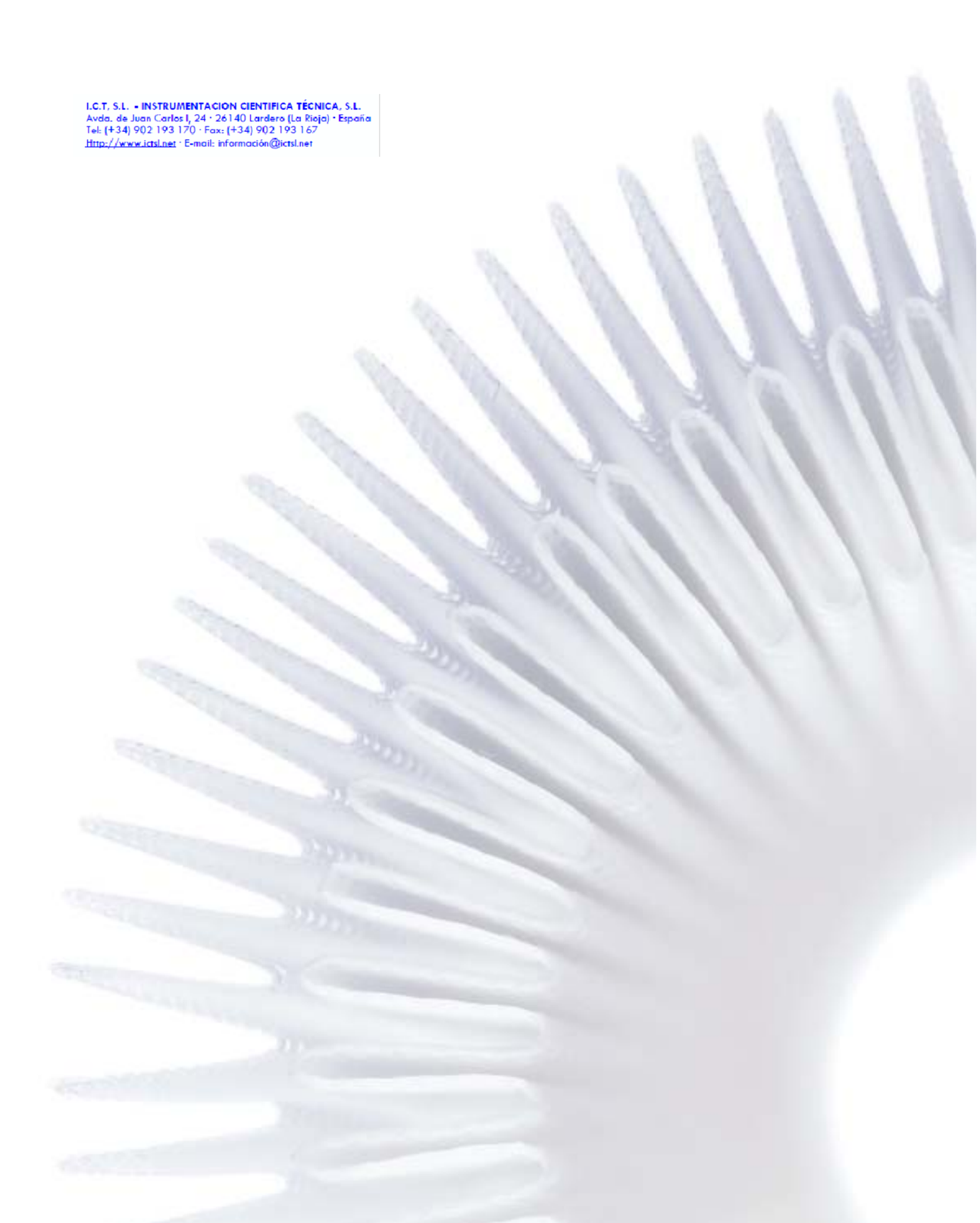

contents

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Filter Papers and Membranes:
Take a Whatman filter paper, run a water sample through it and test for suspended solids. A simple but essential test undertaken throughout the world.

Filter Papers

Whatman filter papers are world-renowned as the standard for laboratory filtration and are associated with quality, reliability and customer service. The familiar Whatman Blue Box is the laboratory benchmark for filtration. Papermaking skills have been developed to the highest level, with the expertise and technology to manufacture innovative multilayer materials.

Whatman offers an extensive line of filter papers. The unique features of these filters make them the optimum choice for many filtering techniques. Whatman maintains a guaranteed quality, reproducibility and uniformity for all its filters by using only the highest quality raw materials. The filters are tested for basis weight, thickness, air flow and mechanical strength. In addition, special parameters such as pore size, wicking rate, filtration performance and surface characteristics can be measured as needed.

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. Whatman offers a wide choice of retention/flow rate combinations to match numerous laboratory applications.

The different groups of filter paper types offer increasing degrees of purity, hardness and chemical resistance.

Typical Properties - Cellulose Filters

Grade	Particle Retention* Liquid (µm)	Air Flow Rate (s/100 mL/in²)	Ash (%)	Typical Thickness (µm)	Basis Weight (g/m²)	Wet Burst (psi)	Dry Burst (psi)	Tensile M/D Dry (N/15 mm)
Qualitative								
1	11	10.5	0.06	180	88	0.3	16	39.1
2	8	21	0.06	190	103	0.7	16	44.6
3	6	26	0.06	390	187	0.5	28	72
4	20-25	3.7	0.06	205	96	0.7	10	28.4
5	2.5	94	0.06	200	98	0.4	21	55.6
6	3	35	0.2	180	105	0.3	15	39.1

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Grade	Particle Retention* Liquid (µm)	Air Flow Rate (s/100 mL/in²)	Ash (%)	Typical Thickness (µm)	Basis Weight (g/m²)	Wet Burst (psi)	Dry Burst (psi)	Tensile M/D Dry (N/15 mm)
General Purpose and Wet Strengthened Qualitative								
91	10	6.2	N/A	205	71	2	18	28
93	10	7	N/A	145	67	2.6	12	38
113	30	1.3	N/A	420	131	8	24	38.6
114	23	5.3	N/A	190	77	8.9	15	42.1
Ashless Quantitative								
40	8	19.3	0.007	210	92	0.5	16	46.7
41	20-25	3.4	0.007	215	84	0.3	10	27.2
42	2.5	107	0.007	200	100	0.7	25	55.8
43	16	8.9	0.007	220	96	0.6	12	38.2
44	3	57	0.007	176	77	0.4	44	39.4
Hardened Low Ash Quantitative								
50	2.7	96	0.015	115	97	9.1	33	84
52	7	11.4	0.015	175	101	8.3	24	71.5
54	20-25	4.2	0.015	185	92	9.4	18	57.6
Hardened Ashless Quantitative								
540	8	13.2	0.006	160	88	9	20	63
541	20-25	3.8	0.006	155	82	5.3	14	43.4
542	2.7	69	0.006	150	93	9.2	28	82.6

Ash is determined by ignition of the cellulose filter at 900° C in air
*Particle Retention Rating at 98% efficiency

Trace Elements - Typical Values

Grade	1	42	542	Grade	1	42	542
Aluminum	<0.5	2	1	Iron	5	6	3
Antimony	<0.02	<0.02	<0.02	Lead	0.3	0.2	0.1
Arsenic	<0.02	<0.02	<0.02	Magnesium	7	1.8	0.7
Barium	<1	<1	<1	Manganese	0.06	0.05	<0.05
Boron	1	1	2	Mercury	<0.005	<0.005	<0.005
Bromine	1	1	1	Nitrogen	23	12	260
Calcium	185	13	8	Potassium	3	1.5	0.6
Chlorine	130	80	55	Silicon	20	<2	<2
Chromium	0.3	0.3	0.7	Sodium	160	33	8
Copper	1.2	0.3	0.2	Sulfur	15	<5	<2
Fluorine	0.1	0.2	0.3	Zinc	2.4	0.6	0.3

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Qualitative Filter Papers

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

In addition, Whatman offers a range of wet strengthened qualitative filters which contain a small quantity of a chemically stable resin to give improved high wet strength. This does not introduce any significant impurities into the filtrate. The resin, however, does contain nitrogen so these grades should not be used in Kjedldahl estimations, etc. All wet strengthened grades are available in prepleated forms. Whatman provides a wide range of qualitative filters to meet your specific needs.

Qualitative Filter Papers - Standard Grades

Grade 1: 11 µm
The most widely used filter paper for routine applications with medium retention and flow rate. Extended range of sizes includes 10 mm to 500 mm diameter circles and 460 mm x 570 mm sheets. This filter is also available in the Whatman FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 mL capacity molded from polypropylene with an integral, heat bonded filter.

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 quantified by optical reflectance.

Grade 2: 8 µm
Slightly more retentive than Grade 1 with a corresponding increase in filtration time (i.e., slightly slower filtration speed). More absorbent than Grade 1. Also available in folded (prepleated) form as Grade 2V. In addition to general filtration in the 8 µm 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.

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Grade 3: 6 µm
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. This filter is also available in the Whatman FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 mL capacity molded from polypropylene with an integral, heat bonded filter.

Grade 4: 20-25 µm
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.

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.

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 prepleated as 591 1⁄2.

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 prepleated as 520 a 1⁄2.

Grade 595: 4-7 µm
Very popular, thin filter paper, medium-fast with medium to fine particle retention. Used for many analytical routine applications in different industries, e.g. particle separation from food extracts for sample preparation or filtration of solid environmental samples digested, e.g. for ICP/AAS analysis. Also available prepleated as 595 1/2.

Grade 597: 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 acc. to Section 35 LMBG*) or removal of carbon dioxide and turbidity from beverages (e.g. beer analysis acc. to EBC or MEBAK). Available prepleated as 597 1⁄2.

Grade 598: 8-10 µm
A thick filter paper with high loading capacity. Combines medium retention with medium-fast to quick filtration speed. Also available prepleated as 598 1⁄2.

* German law for food and consumer products

Filter Papers and Membranes

Grade 0048
Fiber mats made of cellulose/synthetics used in milk analysis and for testing baby food (artificial milk) for textile fibers.

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 prepleated as 602 h 1⁄2.

Typical Properties - Qualitative Filter Papers

Grade	Properties	Classification to DIN 53 135	Thickness (mm)	Filtration time to Herzberg (s)	Filtration time to DIN 53 137 (s)	Weight (g/m²)	Retention-Range* (µm)
520 a	Very Fast, Great Wet Strength, Thin	-	0.32	35	-	90	15-18
591	Medium Fast, Thick	-	0.36	90	-	165	7-12
595	Medium Fast, Thin	1b	0.16	160	12-40	68	4-7
597	Medium Fast	-	0.19	140	11-35	85	4-7
597 L	Medium Fast, Low-fat		0.18	170	17-38	82	4-7
598	Medium Fast, Thick	-	0.32	100	-	140	8-10
602 h	Slow, Dense	1d	0.15	1500	100-200	85	< 2

* Approximate values

Ordering Information - Qualitative Standard Filter Circles

	Catalog Number						
Diameter (mm)	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Quantity/Pack
10	1001-6508	-	-	-	-	-	500
23	-	-	1003-323	-	-	-	100
25	1001-325	-	-	1004-325	1005-325	-	100
30	1001-329	-	-	-	-	-	100
32	1001-032	-	-	-	-	-	100
42.5	1001-042	1002-042	1003-042	1004-042	1005-042	1006-042	100
47	1001-047	-	-	1004-047	1005-047	-	100
55	1001-055	1002-055	1003-055	1004-055	1005-055	-	100
70	1001-070	1002-070	1003-070	1004-070	1005-070	1006-070	100
85	1001-085	-	-	-	-	-	100
90	1001-090	1002-090	1003-090	1004-090	1005-090	1006-090	100 contd>

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	Catalog Number						
Diameter (mm)	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Quantity/Pack
110	1001-110	1002-110	1003-110	1004-110	1005-110	1006-110	100 contd>
125	1001-125	1002-125	1003-125	1004-125	1005-125	1006-125	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	1003-500	-	-	-	100
FilterCup 70*	1600-001	-	1600-003	-	-	-	25

* FilterCup Stem with Stopper - one time purchase - Catalog Number 1600-900

Ordering Information - Qualitative Standard Filter Paper Circles

	Catalog Number					
Diameter (mm)	Grade 595	Grade 597	Grade 598	Grade 602 h	Grade 0048	Quantity/Pack
12.7	-	10 311 862	-	-		1000
42.5	-	10 312 040	-	-		100
45	-	10 311 804	-	-		100
55	-	10 311 807	-	-		100
70	-	10 311 808	-	-		100
90	-	10 311 809	10 312 209	10 312 609		100
110	10 311 610	10 311 810	-	-		100
125	10 311 611	10 311 811	-	10 312 611		100
150	10 311 612	10 311 812	-	10 312 612		100
185	-	10 311 814	-	10 312 614		100
240	-	10 311 820	-	10 312 620		100
320	-	10 311 822	-	-		100
32	-	-	-		10 348 903	1000
150	-	-	10 314 812			100
240	-	10 341 420**	-			100

** Grade 3612 - Black

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Ordering Information - Qualitative Filter Paper Sheets

	Catalog Number					
Dimensions (mm)	Grade 595	Grade 520 a	Grade 520 bII	Grade 2411	Grade 591	Quantity/Pack
580 x 580	-	10 331 487	10 331 687	10 343 287	10 311 387	250
580 x 580	10 311 687	-	-	-		500
Dimensions (mm)	Grade 2589 a	Grade 2589 c	Grade 2589 d	Grade 0860		Quantity/Pack
580 x 580	10 343 687	-	-	10 334 597		100
25 x 75	-	10 343 876	10 343 976	-		100
Dimensions (mm)	Grade 0903	Grade 0905	Grade 0858	Grade 1574	Grade 1575	Quantity/Pack
1100 x 1100	-	-	-	-	10 314 991	100
580 x 580	10 334 887	10 334 987	10 334 387	-	-	500
580 x 580	-	-	10 334 397	-	-	100
400 x 400	-	-	-	10 314 889	10 314 984	500
450 x 450	10 334 885	10 334 985	10 334 385	-	-	500
390 x 390	-	-	10 334 383	-	-	500
300 x 309	-	-	-	-	10 314 983	500
110 x 580	-	-	10 334 365	-	-	500

Ordering Information - Qualitative Standard Filter Paper Sheets

Dimensions (mm)	Catalog Number	Quantity/Pack
Grade 1		
460 x 570	1001-917	100
460 x 570	1001-918	500
580 x 680	1001-931	100
Grade 2		
460 x 570	1002-917	100
580 x 680	1002-931	100
Grade 3		
460 x 570	1003-917	100
Grade 4		
460 x 570	1004-917	100
Grade 591		
580 x 580	10 311 387	250
Grade 597		
580 x 580	10 311 897	100
580 x 580	10 311 887	500
Grade 598		
580 x 580	10 312 287	250

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Qualitative 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. 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 (prepleated) 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 113: 30 µm
Ultra high loading capacity with a particle retention making it ideal for use with coarse or gelatinous precipitates. Fastest flow rate of the qualitative grades. Creped surface. Thickest filter paper in the Whatman range. This filter is also available in the Whatman FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 mL capacity, molded from polypropylene with an integral, heat bonded filter.

Grade 114: 25 µm
Only half the thickness of Grade 113 and suitable for coarse or gelatinous precipitates. Smooth surface for easy recovery of precipitates.

Grade 520 bII: 15-19 µm
A thick paper with high wet strength offering a very high flow rate. Also available prepleated as 520 bII 1/2.

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 2411: 9-11 µm
A fast filter paper with high wet strength and medium retention. Frequently used as a protective paper in filter presses.

Qualitative Filter Papers - Student Grade/Grade 93

Designed for educational use, this filter paper is intermediate in speed and retention between Grades 1 and 4. Student grade retains those flocculent and medium precipitates most often encountered in student experiments.

Available in a dispenser pack, it 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.

Ordering Information - Qualitative Wet Strengthened Filter Circles

Diameter (mm)	Catalog Number Grade 91	Grade 93/ Student	Grade 113	Grade 114	Quantity/Pack
90	-	-	1113-090	1114-090	100
110	1091-110*	1093-111**	1113-110	-	100
125	1091-125*	1093-126**	1113-125	1114-125	100
150	1091-150***	-	1113-150	1114-150	100
185	1091-185***	-	1113-185	1114-185	100
190	1091-190	-	-	-	100
240	1091-240***	-	1113-240	1114-240	100
270	-	-	-	1114-270	100
320	-	-	1113-320	-	100
400	-	-	-	1114-400	100
500	-	-	1113-500	-	100
FilterCup 70****	-	-	1600-113	-	25

Diameter (mm)	Grade 520 a	Grade 2294	Grade 2589 a	Grade 1573	Grade 1575	Quantity/Pack
110	-	10 342 810	-	-	-	100
125	-	-	-	10 314 711	10 314 911	100
140	-	-	10 343 630	-	-	500
150	-	-	-	10 314 712	10 314 912	100
180 / 33 ZL[1]	-	10 342 860	-	-	-	100
185	-	-	-	10 314 714	10 314 914	100
200	-	-	-	-	10 314 916	100
210 / 60 ZL[1]	-	10 342 862	-	-	-	100
240	-	-	-	10 314 720	-	100
270	10 331 421	-	-	-	-	100
290	-	-	-	10 314 726	-	100
510	-	-	-	-	10 314 940	100

[1] Round filter with central hole
* Packed in 4000 subdivided into 100
** Packed in 50 envelopes of 25 circles each

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*** Packed in 1000 subdivided into 100
**** FilterCup Stem with Stopper - one time purchase - Catalog Number 1600-900

Filter Papers for General Laboratory Analyses

Grade 0858: 7–12 µm
Grained, with medium fast flow rate and medium retention. A universal filter paper, e.g. used for the filtration of extracts, oils, beer, syrups etc., also applied in filter presses or for the aspiration of liquids. Available prepleated as 0858 1⁄2.

Grade 0860: 12 µm
Comparable to 0858 but with a smooth surface, slightly thinner and faster. Also available prepleated as 0860 1⁄2.

Grade 0903: 4-7 µm
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, offers a very high filtration speed.

Typical Properties - Qualitative Wet Strengthened Filter Papers

Grade	Properties	Thickness (mm)	Filtration Time to Herzberg (s)	Weight (g/m^2)	Retention-Range** (µm)
2294	Fast, Wet Strength, Thick	1.5	55	550	8-15
2589 a	Medium Fast, Wet Strength	0.45	120	200	6-12
0858	Medium Fast, Wet Strength	0.21	110	75	7-12
0860	Medium Fast, Wet Strength	0.18	120	75	7-12
0903	Medium to Slow, Wet Strength	0.15	350	65	4-7
0905	Very Fast	0.24	40	65	12-25
Shark Skin	Medium to Slow, Wet Strength, Thin	0.17	155	44	8-12

** Approximate values

Ordering Information - Shark Skin Filter Circles

Diameter (mm)	Catalog Number	Quantity/Pack
110	10 347 510	100
150	10 347 513	100
290	10 347 577	100
320	10 347 530	100
812.8	10 347 576	100

Ordering Information - Shark Skin Filter Sheets

Dimensions (inches)	Catalog Number	Quantity/Pack
8 x 10	10 538 877	100
26 x 53	10 347 588	500
32 x 64	10 347 585	500
37 x 37	10 538 873	500
21 x 750 feet	10 537 138	1

Qualitative Filter Papers - Folded (Prepleated Grades)

Time-saving Whatman qualitative grades are offered in this convenient form, which have 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 because more filter area is available
- Maintained flow rate because of the reduction in filter paper contact with funnel side and, of course, 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

Grade 2V: 8 µm
Widely used for general purpose filtration. Has excellent particle retention and a good filtration speed and loading capacity.

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. Ideal for coarse particles and gelatinous precipitates.

Grade 114V: 25 µm
Strong filter with very fast flow rate. Ideal for coarse particles and gelatinous precipitates. Smooth surface.

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Ordering Information - Qualitative Filter Papers - Folded (Prepleated Grades)

	Catalog Number					
Diameter (mm)	Grade 2V	Grade 113V	Grade 114V	Quantity/Pack		
125	1202-125	1213-125	1214-125	100		
150	1202-150	1213-150	1214-150	100		
185	1202-185	1213-185	1214-185	100		
240	1202-240	1213-240	1214-240	100		
270	1202-270	1213-270	-	100		
320	1202-320	1213-320	1214-320	100		
385	1202-385	-	-	100		
400	1202-400	-	-	100		
500	1202-500	1213-500	-	100		
Diameter (mm)	Grade 520 a 1/2	Grade 595 1/2	Grade 597 1/2	Grade 602 h 1/2	Grade 2555 1/2	Quantity/Pack
70	-	-	10 311 841	-	-	100
90	-	-	10 311 842	10 312 642	-	100
110	-	10 311 643	10 311 843	-	-	100
125	-	10 311 644	10 311 844	10 312 644	-	100
150	-	10 311 645	10 311 845	10 312 645	-	100
185	-	10 311 647	10 311 847	10 312 647	10 313 947	100
240	10 331 451	10 311 651	10 311 851	10 312 651	10 313 951	100
270	-	10 311 652	10 311 852	-	-	100
320	-	10 311 653	10 311 853	-	10 313 953	100
385	-	-	10 311 854	-	-	100
500	10 331 456	-	10 311 856	-	-	100
700	10 331 459	-	-	-	-	100
Diameter (mm)	Grade 591 1/2	Grade 520 b II 1/2	Grade 598 1/2	Grade 287 1/2		Quantity/Pack
125	-	-	10 312 244	10 310 244		50
150	-	-	-	10 310 245		50
185	10 311 347	-	10 312 247	10 310 247		50
240	10 311 351	-	10 312 251	10 310 251		50
320	-	10 331 653	-	10 310 253		50
500	-	-	10 312 256	-		50

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Quantitative Filter Papers

Whatman quantitative filters are designed for gravimetric analysis and the preparation of samples for instrumental analysis. They are available in three formats designed to meet your specific needs.

- Ashless: 0.007% ash maximum - very pure filters ideal for a wide range of critical analytical filtration procedures
- Hardened low ash: 0.015% ash maximum - 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: 0.006% ash maximum - acid hardened to give high wet strength and chemical resistance with extreme low ash content. The tough surface makes these filters suitable for a wide range of critical filtration procedures.

Quantitative Filter Papers - Ashless Grades (Ash 0.007%)

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 spectro-photometry. Used also as a high purity filter in the collection of trace elements and radionuclides from the atmosphere.

Grade 41: 20-25 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. This filter is also available in the Whatman Disposable Filter Funnel. This is a convenient, disposable 47 mm filter funnel with a 250 mL capacity. The 47 mm Grade 41 filter can be easily removed for further analysis or culturing.

Grade 42: 2.5 µm
A world standard for critical gravimetric analysis with the finest particle retention of all Whatman cellulose filter papers. Typical analytical precipitates include barium sulfate, metastannic acid and finely precipitated calcium carbonate.

Grade 43: 16 µm
Intermediate in retention between Grade 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.

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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.

Grade 589/1: 12-25 µm
'Black Ribbon Filter' - the established standard in quantitative analysis for the filtration of coarse precipitates (class 2a acc. to DIN 53 135). 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 to Section 35 LMBG*), or for the Blaine test in the cement industry.

Grade 589/2: 4-12 µm
'White Ribbon Filter' - ashless standard filter paper for medium fine precipitates (class 2b acc. to DIN 53 135) offering medium filtration speed. Applied in a variety of routine methods in quantitative analysis, e.g. determination of the sand content in foodstuffs to Section 35 LMBG*, determination of the grade of flour or analysis of aqueous suspensions in the paper industry.

Grade 589/3: 2 µm
'Blue Ribbon Filter' - ashless standard filter paper for very fine precipitates (class 2d acc. to DIN 53 135). 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 acc. to Section 35 LMBG*.

Quantitative Filter Papers - Hardened Low Ash Grades (Ash 0.015%)

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 finest crystalline precipitates. The thinnest of all Whatman filter papers. Slow flow rate. Hardened and highly glazed surface. This finish 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. 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.

Grade 52: 7 µm
The general purpose hardened filter paper with medium retention and flow rate. Very hard surface.

* German law for food and consumer products

Grade 54: 20-25 µm
Very fast filtration for use with coarse and gelatinous precipitates. High wet strength makes this grade very suitable for vacuum assisted fast filtration of 'difficult' coarse or gelatinous precipitates.

Quantitative Filter Papers - Hardened Ashless Grades (Ash 0.006%)

These are the supreme quantitative filter papers featuring high wet strength and chemical resistance. These papers 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
The 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: 20-25 µm
Fast filtration of coarse particles and gelatinous precipitates in acid/alkali solutions during gravimetric analysis. Typical applications include fiber in animal foodstuffs, gelatine in milk and cream, chloride in cement, and chloride and phosphorous in coal and coke.

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.

Typical Properties - Quantitative Filter Papers

Grade	Properties	Classification to DIN 53 135	Thickness (mm)	Filtration Time to Herzberg (s)	Filtration Time to DIN 53 137 (s)	Weight (g/m)	Retention Range* (µm)
589/1	Fast	2a	0.19	50	6-12	80	> 12-25
589/2	Medium Fast	2b	0.19	140	11-35	85	4-12
589/3	Slow	2d	0.15	1500	100-200	85	< 2

* Approximate values

Ordering Information - Quantitative Ashless Filter Circles

Diameter (mm)	Catalog Number Grade 40	Grade 41	Grade 42	Grade 43	Grade 44	Quantity/Pack
Filter Circles						
30	1440-329	-	-	-	-	100

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Diameter (mm)	Catalog Number Grade 40	Grade 41	Grade 42	Grade 43	Grade 44	Quantity/Pack
42.5	1440-042	1441-042	1442-042	-	-	100
47	1440-047	1441-047	1442-047	-	-	100
55	1440-055	1441-055	1442-055	-	-	100
70	1440-070	1441-070	1442-070	-	1444-070	100
90	1440-090	1441-090	1442-090	1443-090	1444-090	100
110	1440-110	1441-110	1442-110	1443-110	1444-110	100
125	1440-125	1441-125	1442-125	1443-125	1444-125	100
150	1440-150	1441-150	1442-150	1443-150	1444-150	100
185	1440-185	1441-185	1442-185	1443-185	1444-185	100
240	1440-240	1441-240	1442-240	-	-	100
320	-	1441-320	1442-320	-	-	100
Disposable Filter Funnel						
		1920-1441				5
Filter Sheets						
8"x 10"	-	1441-866	-	-	-	100
460 mm x 570 mm	-	1441-917	-	-	-	100

Ordering Information - Quantitative Ashless Filter Circles

Diameter (mm)	Catalog Number Grade 589/1	Grade 589/2	Grade 589/3	Quantity/Pack
12.7	-	10 300 102	-	1000
40.5	-	10 300 103	-	100
50	-	10 300 106	-	100
55	-	10 300 107	-	100
70	-	10 300 108	-	100
90	10 300 009	10 300 109	-	100
110	10 300 010	10 300 110	10 300 210	100
125	10 300 011	10 300 111	10 300 211	100
150	10 300 012	10 300 112	10 300 212	100
185	10 300 014	10 300 114	10 300 214	100
240	-	10 300 120	-	100

Ordering Information - Quantitative Ashless Filter Paper Folded (Prepleated) Grade

Diameter (mm)	Catalog Number Grade 589/2 1/2	Quantity/Pack
110	10 300 143	100
150	10 300 145	100

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Ordering Information - Quantitative Hardened Low Ash and Hardened Ashless

	Quantitative Hardened Low Ash Filter Circles Catalog Number			Quantitative Hardened Ashless Filter Circles Catalog Number			
Diameter (mm)	Grade 50	Grade 52	Grade 54	Grade 540	Grade 541	Grade 542	Quantity/Pack
21	-	-	-	1540-321	-	-	100
24	-	-	-	1540-324	-	-	100
42.5	1450-042	-	-	1540-042	1541-042	-	100
47	-	-	-	-	1541-047	-	100
55	1450-055	-	1454-055	1540-055	1541-055	1542-055	100
70	1450-070	1452-070	1454-070	1540-070	1541-070	1542-070	100
90	1450-090	1452-090	1454-090	1540-090	1541-090	1542-090	100
110	1450-110	1452-110	1454-110	1540-110	1541-110	1542-110	100
125	1450-125	1452-125	1454-125	1540-125	1541-125	1542-125	100
150	1450-150	1452-150	1454-150	1540-150	1541-150	1542-150	100
185	1450-185	-	1454-185	1540-185	1541-185	1542-185	100
240	1450-240	1452-240	1454-240	1540-240	1541-240	1542-240	100
320	1450-320	-	1454-320	-	1541-320	-	100
400	-	-	-	-	1541-400	-	100
500	-	-	1454-500	-	-	-	100
Surface Wipes							
Smear Tab	1450-993	-	-	-	-	-	100
Filter Sheets							
460 mm x 570 mm	-	-	1454-917	-	1541-917		100

Application Specific Filters

Whatman offers a line of cellulose filter papers for specific applications. The product line includes filter papers for the soil analysis and sugar industries.

Soil Analysis Filter Paper

Grade 0790 Acid-washed paper with ash content of approximately 0.01%, low-magnesium, for the determination of trace elements (Mg, Mn, Co, Cu, Mo, B).

Grade 512 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.

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Sugar Industry Filter Paper

Creped or smooth filter papers have a good retentivity at a relatively high filtration speed. They are 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)

Grade 551

Black colored paper with a medium to slow flow rate. Provides contrast for the detection of very fine traces of white precipitates.

Grade 287

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. Available prepleated as 287 1⁄2.

Grade 2555

A medium fast filter paper. Used for the filtration of the mash for the determination of the extract in malt and wort acc. to the EBC and for removing carbon dioxide from beer. Available prepleated as 2555 1⁄2.

Typical Properties - Application Specific Filters

Grade	Properties	Thickness (mm)	Filtration Time to: Herzberg (s)	Weight (g/m²)
Soil Analysis Filter Papers				
0790	Low Mg and P	0.17	450	84
512	Low Phosphate	0.16	1500	76
Sugar Industry Filter Papers				
3000	Fast, Smooth	0.16	95	68
3002	Medium Fast, Smooth	0.14	150	60
Specially for the Venema Unit				
3459	Fast, Creped	0.30	110	75

Ordering Information - Application Specific Filters

Diameter (mm)	Catalog Number	Quantity/Pack
Soil Analysis Filter Papers*		
Grade 512		
110	10 310 643	100
150	10 310 645	100
185	10 310 647	100

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Filter Papers and Membranes

Diameter (mm)	Catalog Number	Quantity/Pack
Grade 551		
90	10 310 809	100
Grade 790		
150	10 301 645	100
185	10 301 647	100
Sugar Industry Filter Papers		
Grade 3000		
185	10 316 114	1000
200	10 316 116	1000
Grade 3002		
200	10 316 316	1000
240	10 316 320	1000
Grade 3459		
230	10 316 619	1000

* Prepleated filter paper format

Standard Circle Filter Funnel Volumes

The maximum practical volume of the most popular disc sizes (quadrant folded) are:	
Diameter (mm)	Volume (mL)
90	15
110	20
125	35
150	75
185	135
240	300

Glass Microfiber Filters

Whatman offers two types of glass microfiber filters manufactured from 100% borosilicate glass: binder-free glass microfiber that is chemically inert and binder glass microfiber.

These depth filters combine fast flow rates with high loading capacity and the retention of very fine particles, extending into the sub-microrange. Glass microfiber filters can be used at temperatures up to 500° C and are ideal for use in applications involving air filtration and for gravimetric analysis of volatile materials where ignition is involved.

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Whatman 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. Whatman glass microfiber filters such as GF/B or GF/D are ideal because of the low resistance to fluid flow and high particle loading capacity. Whatman Multigrade GMF 150 is particularly valuable for the prefiltration of larger volumes and solutions that are normally difficult to filter.

Typical Properties - Binder-Free Glass Microfiber Filters

Grade	Particle Retention* Liquid (µm)	Air Flow Rate (s/100 mL/in²)	Basis Weight (g/m²)	Thickness (µm)	Wet Burst (psi)	Tensile MD Dry (N/15 mm)
GF/A	1.6	4.3	53	260	0.3	5.5
GF/B	1.0	12	143	675	0.5	6.4
GF/C	1.2	6.7	53	260	0.3	6.6
GF/D	2.7	2.2	121	675	0.3	6.4
GF/F	0.7	19	75	420	0.3	8.9
934-AH	1.5	3.7	64	435	0.5	4.1
QM-A	2.2	6.4	87	475	1.5	7.3
GMF 150	1.2	3.1	139	730	1.4	4.2
EPM 2000	2.0	4.7	85	450	1.8	6.3

* 98% Particle Retention Rating

Technical Specifications - Glass Microfiber Filters with Binder

Grade	Binder	Retention Rate to BS 4400 (%)	Air Resistance at 1 m/s mm Water Column	Filtration Time to: Herzberg (s)	Gurley (s)	Weight (g/m²)	Thickness (µm)
GF 8	Inorganic	99.00	700	80	8	75	350
GF 9	Inorganic	99.97	700	120	20	70	350
GF 3362	Inorganic	99.99	1000	120	25	130	500
GF 6	Inorganic	99.97	1500	200	40	80	350
GF 10	Organic	99.97	650	80	12	70	350
GF 92	Inorganic	-	-	120	20	70	350

Whatman Acid Treated Low Metal TCLP Filters

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 Whatman TCLP Filter is a binder-free borosilicate glass microfiber with a particle retention rating of 0.6 µm to 0.8 µm, as specified by the EPA Method 1311.

These acid treated low metal filters are available in 47 mm, 90 mm, 110 mm, 125 mm, 142 mm and 150 mm diameters. The 90 mm filter is required for volatile samples and use with a Zero Headspace Extractor. The 142 mm filter is typically used with non-volatile samples in an approved jar.

Ordering Information - Acid Treated Low Metal TCLP Filters

Catalog Number	Size (mm)	Quantity/Pack
1810-047	47	100
1810-090	90	50
1810-110	110	50
1810-125	125	50
1810-142	142	50
1810-150	150	50

Air Sampling Filters/Quartz Filters

Air Sampling Filters EPM 2000

EPM 2000 has been developed especially for use in high volume PM-10 air sampling equipment that collects atmospheric particulates and aerosols. It is manufactured from 100% pure borosilicate glass of special purity enabling detailed chemical analysis of trace pollutants to take place with the minimum of interference or background.

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Whatman EPM 2000 was selected by the EPA to be the standard filter for use in the nationwide network of HiVol air samplers. Sheets are individually numbered to facilitate identification.

Quartz Filters - QM-A

High-purity quartz (SiO_2) microfiber filters are used for air sampling in acidic gases, stacks, flues and aerosols, particularly at high temperatures up to 500° C and in PM-10 testing. Because of the low level of alkaline earth metals, 'artifact' products of sulfates and nitrates (from SO_2 and NO_2) are virtually eliminated. QM-A, sequentially numbered according to EPA standards, is suitable for most applications.

Order Information - Air Sampling Filters

Grade - Diameter (mm)	EPM 2000
Circles (100/pack)	
47	1882-047*
Grade - Size (inches)	EPM 2000
Sheets (100/pack)	
8" x 10" (pre-numbered)	1882-866

Order Information - Quartz Filters

Grade - Diameter (mm)	QM-A
Circles (100/pack)	
25	1851-025
37	1851-037
47	1851-047
55	1851-055*
90	1851-090
Grade - Size (inches)	QM-A
Sheets (100/pack)	
8" x 10"	1851-8866* (pre-numbered)
Sheets (100/pack)	
8" x 10"	1851-865

Items marked * available on special order in Europe, South America, Africa and the Middle East

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Glass Microfiber GF Series

Binder-free Glass Microfiber Filters

Grade GF/A: 1.6 µm
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, foodstuff analyses, protein filtration and radioimmunoassay of weak ß emitters. Recommended for gravimetric determination of airborne particulates, stack sampling and absorption methods of air pollution monitoring.

This filter is available in the Whatman FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 mL capacity, molded from polypropylene with an integral, heat bonded filter. This filter is also available in the Whatman Disposable Filter Funnel. This is a convenient, disposable 47 mm filter funnel with a 250mL capacity. The 47 mm GF/A filter can be easily removed for further analysis or culturing.

Grade GF/B: 1.0 µm
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 µm
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.

This filter is also available in the Whatman FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 mL capacity, molded from polypropylene with an integral, heat bonded filter. This filter is also available in the Whatman Disposable Filter Funnel. This is a convenient, disposable 47 mm filter funnel with a 250 mL capacity. The 47 mm GF/C filter can be easily removed for further analysis or culturing.

Grade GF/D: 2.7 µm
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.

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Grade GF/F: 0.7 µm
This high-efficiency filter will retain fine particles down to 0.7 µm. 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 µm-0.8 µm 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. It remains today the filter of choice.

Recommended for DNA 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.

This filter is also available in the Whatman FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 mL capacity, molded from polypropylene with an integral, heat bonded filter.

Glass Microfiber Filters with Binder

Grade GF 6
This filter is used in water pollution applications, for removing protein from difficult-to-filter beers, for determination of chlorophyll and phytoplankton residues, for the determination of filterable substances and the residue on ignition (dry weight), for the analysis of aggressive media (e.g. acidic gases), for scintillation measurements and for determination of the elemental iron content in the presence of iron oxides.

Grade GF 8
This glass fiber filter is used in the filtration of coarse particles, in the 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 at the workplace, determination of the dust fraction in technical gases, testing the effectiveness of dust-collecting and filter plants and the determination of paper bleeding.

Grade GF 9
Used for air monitoring, scintillation measurements, the 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 at the workplace, determination of the dust fraction in technical gases, testing the effectiveness of dust-collecting and filter plants, monitoring nuclear plants.

Grade GF 10
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
This filter is used as a membrane prefilter in applications such as the determination of crop protection agent residues by GC or HPLC, in cold sludge determination of beer, in soot separation before gas analyzers and as roll filters in automatic air filtration units.

Grade GF 3362
Has inorganic binder. Thicker and slightly denser than GF 9, for the fast filtration of large amounts of particles.

Glass Microfiber Filters with Inorganic Binder

GF 6 with Inorganic Binder
Good retention for very fine particles. Used for (waste) water analysis, removing protein from difficult-to-filter beers, retention of (radioactive) aerosols, monitoring nuclear plants and scintillation measurements.

GF 8 and GF 9 with Inorganic Binder
For fast filtration of coarse particles. GF 9 is slightly slower than GF 8 but offers a higher retention rate. Frequently used in environmental analysis, e.g. for pollution measurements in industrial, urban and surburban areas, cement factories, iron and steel industry, dust measurements at the workplace, determination of the dust fraction in technical gases or testing the effectiveness of dust-collecting and filter plants.

GF 10 with Inorganic Binder
Offers high mechanical stability and temperature resistant up to 180° C. Applied in soot separation before gas analyzers, as roll filters in automatic air filtration units or as a weighing aid for infrared weighing.

GF 92 with Inorganic Binder
Membrane prefilter with inorganic binder. Frequently used in sample preparation.

Grade 934-AH: 1.5 µm - Binder-Free
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 withstands temperatures over 500° C. Specified in Standard Methods 2540D for determining total suspended solids in water, removal of turbidity and filtration of bacterial cultures. Grade 934-AH is used for a wide range of laboratory applications. It is recommended for water pollution monitoring, cell harvesting, liquid scintillation counting and air pollution monitoring.

Ordering Information - 934-AH Binder-Free Glass Microfiber Filters

Diameter (mm)	Catalog Number	Quantity/Pack
21	1827-021	100
24	1827-024	100
25	1827-025	100
32	1827-032	100
35	1827-035	100
37	1827-037	100
42.5	1827-042	100
47	1827-047	100
55	1827-055	100
70	1827-070	100

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Diameter (mm)	Catalog Number	Quantity/Pack
90	1827-090	100
11	1827-110	100
125	1827-125	100
150	1827-150	100
Size (inches)	**Catalog Number**	**Quantity/Pack**
2" x 12"	1827-808	100
8" x 10"	1827-866	100
12" x 15"	1827-889	100

Ordering Information - Binder-Free Glass Microfiber Filters

	Catalog Number					
Diameter (mm)	Grade GF/A	Grade GF/B	Grade GF/C	Grade GF/D	Grade GF/F	Quantity/Pack
21	1820-021	1821-021	1822-021	1823-021	1825-021	100
24	1820-024	1821-024	1822-024	1823-024	1825-024	100
25	1820-025	1821-025	1822-025	1823-025	1825-025	100
37	1820-037	1821-037	1822-037	-	1825-037	100
42.5	1820-042	1821-042	1822-042	1823-042	1825-042	100
47	1820-047	1821-047	1822-047	1823-047	1825-047	100
55	1820-055	1821-055	1822-055	1823-055	1825-055	100
60	1820-060	-	-	-	-	100
70	1820-070	1821-070	1822-070	1823-070	1825-070	100
90	1820-090	1821-090*	1822-090	1823-090*	1825-090*	100
110	1820-110	1821-110*	1822-110	1823-110*	1825-110*	100
125	1820-125	1821-125*	1822-125	1823-125*	1825-125*	100
150	1820-150	1821-150*	1822-150	1823-150*	1825-150*	100
257	-	-	-	1823-257	1825-257	25
FilterCup 70**	1600-820	-	1600-822	-	1600-825	25
Disposable Filter Funnel 25 mm	1922-1820	-	1922-1822	-	-	50
Filter Sheets						
460 x 570	-	1821-914	1822-914	-	-	5
460 x 570	1820-915*	1821-915*	1822-915*	1823-915*	-	25

* 25 per box
** FilterCup Stem with Stopper - one time purchase - Catalog Number 1600-900

Ordering Information - Glass Microfiber Filter Circles with Binder

	Catalog Number					
Diameter (mm)	Grade GF 6	Grade GF 8	Grade GF 9	Grade GF 10	Grade GF 92	Quantity/Pack
25	10 370 018	-	-	-	-	200
42	-	-	-	-	10 421 019	200
44	-	-	-	-	10 421 022	200
47	10 370 019	10 370 119	-	10 370 319	10 421 026	200
50	10 370 002	-	10 370 202	10 370 302	10 421 030	200
55	10 370 003	-	-	-	-	100
70	10 370 004	-	-	-	-	100
90	10 370 005	10 370 105	10 370 205	10 370 305	-	100
100	10 370 020	-	-	10 370 320	10 421 043	100
110	10 370 006	-	10 370 206	-	10 421 048	100
125	10 370 007	-	-	-	-	100
130	-	-	-	-	10 421 055	100
135	-	-	-	-	10 421 057	100
142	-	-	-	-	10 421 060	100
150	10 370 008	-	10 370 208	10 370 308	-	100
185	10 370 010	-	-	-	-	100
200	10 370 011	-	-	-	-	100
240	10 370 012	-	-	-	-	100

Ordering Information - Glass Microfiber Filter Sheets with Binder

		Catalog Number		
Dimensions (mm)	Grade GF 6	Grade GF 8	Grade GF 3362	Quantity/Pack
60 x 90	-	10 370 172	-	100
610 x 620	10 370 050	-	10 372 150	100

Multigrade GMF150

The Whatman GMF150 is a unique multilayer glass microfiber filter with a coarse top layer (10 µm) and meshed with a finer layer of 1 µm or 2 µm. Manufactured from 100% borosilicate glass microfiber, the filter is binder free. It is the ideal prefilter for higher particulate loading capacity with faster flow rates.

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The GMF150 allows for:

- Higher particulate loading capacity
- Faster flow rate
- Extended life of filter

Multiple Porosities, Greater Filtration Efficiency

The GMF150 represents a new dimension in separation science leading to faster and more cost-effective filtration. In application, the GMF150* 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.

* See page 65 for ordering information

Glass Microfiber 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. Whatman 3-Piece Filter Funnels have been designed to complement the range of Whatman 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 design.

A Choice of Three Plates

For quick and easy filtration, Whatman 3-Piece Filter Funnels are available with a choice of three 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 extra. Recommended for most acids (except concentrated nitric acid and fuming sulfuric acid) at room temperatures. Suitable also for most alcohols, glycols, ethers and ketones. Maximum working temperature 100° C.

- PTFE Plate - Optional extra. For virtually all common acids, alkalis and solvents at temperatures up to 100° C. Maximum working temperature 200° C.

Ordering Information - 3-Piece Filter Funnels

Dimensions (cm)	Catalog Number	Reservoir (mL)	Effective Filtration Diameter (cm)	Effective Filtration Area (cm^2)	Filter Support Plate Diameter (cm)	Filter Funnel Height (cm)
2.5	1950-002	16	1.6	2	3	13.6
4.7	1950-004	36	3.2	8	4.7	12.1
7	1950-007	115	5	19.6	7	15.9
7*	1950-017	210	5	19.6	7	20.8
9	1950-009	200	7	38.5	9	17.9
12.5	1950-012	530	9.2	66.5	12.5	22

* Large reservoir

Ordering Information - Filter Funnels contd.

Type	Catalog Number			
	Optional Plates		Replacement Parts	
Dimensions (cm)	PTFE Plate	Polypropylene Plate	Reservoirs	
4.7	1950-114	1950-104	-	
7	1950-117	1950-107	1950-207*	1950-217*
9	1950-119	1950-109		1950-209

* Large reservoir

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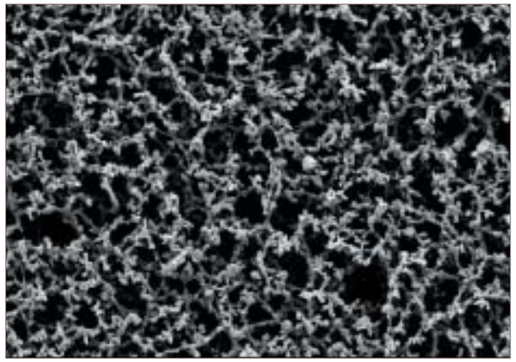
Cellulose Membranes

Whatman offers the following cellulose membranes: (a) Pure cellulose acetate. (b) Pure cellulose nitrate. (c) Mixed esters of cellulose nitrate and cellulose acetate.

Cellulose Acetate Membranes

Whatman cellulose acetate membranes are made from pure cellulose acetate making them ideal for biological and clinical analysis, sterility tests and scintillation measurements.

Cellulose acetate membrane filters exhibit very low protein binding capacity. They are hydrophilic making them 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 180º 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)

Typical Properties - Cellulose Acetate Membranes

Type	Thickness (µm)	Water Flow Rate Δp = 0.9 bar (mL/min/cm^2)	Air Flow Rate Δp = 3 mbar (mL/min/cm^2)	Bubble Point (bar)
OE 66	115	20	-	3.7
OE 67	115	40	25	2.7
ST 68	140	170	50	1.5
ST 69	140	300	90	0.9

Ordering Information - Cellulose Acetate Membranes

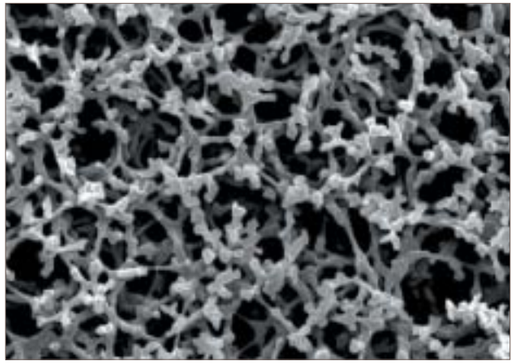
Diameter (mm)	Pore Size (µm)	Catalog Number	Sterile	Quantity/Pack
WCA				
25	0.2	7001-0004	No	100
25	0.45	7000-0002	No	100
47	0.45	7000-0004	No	100
OE 66				
25	0.2	10 404 106	No	100

contd >

Diameter (mm)	Pore Size (µm)	Catalog Number	Sterile	Quantity/Pack
47	0.2	10 404 112	No	100
47	0.2	10 404 170	Yes	100
50	0.2	10 404 114	No	100
110	0.2	10 404 126	No	50
142	0.2	10 404 131	No	25
293	0.2	10 404 139	No	25
300 x 600	0.2	10 404 180	No	5
OE 67				
13	0.45	10 404 001	No	100
25	0.45	10 404 006	No	100
47	0.45	10 404 012	No	100
50	0.45	10 404 014	No	100
85	0.45	10 404 044	No	50
100	0.45	10 404 021	No	50
110	0.45	10 404 026	No	50
142	0.45	10 404 031	No	25
OE 67/A				
142	0.45	10 404 331	No	25
ST 68				
47	0.8	10 403 112	No	100
50	0.8	10 403 114	No	100
ST 69				
47	1.2	10 403 012	No	100
50	1.2	10 403 014	No	100

Cellulose Nitrate Membranes

Recommended for the majority of routine applications, this grade is manufactured under strictly controlled clean room conditions. Usually, it can directly replace the general purpose membrane filters of other manufacturers without requiring any significant change of technique. The user will benefit from the performance improvements which are now available in Whatman membrane filters.



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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. Whatman cellulose nitrate membrane filters have a noticeably improved flexibility and are made to tolerate abuse during 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 or adsorption techniques. In particular, pharmaceutical, immunological, biomedical tissue culture and trace analysis applications can be adversely affected by high extractable levels. Whatman 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 Whatman membrane filters is the narrow distribution of pore sizes. The rated pore size of these membranes is closely controlled due to the 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

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. Whatman membranes exhibit a low shrinkage during autoclaving.

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 Nitrate 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 5.0 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.

Cellulose Nitrate Membranes for Nucleic Acid and Protein Analysis

In 1975 E. M. Southern developed the technique for transferring DNA from agarose gels onto a nitrocellulose membrane. The technique was named Southern Blotting after its inventor. Subsequently, techniques for protein transfer and RNA transfer were also developed. In association with the blotting technique, substantial quantities of good quality chromatography paper are required and 3MM Chr has become the leading choice throughout the world.

Typical Data - Cellulose Nitrate Membranes

	Cellulose Nitrate
Thickness	125 µm
Burst Strength	>2 psi
Weight	3.6–5.5 mg/cm^2
Maximum Service Temperature	80º C
Porosity	66–84%
Steam Autoclavable	Yes
Hydrophilic	Yes

Typical Applications - Cellulose Nitrate Membranes

Field of Application	Pore Size (µm)
General	
Microfiltration	0.1
Ultracleaning	0.1
Sterilizing	0.2
Bulk Bacterial Removal	0.45
Analytical Precipitates	0.65
Clarifying Filtration	1
Particle Removal	5
Water Microbiology and Analysis	
Bacterial Colony Count	0.45 (grid)
Sediment Analysis	0.45
Suspended Particles	5
Air Pollution Monitoring	
Asbestos Monitoring (NIOSH)	0.8
Food and Beverage QC	
E. coli and Coliforms	0.45 (grid)
Total Bacteria Count	0.2
Tissue Culture	
Mycoplasma Removal	0.1
Sterile Filtration	0.2

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Ordering Information - Cellulose Nitrate Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Type[1]	Sterile[2]	Protein Binding	Quantity/Pack
WCN						
13	0.2	7182-001	Plain	No	High	100
13	0.45	7184-001	Plain	No	High	100
25	0.2	7182-002	Plain	No	High	100
25	0.1	7181-002	Plain	No	High	100
25	0.45	7184-002	Plain	No	High	100
25	0.65	7186-002	Plain	No	High	100
25	0.8	7188-002	Plain	No	High	100
25	1.0	7190-002	Plain	No	High	100
25	3.0	7193-002	Plain	No	High	100
25	5.0	7195-002	Plain	No	High	100
37	0.45	7184-003	Plain	No	High	100
37	0.8	7188-003	Plain	No	High	100
47	0.1	7181-004	Plain	No	High	100
47	0.2	7182-004	Plain	No	High	100
47	0.45	7141-004	Gridded	No	High	100
47	0.45	7141-104	Gridded	Yes	High	100
47	0.45	7141-114*	Gridded	Yes	High	100
47	0.45	7141-204**	Gridded	Yes	Medium	100
47	0.45	7141-124	Gridded	Yes	Medium	200
47	0.45	7141-154***	Gridded	Yes	High	1000
47	0.45	7184-004	Plain	No	High	100
47	0.65	7186-004	Plain	No	High	100
47	0.8	7188-004	Plain	No	High	100
47	1.0	7190-004	Plain	No	High	100
47	3.0	7193-004	Plain	No	High	100
47	5.0	7195-004	Plain	No	High	100
82	0.45	7184-008	Plain	No	High	25
90	0.2	7182-009	Plain	No	High	25
90	0.45	7184-009	Plain	No	High	25
90	0.8	7188-009	Plain	No	High	25
90	1.0	7190-009	Plain	No	High	25
90	5.0	7195-009	Plain	No	High	25
142	0.2	7182-014	Plain	No	High	25
142	0.45	7184-014	Plain	No	High	25
293	0.45	7184-029	Plain	No	High	25
AE 98						
25	5.0	10 400 206	Plain	No	High	100
47	5.0	10 400 212	Plain	No	High	100
50	5.0	10 400 214	Plain	No	High	100

contd >

Diameter (mm)	Pore Size (µm)	Catalog Number	Type[1]	Sterile[2]	Protein Binding	Quantity/Pack
AE 99						
25	8.0	10 400 106	Plain	No	High	100
37	8.0	10 400 109	Plain	No	High	100
47	8.0	10 400 112	Plain	No	High	100
50	8.0	10 400 114	Plain	No	High	100
50	8.0	10 405 079	Plain †	No	High	100
150	8.0	10 400 132	Plain	No	High	25
AE 100						
47	12.0	10 400 012	Plain	No	High	100
50	12.0	10 400 014	Plain	No	High	100
NC 10						
47	0.1	10 402 012	Plain	No	High	100
50	0.1	10 402 014	Plain	No	High	100
NC 20						
25	0.2	10 401 306	Plain	No	High	100
47	0.2	10 401 312	Plain	No	High	100
50	0.2	10 401 314	Plain	No	High	100
142	0.2	10 401 331	Plain	No	High	25
NC 45						
24	0.45	10 401 104	Plain	No	High	100
25	0.45	10 401 106	Plain	No	High	100
47	0.45	10 401 112	Plain	No	High	100
47	0.45	10 401 170	Plain	Yes	High	100
50	0.45	10 401 114	Plain	No	High	100
90	0.45	10 401 118	Plain	No	High	50
100	0.45	10 401 121	Plain	No	High	50
110	0.45	10 401 126	Plain	No	High	50
142	0.45	10 401 131	Plain	No	High	25

[1]The ink used in the gridded filters is non-toxic and is free of bacterial growth inhibitors. Each line is spaced at 3.1 mm intervals
[2]Sterile membranes are packed individually with an absorbent pad. Sterilized using ethylene oxide gas
* Packed without pad
** Autoclave pack contains 10 sealed envelopes. Each envelope contains 10 filters with 10 pads
*** 1000/box without absorbent pad
† With hydrophobic rim

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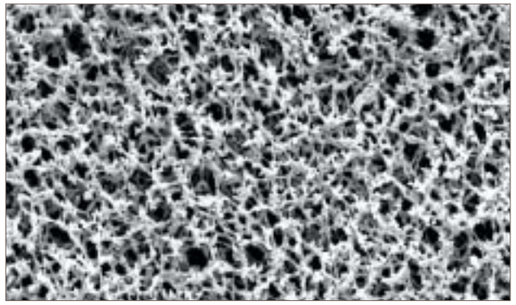
Membra-Fil® Mixed Ester Membranes

Whatman mixed cellulose ester membranes are composed of cellulose acetate (~20%) and cellulose nitrate (~80%). These membranes are characterized by a smoother and more uniform surface than pure nitrocellulose filters. Also, the color contrast provided by the filter surface facilitates particle detection and minimizes eye fatigue.



Eased Counting Process

In microbiological colony counting procedures, the color contrast between the surface and the colonies facilitates the counting process.

Plain or Gridded

Many microbiological techniques include colony counting after incubation as the standard method of quantification. Whatman gridded filters have clearly defined grid lines spaced at 3.1 mm intervals. The special ink used is non-toxic and completely free from bacterial growth inhibitors.

Whatman black mixed cellulose esters are available plain for automatic colony counting applications, as well as gridded to assist in manual counting procedures. Black membranes provide contrast between residue or cell colors and the filter without having to counter-stain the membrane.

Sterile Filters

For those laboratories preferring to use membranes sterilized by autoclaving for microbiological work, Whatman provides black gridded membranes in packs with pads ready for laboratory autoclaving.

Features and Benefits

- Sterile options available for critical applications
- Excellent contrast for easier particle detection
- Grids are non-toxic and do not inhibit bacterial growth, ensuring sample integrity
- Autoclavable for repeated use
- Black plain and black gridded membranes have 80:20 ratio of cellulose nitrate to cellulose acetate
- The membrane offers a high degree of internal surface area for greater adsorption of product
- Higher dirt loading capacity
- Low protein binding characteristics
- Biologically inert with good thermal stability
- No surfactants to contaminate samples
- Uniform microporous structure of membrane gives high flow rates
- Thermally stable

Filter Papers and Membranes

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:

- Clarification or sterilization of aqueous solutions
- Cytology
- Air monitoring
- HPLC samples (aqueous)
- Virus concentration
- Particulate analysis
- Biological assays
- Food microbiology including enumeration of *E. coli* in foods
- Bacteriological studies
- Particle counting from liquids and aerosols
- Yeasts and molds

Ordering Information - Membra-Fil Mixed Cellulose Ester Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Quantity/Pack
13	0.45	140418	100
13	5	140413	100
25	0.22	140628	100
25	0.45	140618	100
25	1.2	140627	100
25	5	140613	100
47	0.22	141128	100
47	0.45	141118	100
47	0.65	141119	100
47	0.8	141109	100
47	1.2	141127	100
47	3	141112	100
47	5	141113	100
90	0.45	141718	100
142	0.22	142128	25
142	0.45	142118	25
142	0.8	142109	25

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Typical Data - Mixed Cellulose Ester Membranes

Burst Strength	>10 psi
Weight	4.3–5.0 mg/cm²
Maximum Service Temperature	130° C
Porosity	74–77%
Steam Autoclavable	Yes
Solvent Resistancy	Medium
Protein Binding[1]	Medium

[1] WME white gridded type: high protein binding

Product Selection - Mixed Cellulose Ester Membranes

Type	Thickness (µm)	Water Flow Rate Δp = 0.9 bar (mL/min/cm²)	Air Flow Rate Δp = 3 mbar (mL/min/cm²)	Bubble Point (bar)
WME	140	-	-	-
ME 24	135	25	-	3.7
ME 25	135	45	25	2.5
ME 26	135	110	45	1.5
ME 27	140	170	80	1.3
ME 28	140	240	100	0.8
ME 29	150	400	140	0.7

Ordering Information - Mixed Cellulose Ester Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Type	Sterile	Quantity/Pack
WME					
47	0.45	7153-004	Black Gridded	No	100
47	0.45	7153-104	Black Gridded	Yes	100
47	0.2	7187-114	White Gridded	Yes	100
ME 24					
25	0.2	10 401 706	Plain	No	100
47	0.2	10 401 712	Plain	No	100
47	0.2	10 401 770	Plain	Yes	100
50	0.2	10 401 714	Plain	No	100
50	0.2	10 401 772	Plain	Yes	100
110	0.2	10 401 726	Plain	No	50
142	0.2	10 401 731	Plain	No	25

contd >

Diameter (mm)	Pore Size (µm)	Catalog Number	Type	Sterile	Quantity/Pack
ME 25					
25	0.45	10 401 606	Plain	No	100
47	0.45	10 401 612	Plain	No	100
47	0.45	10 401 670	Plain	Yes	100
50	0.45	10 401 614	Plain	No	100
50*	0.45	10 401 662	Plain	No	100
50	0.45	10 401 672	Plain	Yes	100
90	0.45	10 401 618	Plain	No	50
100	0.45	10 401 621	Plain	No	50
110	0.45	10 401 626	Plain	No	50
142	0.45	10 401 631	Plain	No	25
ME 26					
47	0.6	10 401 512	Plain	No	100
50	0.6	10 401 514	Plain	No	100
ME 27					
25	0.8	10 400 906	Plain	No	100
37	0.8	10 400 909	Plain	No	100
47	0.8	10 400 912	Plain	No	100
47	0.8	10 400 970	Plain	Yes	100
50	0.8	10 400 914	Plain	No	100
100	0.8	10 400 921	Plain	No	50
ME 28					
25	1.2	10 400 806	Plain	No	100
47	1.2	10 400 812	Plain	No	100
50	1.2	10 400 814	Plain	No	100
ME 29					
25	3.0	10 400 706	Plain	No	100
47	3.0	10 400 712	Plain	No	100
50	3.0	10 400 714	Plain	No	100
50	3.0	10 400 772	Plain	Yes	100

* Without interleaving papers

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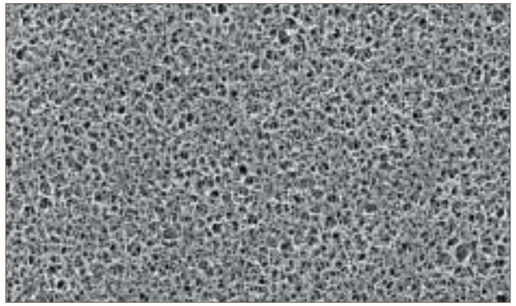
Regenerated Cellulose Membranes

Whatman regenerated cellulose membranes are made of pure cellulose, without any wetting agents.

Features and Benefits

- Spontaneously wetting, very good wet strength
- Extremely chemically resistant; suitable for aqueous and organic media
- Hydrophilic
- Mechanically stable
- Can be used up to 180° C
- Sterilizable by all methods
- Pore sizes between 0.2 µm and 1 µm
- Suitable for use as sterile filter to ASTM D 3862-80



Regenerated Cellulose Membrane (Type RE 55, 0.45 µm) Electron Micrograph (Magnification 1000x)

Typical Data - Regenerated Cellulose Membranes

	Thickness (µm)	Water Flow Rate Δp = 0.9 bar (mL/min/cm²)	Air Flow Rate Δp = 3 mbar (mL/min/cm²)	Bubble Point (bar)
RC 58	75	20	-	3.7
RC 55	75	35	-	3.5
RC 60	75	240	75	0.8

Ordering Information - Regenerated Cellulose Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Sterile	Quantity/Pack
RC 58				
47	0.2	10 410 312	No	100
50	0.2	10 410 314	No	100
100	0.2	10 410 319	No	25
RC 55				
25	0.45	10 410 206	No	100
47	0.45	10 410 212	No	100
50	0.45	10 410 214	No	100
100	0.45	10 410 219	No	25
110	0.45	10 410 224	No	25
142	0.45	10 410 229	No	25
RC 60				
47	1.0	10 410 012	No	100
50	1.0	10 410 014	No	100

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 121º C.

Applications

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

Typical Data - Nylon Membranes

	0.2 µm	0.45 µm	0.8 µm
Thickness	150–187 µm	150–187 µm	137–200 µm
Fiber Releasing	No	No	No
Bubble Point	40–49 psi	34–42 psi	>13 psi
Water Flow Rate @ 5 psi	>50 mL/min	>60 mL/min	>180 mL/min
Maximum Temperature	135° C	135° C	135° C

Ordering Information - Nylon Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/ Pack
13	0.2	7402-001	Yes	High	Good	100
13	0.45	7404-001	Yes	High	Good	100
25	0.2	7402-002	Yes	High	Good	100
25	0.45	7404-002	Yes	High	Good	100
47	0.2	7402-004	Yes	High	Good	100
47	0.45	7404-004	Yes	High	Good	100
47	0.8	7408-004	Yes	High	Good	100
90	0.2	7402-009	Yes	High	Good	50
90	0.45	7404-009	Yes	High	Good	50

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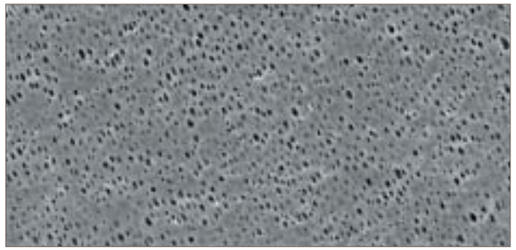
Polyamide Membranes

Whatman polyamide membranes are made from pure polyamide making them the universal filter for clarification and sterile filtration.

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



Polyamide Membrane (Type NL 17, 0.45 µm)
Electronic Micrograph (Magnification 1000x)

Typical Properties - Polyamide Membranes

Type	Nominal Pore Size (µm)	Thickness (µm)	Water Flow Rate Δp = 0.9 bar (mL/min/cm²)	Bubble Point (bar)
NL 16	0.2	110	10	4.2
NL 17	0.45	110	20	2.8

Ordering Information - Polyamide Membranes

Pore Size (µm)	Diameter (mm)	Membrane Type	Catalog Number	Quantity/Pack
0.2 µm	25	NL 16	10 404 106	100
	47	NL 16	10 404 112	100
	50	NL 16	10 404 170	100
0.45 µm	25	NL 17	10 404 001	100
	47	NL 17	10 404 006	100
	50	NL 17	10 404 012	100
	142	NL 17	10 404 014	25

PM 2.5 Air Monitoring Membrane

A new, high-purity, thin PTFE membrane in a sequentially numbered chemically resistant polypropylene support ring has been developed for PM 2.5 Ambient Air Monitoring. Whatman PM 2.5 membranes have low tare mass for accurate gravimetric determinations. The unique thermally stable design eliminates curling, keeps the membrane flat and makes the filter robot-friendly.

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 46.2 mm diameter products.

Statement of Conformance

PTFE Filters for EPA PM 2.5 Reference Method.

Under the requirements of 40 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) 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:

- 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 PM2.5 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 Air)
- Maximum Moisture Pick-up
- Collection Efficiency
- Alkalinity
- Special Requirements

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

Whatman hereby states that every manufacturing lot that is offered for sale, and is identified for use with the PM 2.5 reference method, conforms to EPA acceptance criteria.

Technical Specifications - PTFE Filters for Use in US EPA PM 2.5 Ambient Air Monitoring

Property	Test Method	Unit of Measure	Value	Range
PTFE Filter Media	n/a	n/a	PTFE	-
Filter Thickness	µm	µm	40	±10
Filter Diameter	mm	template	46.2	2.5
Filter Pore Size	ASTM F 316-94	µm	2	maximum
Support Ring Media	n/a	n/a	Polypropylene	-
Total Support Ring Thickness	mm	mm	0.38	±0.04
Support Ring width	mm	template	3.68	+0.00 – 0.51
Particle Retention (0.3 µm)	ASTM D 2986-91	%	99.7	minimum
Pressure Drop (0.3 µm) @ 16.67 L/min	ASTM D 2986-91	cm H_2O	30	maximum
Alkalinity	Section 2.12 EPA/600/R-94/038b	µeq/g of filter	<25	maximum
Temperature Wt. Loss Stability	as above	µg	<20	average
Drop Test Wt. Loss Stability	as above	µg	<20	average
Moisture Wt. Gain Stability	as above	µg	<10	average

Maximum Trace Element Concentration by X-Ray Fluorescence

Ion	ng/cm²	Ion	ng/cm²	Ion	ng/cm²	Ion	ng/cm²	Ion	ng/cm²	Ion	ng/cm²
Al	94.4	Sc	7.2	Ni	3	Br	2	Pd	9.6	Cs	25
Si	32.8	Ti	13.8	Cu	2.8	Rb	2	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	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	Se	1.6	Rh	9.4	I	18.6	Pb	4.8

Ordering Information - PM 2.5 Air Monitoring Membranes

Diameter (mm)	Product Description	Catalog Number	Quantity/Pack
46.2	PTFE Membrane with Polypropylene Support Ring, Sequentially Numbered	7592-104	50

Polyethersulfone (PES) Membranes

Whatman polyethersulfone (PES) membranes are hydrophilic, low protein binding and stable in alkaline pH. Available in a 0.8 µm pore size, the PES membrane is recommended for aqueous applications and for biological samples. Whatman PES membranes have a smooth surface that allows for easy enumeration of artifacts.

Ordering Information - PES Membranes

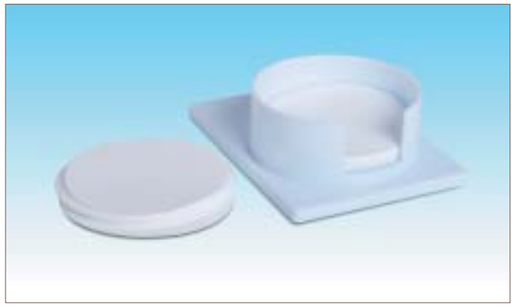
Diameter (mm)	Pore Size (µm)	Catalog Number	Quantity/Pack
47	0.8	111164	100

Polypropylene Membranes

Whatman polypropylene membrane filters are ideal for numerous applications in chromatography and biotechnology laboratories. They come in a range of diameters and pore sizes from 0.2 µm to 1.0 µm.

Easy Handling

Whatman polypropylene membrane filters are flexible, durable and virtually indestructible. The exceptionally uniform strength of the device means that the membrane will not crack, tear, break or distort when picked up by hand or forceps.



Versatility

These devices are temperature tolerant, which means they are not affected by autoclaving. This temperature resistance gives users autoclaved membranes with flow rates and throughput at least 80% higher than those of autoclaved cellulosic membranes.

Purity

There is no need for pre-wetting or wetting with cytotoxic wetting agents that could be extracted. This makes the membranes ideal as a support for cell growth, filtration of media and sterilization of tissue culture media, pharmaceuticals and other solutions used for biological work. The membranes are also compatible with organic solvents, making them highly suitable for HPLC mobile phase filtering and degassing, especially acetonitrile.

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Ordering Information - Polypropylene (Type WPP) Membranes

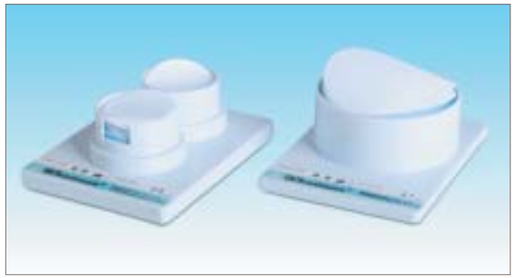
Diameter (mm)	Pore Size (µm)	Catalog Number	Quantity/Pack
25	0.45	7002-0425	100
47	0.45	7002-0447	100
90	0.2	7002-0290	50

Teflon® (PTFE) Membranes

Whatman 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. The hydrophobic nature of the membrane also has applications for air and gas sterilization. The membrane is laminated onto a non-woven polypropylene support web for improved strength and handling and can be used at temperatures up to 150º 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 (Type WTP) membrane is the clarification of corrosives, solvents and aggressive fluids. This includes the important requirement in HPLC analysis for sample filtration where any solid particles can cause permanent damage to the column. The 0.5 µm pore size is normally used. Air and gas sterilization make use of the hydrophobic characteristics of PTFE membranes and their ability to stop aqueous aerosols. Usual pore sizes are 0.2 µm and 0.5 µm. Sterile venting of vacuum manifolds, fermentation vessels and sterile filtrate tanks and containers utilize PTFE 0.2 µm membranes.

Typical Data - Teflon (PTFE) Membranes

	0.2 µm	0.5 µm	1.0 µm
Thickness	130 µm	120 µm	90 µm
Porosity	72%	74%	76%
Fiber Releasing	No	No	No
Air Flow Rate @ 10 psi Vacuum	4.5 L/min/cm²	7.5 L/min/cm²	17 L/min/cm²
Bubble Point	13 psi	6 psi	3 psi
Maximum Temperature	150º C	150º C	150º C

Product Selection - Teflon (PTFE) Membranes

	Thickness (µm)	Water Flow Rate Δp 0.9 bar (mL/min/cm²)	Air Flow Rate Δp 3 m bar (mL/min/cm²)	Bubble Point (bar)
TE 35	190	20*	15	1.4
TE 36	190	40*	30	0.9
TE 37	100	90*	80	0.25
TE 38	180	220**	265	0.2

* Measured with ethanol

** Pre-wetted with isopropanol

Ordering Information - Teflon (PTFE) Membranes

Type* Diameter (mm)	Pore Size (µm)	Catalog Number	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/Pack
WTP						
25	0.2	7582-002	No	Low	Very Good	100
47	0.2	7582-004	No	Low	Very Good	100
47	0.5	7585-004	No	Low	Very Good	100
47	1.0	7590-004	No	Low	Very Good	100
TE 35						
25	0.2	10 411 405	No	Low	Very Good	50
47	0.2	10 411 411	No	Low	Very Good	50
50	0.2	10 411 413	No	Low	Very Good	50
TE 36						
25	0.45	10 411 305	No	Low	Very Good	50
47	0.45	10 411 311	No	Low	Very Good	50
50	0.45	10 411 313	No	Low	Very Good	50
TE 37						
25	1.0	10 411 205	No	Low	Very Good	50
47	1.0	10 411 211	No	Low	Very Good	50
50	1.0	10 411 213	No	Low	Very Good	50
TE 38						
37	5.0	10 411 108	No	Low	Very Good	50
47	5.0	10 411 111	No	Low	Very Good	50
50	5.0	10 411 113	No	Low	Very Good	50
90	5.0	10 411 116	No	Low	Very Good	25
150	5.0	10 411 130	No	Low	Very Good	25

* WTP = Teflon membrane with polypropylene support

TE = Teflon membrane with polyester support

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Track-Etched Polycarbonate and Polyester Membranes

Whatman offers a complete range of track-etched membranes manufactured using proprietary Whatman technology to produce a precision membrane filter with a closely controlled pore size distribution. These membranes include Cyclopore polycarbonate and polyester, Nuclepore polycarbonate, chemotaxis membranes, black polycarbonate and polycarbonate membranes for cell culture.

Cyclopore® Polycarbonate and Polyester Membranes

Whatman Cyclopore membranes are true pore size microporous membranes featuring sharp cut-off and reproducible microfiltration performance characteristics of track-etched membranes. The smooth flat membrane ensures particles are retained on the surface so that they are easily visible under a microscope.

Cyclopore membranes are manufactured using proprietary Whatman technology to produce a precision membrane filter with a closely controlled pore size distribution.

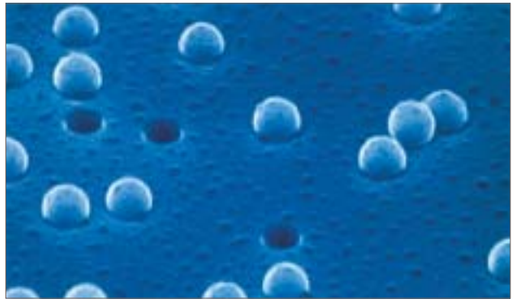
Membranes are produced from a pure polymeric film and give exceptional chemical cleanliness. They are free of contaminants, have low tare weight, minimum water adsorption and very low levels of non-specific protein binding.

The polycarbonate membranes are hydrophilic and are available in a choice of diameters and pore sizes. The polyester membranes are resistant to most organic solvents, amides and halogenated hydrocarbons. This broad chemical compatibility makes them suitable for the detection of particles in many corrosive fluids.

Cyclopore Track-Etched Membranes

Features and Benefits

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



Electron Micrograph of Cyclopore Membrane

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**
  RBC deformability, leukocyte removal, RBC filtration and plasmaphoresis, chemotaxis, cytology and cell culture
- **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 new 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. (Ref: Hewes et al. 1998; Graham and Mitchell 1999; Graham 1999.)
- **Medical devices and in vitro diagnostics**
  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. Transdermal drug delivery - as an inert matrix for retention of therapeutics.

Typical Data - Cyclopore Track-Etched Membranes

	Polycarbonate	Polyester
Thickness	7–20 µm	9–23 µm
Burst Strength	>10 psi	>10 psi
Weight	0.7–2.0 mg/cm^2	0.9–2.3 mg/cm^2
Maximum Service Temperature	140º C	150º C
Porosity (Void Vol.)	4–20%	4–20%
Ash Weight	0.6 µg/cm^2	2.3 µg/cm^2
Pore Density	10^5 - 6 x 10^8 pores/cm^2	10^5 - 6 x 10^8 pores/cm^2
Opacity	Translucent or transparent	N/A
Autoclavable	30 minutes at 121º C	30 minutes at 121º C
Specific Gravity	1.21 g/cm^2	1.39 g/cm^2

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	Polycarbonate	Polyester
Flammability	Slow burn	Slow burn
Fiber Releasing	No	No
Leachables	Negligible	Negligible
Biological Compatibility	Inert	Inert

Typical Properties - Cyclopore Track-Etched Membranes

Pore Size (µm)	Nominal Thickness (µm)	Rated Pore Density (pores/cm^2)	Mean Porosity (%)	Bubble Point in Water (bar)*	Burst Strength (bar)*
Polycarbonate Microporous					
0.1	20	6 x 10^2	4	>6.9	>1.4
0.2	20	5 x 10^8	13	4	>1
0.4	20	1.5 x 10^8	15	2.2	>1
1.0	19	2.2 x 10^7	14	0.95	>3.4
5.0	15	4 x 10^5	6	>0.15	>3.4
8.0	12	10^5	4	>0.15	>3.4
12.0	8	10^5	5	<0.07	>3.4
Polyester Microporous					
1.0	22	2.2 x 10^7	14	0.95	>3.4

* 1 bar = 14.7 psi

Ordering Information - Cyclopore Track-Etched Membranes

Diameter (mm)	Pore Size (µm)	Membrane	Catalog Number	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/ Pack
Standard Cyclopore							
25	0.1	Polycarbonate	7060-2501	Yes	Low	Medium	100
25	0.2	Polyester	7061-2502	Yes	Low	Medium	100
25	0.4	Polyester	7061-2504	Yes	Low	Medium	100
25	1.0	Polyester	7061-2510	Yes	Low	Medium	100
25	5.0	Polycarbonate	7060-2513	Yes	Low	Medium	100
47	0.2	Polycarbonate	7060-4702	Yes	Low	Medium	100
47	0.4	Polycarbonate	7060-4704	Yes	Low	Medium	100
47	1.0	Polycarbonate	7060-4710	Yes	Low	Medium	100
47	5.0	Polycarbonate	7060-4713	Yes	Low	Medium	100
47	12.0	Polycarbonate	7060-4716	Yes	Low	Medium	100

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Diameter (mm)	Pore Size (µm)	Membrane	Catalog Number	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/ Pack
25	0.4	Polycarbonate	7060-2504	Yes	Low	Medium	100
25	0.6	Polycarbonate	7060-2506	Yes	Low	Medium	100
25	0.8	Polycarbonate	7060-2508	Yes	Low	Medium	100
25	1.0	Polycarbonate	7060-2510	Yes	Low	Medium	100
25	2.0	Polycarbonate	7060-2511	Yes	Low	Medium	100
25	8.0	Polycarbonate	7060-2514	Yes	Low	Medium	100
47	0.2	Polyester	7061-4702	Yes	Low	Medium	100
47*	1.0	Polycarbonate	7091-4710	Yes	Low	Medium	100

* Special Clear Cyclopore

Nuclepore® Track-Etched Membranes

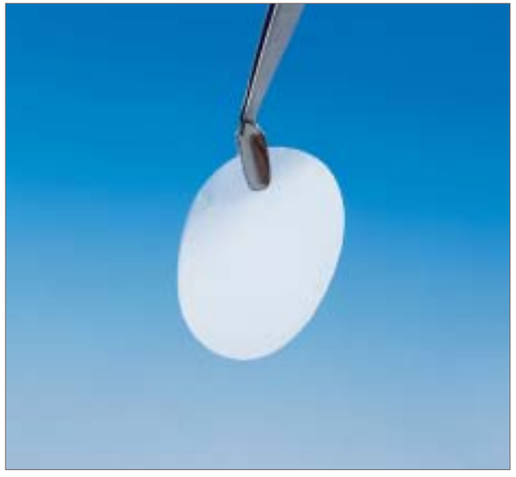
Nuclepore track-etched polycarbonate membranes are manufactured from high quality polycarbonate film and have sharply defined pore sizes, high flow rates and excellent chemical and thermal resistance. The membranes have a smooth flat surface and exhibit very low levels of extractables.

Features and Benefits

- Low protein binding and low extractables ensuring no 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
- EPA testing
- Fuel testing
- Bioassays
- Parasitology
- Air analysis
- Water microbiology



Typical Data - Nuclepore Track-Etched Membranes

	Polycarbonate
Thickness	6-11 µm
Burst Strength	>10 psi
Weight (Tare)	0.6-1 mg/cm^2
Specific Gravity Bulk Material	1.20 g/cm^3
Heat Sealing Range	230º C-275º C
Maximum Service Temperature	140º C
Flammability	Slow burn
Ash Weight	0.92 µg/cm^2
Porosity	<15%
Rated Pore Size	0.05-12.0 µm
Rated Pore Density	1 x 10^5- 6 x 10^8 pores/cm^2
Surface Texture	Flat and smooth
Optical	Translucent
Refractive Index	1.584-1.625 (birefringent)
Hydrophobic	No
Fiber Releasing	No
Autoclavable	121º C

Ordering Information - Nuclepore Track-Etched Membranes

Diameter (mm)	Membrane	Pore Size (µm)	Catalog Number	Quantity/Pack
13	Polycarbonate	0.015	110401	100
13	Polycarbonate	0.1	110405	100
13	Polycarbonate	0.2	110406	100
13	Polycarbonate	0.4	110407	100
13	Polycarbonate	0.8	110409	100
13	Polycarbonate	1	110410	100
13	Polycarbonate	3	110412	100
13	Polycarbonate	5	110413	100
13	Polycarbonate	8	110414	100
13	Polycarbonate	10	110415	100
13	Polycarbonate PVP-free	8	150446	100
13	Gold Coated PC	0.8	800195	10
25	Polycarbonate	0.015	110601	100
25	Polycarbonate	0.03	110602	100
25	Polycarbonate	0.05	110603	100
25	Polycarbonate	0.08	110604	100
25	Polycarbonate	0.1	110605	100
25	Polycarbonate	0.2	110606	100
25	Polycarbonate	0.4	110607	100
25	Polycarbonate	0.6	110608	100

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Diameter (mm)	Membrane	Pore Size (µm)	Catalog Number	Quantity/Pack
25	Polycarbonate	0.8	110609	100
25	Polycarbonate	1	110610	100
25	Polycarbonate	2	110611	100
25	Polycarbonate	3	110612	100
25	Polycarbonate	5	110613	100
25	Polycarbonate	8	110614	100
25	Polycarbonate	10	110615	100
25	Polycarbonate	12	110616	100
25	Polycarbonate AOX	0.4	110637	100
25	Gold Coated PC	0.4	170607	50
25	Gold Coated PC	0.8	117197	50
37	Polycarbonate	0.4	110807	100
37	Polycarbonate	0.8	110809	100
47	Polycarbonate	0.015	111101	100
47	Polycarbonate	0.05	111103	100
47	Polycarbonate	0.08	111104	100
47	Polycarbonate	0.1	111105	100
47	Polycarbonate	0.2	111106	100
47	Polycarbonate	0.4	111107	100
47	Polycarbonate	0.6	111108	100
47	Polycarbonate	0.8	111109	100
47	Polycarbonate	1	111110	100
47	Polycarbonate	2	111111	100
47	Polycarbonate	3	111112	100
47	Polycarbonate	5	111113	100
47	Polycarbonate	8	111114	100
47	Polycarbonate	10	111115	100
47	Polycarbonate	12	111116	100
47	Polycarbonate AOX	0.4	111137	100
47	Polycarbonate AERO	0.4	111130	100
50	Polycarbonate	0.2	111206	100
50	Polycarbonate	0.4	111207	100
50	Polycarbonate	5	111213	100
50	Polycarbonate	12	111216	100
76	Polycarbonate	0.1	111505	100
90	Polycarbonate	0.05	111703	25
90	Polycarbonate	0.1	111705	25
90	Polycarbonate	0.2	111706	25
90	Polycarbonate	0.4	111707	25
90	Polycarbonate	1	111710	25
90	Polycarbonate	2	111711	25
142	Polycarbonate	0.08	112104	25
142	Polycarbonate	0.1	112105	25

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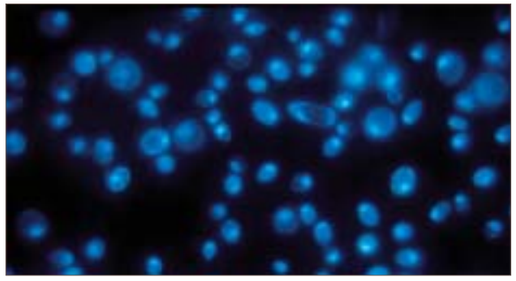
Diameter (mm)	Membrane	Pore Size (µm)	Catalog Number	Quantity/Pack
142	Polycarbonate	0.2	112106	25
142	Polycarbonate	0.4	112107	25
142	Polycarbonate	0.6	112108	25
142	Polycarbonate	1	112110	25
293	Polycarbonate	0.2	112806	25
293	Polycarbonate	0.4	112807	25
293	Polycarbonate	1	112810	25
293	Polycarbonate	2	112811	25
8 x 10	Polycarbonate	0.03	113502	25
19 x 42	Polycarbonate	5	113313	100
25 x 80	Polycarbonate PVP-free	8	155846	100

AOX – suitable for AOX (Adsorbable Organic Halogens) analysis
PVP-free – hydrophobic

Black Cyclopore® Membranes

Black Cyclopore membranes are ideal 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.



Yeast Cells on Black Cyclopore with DAPI Stain

Typical Data - Black Cyclopore Membranes

	Black Polycarbonate
Thickness	7-20 µm
Burst Strength	>10 psi
Weight	0.7-2.0 mg/cm^2
Maximum Service Temperature	140º C
Porosity (Void Vol.)	4-20%
Ash Weight	20.6 µg/cm^2
Pore Density	10^5- 6 x 10^8 pores/cm^2
Opacity	N/A

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Filter Papers and Membranes

	Black Polycarbonate
Autoclavable	30 minutes at 121º C
Specific Gravity	-
Flammability	Slow burn
Fiber Releasing	No
Leachables	Negligible
Biological Compatibility	Inert

Typical Properties - Black Cyclopore Membranes

Pore Size (µm)	Nominal Thickness (µm)	Rated Pore Density (pores/cm²)	Mean Porosity (%)	Bubble Point in Water (bar)*	Burst Strength (bar)*
Polycarbonate Microporous					
0.2	20	5×10^8	13	4	>1
0.4	20	1.5×10^8	15	2.2	>1

* 1 bar = 14.7 psi

Ordering Information - Black Cyclopore Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/Pack
25	0.2	7063-2502	Yes	Low	Medium	100
25	0.4	7063-2504	Yes	Low	Medium	100
47	0.2	7063-4702	Yes	Low	Medium	100
47	0.4	7063-4704	Yes	Low	Medium	100

Black Nuclepore® Membranes

Membranes for Use with Epifluorescence Microscopy

Nuclepore black dyed polycarbonate membranes are high-performance membranes ideally 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 non-viable 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.

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Features and Benefits

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

Applications

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

Ordering Information - Black Nuclepore Polycarbonate Track-Etched Membranes

Diameter (mm)	Catalog Number	Pore Size (µm)	Quantity/Pack
25	110656	0.2	100
25	110657	0.4	100
25	110659	0.8	100
47	111156	0.2	100
47	111157	0.4	100

Hemafil™ Track-Etched Polycarbonate Membranes

Whatman Hemafil polycarbonate track-etched membranes, part of the Whatman family of Nuclepore membranes, are specially selected for measuring erythrocyte deformability to assure a uniform flow rate and pore size. Select membranes for quantitative assessment of erythrocyte (red blood cell) deformability. Healthy erythrocytes have a mean diameter of approximately 7.5 µm but pass through capillaries as small as 3.0 µm (dia) due to their ability to deform.

Ordering Information - Hemafil Track-Etched Polycarbonate Membranes

Diameter (mm)	Catalog Number	Quantity/Pack
13	110424	100

Track-Etched Polycarbonate Membranes

For Cell Culture and Chemotaxis Applications

Whatman offers 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 Membrane

Ordering Info - Track-Etched Polycarbonate Membranes for Cell Culture Applications

Diameter (mm)	Pore Size (µm)	Catalog Number	Surface	Quantity/Pack
13	3	110412	Standard	100
13	5	110413	Standard	100
13	8	110414	Standard	100
13	5	150445	PVP-free	100
13	8	150446	PVP-free	100
25	2	110611	Standard	100
25	3	110612	Standard	100
25	5	110613	Standard	100
25	8	110614	Standard	100
25 x 80	8	155814	Standard	100
25 x 80	5	155845	PVP-free	100
25 x 80	8	155846	PVP-free	100

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Membrane Accessories

Membrane Prefilters

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.

Whatman manufactures glass microfiber filters which are used as prefilters for membranes. The unique properties of borosilicate glass microfibers enable Whatman to manufacture filters with high loading capacity and retention of very fine particulates.

The Whatman 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 up to the same caliper as the Multigrade GMF 150 simply because prefilters of a uniform density do not have the loading capacity of the new multiporosity filter technology advanced by Whatman.

Ordering Information - Glass Microfiber Prefilters

Prefilter Diameter (mm)	Membrane Diameter (mm)	Catalog Number - Grade GF/B (fine)	Catalog Number - Grade GF/D (coarse)	Quantity/Pack
10	13	-	1823-010	100
16	25	-	1823-016	100
25	25	1821-025	1823-025	100
35	47	-	1823-035	100
37	47	1821-037	-	100
42.5	47	1821-042	1823-042	100
47	47	1821-047	1823-047	100
90	90	1821-090	1823-090	25
125	142	1821-125	1823-125	25
142	142	-	1823-142	25
257	293	-	1823-257	25
GMF 150		10 µm/1 µm	10 µm/2 µm	
47	47	1841-047	1842-047	40
90	90	1841-090	1842-090	40

Membrane Filter Accessories

Whatman offers a choice of holders for use with membrane filters.

Vacuum Type Glass Holders

Produced from borosilicate glass and available with a choice of support screen. Suitable for aqueous and organic solvent filtration. The funnel seal ensures that the sample does not bypass the membrane and that particulates are retained on the surface of the membrane.

The sintered glass support is recommended for filtration and biological analysis. The 304 stainless steel support screen is suitable for use with proteinaceous solutions.

Membrane Filter Holders

Hardware/Replacement Parts

Whatman offers both stoppers and glass reservoirs.

Polyester Drain Discs

For use with membrane hardware where extra support is needed for improved flow rate and throughput. The polyester drain disc is binder-free and has a thickness of 100 µm. It provides a flat surface to eliminate filter tearing or rupturing. It is also 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
- Quality control and sterility testing
- Removal of particulates from HPLC solvents
- Tissue culture media filtration

Typical Data - Membrane Holders

Filter Diameter (mm) Membrane	Membrane Holder Filter Systems-Glass	Reservoir Volume (mL)	Filter Surface Area (cm^2)	Prefilter Diameter (mm)
25	FG 25	25	2.1	16
25	FG 25R	50	2.1	13
25	FG 25S	25	2.1	16
47	FG 47	300	9.6	35
47	FG 47S	300	9.6	35
90	FG 90	1000	38.5	70

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Ordering Information - Membrane Accessories

Diameter (mm)	Description	Catalog Number	Quantity/Pack
Membrane Filter Holders			
25	Glass Support; 50 mL-FG 25R; Sintered Glass	1960-032	1
25	Glass Support; 25 mL-FG 25; Sintered Glass	1960-002	1
25	Stainless Steel Support 25 mL FG 25S; 304 Stainless Steel 100 Mesh Screen	1960-052	1
47	Glass Support; 300 mL-FG 47; Sintered Glass	1960-004	1
47	Stainless Steel Support 300 mL FG 47S 304; Stainless Steel 100 Mesh Screen	1960-054	1
90	Glass Support; 1000 mL-FG 90; Sintered Glass	1960-009	1
Hardware/Replacement Parts			
	Glass Reservoir for FG47 (300 mL)	1961-054	1
Accessories			
10	Polyester Drain Disc	230300	100
22	Polyester Drain Disc	230500	100
25	Polyester Drain Disc	230600	100
37	Polyester Drain Disc	230800	100
47	Polyester Drain Disc	231100	100

Note: 25 mm holders have No. 5 stopper, fitting 125 mL flasks; 47 mm and 90 mm holders have a No. 8 stopper, fitting standard manifolds and 1 L flasks.

Syringe Type Holders S/S

Syringe Filter Type Membrane Filter Holders

Available in stainless steel and polypropylene with luer fittings for use with a standard syringe. The holders are designed for the quick and easy clarification, sterilization and removal of particulates from small volume samples, typically for HPLC applications. The holders contain PTFE gaskets and O-rings and allow the membrane to be autoclaved in place without the filter sticking to the holder.

Luer lock fittings connect to a standard syringe and offer convenience and ease of use for clarification, sterilization and removal of particulates from small volumes of liquid (e.g., HPLC samples and solvents).

Syringe Type Holder

Ordering Information - Syringe Type Holders S/S

Filter Diameter (mm)	Description	Catalog Number	Model	Prefilter Diameter (mm)	Quantity
13	S/S, Female Luer Inlet; Male Luer Nozzle Outlet	1980-001	SH13	10	1
25	S/S, Female Luer Inlet; Male Luer Nozzle Outlet	1980-002	SH25	22	1

Pop-Top™ and Swin-Lok™ Plastic Filter Holders

Features and Benefits

- Designed for microfiltration and ultra cleaning of small volumes of liquids using positive pressure
- All three holders will accommodate Nuclepore track-etched and cast membranes
- Syringe compatible

Plastic Filtration Holders

Typical Data - 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 (100° F) at 50 psi (3.5 bar)		
Sterilization	121° C (250° F) for 15 minutes		
Size (cm)	2.7 OD x 2.7 H	3.5 OD x 3.7 H	6.0 OD x 6.5 H
Membrane Size (mm)	13	25	47
Prefilter Size (mm)	10	22	42
Filtration Area (cm^2)	0.8	3.9	13.8
Connection			
Cap	Male luer slip-fit	Female luer-lok	Female luer slip-fit with Male 1/4" NPT and 1/4" Tubing (multipurpose)
Base	Female luer slip-fit	Male luer slip-fit	

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Ordering Information - Pop-Top and Swin-Lok Plastic Filter Holders

Diameter (mm)	Description	Catalog Number	Quantity
13	Pop-Top	420100	10
25	Swin-Lok Holder	420200	10
47	Swin-Lok Holder	420400	10

GMF 150, The Ideal Prefilter

Routine filtration performed with a membrane often results in rapid binding of the surface pores. Therefore, flow rate is quickly diminished and the volume of sample to be filtered is minimized. Tests have proven that the Whatman GMF150, 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 up to the same caliber as the Whatman GMF150 simply because prefilters of a uniform density do not have the loading capacity of the multilayer filter technology advanced by Whatman.

Ordering Information - Multigrade GMF 150 Circles

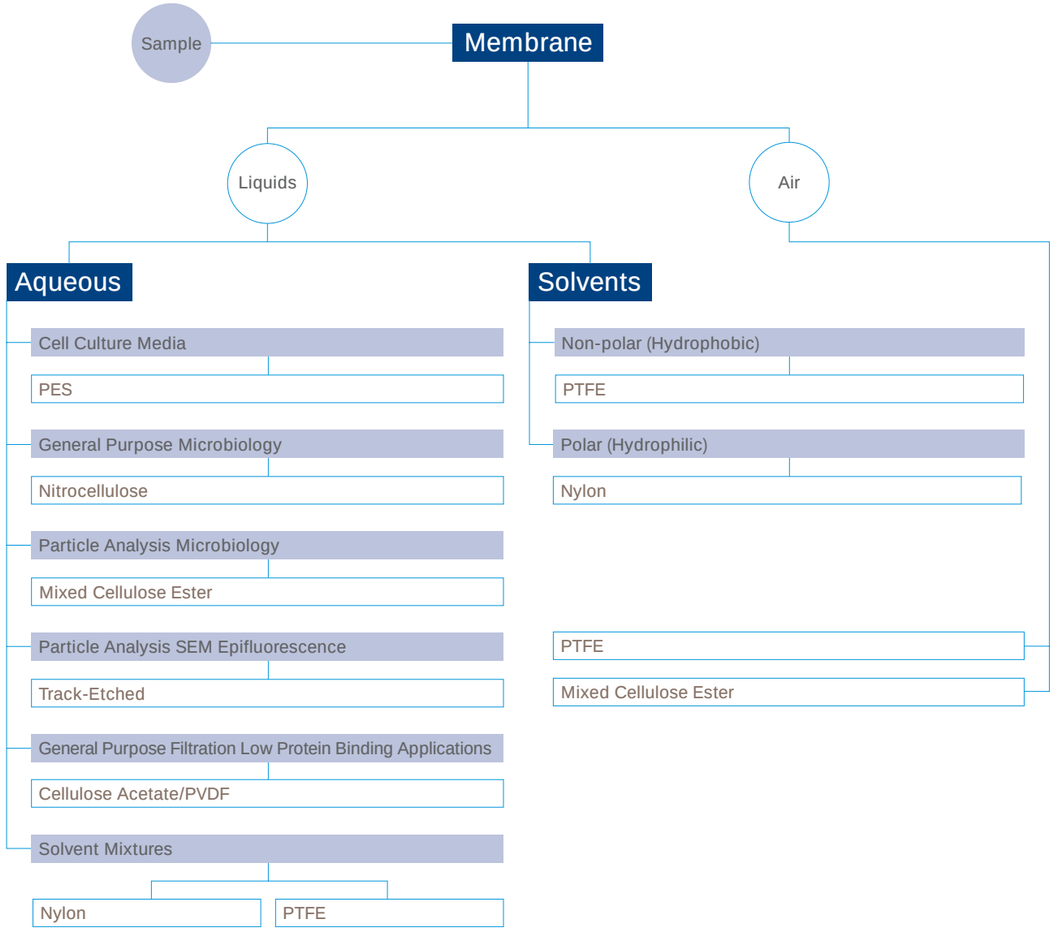
Pore Size Diameter (mm)	1 µm	2 µm	Quantity/Pack
47	1841-047	1842-04	40
90	1841-090	1842-090	20

Above items available on special order in Europe, South America, Africa and the Middle East

Membrane Filters

Whatman brings to the laboratory user a range of membrane filters whose advanced technical specifications makes them today's preferred choice for a wide range of applications. The membrane filters offer accurately controlled pore size distribution and higher strength and flexibility which ensure reproducibility and consistency. The Whatman membrane filter range includes pore sizes (from 0.02 to 12 µm) with a wide selection of membrane filters. Sterile and autoclave packs are available for specialized applications. Colored and gridded types are also available.

Quick Pick Reference Chart



Typical Properties - Membranes

Membrane Media	Material	Pore Size (µm)	Diameter (mm)	Rectangular	Brand Name
Track-Etched Membranes	Polyester - Polyethylene terephthalate	0.2, 0.4, 1.0	25	-	Cyclopore Nuclepore
	Polycarbonate - (4, 4 hydroxydiphenyl-2, 2'-propane)	0.015, 0.03, 0.05, 0.08, 0.1, 0.2, 0.4, 0.6, 0.8, 1.0, 2.0, 3.0, 5.0, 8.0, 10.0, 12.0	13, 25, 37, 47, 50, 76, 90, 142	8 x 10 mm 19 x 42 mm 25 x 80 mm 8" x 10"	
Cellulose Membranes	Cellulose Nitrate	0.45, 0.8, 1.0, 3.0, 5.0, 6.0	25, 47, 90	-	-
	Mixed Cellulose Esters - Mixed Esters (Cellulose Acetate and Nitrate)	0.22, 0.45, 0.65, 0.8, 1.2, 3.0, 5.0	13, 25, 47, 90, 142	19 x 42 mm	Membra-Fil Whatman Brand
Nylon	Polymer (Hexamethylene-diamine; Nylon 66)	0.2, 0.45, 0.8	13, 25, 47, 90	-	-
PTFE	Polytetrafluoro -ethylene	0.2, 0.5, 1.0	25, 47	-	-
Polypropylene	Polypropylene	0.2, 0.45, 1.0	25, 47, 90	-	-
Anopore	Aluminum Oxide	0.02, 0.1, 0.2	13, 21, 43	-	Anopore Anodisc
PES	Polyether Sulfone	0.8	47	-	-

Anopore® Inorganic Membranes

The Anopore inorganic membrane is ideal for a wide range of laboratory filtration applications. This unique material has a precise, non-deformable honeycomb pore structure with no lateral cross overs between individual pores, that filters at precisely the stated cut-off, allowing no larger sized particles to pass through the membrane. The Anopore inorganic membrane is composed of a high-purity alumina matrix that is manufactured electrochemically. The membrane also exhibits low protein binding, has minimal autofluorescence, is non-toxic 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, which means that retained particles do not need to be transferred to another surface before microscopic examination.

Filter Papers and Membranes

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 eliminates sample contamination and ensures low protein binding and minimal loss of sample.

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

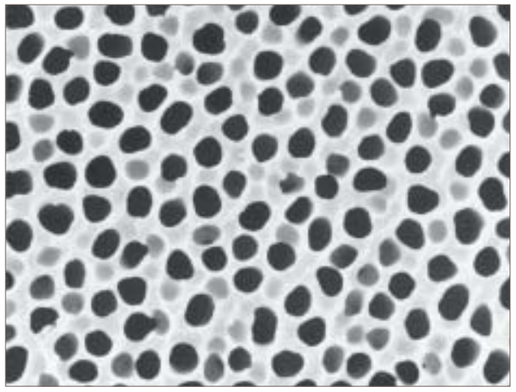
Anopore is available in 3 nominal pore sizes: 0.02 µm, 0.1 µm and 0.2 µm and in 3 diameters: 13 mm, 25 mm and 47 mm.

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
- No additives used in the manufacturing process ensures minimal extractables and no sample contamination
- Extremely low protein binding minimizes sample loss
- Virtually transparent when wet making it ideal 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 Pore Structure

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Typical Data - 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	None	Thermal weld	Thermal weld
Protein Adsorption	Low	Low	Low
Burst Strength	65–110 psi	65-110 psi	65-110 psi
Maximum Service Temp	400° C	40° C	40° C
Porosity	25-50%	25-50%	25-50%
Autoclavable	Yes	No	No
Refractive Index	1.6	1.6	1.6

Ordering Information - Anopore Inorganic Membranes

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	6809-5002	Yes	Low	Very Good	50
47	Anodisc 47	0.1	6809-5012	Yes	Low	Very Good	50
47	Anodisc 47	0.2	6809-5022	Yes	Low	Very Good	50

* No support ring

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Filtration Devices:
Ensure that, across products and batches, every tablet contains precisely the correct amount of the drug. Every day, people put their trust in our solutions.

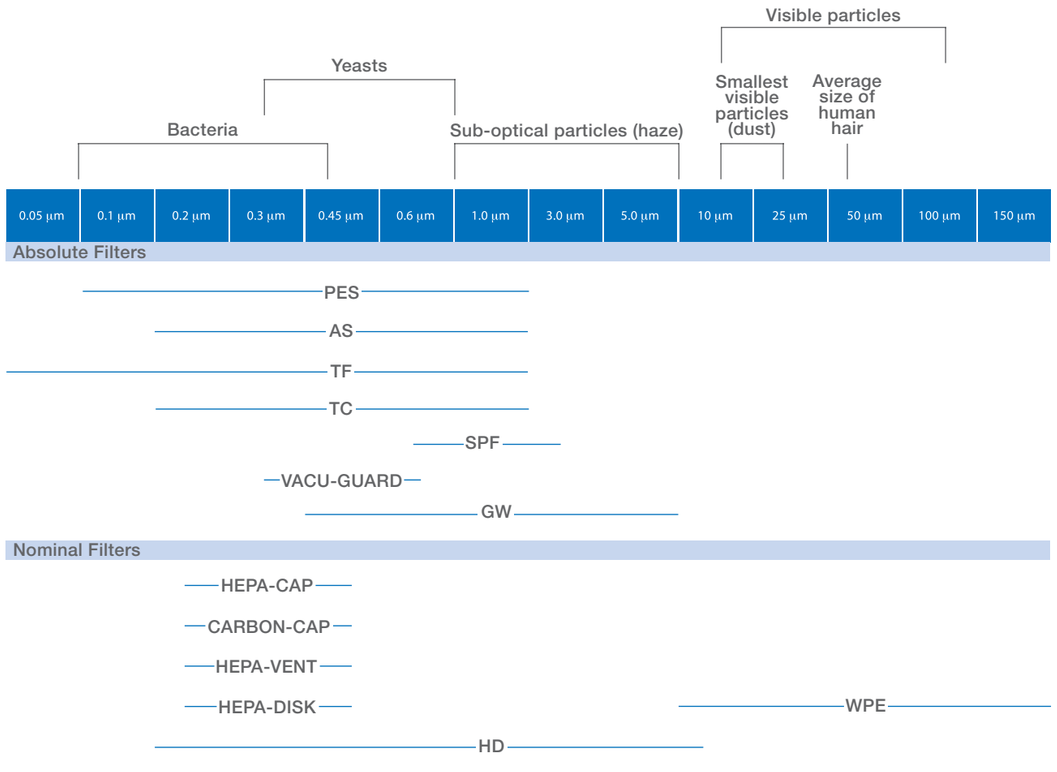
Filtration Devices

Whatman disposable filtration devices are designed to enable filtration of many types of samples. They are available in a wide variety of filter choices with a polypropylene housing and utilize the most advanced construction methods and design features. This level of engineering provides for the finest disposable filtration devices possible.

Capsule Filters

Whether you are conducting research, pilot manufacturing or full-scale production, filtering large volumes or hard-to-filter samples, Whatman has a filtration solution to fit your needs.

Product Overview - Capsule Filters



Whatman products are manufactured with the highest quality materials, under exacting clean room conditions using ISO-controlled manufacturing processes. We offer a variety of pore sizes and filter materials to choose from, and all our capsules are free of adhesives to ensure product purity. For the most reliable performance in any application trust the comprehensive line of Whatman capsule filtration devices.

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 a capsule filter that 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

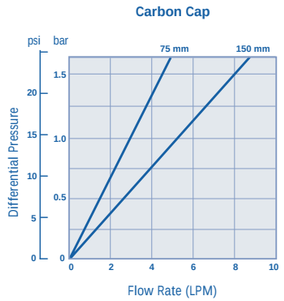
- Carbon acts as an adsorption media
- Pleated glass microfiber filter structure
- Retains 99.97% of particles greater than 0.3 µm
- Large surface area of activated carbon for effective operation
- Two sizes of capsules available to suit your specific application

Applications

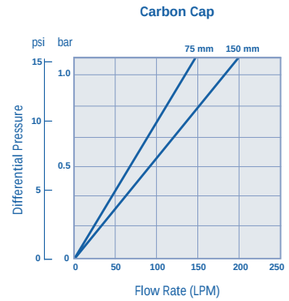
- Water, chemical and reagent purification
- Removes noxious odors, oil mists and contaminants
- Compressed air lines and vacuum pumps
- Instrument outlet exhausts
- Eliminates a potential health hazard from the workplace

Carbon Cap

Carbon Cap in Water*



Carbon Cap in Air*



* Flow rates are indicative and vary by type of end fitting

Technical Properties - 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^2
	Carbon Cap 150 Capsule: 82,000 m^2

Ordering Information - Carbon Cap

Catalog Number	Description	Quantity/Pack
6704-7500	Carbon Cap 75	1
6704-1500	Carbon Cap 150	1
2022S	Carbon Cap 150 Sanitary TC	5

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Polycap™ AS

Polycap AS is a unique product 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.

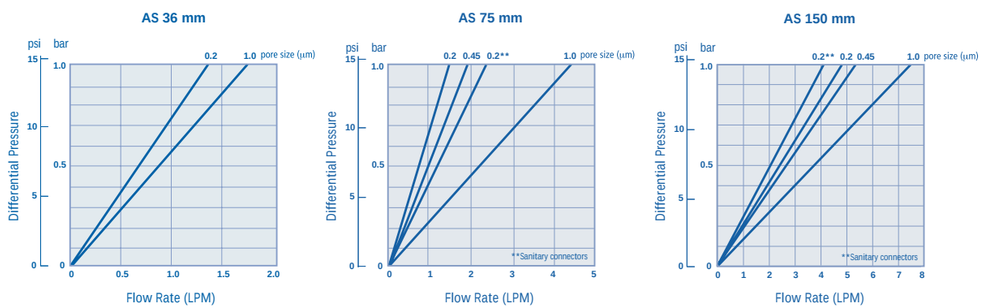
Features and Benefits

- 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 bio-safe and has excellent flow rates
- Ultra-clean containing no surfactant or mold release agents
- Housing 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 pre-sterilized with gamma irradiation
- Manufactured in clean room facilities under ISO Quality Systems

Applications

- Admixtures
- Biologicals
- Buffers
- Cleaning/rinsing solutions
- Enzymes
- Extemporaneous solutions
- Immunologicals
- Irrigation solutions
- Nutrients
- Ophthalmic solutions
- Pharmaceutical solutions
- Reagent preparation
- Salt solutions
- Therapy solutions
- Tissue culture media
- Viral suspensions

Water Flow Rates*



* Flow rates are indicative and vary by type of end fitting

Technical Properties - Polycap AS

Housing	Polypropylene
Vent	On inlet
Prefilter	Glass microfiber double laminated with polyolefin monofilament non-woven
Membrane	Nylon
Support System	Polypropylene
Sealing	Heat-fused
Maximum Pressure	60 psi (4.1 bar)
Non-Pyrogenic	LAL tested, non-reactive
Biosafety	Materials pass USP Class VI
Sterilization	Capsules are autoclavable at 121° C for 20 minutes (maximum temperature is 132° C). However, an integrity test should be performed after autoclaving.
Filtration Area	36 mm capsule: 400 cm^2 (62 in^2) 75 mm capsule: 820 cm^2 (127 in^2) 150 mm capsule: 1,650 cm^2 (256 in^2)
Water Bubble Point (Typical)	0.2 µm membrane: 2.9 bar (42 psi) 0.45 µm membrane: 2.1 bar (30 psi) 1.0 µm membrane: 0.5 bar (8 psi)

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Ordering Information - Polycap AS

Catalog Number	Membrane	Prefilter[1]	Pore Size (µm)	Connections* Inlet	Outlet	Sterile	Quantity/Pack
Polycap 36 AS							
6705-3602	Nylon	GMF	0.2	SB	SB	Yes	1
6705-3604	Nylon	GMF	0.45	SB	SB	Yes	1
6705-3610	Nylon	GMF	1.0	SB	SB	Yes	1
6708-3602	Nylon	GMF	0.2	½" SB	½" SB	Yes	1
6708-3604	Nylon	GMF	0.45	½" SB	½" SB	Yes	1
6709-3602	Nylon	GMF	0.2	MNPT	SB	Yes	1
2606T	Nylon	GMF	0.2	⅜" FNPT	⅜" FNPT	No	5
2607NS	Nylon	GMF	0.45	SB	SB	No	5
2608NS	Nylon	GMF	1	SB	SB	No	5
Polycap 36 AS with Filling Bell							
6706-3602	Nylon	GMF	0.2	SB	SB	Yes	1
Polycap 75 AS							
6705-7502	Nylon	GMF	0.2	SB	SB	Yes	1
6705-7504	Nylon	GMF	0.45	SB	SB	Yes	1
6705-7510	Nylon	GMF	1.0	½" SB	½" SB	Yes	1
6708-7502	Nylon	GMF	0.2	½" SB	½" SB	Yes	1
6708-7504	Nylon	GMF	0.45	½" SB	½" SB	Yes	1
6709-7502	Nylon	GMF	0.2	¼" MNPT	½" SB	Yes	1
6709-7504	Nylon	GMF	0.45	¼" MNPT	½" SB	Yes	1
2706T	Nylon	GMF	0.2	⅜" FNPT	⅜" FNPT	No	5
2707NS	Nylon	GMF	0.45	SB	SB	No	5
Polycap 75 AS with Filling Bell							
6706-7502	Nylon	GMF	0.2	SB	SB	Yes	1
Polycap 150 AS							
2806T	Nylon	GMF	0.2	⅜" FNPT	⅜" FNPT	No	5
2806	Nylon	GMF	0.2	½" SB	½" HB	Yes	5
2807	Nylon	GMF	0.45	½" SB	½" HB	Yes	5
2805	Nylon	GMF	0.2	1½" Sanitary	1½" Sanitary	Yes	5
2808	Nylon	GMF	1	½" SB	½" HB	Yes	5

[1] GMF – Glass microfiber prefilter
* SB – Stepped Barb for 6–10 mm ¼"–⅜" tubing
½ SB – Stepped Barb for 10–12 mm ⅜"–½" tubing
MNPT – Male National Pipe Thread
FNPT – Female National Pipe Thread
HB – Hose Barb

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 in-line filter unit.

Features and Benefits

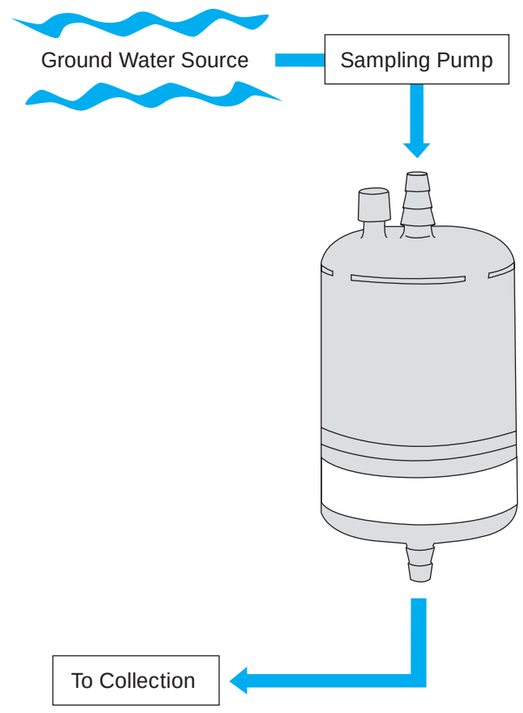
- Connects directly to outlet of a sampling pump
- Easy to use
- Filtration membrane is encapsulated in durable polypropylene housing
- Also available in 1.0 µm and 5.0 µm filters, as required by US and regional EPA test methods
- Large surface area optimized to provide at least 600 cm^2 of effective filtration area to ensure rapid sample collection
- Housing components 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

Applications

- Filter ground water samples before dissolved metal analysis

Technical Properties - Polycap GW

Housing	Polypropylene
Filter Media	0.45 µm: PES Filter 1.0 µm: Polypropylene Filter 5.0 µm: Polypropylene Filter
Inlet/Outlet	¼ to ⅜ in (6–9 mm) Stepped Barb (SB)
Support System	Polypropylene
Vent	On inlet
Filtration Area	600 cm^2 (93 in^2)
Wetting Characteristics	Hydrophilic
Maximum Pressure	60 psi (4.1 bar)
Water Flow Rate @ 1.0 bar (14.5 psi)	60 L/min
Flow Direction	Flow should follow arrows



Whatman Polycap GW is designed to make the process of collecting ground water samples for analysis quick, easy and convenient.

Ordering Information - Polycap GW

Catalog Number	Membrane[1]	Pore Size (µm)	Connections*		Sterile	Quantity/Pack
			Inlet	Outlet		
6714-6004	PES	0.45	SB	SB	Yes	1
6724-6004	PES	0.45	SB	SB	Yes	100
6703-6010	PP	1.0	SB	SB	Yes	1
6703-6050	PP	5.0	SB	SB	Yes	1

[1] PES – Polyethersulfone
* SB – Stepped Barb for 6–10 mm ¼"–⅜" tubing
PP – Polypropylene

Polycap™ HD

Polycap HD (Heavy Duty) is a well-engineered product that offers high filtration efficiency and excellent filtrate purity due to its materials and methods of manufacture.

Polycap HD provides a unique 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 broad range of solutions, pH and temperature
- High flow and high retention capacity
- Materials of construction are FDA approved for food contact
- Able to be sterilized by autoclaving with steam at 121° C for 20 minutes
- Manual vent with luer lock to bleed air from upstream or serve as an injection or sample port
- Available in 0.2, 0.45, 1.0, 5.0 and 10 µm pore sizes and a variety of end-fitting configurations
- Manufactured in a Class 10,000 clean room in an ISO certified manufacturing plant

Applications

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

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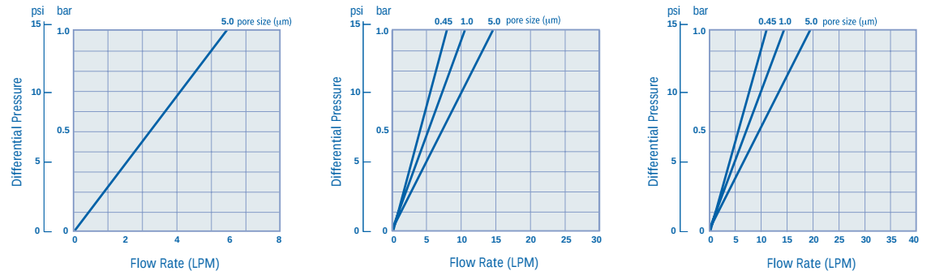
Water Flow Rates*



* Flow rates are indicative and vary by type of end fitting. X-rated with 90% removal efficiency

Technical Properties - Polycap HD

Housing	Polypropylene
Vent	On inlet
Filter Media	Polypropylene
Support System	Polypropylene
Biosafety	Materials pass USP Class VI
Filtration Area	36 mm capsule: 400 cm^2 (62 in^2) 75 mm capsule: 820 cm^2 (127 in^2) 150 mm capsule: 1,650 cm^2 (256 in^2)
Sterilization	Capsules autoclavable at 121° C for 20 minutes (maximum temperature is 132° C)
Non-Pyrogenic	LAL tested, non-reactive
Maximum Pressure	4.1 bar (60 psi)

Ordering Information - Polycap HD

Catalog Number	Membrane[1]	Prefilter	Pore Size (µm)	Connections* Inlet	Outlet	Sterile	Quantity/ Pack
Polycap 36 HD							
2610T	PP	No	0.2	⅜" FNPT	⅜" FNPT	No	5
2611T	PP	No	0.45	⅜" FNPT	⅜" FNPT		
6707-3612	PP	No	0.45	¼" MNPT	½" HB	No	1
6703-3610	PP	No	1.0	SB	SB	No	1
6703-3650	PP	No	5.0	SB	SB	No	1
2612T	PP	No	5.0	⅜" FNPT	⅜" FNPT	No	5

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Catalog Number	Membrane[1]	Prefilter	Pore Size (µm)	Connections* Inlet	Outlet	Sterile	Quantity/ Pack
2613T	PP	No	5.0	⅜" FNPT	⅜" FNPT	No	5
6703-3611	PP	No	10.0	SB	SB	No	1
2614T	PP	No	10.0	⅜" FNPT	⅜" FNPT	No	5
6703-3621	PP	No	20.0	SB	SB	No	1
Polycap 75 HD							
2710	PP	No	0.2	½" HB	½" HB	No	5
2710T	PP	No	0.2	⅜" FNPT	⅜" FNPT	No	5
2711T	PP	No	0.45	⅜" FNPT	⅜" FNPT	No	5
6703-7510	PP	No	1.0	½" SB	½" SB	No	1
6703-7550	PP	No	5.0	½" SB	½" SB	No	1
2712	PP	No	5.0	½" HB	½" HB	No	5
2712M	PP	No	5.0	¼" MNPT	¼" MNPT	No	5
2712T	PP	No	5.0	⅜" FNPT	⅜" FNPT	No	5
2713	PP	No	5.0	½" HB	½" HB	No	5
2713T	PP	No	5.0	⅜" FNPT	⅜" FNPT	No	5
2714	PP	No	10.0	½" HB	½" HB	No	5
2714T	PP	No	10.0	⅜" FNPT	⅜" FNPT	No	5
6703-7511	PP	No	10.0	½" SB	½" SB	No	1
6703-7521	PP	No	20.0	½" SB	½" SB	No	1
Polycap 150 HD							
6703-9502	PP	No	0.2	½" HB	½" HB	No	1
2810T	PP	No	0.2	⅜" FNPT	⅜" FNPT	No	5
2811T	PP	No	0.45	⅜" FNPT	⅜" FNPT	No	5
6703-9504	PP	No	0.45	½" HB	½" HB	No	1
6703-9510	PP	No	1.0	½" HB	½" HB	No	1
2812T	PP	No	1.0	⅜" FNPT	⅜" FNPT	No	5
2813	PP	No	5.0	½" HB	½" HB	No	5
2813T	PP	No	5.0	⅜" FNPT	⅜" FNPT	No	5
2814	PP	No	10.0	½" HB	½" HB	No	5
2814T	PP	No	10.0	⅜" FNPT	⅜" FNPT	No	5

[1] PP – Polypropylene
* SB – Stepped Barb for 6–10 mm ¼"–⅜" tubing
½" SB – Stepped Barb for 10–12 mm ⅜"–½" tubing
HB – Hose Barb

MNPT – Male National Pipe Thread
FNPT – Female National Pipe Thread

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Polycap™ SPF

Polycap SPF (Serum Prefilter) is an exceptional product that is optimized for prefiltration applications and is typically used upstream of a Polycap AS or Polycap PES capsule.

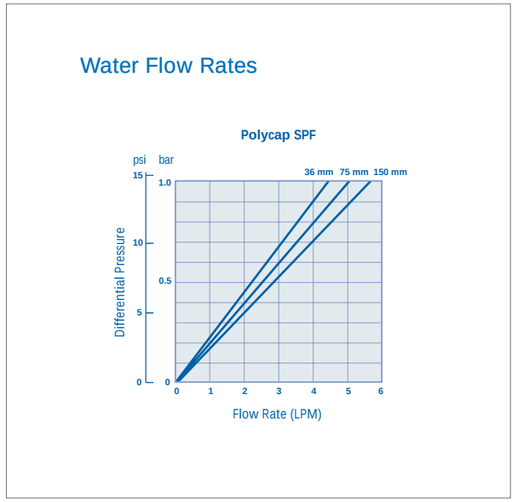
Serum is difficult to filter because it contains a high degree of loading of complex particulates, lipids, triglycerides and lipoproteins that clog filters. When filtering serum without proper prefiltration, membrane filters clog rapidly.

Features and Benefits

- Three layers of special media: fine and ultrafine glass microfiber (GMF) and polyethersulfone membrane
- Ideal for hard-to-filter solutions such as serums and protein solutions
- Able to be sterilized by autoclaving with steam
- 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
- Diagnostics standards
- Enzymes
- Immunologicals
- Nutrients
- Serum prefiltration
- Tissue culture media
- Viral suspensions



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Technical Properties - PolyCap SPF

Housing	Polypropylene
Vent	On inlet
Pre-filter	Two layers of Glass Microfiber
Membrane	Polyethersulfone (PES)
Support System	Polypropylene
Sealing	Heat-fused
Maximum Pressure	60 psi (4.1 bar)
Sterilization	Autoclave at 121° C for 20 minutes (132° C max)
Filtration Area	36 mm Capsule: 260 cm^2 (40 in^2) 75 mm Capsule: 535 cm^2 (83 in^2) 150 mm Capsule: 1,100 cm^2 (170 in^2)

Ordering Information - PolyCap SPF

Catalog Number	Membrane[1]	Prefilter[2]	Pore Size (µm)	Connections* Inlet	Outlet	Sterile	Quantity/Pack
Polycap 36 SPF							
6705-3600	PES	GMF	1.0	SB	SB	No	1
Polycap 75 SPF							
6705-7500	PES	GMF	1.0	SB	SB	No	1
Polycap 150 SPF							
2820	PES	GMF	1.0	½" HB	½" HB	No	5

[1] PES – Polyethersulfone
[2] GMF – Glass microfiber prefilter
* SB – Stepped Barb for 6–10 mm ¼"–⅜" tubing
HB – Hose Barb

Polycap™ TC

Polycap TC/PES, available with and without bell, are disposable, dual layer polyethersulfone (PES) membrane filtration capsules that provide efficient filtration for critical aqueous solutions.

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

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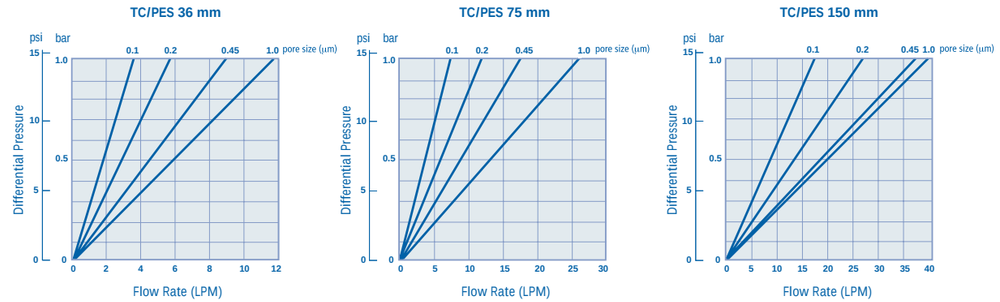
Features and Benefits

- Polycap TC/PES 0.1, 0.2 and 0.8/0.2 µm capsules pass the HIMA Challenge Test for Sterilizing Grade Filters
- 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 sterile and non-sterile 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^2
  Insulin 2.0 µg/cm^2
  Gammaglobulin 1.5 µg/cm^2

Water Flow Rates*



* Flow rates are indicative and vary by type of end fitting

Applications

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

Technical Properties - 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
Non-Pyrogenic	LAL tested, non-reactive
Biosafety	Materials pass USP Class VI
Sterilization	Certain filter devices have been sterilized.* They may be autoclaved once at a minimum of 121° C for 20 minutes (maximum 132° C). However, an integrity test should be performed after autoclaving. (*sterile and non-sterile options offered)
Filtration Area	36 mm capsule: 440 cm^2 (72 in^2) 75 mm capsule: 930 cm^2 (144 in^2) 150 mm capsule: 1,900 cm^2 (302 in^2)
Water Bubble Point	0.1 µm > 3.2 bar (46 psi) 0.2 µm > 2.7 bar (40 psi) 0.45 µm > 2.1 bar (30 psi)
Final Membrane	1.0 µm > 1.1 bar (16 psi)

Ordering Information - Polycap TC

Catalog Number	Membrane[1]	Pore Size (µm)	Connections* Inlet	Outlet	Sterile	Quantity/Pack
Polycap 36 TC						
6714-3602	PES	0.2/0.2	SB	SB	Yes	1
6717-3602	PES	0.2/0.2	½" SB	½" SB	Yes	1
2622NS	PES	0.2/0.2	½" HB	SB	No	5
6714-3604	PES	0.65/0.45	SB	SB	Yes	1
Polycap 36 TC with Bell						
6715-3601	PES	0.2/0.1	SB	SB	Yes	1
6715-3602	PES	0.2/0.2	SB	SB	Yes	1
6716-3612	PES	0.2/0.2	¼" MNPT	SB	Yes	1
6715-3682	PES	0.8/0.2	SB	SB	Yes	1
6716-3602	PES	0.2/0.2	MNPT	SB	Yes	1
6715-3604	PES	0.65/0.45	SB	SB	Yes	1

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Catalog Number	Membrane[1]	Pore Size (µm)	Connections* Inlet	Outlet	Sterile	Quantity/Pack
Polycap 75 TC						
6714-7501	PES	0.2/0.1	SB	SB	Yes	1
6714-7502	PES	0.2/0.2	SB	SB	Yes	1
2742C	PES	0.2/0.2	½" SB	½" SB	Yes	5
2742M	PES	0.2/0.2	¼" MNPT	¼" MNPT	No	5
6717-7504	PES	0.65/0.45	½" SB	½" SB	Yes	1
6714-7504	PES	0.65/0.45	SB	SB	Yes	1
6717-7510	PES	1.0/1.0	½" SB	½" SB	Yes	1
Polycap 75 TC with Bell						
6715-7501	PES	0.2/0.1	SB	SB	Yes	1
6715-7502	PES	0.2/0.2	SB	SB	Yes	1
6715-7582	PES	0.8/0.2	SB	SB	Yes	1
6718-7504	PES	0.65/0.45	½" SB	SB	Yes	1
Polycap 150 TC						
6717-9501	PES	0.2/0.1	½" SB	½" SB	Yes	1
6717-9502	PES	0.2/0.2	½" SB	½" SB	Yes	1
6704-9502	PES	0.2/0.2	1 ½" Sanitary	1 ½" Sanitary	No	5
6717-9504	PES	0.65/0.45	½" SB	½" SB	Yes	1
6717-9510	PES	1.0/1.0	½" SB	½" SB	Yes	1
Polycap 150 TC with Bell						
6718-9502	PES	0.2/0.2	½" SB	SB	Yes	1
6718-9582	PES	0.8/0.2	½" SB	SB	Yes	1

[1] PES – Polyethersulfone

* SB – Stepped Barb for 6 –10 mm ¼"–⅜" tubing

½" SB – Stepped Barb for 10 –12 mm ⅜"–½" tubing

MNPT – Male National Pipe Thread

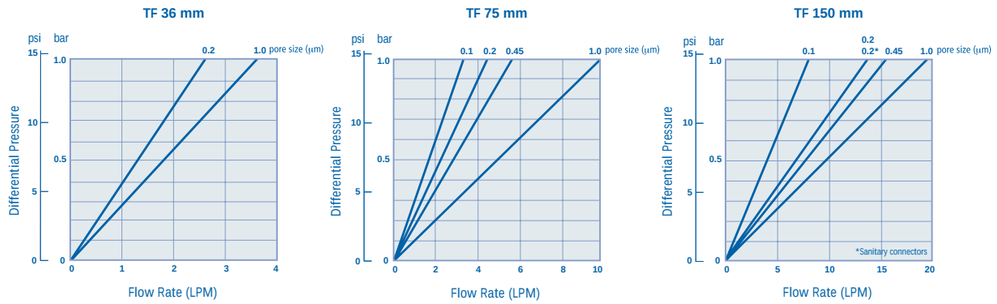
HB – Hose Barb

Polycap™ TF

Polycap TF filter devices are among the finest disposable encapsulated filters. These 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.

Filtration Devices

Water Flow Rates



Features and Benefits

- Resistant to most solvents, autoclavable and integrity-testable
- Available in 0.05, 0.1, 0.2, 0.45 and 1.0 µm pore sizes
- 0.05 µm capsules designed for ultra-clean applications; 1.0 µm used for extended life and filtration of highly contaminated solutions
- Able to be sterilized by autoclaving with steam or EtO
- Manufactured under very clean conditions in a Class 10,000 clean room and under ISO Quality Systems

Applications

- Venting
- In-line filtration
- Isolation
- Electronics
- Pharmaceutical
- Biotech
- Laboratory
- Other uses

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Technical Properties - 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.
Biosafety	Materials pass USP Class VI
Sterilization	May be autoclaved at 121° C for 20 minutes (maximum 132° C). 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. Compatible with EtO sterilization.
Filtration Area	36 mm capsule: 500 cm^2 (77 in^2) 75 mm capsule: 1,000 cm^2 (155 in^2) 150 mm capsule: 2,000 cm^2 (310 in^2)
Methanol	0.1 µm membrane: 1.7 bar (25 psi) 0.2 µm membrane: 0.9 bar (13 psi)
Bubble Point	0.45 µm membrane: 0.5 bar (7 psi) 1.0 µm membrane: 0.2 bar (3 psi)

Ordering Information - Polycap TF

Catalog Number	Membrane[1]	Prefilter[2]	Pore Size (µm)	Connections* Inlet	Outlet	Sterile	Quantity/Pack
Polycap 36 TF							
6700-3602	PTFE	-	0.2	SB	SB	No	1
6700-3610	PTFE	PP	1.0	SB	SB	No	1
6710-3602	PTFE	-	0.2	½" SB	½" SB	No	1
6710-3604	PTFE	-	0.45	⅜" – ½" SB	½" SB	No	1
6711-3601	PTFE	-	0.1	¼" MNPT	SB	No	1
6711-3602	PTFE	-	0.2	¼" MNPT	SB	No	1
6711-3604	PTFE	-	0.45	¼" MNPT	SB	No	1
2601T	PTFE	-	0.2	⅜" FNPT	⅜" FNPT	No	5
2602S	PTFE	-	0.45	1½" Sanitary	1½" Sanitary	No	5
2603T	PTFE	PP	1.0	⅜" FNPT	⅜" FNPT	No	5
Polycap 75 TF							
6700-7501	PTFE	-	0.1	SB	SB	No	1
6700-7502	PTFE	-	0.2	SB	SB	No	1
6700-7504	PTFE	-	0.45	SB	SB	No	1
6700-7510	PTFE	PP	1.0	SB	SB	No	1
6701-7510	PTFE	PP	1.0	½" SB	½" SB	No	1

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Filtration Devices

Catalog Number	Membrane[1]	Prefilter[2]	Pore Size (µm)	Connections* Inlet	Outlet	Sterile	Quantity/Pack
6710-7502	PTFE	-	0.2	½" SB	½" SB	No	1
6710-7504	PTFE	-	0.45	½" SB	½" SB	No	1
6711-7502	PTFE	-	0.2	¼" MNPT	SB	No	1
6711-7504	PTFE	-	0.45	¼" MNPT	SB	No	1
6711-7505	PTFE	-	0.05	¼" MNPT	SB	No	1
2700M	PTFE	-	0.1	¼" MNPT	¼" MNPT	No	5
2700T	PTFE	-	0.1	⅜" FNPT	⅜" FNPT	No	5
2702M	PTFE	-	0.2	¼" MNPT	¼" MNPT	No	5
2702T	PTFE	-	0.2	⅜" FNPT	⅜" FNPT	No	5
2703T	PTFE	-	0.45	⅜" FNPT	⅜" FNPT	No	5
Polycap 150 TF							
2800T	PTFE	-	0.1	⅜" FNPT	⅜" FNPT	No	5
2801	PTFE	-	0.2	1 ½" Sanitary	1 ½" Sanitary	No	5
2802	PTFE	-	0.2	½" HB	½" HB	No	5
2802T	PTFE	-	0.2	⅜" FNPT	⅜" FNPT	No	5
2803T	PTFE	-	0.45	⅜" FNPT	⅜" FNPT	No	5
2804T	PTFE	PP	1.0	⅜" FNPT	⅜" FNPT	No	5

[1] PTFE – Polytetrafluoroethylene
[2] PP – Polypropylene prefilter
* SB – Stepped Barb for 6 –10 mm ¼"– ⅜" tubing
½" SB – Stepped Barb for 10 –12 mm ⅜"–½" tubing
MNPT – Male National Pipe Thread
FNPT – Female National Pipe Thread

Centrifuge Filters

Whatman centrifuge filters are ideal for the quick and easy preparation of a wide range of laboratory samples by centrifugation.

VectaSpin™ Centrifuge Filters

VectaSpin centrifuge filters are supplied with a range of filtration and separation media. The centrifuge filters are available in 400 µL, 3 mL and 20 mL sizes and are produced from pigment free polypropylene to eliminate sample contamination. A 10 µm mesh is available for the filtration of coarse particulates. VectaSpin Micro and VectaSpin 3 are also available with a range of ultrafiltration membranes which can separate macromolecules, such as proteins, based on differences in their molecular weights.

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The centrifuge filters are compatible with all common centrifuge rotors and holders. Filtrate can be stored in the receiving tube after centrifugation eliminating the need for a separate storage tube.

VectaSpin™ Micro

Features and Benefits
- Quick and easy-to-use. Supplied ready assembled saving time in the laboratory
- Prefilter versions available for difficult-to-filter samples
- Frosted area on tube for easy sample identification
- Capacity 400 / 600µL (insert vol / tube vol)

Applications
- Removal of cells from culture media
- Particle removal from solvents
- Liquid chromatography sample preparation
- Removal of bacteria from sample material
- Fractionation/purification of proteins

VectaSpin Micro

VectaSpin™ 3

Features and Benefits
- 3 mL sample capacity is ideal for many laboratory samples
- Store filtrate in receiving tube, reducing costs and saving time in the laboratory
- Frosted area on tube for easy sample identification

Applications
- HPLC sample preparation
- Biotechnology and life science
- Environmental research
- Removal of microspheres in aqueous solution
- Filtration of river waters
- Protein separation from sample matrices

VectaSpin 3

VectaSpin™ 20

Features and Benefits

- 20 mL sample capacity is ideal for large volume samples
- Screw top cap for easy sample storage

Applications

- Easy particle removal from large volume samples
- Environmental sample filtration
- Sample preparation and collection
- Ligand binding studies
- Buffer exchange

VectaSpin 20

Typical Data - VectaSpin Centrifuge Filters

	VectaSpin Micro	VectaSpin 3	VectaSpin 20
Housing (Pigment Free)	Polypropylene	Polypropylene	Polypropylene
Insert Capacity	400 µL	3 mL	20 mL
Receiving Tube Capacities			
With Insert	1.25 mL	5 mL	25 mL
Without Insert	2.0 mL	10 mL	50 mL
Maximum Force	10,000 G	5,000 G*	2,075 G*
Tube Dimensions	42 mm x 10.6 mm	87 mm x 16.4 mm	35 mm dia. x 117 mm (with cap) 31 mm dia. x 104 mm (without cap)
Cap Material	Polypropylene	Polypropylene	Polypropylene
Cap Closure	N/A	N/A	Screw-on
Minimum Force for RCF** (Polypropylene 0.45 µm)	N/A	2,000 G	N/A
Temperature Resistance in Use	+4º C to +40º C	+4º C to +40º C	+4º C to +40º C
For Sample Storage (Without Filter Insert)	–70º C to +50º C	–70º C to +50º C	–70º C to +50º C
Insert Material	Polypropylene	Polypropylene	Polypropylene
Overall Height	42 mm	86 mm	61 mm

* Do not use at centrifugal forces above the recommended maximum
** All other devices no minimum RCF
Other Considerations – Ultrafiltration

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The cellulose acetate and polysulfone membranes contain glycerin as a wetting agent. This may be removed if necessary by prerinsing with distilled water or buffers. Transparent spots may appear on filters under higher levels of humidity. These are due to the glycerin and do not affect performance of the filter.

CENTREX® Centrifuge Filters

CENTREX centrifuge filters are supplied with a range of filtration and separation media. 5 mL (sterile and non-sterile) and 25 mL versions are available.

Features and Benefits

- Centrifugal filter units with various types of membrane filter
- Rapid and simple preparation of a large number of samples
- More than six samples can be processed at once
- Ideal for automated systems and high-speed batch filtration with robots
- Considerably reduced contamination risk when working with radioactive biologically hazardous material
- Cross contamination avoided

CENTREX Centrifuge Filters

CENTREX® 5 mL Centrifuge Filters

Applications

- 0.45 µm cellulose acetate membrane for the rapid elution of agarose gels
- Nylon, regenerated cellulose and cellulose acetate membranes for the removal of particles and microorganisms from HPLC samples
- Sample preparation for quality control
- Glass fiber for the filtration of very highly loaded samples or a prefilter before a further filtration step

CENTREX 5 mL Centrifuge Filter

CENTREX® 25 mL Centrifuge Filters

Applications

- Filtration of soil samples
- Clarification of antibody or other protein solutions
- Filtration of cell cultures

Ordering Information - VectaSpin Micro Centrifuge Filters

Catalog Number	Membrane	Pore Size (µm)	Quantity/Pack
Microfiltration			
6830-0021	Anopore	0.02	100
6830-0201	Anopore	0.2	100
6833-0201	Polysulfone	0.2	100
6833-0401	Polysulfone	0.45	100
Ultrafiltration			
6835-3001	Polysulfone	30 K	100
6835-1101	Polysulfone	100 K	100
6834-1001	Cellulose Acetate	12 K	100
6834-2001	Cellulose Acetate	20 K	100
Coarse Filtration			
6838-0002	Polypropylene Mesh	10	25

Ordering Information - VectaSpin 3 Centrifuge Filters

Catalog Number	Membrane	Pore Size (µm)	Quantity/Pack
Microfiltration			
6831-0405	PVDF	0.45	25
6832-0405	Polypropylene	0.45	25
Ultrafiltration			
6835-3005	Polysulfone	30 K	25
6835-1005	Polysulfone	10 K	25
Coarse Filtration			
6838-0005	Polypropylene Mesh	10	25

Ordering Information - VectaSpin 20 Centrifuge Filters

Catalog Number	Membrane	Pore Size (µm)	Quantity/Pack
Microfiltration			
6830-0218	Anopore Plus with Prefilter	0.2	10
6832-0408	Polypropylene	0.45	10
Coarse Filtration			
6838-0008	Polypropylene Mesh	10	10
6838-0009	Polypropylene Mesh	10	100

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Ordering Information - CENTREX Centrifuge Filters

Pore Size (µm)	Membrane/Housing[1]	Color Code	Quantity/Pack	Catalog Number
Centrex 5 mL Sterile				
0.2	CA/PP	blue	50	10 467 013
0.2	NL/PP	brown	50	10 467 015
0.45	CA/PP	white	50	10 467 017
0.45	NL/PP	light brown	50	10 467 021
Centrex 5 mL Non-Sterile				
0.45	NL/PP	light brown	250	10 467 012
Centrex 25 mL Non-Sterile				
0.45	RC/PP	-	25	10 467 032

[1] CA – Cellulose acetate
PP – Polypropylene
NL – Nylon
RC – Regenerated cellulose
Adapter – 17 mm x 12 mm
Centrex 25 mL maximum force – 4000 x G

In-line Filters

Whatman in-line filters feature a high-purity polypropylene housing to maintain sample purity and are available with a choice of filtration media to suit a range of aqueous and organic samples. They utilize the most advanced construction methods and design features. This level of engineering provides for the finest disposable in-line filter devices.

Aqueous IFD™ and Solvent IFD™

Whatman in-line 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. Specifically, the Aqueous IFD is designed to work with mobile phases containing at least 20% of the aqueous component.

In-line Filter Degasser

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"-1/8" tubing and an air vent on the inlet with luer lock cap to enable priming.

The in-line 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

Typical Data - In-line Filters

	Aqueous IFD	Solvent IFD
Bubble Point[1]		
bar	2.9 (a)	0.76 (b)
psi	42 (a)	11.0 (b)
Maximum Flow Rate[2]	2.5 mL/min	2.5 mL/min
Filtration Area	16 cm^2	16 cm^2

[1] Typical values determined with (a) water and (b) isopropanol
[2] For effective gas bubble removal in HPLC

Ordering Information - In-line Filters

Catalog Number	Description	Pore Size (µm)	Diameter (mm)	Filter Media[1]	Quantity/Pack
6726-5002	Aqueous IFD*	0.2	50	Nylon	10
6725-5002	Solvent IFD*	0.2	50	PP	10
6726-5002A	Aqueous IFD**	0.2	50	Nylon	10
6725-5002A	Solvent IFD**	0.2	50	PP	10
6726-5000	IFD End Fitting Kit (10 rings and 10 caps)	-	-	-	10

[1] PP – Polypropylene
* O-rings included: 1/32" – 5/32"; accepts different diameter tubing 0.8 mm – 4 mm
** Non o-ring style – accepts 1/8" tubing only

Polydisc™ Filters

Whatman Polydisc 50 mm in-line disc filters are designed for larger volume sample filtration in the laboratory, at a pilot plant or in manufacturing.

They are extremely versatile and cost effective. Sample volumes up to 1 liter can be filtered with one device. Polydisc devices can be used in conjunction with a syringe or connected in-line via stepped hose barbs.

Polydisc filters feature a high-purity polypropylene housing to maintain sample purity and are available with a choice of filtration media to suit a range of aqueous and organic samples. The devices are autoclavable and sterile options are available.

Polydisc AS

The Polydisc AS (Aqueous Solution) family of 50 mm filter devices feature a high throughput polyethersulfone membrane, which has low protein binding and no surfactants, developed for use in the pharmaceutical industry. A glass microfiber prefilter extends the life of the membrane and effectively filters heavily contaminated samples. Each Polydisc AS device has a sterility cap on the outlet and is sealed in its own 'medical grade' clear blister pack, irradiation sterilized and secured in a protective shelf pack.

Features and Benefits

- Radiation sterilized. No EtO residuals.
- Barbed hose connections fit multiple tubing sizes
- Integrity-testable (bubble point method)
- Lightweight (11.5 grams); avoids the collapsing of tubing which can be caused by heavy filter devices

Applications

- Tissue culture media
- Reagent preparation
- Particle counting solutions
- Pharmaceutical preparations

Typical Data - Polydisc AS

Description	Pore Size (µm)	Air Flow Rate (SLPM) 1.0 bar (14.5 psi)	Water Flow Rate* mL/min @ 0.7 bar (10 psi)
Polydisc AS	0.2 (GMF/PES)	-	150
Polydisc AS	0.45 (GMF/PES)	-	225
Polydisc AS	1.0 (GMF/Nylon)	-	625

* Liquid rating. Retention efficiency in gas streams is significantly higher
GMF – Glass microfiber filter
PES – Polyethersulfone
SLPM – Standard liters per minute

Polydisc TF

This device features a PTFE membrane which is ideal for chemically aggressive solutions, reagents and organic solvents. This lightweight unit is particularly suitable for protective vents and for in-line 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 (multiple)
- Integrity-testable (bubble point or water breakthrough pressure ‘in situ’ methods)
- Biosafe
- Lightweight (11.5 grams); avoids the collapsing of tubing which can be caused by heavy filter devices

Applications
- Pharmaceutical: vents and in-line applications
- Biotech: sterile vents and exhausts for growth environments, in-line sterilization
- Laboratory: clean or sterile gases, solvents, reagents, drying gases
- Electronics: photoresists, solvents, gases for research

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Typical Data - Polydisc TF

Description	Pore Size (µm)	Integrity Test Data* Methanol Bubble Point (bar)	(psi)	Water Breakthrough (bar)	(psi)	Flow Rates* Methanol mL/min at 0.7 bar (10 psi)	Air SLPM at 0.2 bar (3 psi)
Polydisc TF	0.1	1.7	25	3.4	50	200	8
Polydisc TF	0.2	0.9	13	2.1	30	400	16
Polydisc TF	0.45	0.5	7	1.1	16	700	24
Polydisc TF	1.0	0.2	3	0.3	5	900	30

* Typical values

Polydisc HD

Excellent flow rate characteristics and ideal for filtering large volumes to 1 liter of aqueous and solvent samples. Polydisc HD 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 SPF

Contains a unique stack of filter media ideal for prefiltration of serum and other hard-to-filter solutions. Contains a glass microfiber and polysulfone membrane filter stack that effectively filters the complex particulates found in serum samples.

Applications
- Virology, microbiology and tissue culture laboratories
- Immunoassay methods and diagnostic standards/controls

Typical Data - Polydisc HD/SPF

Description	Pore Size (µm)	Air Flow Rate (SLPM) 1.0 bar (14.5 psi)	Water Flow Rate* mL/min 1.0 bar (14.5 psi)
Polydisc HD	5.0	110	1500
Polydisc HD	10.0	140	2200
Polydisc SPF	1.0	-	500

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

Polydisc GW

Polydisc GW 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.

It has everything that makes the preparation of aqueous solutions for the analysis of dissolved heavy metals easy: A large filter surface, quartz fiber prefilter and membrane filter in sandwich arrangement and a high soil absorption capacity. And, of course, it meets all the requirements of regulations such as NEN, EPA.

Typical Data - Polydisc GW

Housing	Polypropylene
Membrane Type	0.45 µm polyamide (nylon)
Prefilter	100% quartz fiber
Filtration Diameter	52 mm
Filtration Area	20.4 cm^2
Dead Volume	220 µL
Filling Volume	540 µL
Maximum Pressure	4.5 bar
Connections	Tubing nozzle 6-14 mm
Max. Operating Temperature	80º C

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Ordering Information - Polydisc Filters

Catalog Number	Prefilter/Membrane	Pore Size (µm)	Quantity/Pack
Polydisc AS			
6724-5002	GMF/PES sterile	0.2	10
6724-5045	GMF/PES sterile	0.45	10
6724-5010	GMF/Nylon sterile	1.0	10
Polydisc TF			
6720-5001	NA/PTFE	0.1	10
6720-5002	NA/PTFE	0.2	10
6720-5045	NA/PTFE	0.45	10
6721-5010	PP/PTFE	1.0	10
Polydisc SPF			
6724-5000	GMF/GF/Polysulfone	1.0	10
Polydisc HD			
6728-5050	NA/Polypropylene	5.0	10
6728-5100	NA/Polypropylene	10.0	10
Polydisc GW			
10 463 400	Quartz fiber/Nylon	0.45	20
10 463 401	Quartz fiber/Nylon	0.45	50

In-line connection
- Polydisc AS, TF, SPF accepts 6-10 mm ID hose
- Polydisc GW accepts 6-14 mm ID hose

NA – Not available

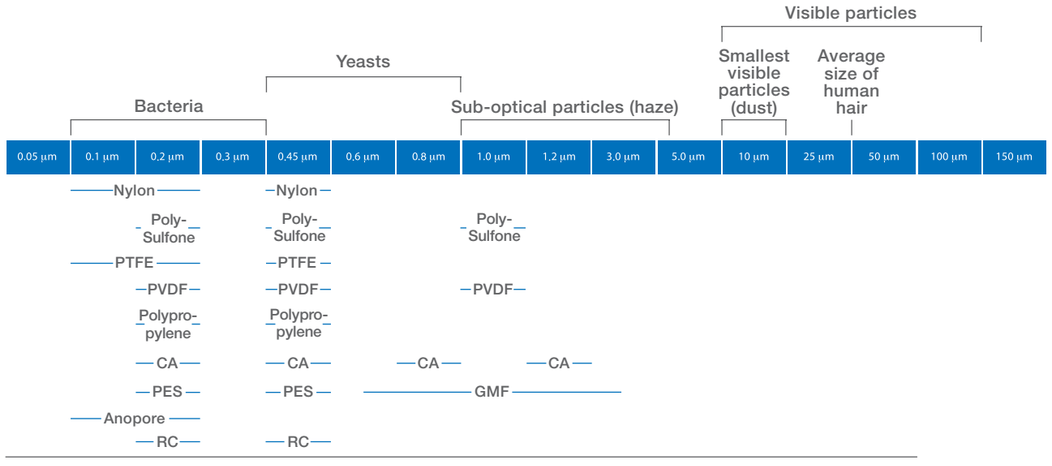
Syringe Filters

Whatman offers a complete line of disposable syringe filter devices designed to provide fast and efficient filtration of aqueous and organic solutions. They are made with a wide variety of different membrane filters with a polypropylene housing using the most advanced methods and design features available today. These syringe filters are ideal for numerous applications in pharmaceutical, environmental, biotechnology, food/beverage and agricultural testing laboratories.

Whatman syringe filters are composed of a pure polypropylene housing, heat sealed without the use of glues or sealants.

Product Overview - Syringe Filters

Filters	Diameter (mm)	Features	Media
Anotop	10, 25	• Made of Anopore membrane	Anopore
Anotop Plus	10, 25	• Made with glass microfiber prefilter • For difficult-to-filter solutions	Anopore
Anotop IC	10, 25	• Suitable for Ion Chromatography • Low levels of anion leaching	Anopore
ZC	13	• Designed to be Zymark compatible (ZC) for automated robotic systems	CA, GMF, PTFE, PP, PS, 934-AH
Puradisc	4, 13, 25, 30	• Designed for manual operation	PTFE, Nylon, PP, PS, CA, CN PVDF, glass microfiber
GD/X	13, 25	• Contains unique prefiltration stack of Whatman GMF 150 and Grade GF/F • 3x flow rates compared to unprotected membrane	CA, PTFE, Nylon, PP, PS, PVDF, glass microfiber
GD/XP	25	• Contains proprietary polypropylene prefiltration stack • Suitable for inorganic ion analysis	Nylon, PVDF, PP, PES, PTFE and Depth Polypropylene
Roby 25	25	• Designed to be compatible with the major dissolution test systems	CA, Nylon, RC and glass microfiber
SPARTAN	13, 30	• Optimized for HPLC sample prep HPLC certified, batch certificate can be downloaded. Compatible with organic and aqueous solvents	RC
ReZist	13, 30	• Inlet PTFE for HPLC sample prep	PTFE



Syringe filters are available in 4, 10, 13, 25 and 30 mm sizes – not all combinations may be available.

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Anotop® Syringe Filters

Anotop disposable syringe filters are designed for use with most organic solvents and aqueous materials and are suitable for sample volumes up to 100 mL. The devices feature a distinctive hexagonal housing, produced from pigment-free polypropylene to eliminate sample contamination. No wetting agents or adhesives are used in the manufacturing process.

Anotop syringe filters contain the unique Anopore membrane and are supplied in three pore sizes. Glass microfiber prefilter versions are available for difficult-to-filter samples.

Anotop 10

Features and Benefits

- 10 mm diameter syringe filter
- Inorganic membrane
- Capillary pore structure
- Made from Gamma-Alumina 6 mm Al_2O_3
- Low protein binding
- Sample volume up to 10 mL
- Low hold up volume <20 µL ensures maximum sample recovery
- Sterile formats available for critical applications

Anotop 10

Anotop 10 Plus

The Anotop 10 Plus syringe filter offers the added benefit of an integral glass microfiber prefilter. This unit is designed to enable difficult and hard-to-filter solutions to be filtered without adversely affecting the filtration efficiency of the final membrane. This can eliminate the need for sample cleanup or expensive and time-consuming sequential filtration.

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Anotop 25

Features and Benefits
- 25 mm diameter syringe filter
- 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

Anotop 25

Anotop 25 Plus

Contains a glass microfiber prefilter.

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

Anotop IC

Whatman Anotop IC syringe filters are specifically designed for the preparation of samples for subsequent Ion Chromatography and HPLC analysis. These devices ensure very low levels of anion leaching for ion chromatography testing.

Features and Benefits
- 10 mm and 25 mm diameter syringe filters
- Better consistency of analytical results and extended column life
- Certified and guaranteed low levels of anion leaching mean better results

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Applications
- Ion chromatography sample preparation
- HPLC sample preparation

Safety
High pressures can be achieved when using syringes. The smaller the syringe the higher the pressure that can be generated. As a general guide, the following pressures can be achieved by hand with the syringes indicated: 20 mL – 30 psi; 10 mL - 50 psi; 5 mL - 75 psi; 3 mL - 100 psi; 1 mL - 150 psi. Each user should determine the pressure they can generate by hand with a specific size syringe and take appropriate safety precautions not to exceed the recommended rating for the device used. If these limitations are exceeded, bursting of the device may occur.

Typical Data - Auotop Syringe Filters

	Anotop 10	Anotop 10 Plus	Anotop 25	Anotop 25 Plus
Housing	Polypropylene	Polypropylene	Polypropylene	Polypropylene
Filtration Area	0.78 cm^2	0.78 cm^2	4.78 cm^2	4.78 cm^2
Maximum Pressure	100 psi	100 psi	100 psi	100 psi
Volume 'Hold Up'	<20 µL	<30 µL	<150 µL	<200 µL
Prefilter Type	N/A	Glass microfiber (binderless)	N/A	Glass microfiber (binderless)
Membrane Diameter	10 mm	10 mm	25 mm	25 mm
Membrane Type	Anopore	Anopore	Anopore	Anopore
Average Membrane Thickness	60 µm	60 µm	60 µm	60 µm
Device width	14 mm	14 mm	31 mm	31 mm
Device Length	18 mm	18 mm	25 mm	25 mm
Device Shape	Hexagonal	Hexagonal	Hexagonal	Hexagonal
Construction Process	Thermal weld	Thermal weld	Thermal weld	Thermal weld
Inlet Connection	Female luer lock	Female luer lock	Female luer lock	Female luer lock
Outlet Connection	Male slip luer	Male slip luer	Male slip luer	Male slip luer
Protein Adsorption	Low	Medium/high	Low	Medium/high
Extractable Materials	Low	Low	Low	Low
Cytotoxicity	Non-cytotoxic	Non-cytotoxic	Non-cytotoxic	Non-cytotoxic

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Filtration Devices

	Anotop 10 IC	Anotop 25 IC
Housing	Polypropylene	Polypropylene
Filtration Area	0.78 cm^2	4.78 cm^2
Maximum Pressure	100 psi	100 psi
Volume 'Hold Up' with Air Purge	<20 µL	<150 µL
Membrane Diameter	10 mm	25 mm
Construction Process	Thermal weld	Thermal weld
Extractable Materials	Negligible	Negligible
Average Membrane Thickness	60 µm	60 µm
Device Width	14 mm	31 mm
Device Length	18 mm	25 mm
Inlet Connection	Female luer lock	Female luer lock
Outlet Connection	Male slip luer	Male slip luer
Membrane Type	Anopore	Anopore

Typical Data - Anotop Syringe Filters

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

Typical average anion leaching levels in 18 M W-cm (Meg Ohm-cm). Water at 20º C.

Ordering Information - Anotop Syringe Filters

Catalog Number	Membrane	Pore Size (µm)	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/Pack
Anotop 10						
6809-1002	Anopore	0.02	Yes	Low	Very Good	50
6809-1012	Anopore	0.1	Yes	Low	Very Good	50
6809-1022	Anopore	0.2	Yes	Low	Very Good	50
6809-1102	Anopore Sterile	0.02	Yes	Low	Very Good	50
6809-1112	Anopore Sterile	0.1	Yes	Low	Very Good	50
6809-1122	Anopore Sterile	0.2	Yes	Low	Very Good	50

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Catalog Number	Membrane	Pore Size (µm)	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/Pack
Anotop 10 Plus						
6809-3002	Anopore with Prefilter	0.02	Yes	Medium	Very Good	50
6809-3012	Anopore with Prefilter	0.1	Yes	Medium	Very Good	50
6809-3022	Anopore with Prefilter	0.2	Yes	Medium	Very Good	50
6809-3102	Anopore with Prefilter Sterile	0.02	Yes	Medium	Very Good	50
6809-3112	Anopore with Prefilter Sterile	0.1	Yes	Medium	Very Good	50
6809-3122	Anopore with Prefilter Sterile	0.2	Yes	Medium	Very Good	50
Anotop 25						
6809-2002	Anopore	0.02	Yes	Low	Very Good	50
6809-2012	Anopore	0.1	Yes	Low	Very Good	50
6809-2022	Anopore	0.2	Yes	Low	Very Good	50
6809-2024	Anopore	0.2	Yes	Low	Very Good	200
6809-2102	Anopore Sterile	0.02	Yes	Low	Very Good	50
6809-2112	Anopore Sterile	0.1	Yes	Low	Very Good	50
6809-2122	Anopore Sterile	0.2	Yes	Low	Very Good	50
Anotop 25 Plus						
6809-4002	Anopore with Prefilter	0.02	Yes	Medium	Very Good	50
6809-4012	Anopore with Prefilter	0.1	Yes	Medium	Very Good	50
6809-4022	Anopore with Prefilter	0.2	Yes	Medium	Very Good	50
6809-4024	Anopore with Prefilter	0.2	Yes	Medium	Very Good	200
6809-4102	Anopore with Prefilter Sterile	0.02	Yes	Medium	Very Good	50
6809-4112	Anopore with Prefilter Sterile	0.1	Yes	Medium	Very Good	50
6809-4122	Anopore with Prefilter Sterile	0.2	Yes	Medium	Very Good	50
Anotop 10 IC						
6809-9233	Anopore	0.2	Yes	Low	Very Good	100
6809-9234	Anopore	0.2	Yes	Low	Very Good	200
Anotop 10 IC Blister						
6809-9232	Anopore	0.2	Yes	Low	Very Good	50
6809-9235	Anopore	0.2	Yes	Low	Very Good	250
Anotop 25 IC						
6809-9244	Anopore	0.2	Yes	Low	Very Good	200

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GD/X® Syringe Filters

Whatman GD/X disposable syringe filters are the ideal choice for the preparation of hard-to-filter samples. The syringe filters have a pigment-free polypropylene housing to eliminate sample contamination and contain a unique prefiltration stack of Whatman GMF 150 (graded density) and GF/F glass microfiber media, which allows you to filter even the most difficult samples with less hand pressure. Compared to an unprotected membrane, GD/X syringe filters can process three to seven times more sample volume.

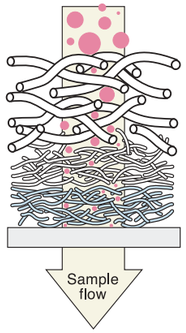
GMF 150 (graded density) and GF/F are produced from 100% borosilicate glass microfiber. The unique, graded density GMF 150 medium has a coarse top layer meshed with a fine layer beneath that retains particles to 1.0 µm. A GF/F filter then retains particles down to 0.7 µm. Below the prefilter stack is the final membrane. This provides exceptionally good loading capacity with fast flow rates and avoids the build up of back pressure often experienced through 'blocking' of an unprotected membrane.

Features and Benefits

- 13 mm and 25 mm diameter syringe filters
- 13 mm device for samples up to 10 mL and 25 mm device for samples larger than 10 mL
- Sterile options available

Applications

- Hard-to-filter heavily particulate laden samples
- Dissolution testing
- Content uniformity
- Concentration analysis
- Routine sample preparation
- Food analysis
- Environmental samples
- Composite assay



GD/X syringe filters contain four filtration layers which substantially reduce blockage and increase volume throughput

Layers 1 & 2
Glass microfiber prefilter
GMF 150 (graded density)
filters from 10 µm to 1 µm

Layer 3
Glass microfiber prefilter
GF/F filters down to 0.7 µm

Layer 4
Membrane filter
Nylon, PVDF, PTFE, etc.
Filters down to 0.45 µm or 0.2 µm

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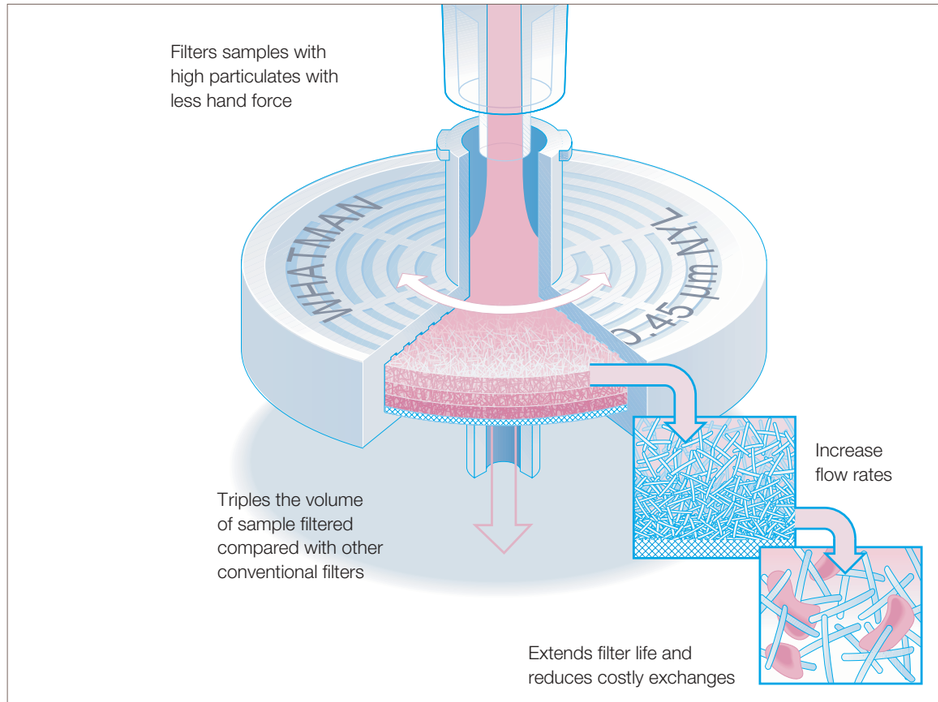
Safety
High pressures can be obtained when using syringes. The smaller the syringe the higher the pressure that can be generated. As a general guide, the following pressures can be achieved by hand with the syringes indicated: 20 mL - 30 psi; 10 mL - 50 psi; 5 mL - 75 psi; 3 mL - 100 psi; 1 mL - 150 psi. Each user should determine the pressure they can generate by hand with a specific size syringe and take appropriate safety precautions not to exceed the recommended rating for the device used. If these limitations are exceeded, bursting of the device may occur.



Typical Data - GD/X Syringe Filters

	GD/X 13 mm	GD/X 25 mm
Housing	Polypropylene (pigment free)	Polypropylene (pigment free)
Filtration Area	1.3 cm^2	4.6 cm^2
Maximum Pressure	100 psi	75 psi
Volume 'Hold Up' Full Housing	0.5 mL	1.4 mL
with Air Purge	50 µL (approx)	250 µL (approx)
Dimensions	21.7 mm x 29.7 mm	21.7 mm x 29.7 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 slip luer	Male slip luer
Sterilization	Autoclave at 121º C (131º C max)	Autoclave at 121º C (131º C max)
	at 15 psi for 20 minutes*	at 15 psi for 20 minutes*
Biosafe	All materials pass USP Class VI	All materials pass USP Class VI
Glass Microfiber	100% borosilicate	100% borosilicate
Prefiltration Media	GMF 150 10 µm : 1 µm	GMF 150 10 µm : 1 µm
	GF/F 0.7 µm	GF/F 0.7 µm

* Not recommended for nylon

Ordering Information - GD/X Syringe Filters

Catalog Number	Description	Quantity/Pack
13 mm		
6871-1302	13GD/X 0.2 µm NYL	1500
6871-1304	13GD/X 0.45 µm NYL	1500
6873-1304	13GD/X 0.45 µm PVDF	1500
6875-1302	13GD/X 0.2 µm PTFE	1500
6875-1304	13GD/X 0.45 µm PTFE	1500
6876-1304	13GD/X 0.45 µm PSU	150
6880-1302	13GD/X 0.2 µm CA	150
6882-1316	13GD/X 1.6 µm GF/A	150
6884-1310	13GD/X 1.0 µm GF/B	150
6886-1312	13GD/X 1.2 µm GF/C	150
6888-1327	13GD/X 2.7 µm GF/D	150
25 mm Non-Sterile		
6869-2502	25GDX 0.2 µm NYL-S*	150
6869-2504	25GDX 0.45 µm NYL-S*	150
6871-2550	25GDX 5.0 µm NYL	1500
6873-2502	25GD/X 0.2 µm PVDF	1500
6875-2502	25GD/X 0.2 µm PTFE	1500
6882-2516	25GD/X 1.6 µm GF/A	150

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Catalog Number	Description	Quantity/Pack
6883-2516	25GD/X 1.6 µm GF/A	1500
6884-2510	25GD/X 1.0 µm GF/B	150
6886-2512	25GD/X 1.2 µm GF/C	150
6892-2515	25GD/X 1.5 µm 934AH	150
6904-2502	25GD/X 0.2 µm PES	150
6904-2504	25GD/X 0.45 µm PES	150
6905-2502	25GD/X 0.2 µm PES	1500
6905-2504	25GD/X 0.45 µm PES	1500
25 mm Sterile		
6897-2502	25GD/XS 0.2 µm PES	500
6902-2504	25GD/XS 0.45 µm GMF	50

* Membrane – nylon/borosilicate

GD/XP Syringe Filters

Whatman GD/XP disposable syringe filters are ideal 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 a choice of membrane, which is positioned below the prefilter stack.

Applications

- HPLC sample preparation
- Trace metal analysis

Safety

High pressures can be achieved when using syringes. The smaller the syringe the higher the pressure that can be generated. As a general guide, the following pressures can be achieved by hand with the syringes indicated: 20 mL - 30 psi; 10 mL - 50 psi; 5 mL - 75 psi; 3 mL - 100 psi; 1 mL - 150 psi. Each user should determine the pressure they can generate by hand with a specific size syringe and take appropriate safety precautions not to exceed the recommended rating for the device used. If these limitations are exceeded, bursting of the device may occur.

Typical Data - GD/XP Syringe Filters

	GD/XP 25 mm
Housing	Polypropylene (pigment free)
Filtration Area	4.6 cm^2
Maximum Pressure	75 psi
Volume 'Hold Up' Full Housing	1.4 mL with air purge 250 µL (approx)
Dimensions	21.7 mm x 29.7 mm
Weight	3 g (approx)
Flow Direction	Flow should enter from the inlet
Inlet Connection	Female luer lock
Outlet Connection	Male slip luer
Sterilization	Autoclave at 121º C (131º C max) at 15 psi for 20 minutes*
Biosafe	All materials pass USP Class VI
Prefiltration Media	PP 20 µm: 5 µm

* Not recommended for nylon

Ordering Information - GD/XP Syringe Filters

Catalog Number	Membrane	Pore Size (µm)	Diameter (mm)	Hydrophilic	Solvent Resistance	Quantity/Pack
6970-2504	Nylon	0.45	25	Yes	Good	150
6971-2504	Nylon	0.45	25	Yes	Good	1500
6972-2504	PVDF	0.45	25	Yes	Good	150
6973-2504	PVDF	0.45	25	Yes	Good	1500
6974-2504	PTFE	0.45	25	No	Very Good	150
6978-2504	Polypropylene	0.45	25	No	Good	150
6993-2504	DpPP	0.45	25	No	Good	1500
6994-2504	PES	0.45	25	Yes	Poor	150
6995-2504	PES	0.45	25	Yes	Poor	1500

Puradisc™ Syringe Filters

Puradisc syringe filters are designed for the quick and efficient filtration of samples up to 100 mL volume. The syringe filters are produced from pigment free polypropylene and have standard inlet luer and outlet connectors. Puradisc 4 and Puradisc 13 are available with a special tube tip outlet that allows the sample to be accurately dispensed into a micro-vial, eliminating air lock. Sterile options are supplied in a medical-grade blister pack for critical applications.

Devices are available with a choice of membrane or glass microfiber filter media for wide sample compatibility. The media are sealed into the unit without the use of adhesives to eliminate potential sample contamination.

Puradisc™ 4

Applications
- Small volume sample preparation
- High value sample preparation

Features and Benefits
- 4 mm diameter syringe filter
- Sample volume up to 2 mL
- Low hold up volume <10 µL ensures maximum sample recovery

Puradisc 4 Syringe Filters

Puradisc™ 13

Applications
- HPLC sample preparation
- Biological sample preparation

Features and Benefits
- 13 mm diameter syringe filter
- Sample volume up to 10 mL
- Low hold up volume <25 µL ensures maximum sample recovery
- Glass microfiber options available

Puradisc 13 Syringe Filters with Tube Tip

Filtration Devices

Puradisc™ 25

Applications
- HPLC aqueous sample preparation
- Biological sample preparation
- Buffer solutions
- Salt solutions
- Tissue culture media
- Ophthalmic solutions
- Irrigation solutions
- Sterile isolation

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

Puradisc 25 Syringe Filters

Puradisc™ GW

The ready-to-use Puradisc GW filter holder with its prerinsed, hydrophilic cellulose acetate membrane has been specially developed for sample filtration and the determination of COD, TOC, DOC.

Puradisc™ FP 30

Syringe filter for aqueous solutions.

FP Membrane Types

Cellulose Acetate Membranes have an extremely low binding capacity for proteins. They are mainly used for the filtration of aqueous solutions.

Regenerated Cellulose Membranes have an excellent chemical resistance to organic solvents and can be used for the purification of both aqueous and organic solutions.

Puradisc FP 30

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Polyamide membranes are suitable for the sterile filtration or purification of alkaline solutions.

Cellulose nitrate membranes are versatile membrane filters for the filtration of aqueous solutions.

Puradisc FP Applications

Pore size	Application	Sterile	Non-Sterile
0.2 µm	Sterile filtration of aqueous solutions	x	
	Filtration of protein-containing solutions with minimal protein loss (CA)	x	x
	Sterile filtration of tissue culture solutions	x	
	Filtration of biological buffers before pH adjustment		x
	Ultrapurification of solutions		x
0.45 µm	Filtration of protein-containing solutions with minimal protein loss (CA)	x	x
	Filtration of biological solutions	x	x
	Filtration of water samples		x
	Clarification of samples		x
	Clarification under sterile conditions	x	
0.8 µm	Removal of cellular constituents from solutions		x
1.2 µm	Purification of dye and indicator liquids		x
5.0 µm	Prefiltration of solutions with a high particle load		x
	Purification of viscous solutions	x	

Safety
High pressures can be achieved when using syringes. The smaller the syringe the higher the pressure that can be generated. As a general guide, the following pressures can be achieved by hand with the syringes indicated: 20 mL - 30 psi; 10 mL - 50 psi; 5 mL - 75 psi; 3 mL - 100 psi; 7 mL - 150 psi. Each user should determine the pressure they can generate by hand with a specific size syringe and take appropriate safety precautions not to exceed the recommended rating for the device used. If these limitations are exceeded, bursting of the device may occur.

Typical Data - Puradisc Syringe Filters

	Puradisc 4	Puradisc 13	Puradisc 25
Housing	Polypropylene	Polypropylene	Polypropylene
Filtration Area	0.2 cm^2	1.3 cm^2	4.2 cm^2
Maximum Pressure	75 psi	75 psi	75 psi
Volume 'Hold Up' with Air Purge	<10 µL	<25 µL	<100 µL
Dimensions	6.2 x 20 mm	16 x 20 mm	28 x 23 mm
Weight	0.55 g (approx)	0.95 g	2.7 g

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Filtration Devices

	Puradisc 4	Puradisc 13	Puradisc 25
Volume Throughput	up to 2 mL	up to 10 mL	up to 100 mL
Inlet Connection	Female luer lock	Female luer lock	Female luer lock
Outlet Connection	Male slip luer/male tube tip	Male slip luer/male tube tip	Male slip luer
Sterilization	Autoclave at 121º C (131º C max)	Autoclave at 121º C (131º C max)	Autoclave at 121º C (131º C max)

Typical Data - Puradisc FP 30

Housing	Polycarbonate
Filtration Area	5.7 cm^2
Volume 'Hold Up' with Air Purge	<50 µL
Dimensions	34 x 26 mm
Volume Throughput	up to 100 mL
Inlet Connection	Female luer lock
Outlet Connection	Male slip luer

Ordering Information - Puradisc 4 mm Syringe Filters

Quantity/ Pack	Pore Size (µm)	Non-Sterile Without Tube Tip Membranes:				Sterile Without Tube Tip Membranes:			Sterile With Tube Tip Membranes:
		Nylon	PVDF	PTFE	PS	Nylon	PVDF	PS	PVDF
50	0.1	-	-	-	-	-	-	-	-
	0.2	-	-	-	-	6786-0402	6791-0402	6780-0402	6777-0402
	0.45	-	-	-	-	-	-	6780-0404	6777-0404
100	0.2	6789-0402	6779-0402	6784-0402	6782-0402	-	-	-	-
	0.45	6789-0404	6779-0404	6784-0404	6782-0404	-	-	-	-
500	0.2	6790-0402	6792-0402	6783-0402	-	-	-	-	-
	0.45	6790-0404	6792-0404	6783-0404	-	-	-	-	-

Ordering Information - Puradisc 13 mm Syringe Filters (Non-sterile)

Quantity/ Pack	Pore Size (µm)	Without Tube Tip Membranes:							With Tube Tip Membranes:	
		Nylon	PVDF	PTFE	PS	PP	GMF	CA	PVDF	PTFE
50	0.2	-	-	-	-	-	-	-	6777-1302	6775-1302
	0.45	-	-	-	-	-	-	-	6777-1304	6775-1304

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Quantity / Pack	Pore Size (µm)	Without Tube Tip Membranes:							With Tube Tip Membranes:	
		Nylon	PVDF	PTFE	PS	PP	GMF	CA	PVDF	PTFE
100	0.1	6789-1301	-	6784-1301	-	-	-	-	-	-
	0.2	6789-1302	6779-1302	6784-1302	6782-1302	6788-1302	-	-	-	-
	0.45	6789-1304	6779-1304	6784-1304	6782-1304	6788-1304	-	6771-1304	6796-1304	-
	1.0	-	-	6784-1310	-	-	-	-	-	-
	5.0	-	-	6784-1350	-	-	-	-	-	-
	GF/A 1.6*	-	-	-	-	-	6820-1316	-	-	-
	GF/B 1.0*	-	-	-	-	-	6821-1310	-	-	-
	GF/C 1.2*	-	-	-	-	-	6822-1312	-	-	-
	GF/D 2.7*	-	-	-	-	-	6823-1327	-	-	-
	GF/F 0.7*	-	-	-	-	-	6825-1307	-	-	-
	934-AH 1.5*	-	-	-	-	-	6827-1315	-	-	-
500	0.2	-	6792-1302	6783-1302	-	6785-1302	-	-	6760-1302	-
	0.45	-	6792-1304	6783-1304	6781-1304	6785-1304	6818-1304	-	6762-1304	-
2000	0.2	-	6765-1302	6766-1302	-	-	-	-	-	-
	0.45	-	6765-1304	6766-1304	-	-	-	6763-1304	-	-
	934 AH 1.5*	-	-	-	-	-	6816-1315	-	-	-

* Particle Retention Rating

Ordering Information - Puradisc 13 mm Syringe Filters (Sterile)

Quantity / Pack	Pore Size (µm)	Without Tube Tip Membranes:			With Tube Tip Membranes:
		Nylon	PVDF	PES	PVDF
50 pack	0.1	6786-1301	-	-	-
	0.2	6786-1302	6791-1302	6780-1302	6778-1302
	0.45	-	6791-1304	6780-1304	-

Ordering Information - Puradisc 25 mm Syringe Filters Without Tube Tip

Quantity/ Pack	Pore Size (µm)	Non-Sterile Membranes:						Sterile Membranes:
		Nylon	PVDF	PFTE	PP	AS (PES)	Glass Microfiber*	PES
50	0.1	-	-	6784-2501	-	-	-	-
	0.2	6750-2502	6746-2502	6784-2502	6786-2502	-	-	6780-2502
	0.45	6750-2504	6746-2504	6784-2504	6786-2504		-	6780-2504
	1.0	6750-2510	-	6784-2510	-	-	-	6780-2510
	0.7 GF/F	-	-	-	-	-	6825-2517	-

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Filtration Devices

Quantity/ Pack	Pore Size (µm)	Non-Sterile Membranes: Nylon	PVDF	PFTE	PP	AS (PES)	Glass Microfiber*	Sterile Membranes: PES
100	1.0 GD 1	-	-	-	-	-	6783-2510	-
	2.0 GD 2	-	-	-	-	-	6783-2520	-
200	0.2	6751-2502	-	6785-2502	6788-2502	6781-2502	-	-
	0.45	6751-2504	6747-2504	6785-2504	6788-2504	6781-2504	-	-
	1.0	6751-2510	-	-	-	6781-2510	-	-
	0.7 GF/F	-	-	-	-	-	6825-2527	-
300	0.2	-	-	-	-	6759-2502	-	-
	0.45	-	-	-	-	6759-2504	-	-
500	0.45	6752-2504	-	-	-	-	-	-
1000	0.1	-	-	6798-2501	-	-	-	-
	0.2	6753-2502	-	6798-2502	-	6794-2502	-	6794-2512
	0.45	6753-2504	6749-2504	6798-2504	-	6794-2504	-	6794-2514
	1.0	6753-2510	-	6798-2510	-	-	-	-
	1.0 GD 1	-	-	-	-	-	6792-2510	-

* Particle Retention Rating

Ordering Information - Puradisc FP30 Syringe Filters

Catalog Number	Description	Diameter (mm)	Pore Size (µm)	Membrane/ Housing	Connection[1] In/Out	Color Code	Quantity/Pack
Individually Sterile Packed							
10 462 200	FP 30 CA-S[2]	30	0.2	CA/PC	LLF/LM	red	50
10 462 205	FP 30 CA-S[2]	30	0.2	CA/PC	LLF/LLM	red	50
10 462 100	FP 30 CA-S[2]	30	0.45	CA/PC	LLF/LM	white	50
10 462 240	FP 30 CA-S	30	0.8	CA/PC	LLF/LM	green	50
10 462 260	FP 30 CA-S	30	1.2	CA/PC	LLF/LM	orange	50
10 462 000	FP 30 CN-S	30	5.0	CN/PC	LLF/LM	black	50
Non-sterile							
10 462 701	FP 30 CA	30	0.2	CA/PC	LLF/LM	red	50
10 462 710	FP 30 CA	30	0.2	CA/PC	LLF/LM	red	100
10 462 700	FP 30 CA	30	0.2	CA/PC	LLF/LM	red	500
10 462 206	FP 30 CA	30	0.2	CA/PC	LLF/LLM	red	500
10 462 601	FP 30 CA	30	0.45	CA/PC	LLF/LM	white	50
10 462 610	FP 30 CA	30	0.45	CA/PC	LLF/LM	white	100
10 462 600	FP 30 CA	30	0.45	CA/PC	LLF/LM	white	500
10 462 241	FP 30 CA	30	0.8	CA/PC	LLF/LM	green	50
10 462 243	FP 30 CA	30	0.8	CA/PC	LLF/LM	green	500
10 462 261	FP 30 CA	30	1.2	CA/PC	LLF/LM	orange	50
10 462 263	FP 30 CA	30	1.2	CA/PC	LLF/LM	orange	500

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Catalog Number	Description	Diameter (mm)	Pore Size (µm)	Membrane/ Housing	Connection[1] In/Out	Color Code	Quantity/Pack
10 462 520	FP 30 CN	30	5.0	CN/PC	LLF/LM	black	50
10 462 510	FP 30 CN	30	5.0	CN/PC	LLF/LM	black	100
10 462 500	FP 30 CN	30	5.0	CN/PC	LLF/LM	black	500
10 462 655	GW 30 CA	30	0.45	CA/PC	LLF/LM	white	100
10 462 650	GW 30 CA	30	0.45	CA/PC	LLF/LM	white	500

CA – Cellulose acetate
CN – Cellulose nitrate
GF – Glass fiber
PES – Polyethersulfone
PP – Polypropylene
PTFE – Teflon
RC – Regenerated cellulose

[1] LLF – Luer-lock female; LM – Luer male; LLM – Luer-lock male

[2] Non-pyrogenic according to LAL test (USPXXIII), sensitivity: 0.25 EU/ mL

ReZist®

For solutions and aerosol separation and venting Whatman offers ready-to-use filter units with an integral filter to retain fine contaminants.

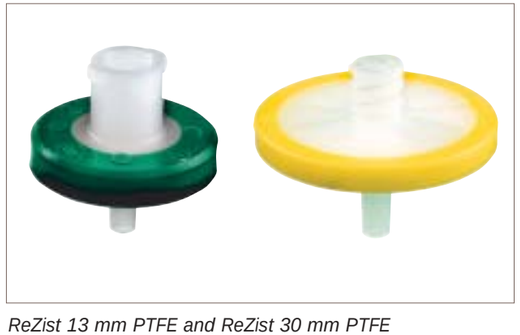
ReZist Membrane Filter Type

Hydrophobic PTFE membranes are used for the clarification of aggressive organic solvents.

ReZist for HPLC Sample Preparation

Features and Benefits

- Hydrophobic PTFE membrane laminated with polypropylene
- First-class chemical resistance against the usual organic HPLC solvents
- 13 mm diameter with Mini-Tip outlet is ideal for filtration into very small sample bottles
- 13 mm diameter with extremely low dead volume <10 µL for optimal utilization of small sample volumes



ReZist 13 mm PTFE and ReZist 30 mm PTFE

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ReZist for Air-Venting

Features and Benefits

- With integral permanently hydrophobic PTFE membranes
- With polypropylene support for extremely high resistance

Typical Applications - ReZist

Prefiltration of difficult-to-filter aqueous or organic solutions containing particles	ReZist 30/GF92
Filtration of organic solutions in HPLC	ReZist
Filtration of aggressive solutions	
1 µm membrane for prefiltration of loaded solutions	
Moisture barrier when venting	ReZist 30
Air sterilization for tubing systems	
Aerosol separation for protecting vacuum pumps	
Sterile venting of small volumes	
For the sterile venting of small fermenters and culture vessels	ReZist 50
Aerosol separation for protecting vacuum pumps	

PTFE – Teflon
GF – Glass fiber

Ordering information - ReZist

Description	Diameter (mm)	Pore Size (µm)	Membrane/ Housing*	Connection* In/Out	Color Code	Quantity/ Pack	Catalog Number	
ReZist 30/GF92	30	-	GF/PP	LLF/LLM	natural	100	10 463 543	
ReZist 30/GF92	30	-	GF/PP	LLF/LLM	natural	500	10 463 545	
ReZist 13 PTFE	13	0.2	PTFE/PP	LLF/Mini-Tip	white	100	10 463 703	
ReZist 13 PTFE	13	0.45	PTFE/PP	LLF/Mini-Tip	green	100	10 463 713	
ReZist 30 PTFE	30	0.2	PTFE/PP	LLF/LM	white	100	10 463 503	
ReZist 30 PTFE	30	0.2	PTFE/PP	LLF/LM	white	500	10 463 505	
ReZist 30 PTFE	30	0.45	PTFE/PP	LLF/LM	green	100	10 463 513	
ReZist 30 PTFE	30	0.45	PTFE/PP	LLF/LM	green	500	10 463 515	
ReZist 30 PTFE	30	1.0	PTFE/PP	LLF/LM	yellow	100	10 463 523	
ReZist 30 PTFE	30	1.0	PTFE/PP	LLF/LM	yellow	500	10 463 525	
ReZist 30 PTFE	30	5.0	PTFE/PP	LLF/LM	grey	100	10 463 533	
ReZist 30 PTFE	30	5.0	PTFE/PP	LLF/LM	grey	500	10 463 535	
ReZist PTFE-S**	30	0.2	PTFE/PP	LLW/LM	white	50	10 463 500	
ReZist PTFE-S**	30	0.45	PTFE/PP	LLW/LM	green	50	10 463 510	
ReZist PTFE-S**	30	5.0	PTFE/PP	LLW/LM	grey	50	10 463 530	
ReZist PTFE-S**	50	0.2	PTFE/PP	TN/TN	-	10	10 463 607	contd>

Description	Diameter (mm)	Pore Size (µm)	Membrane/ Housing*	Connection* In/Out	Color Code	Quantity/ Pack	Catalog Number
ReZist PTFE-S**	50	0.45	PTFE/PP	TN/TN	-	10	10 463 610
ReZist 50 PTFE	50	0.2	PTFE/PP	TN/TN	-	10	10 463 608
ReZist 50 PTFE	50	0.2	PTFE/PP	TN/TN	-	50	10 463 609
ReZist 50 PTFE	50	0.45	PTFE/PP	TN/TN	-	10	10 463 611
ReZist 50 PTFE	50	0.45	PTFE/PP	TN/TN	-	50	10 463 612

* GF – Glass fiber
** Sterile, non-pyrogenic according to LAL test (USPXXIII), sensitivity: 0.25 EU/mL
PP – Polypropylene
PTFE – Teflon
LLF – Luer-lock female; LM – Luer male; LLM – Luer-lock male
TN – Tubing nozzle 6-14 mm with luer inner cone

SPARTAN® - HPLC Certified

SPARTAN is certified batch to batch with solvents used in HPLC such as acetonitrile, methanol and water. It has the controlled and guaranteed lowest fraction of UV-absorbing extractables.

You can download your batch certificate from the internet at http://www.whatman.com/hplc-certificate. This means that the unequalled purity of each batch is documented. Simply enter the catalog number and batch number and you will receive the appropriate batch chromatogram together with the test conditions.

Features and Benefits

- Versatile use; ready-to-use filter unit with a hydrophilic, low protein binding membrane made of regenerated cellulose
- First-class chemical resistance against the most common aqueous and organic HPLC solvents
- SPARTAN 13 and 30 are tested and certified for UV-absorbing substances at wavelengths of 210 and 254 nm with water, methanol and acetonitrile; this means quality batch for batch

Application

- Filtration of organic and aqueous solutions in HPLC for achieving reproducible results

Filtration Devices

SPARTAN Membrane Filter Type
Regenerated cellulose membranes have an excellent chemical resistance to organic solvents and can be used for the purification of both aqueous and organic solutions.

SPARTAN 13

SPARTAN 30

Ordering Information - SPARTAN Syringe Filters

Description	Diameter (mm)	Pore Size (µm)	Membrane/ Housing*	Connection* In/Out	Color Code	Quantity/ Pack	Catalog Number
SPARTAN 13 RC	13	0.2	RC/PP	LLF/Mini-Tip	dark brown	100	10 463 040
SPARTAN 13 RC	13	0.2	RC/PP	LLF/Mini-Tip	dark brown	500	10 463 042
SPARTAN 13 RC	13	0.2	RC/PP	LLF/LM	dark brown	100	10 463 100
SPARTAN 13 RC	13	0.2	RC/PP	LLF/LM	dark brown	500	10 463 102
SPARTAN 13 RC	13	0.45	RC/PP	LLF/Mini-Tip	light brown	100	10 463 030
SPARTAN 13 RC	13	0.45	RC/PP	LLF/Mini-Tip	light brown	500	10 463 032
SPARTAN 13 RC	13	0.45	RC/PP	LLF/LM	light brown	100	10 463 110
SPARTAN 13 RC	13	0.45	RC/PP	LLF/LM	light brown	500	10 463 112
SPARTAN 30 RC	30	0.2	RC/PP	LLF/LM	dark brown	100	10 463 060
SPARTAN 30 RC	30	0.2	RC/PP	LLF/LM	dark brown	500	10 463 062
SPARTAN 30 RC	30	0.45	RC/PP	LLF/LM	light brown	50	10 463 053
SPARTAN 30 RC	30	0.45	RC/PP	LLF/LM	light brown	100	10 463 050
SPARTAN 30 RC	30	0.45	RC/PP	LLF/LM	light brown	500	10 463 052

* RC – Regenerated cellulose membrane
PP – Polypropylene
LLF – Luer-lock female; LM – Luer male

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Syringe Filters - Automation

Whatman offers a complete line of disposable syringe filters for automation. These devices are designed to provide fast and efficient filtration of aqueous and organic solutions. They are made with of a wide variety of membrane filters with a polypropylene housing using the most advanced methods and design features available today.

These syringe filters are compatible with Caliper Zymark and Sotax instrumentations and are ideal for numerous applications in pharmaceutical, environmental, biotechnology, food/beverage and agricultural testing laboratories. Whatman syringe filters for automation are composed of a pure polypropylene housing, heat sealed without the use of glues or sealants.

Roby 25

Filter for Automation

Roby 25 filters for robot systems have been specially developed for automatic sample preparation for the clarification of samples. A wide range of these ready-to-use filter holders fitted with various membrane filters is available. For difficult-to-filter samples, syringe filters with membrane and integral glass fiber prefilters or with glass fiber filters are available.

Roby 25

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.

Roby 25 has been optimized for Sotax and Caliper tablet testers.

Applications

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

Roby 25 Filter Validation Kit

Features and Benefits

- Eight different types of filters: eight tubes each with 25 filter holders
- Filter validation protocol with filter selection aid
- All important selection tests explained step-by-step with all the important properties at a glance

Ordering Information - Roby 25 Syringe Filters

Description	Diameter (mm)	Pore Size (µm)	Membrane/ Housing*	Connection* in/Out	Color Code	Quantity/ Pack	Catalog Number
Roby 25/GF92	25	> 1	GF/PP	LLF/LM	natural	200**	10 463 801
Roby 25/GF92	25	> 1	GF/PP	LLF/LM	natural	1000	10 463 800
Roby 25/GF55	25	0.7	GF/PP	LLF/LM	-	200	10 463 814
Roby 25/GF55	25	0.7	GF/PP	LLF/LM	-	1000	10 463 815
Roby 25 NL	25	0.45	NL/PP	LLF/LM	printed	200**	10 463 803
Roby 25 NL	25	0.45	NL/PP	LLF/LM	printed	1000	10 463 802
Roby 25 NL-GF92	25	0.45	NL-GF/PP	LLF/LM	yellow	200**	10 463 805
Roby 25 NL-GF92	25	0.45	NL-GF/PP	LLF/LM	yellow	1000	10 463 804
Roby 25 RC	25	0.45	RC/PP	LLF/LM	printed	200**	10 463 807
Roby 25 RC	25	0.45	RC/PP	LLF/LM	printed	1000	10 463 806
Roby 25 RC-GF92	25	0.45	RC-GF/PP	LLF/LM	brown	200**	10 463 809
Roby 25 RC-GF92	25	0.45	RC-GF/PP	LLF/LM	brown	1000	10 463 808
Roby 25 CA-GF92	25	0.45	CA-GF/PP	LLF/LM	green	200**	10 463 813
Roby 25 CA-GF92	25	0.45	CA-GF/PP	LLF/LM	green	1000	10 463 812
Filter Validation Kit [1]						200	10 463 898

[1] Kit includes: Roby 25/GF92; Roby 25/GF55; Roby 25/RC; Roby 25/RC-GF92; Roby 25 NL; Roby 25 NL-GF92; Roby 25 CA; Roby 25 CA-GF92.
* CA – Cellulose acetate
GF – Glass fiber
PP – Polypropylene
NYL – Nylon
RC – Regenerated cellulose
LLF – Luer-lock female; LM – Luer male
** 8 tubers with 25 pieces each

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ZC

Filters for Automation

ZC disposable robotic/syringe filters are designed to be fully compatible with the Caliper Life Sciences Benchmate and other Caliper robotic systems. The ZC syringe filters feature a polypropylene housing and contain a prefilter stack of Whatman graded density Multigrade GMF 150 and GF/F glass microfiber, which increases loading capacity and significantly reduces back pressure when difficult samples are filtered.

These devices offer an effective alternative to single layer devices and prevent premature membrane clogging.

Features

- 13 mm diameter syringe filters
- For sample volumes up to 10 mL
- High loading capacity for difficult samples
- Choice of membranes and pore sizes available for wide sample compatibility
- Suitable for manual and automated processes

Applications

- Automated sample filtration
- Tablet dissolution tests

Typical Data - ZC Syringe Filters

	13 mm ZC
Housing	Polypropylene
Dimensions	21.7 mm x 29.7 mm
Weight	3 g (approx)
Filtration Area	1.3 cm^2
Glass Microfiber	100% borosilicate
Maximum Pressure	100 psi
Volume ‘Hold Up’	0.5 mL
Full Housing with Air Purge	50 µL (approx)
Inlet Connection	Female slip luer
Outlet Connection	Male slip luer
Prefiltration Media	GMF 150 10 µm : 1 µm and GF/F 0.7 µm
Sterilization	Autoclave at 121ºC (max 131ºC) at 15 psi for 20 minutes
Biosafe	All materials pass USP Class VI

Ordering Information - ZC Syringe Filters

Catalog Number	Membrane	Pore Size (µm)	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/ Pack
13 mm ZC Syringe Filters						
6840-1304	Nylon	0.45	Yes	High	Good	200
6841-1302	Nylon	0.2	Yes	High	Good	1000
6842-1304	PVDF	0.45	Yes	Low	Good	200
6843-1304	PVDF	0.45	Yes	Low	Good	1000
6844-1302	PTFE	0.2	No	Low	Excellent	200
6844-1304	PTFE with Prefilter	0.45	No	Low	Excellent	200

Syringeless Filters

Whatman syringeless filters are pre-assembled convenient filtration devices for removing particulates from samples. They replace syringe-coupled filtration devices with single, disposable units. Whatman has made sample preparation easier, faster and more efficient with its innovative product line of syringeless filters.

Autovial™ Syringeless Filters

Autovial syringeless filters 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 and, 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 saves time. No assembly required – easier to load.
- Choice of filter media. Compatible with a wide range of sample types.
- Ideal for hazardous samples. Self contained device eliminates risk of filter pop-off.
- Built-in air purge maximizes sample recovery
- Sterile option available to maintain sample integrity
- Unique prefilter design for difficult-to-filter samples

Autovial membranes are available for various applications:

- CA: Cellulose Acetate - low non-specific 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 3-10
- PTFE: Polytetrafluorethylene - Teflon® membrane for samples with > 50% organic solvent
- PVDF: Polyvinylidene Fluoride - low non-specific protein binding membrane for samples in aqueous solutions and/or organic solvents
- PSU: Polysulfone – low non-specific protein binding membrane for samples in aqueous solutions

Patent # 4,859,336

Typical Data - Autovial Syringeless Filters

	Autovial 5	Autovial 12
Housing	Polypropylene	Polypropylene
Filtration Area	1.7 cm^2	3.0 cm^2
Capacity	5 mL	12 mL
Volume 'Hold Up'	30 µL	140 µL
Outlet Connection	Male slip luer	Male slip luer
Autoclavable	121° C for 20 minutes	121° C for 20 minutes

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Ordering Information - Autovial Syringeless Filters

	Catalog Number	Membrane	Pore Size (µm)	Sterile	Quantity/Pack
Autovial 5					
	AV115NPEORG	PTFE	0.2	No	50
	AV115NPUORG	PTFE	0.45	No	50
	AV115NPUNYL	Nylon	0.45	No	50
	AV115UGMF	GMF	0.45*	No	50
	AV115NPUAQU	PVDF	0.45	No	50
Autovial 12					
	AV125UGMF	GMF	0.45*	No	50
	AV125ENAO	Nylon	0.2	No	50
	AV125SNAO	Nylon	0.2	Yes	40
	AV125SORG	PTFE	0.2	Yes	40
	AV125SAQU	PVDF	0.2	Yes	40
	AV125UNAO	Nylon	0.45	No	50
	AV125EPP	PP	0.2	No	50
	AV125EORG	PTFE	0.2	No	50
	AV125UORG	PTFE	0.45	No	50
	AV125EAQU	PVDF	0.2	No	50
	AV125UAQU	PVDF	0.45	No	50
	AV125UCA	CA	0.45	No	50
	AV125NPUAQU**	PVDF	0.45	No	50
	AV125NPUPSU**	PSU	0.45	No	50
	AV525UORG	PTFE	0.45	No	1000
	AV525UAQU	PVDF	0.45	No	1000
	AV525UNAO	Nylon	0.45	No	1000
	AV525BGMF	GF/B	1.0	No	1000
	AV125UPP	AV12	0.45	PP	50
	AV12URCT	AV12	0.45	GMF	75
Autovial Accessories					
Autovial Stand - 4 mL Vial Size	AVST25040				4

* Particle retention rating
** No prefilters

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Mini-UniPrep™ Syringeless Filters

Simple, Innovative, Convenient

The Whatman Mini-UniPrep syringeless filters, now with a new durable plastic cap, provide a faster, easier way to remove particulates from samples being prepared for High Performance Liquid Chromatography (HPLC) analysis. In fact, Mini-UniPrep lets you prepare samples in one third the time required by other methods. Add up the time savings, plus the money saved from cutting multiple consumables out of the sample preparation process and you'll see huge benefits for your laboratory.

Mini-UniPrep

Mini-UniPrep is a pre-assembled filtration device consisting of a 0.4 mL capacity chamber and a plunger. The plunger contains a filtration membrane at one end and a pre-attached cap/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 approved autosampler for injection into your instrument.

The device can be used either manually or with one of the compressor units available. The new multi compressor can process up to 6 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 designed to accommodate 12 x 32 mm vials. Alternatively the septum can be pierced with a needle and the sample drawn off for manual injection into an analyzer.

Mini-UniPrep Automated

Features and Benefits

- All-in-one filtration process allows you to process sample loads in one-third 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 required - lower costs by up to 40 percent

Six Position Compressor

Applications

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

Filtration Devices

A Variety of Mini-UniPrep Filters to Meet Your Needs

In a process of continuous improvement and innovation, Whatman has listened to customers and created a whole family of Mini-UniPrep filters to meet specific needs. For customers using robotics to maximize throughput, Whatman offers Slit Septa Mini-UniPrep. For customers who need to filter light sensitive samples, there is Amber Mini-UniPrep.

Amber Mini-UniPrep Syringeless Filter

Protects samples from UV damage.

Features and Benefits

- Amber colorant prevents photo degradation of light sensitive samples
- Same colorant used in pharmaceutical containers designed to meet USP 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

Amber Mini-Uniprep

Slit Septa Mini-UniPrep Syringeless Filter

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.

Applications

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

Mini-Uniprep HPLC Instrument

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Choose the Right Mini-UniPrep Filtering Media

Sample Type	Suitable Mini-UniPrep Media
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	Polyethersulfone (PES)
Aqueous/organic solvents-low non-specific protein binding media	Polyvinylidene fluoride (PVDF)
Aqueous/organic solvents-high flow and loading capacity	Polypropylene Depth (dpPP)

Typical Data - Mini-UniPrep Syringeless Filters

Dimensions	Equivalent in size to 12 mm x 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 Syringeless Filters

Catalog Number	Pore Size (µm)	Media	Quantity/Pack
Standard Cap - Translucent Housing			
UN203NPEAQU	0.2	PVDF	100
UN203NPENYL	0.2	Nylon	100
UN203NPEORG	0.2	PTFE	100
UN203NPEPES	0.2	PES	100
UN203NPEPP	0.2	PP	100
UN203NPUAQU	0.45	PVDF	100
UN203NPUDPP	0.45	Dp PP	100
UN203NPUGMF	0.45	GMF	100
UN203NPUNYL	0.45	Nylon	100
UN203NPUORG	0.45	PTFE	100
UN203NPUPES	0.45	PES	100
UN203NPUPP	0.45	PP	100
UN503NPEAQU	0.2	PVDF	1000
UN503NPENYL	0.2	Nylon	1000
UN503NPEORG	0.2	PTFE	1000
UN503NPEPES	0.2	PES	1000

contd >

Filtration Devices

Catalog Number	Pore Size (µm)	Media	Quantity/Pack
Slit Septa for Automated Samples - Translucent Housing			
UN203NPERC	0.2	RC	100
UN503NPERC	0.2	RC	1000
UN503NPEPP	0.2	PP	1000
UN203NPURC	0.45	RC	100
UN503NPURC	0.45	RC	1000
UN503NPUAQU	0.45	PVDF	1000
UN503NPUDPP	0.45	Dp PP	1000
UN503NPUGMF	0.45	GMF	1000
UN503NPUNYL	0.45	Nylon	1000
UN503NPUORG	0.45	PTFE	1000
UN503NPUPES	0.45	PES	1000
UN503NPUPP	0.45	PP	1000
US203NPEAQU	0.2	PVDF	100
US203NPENYL	0.2	Nylon	100
US203NPEORG	0.2	PTFE	100
US203NPEPES	0.2	PES	100
US203NPEPP	0.2	PP	100
US203NPUAQU	0.45	PVDF	100
US203NPUDPP	0.45	Dp PP	100
US203NPUGMF	0.45	GMF	100
US203NPUNYL	0.45	Nylon	100
US203NPUORG	0.45	PTFE	100
US203NPUPES	0.45	PES	100
US203NPUPP	0.45	PP	100
US503NPEAQU	0.2	PVDF	1000
US503NPENYL	0.2	Nylon	1000
US503NPEORG	0.2	PTFE	1000
US503NPEPES	0.2	PES	1000
US503NPEPP	0.2	PP	1000
US503NPUAQU	0.45	PVDF	1000
US503NPUDPP	0.45	Dp PP	1000
US503NPUGMF	0.45	GMF	1000
US503NPUNYL	0.45	Nylon	1000
US503NPUORG	0.45	PTFE	1000
US503NPUPES	0.45	PES	1000
US503NPUPP	0.45	PP	1000

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Catalog Number	Pore Size (µm)	Media	Quantity/Pack
Amber for Light Sensitive Samples - Standard Cap			
UN203APEAQU	0.2	PVDF	100
UN203APENYL	0.2	Nylon	100
UN203APEORG	0.2	PTFE	100
UN203APEPES	0.2	PES	100
UN203APEPP	0.2	PP	100
UN203APUAQU	0.45	PVDF	100
UN203APUDPP	0.45	Dp PP	100
UN203APUGMF	0.45	GMF	100
Amber for Light Sensitive Samples			
Slit Septa Cap			
UN203APUNYL	0.45	Nylon	100
UN203APUORG	0.45	PTFE	100
UN203APUPES	0.45	PES	100
UN203APUPP	0.45	PP	100
Six Position Compressor Accessory			
CR0000006			1

UniPrep® Syringeless Filters

UniPrep syringeless filters 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.

Features and Benefits

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

Applications
- Sample preparation
- Difficult-to-filter samples
- Quick filtration of samples

The UniPrep syringeless filter is selected based on compatibility with the sample in use. In manual operation, the filter-plunger, after the tip comes in contact with the liquid, 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 for various applications:

- GMF: Layered glass microfiber depth filter for use with samples containing aqueous organic solvents
- NYL: Naturally hydrophilic membrane for filtration of samples containing aqueous or organic solvents with a pH range of 3-10
- PTFE: Chemically inert Teflon 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

Typical Data - UniPrep Syringeless Filters

Housing	Polypropylene
Filtration Area	0.3 cm^2
Capacity	1–5 mL
Volume 'Hold Up'	50 µL
Autoclavable	121° C for 20 minutes

Ordering Information - UniPrep Syringeless Filters

Catalog Number	Membrane	Pore Size (µm)	Sterile	Quantity/Pack
UN113EORG	PTFE	0.2	No	50
UN113UORG	PTFE	0.45	No	50
UN113UNYL	Nylon	0.45	No	50
UN113UGMF	GMF	0.45*	No	50
UN113EAQU	PVDF	0.2	No	50
UN113UAQU	PVDF	0.45	No	50
UN113ENYL	Nylon	0.2	No	50

* Particle Retention Rating

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Vacuum Protection Filters

VACU-GUARD™
These easy-to-use in-line filter devices help to confine and isolate infectious materials in vacuum systems and protect your laboratory.

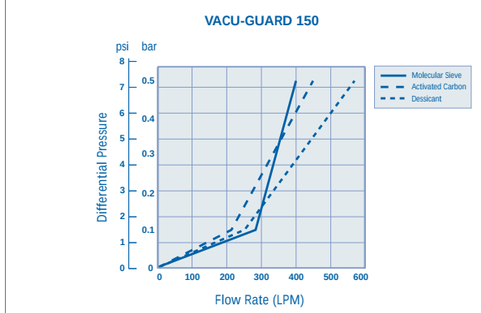
Features and Benefits
- Ideal for protecting vacuum pump systems from solvent vapor or gaseous contaminants and aqueous aerosols
- Designed for in-line use with stepped barb connections for 10-12 mm ID hose
- Available with choice of chemical trap: activated carbon, molecular sieve or desiccant
- Membrane retains 99.99% of airbone particles greater than 0.1 µm
- Features hydrophobic PTFE membrane

Applications
- Vacuum pump protection
- Activated carbon removes organic vapors and radioactive particles
- Molecular sieve for use with organic and alkaline air streams
- Desiccant for use with high velocity acidic air streams
- Eliminates a potential health hazard from the work place

VACU-GUARD

VACU-GUARD 150

Air Flow Rates*



* Flow rates are indicative and vary by type of end fitting

Typical Data - VACU-GUARD

Housing Type	Maximum Pressure	Filtration Media	Connections	Retentions
Polypropylene	1 Bar (15 psi)	PTFE	6722-5000 (50mm)	Aqueous Solutions:
			6–10 mm (¼"–⅜") SB (Stepped Barb)	up to 0.9 bar (14psi)
			6722-5001 (60mm)	Particulates in Air:
			10–12 mm (⅜"–½") SB (Stepped Barb)	0.1 µm 99.99%

Typical Data - VACU-GUARD 150

Product	VACU-GUARD 150 Activated Carbon	VACU-GUARD 150 Desiccant	VACU-GUARD 150 Molecular Sieve
Chemical Trap Media	Activated Carbon	Anhydrous Calcium Sulfate	Silico Aluminate Zeolite
Filter Media[1]	PTFE	PTFE	PTFE
Surface Area[2] or Weight (nominal)	82,000 m² (Carbon)	318 g (Desiccant)	318 g (Zeolite)
Connectors - Inlet/Outlet *	HB/SB	HB/SB	HB/SB
Maximum Operating Pressure			
Dry Gas	60 psi	60 psi	60 psi
Wet Gas	14 psi	14 psi	14 psi

[1] PTFE – Polytetrafluoroethylene
[2] For 50 mm disc = 16 cm²; 60 mm = 25 cm²
* HB – Hose Barb ½ cm² - inlet

SB – Stepped Barb: ⅜" - ½" (10-12 mm) - outlet
For 50 mm disc = SB; 60 mm disc = HB

Ordering Information - VACU-GUARD and VACU-GUARD 150

Catalog Number	Chemical Media [1]	Housing Type	Quantity/Pack
VACU-GUARD 150			
6722-1001	Activated Carbon	Capsule	1
6722-1002	Desiccant	Capsule	1
6722-1003	Molecular Sieve	Capsule	1
VACU-GUARD			
6722-5000	PTFE	50 mm Disc	10
6722-5001	PTFE	60 mm Disc	10

[1] PTFE – 0.2 µm polytetrafluoroethylene

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Vacuum Specialty Devices

Whatman offers a unique line of disposable specialty filter devices designed to provide fast and efficient filtration of aqueous and organic solutions. They are made with a wide variety of different membrane filters with a polypropylene housing using the most advanced methods and design features available today.

Disposable Filter Funnels

The Whatman Disposable Filter Funnels, available in 25 mm and 47 mm diameters, are convenient filter funnels containing Whatman brand filter media. The filter media can be easily removed for further analysis. The unit is composed of medical grade polypropylene, compatible with most solutions.

25 mm Disposable Filter Funnel

The 25 mm Disposable Filter Funnel is a convenient, disposable filter funnel containing Whatman brand filter media. This 25 mm diameter filter can be used in evaluation of processed proteins in TCA precipitation or binding assay procedures and can be easily removed for further analysis or culturing.

The 25 mm Disposable Filter Funnel is available with glass microfiber filters. Typical applications include TCA precipitation, cell harvesting, tissue washing, protein precipitation and high recovery capture filtration.

Chemical Resistance

Both are compatible with aqueous solutions and most organic solvents. Caution should be used when working with strong acids or strong bases in these filter funnels.

Features and Benefits

- Disposable design eliminates dedicated glassware, ideal for radioactive applications
- Chemically resistant polypropylene housing allows for use with a wide range of aggressive solutions
- Designed for single use or batch sample processing
- Robotic friendly
- Removable filter allows for further processing
- Luer taper outlet for easy vacuum attachment

47 mm Disposable Filter Funnel

The 47 mm Disposable Filter Funnel is a convenient, disposable unit containing Whatman brand media. The 47 mm diameter filter can be easily removed for further analysis or culturing.

Features and Benefits

- 47 mm diameter Whatman brand filter
- Retrievable filter for further analysis
- Disposable for cleanliness and convenience
- 250 mL reservoir
- 0.45 µm cellulose nitrate available sterile for culturing

Ordering Information - 25 mm Disposable Filter Funnel

Catalog Number	Filter Media	Nominal Particle Retention (µm)	Volume Capacity	Quantity/Pack
1922-1820	Grade GF/A	1.6	30 mL	50
1922-1822	Grade GF/C	1.2	30 mL	50

Ordering Information - 47 mm Disposable Filter Funnel

Catalog Number	Filter Media	Nominal Particle Retention (µm)	Volume Capacity	Quantity/Pack
1920-1441	Grade 41	20-25	250 mL	5
1920-7001	WCN 0.45 µm Grid Sterile	0.45	250 mL	5
1920-7113	WCN 0.45 µm Grid Sterile with Pads	0.45	250 mL	50

AUTOCUP™ Disposable Filter Funnel

The AUTOCUP filter funnel is a convenient, disposable device for batch filtration of samples. Designed specifically for use with automated systems, AUTOCUP can also be used with a standard flask or manifold under vacuum. The device is fully compatible with Zymark automated systems.

AUTOCUP is manufactured from pigment-free polypropylene and contains a choice of Nylon or PTFE membrane for use with aqueous and solvent solutions.

Features and Benefits

- 20 mL sample volume, ideal for batch processing of laboratory samples
- Manufactured using no adhesives or additives and ensures sample purity
- Versatile and easy to use and suitable for use under vacuum or in automated systems

Applications

- Drug discovery synthesis
- Sample clarification
- Sample filtration
- Combinatorial chemistry
- Batch preparation

Typical Data - AUTOCUP Disposable Filter Funnel

Housing	Polypropylene
Volume	20 mL
Filtration Area	4.7 cm^2
Filter Diameter	25.7 mm
Maximum Pressure	10 psi

Ordering Information - AUTOCUP Disposable Filter Funnel

Catalog Number	Membrane	Pore Size (µm)	Quantity/Pack
1602-0465	Nylon	0.45	250
1602-0475	PTFE	0.45	250

FilterCup™

The FilterCup is a disposable filter funnel available with a range of 70 mm Whatman brand filter media. This convenient device is molded from polypropylene with an integral, heat bonded filter for easy filtration.

Features and Benefits

- Choice of glass microfiber and cellulose filter media
- 250 mL capacity
- > 31 cm^2 filtration area

Chemical Compatibility - FilterCup

Dilute Acids	Recommended
Dilute Bases	Recommended
Alcohols: Aliphatic	Recommended
Aldehydes	Recommended
Esters	Recommended
Ketones	Recommended
Hydrocarbons: Aliphatic	Recommended
Hydrocarbons: Aromatic	Limited Applications
Hydrocarbons: Halogenated	Not Recommended

Note: Paper Grade 113 contains a wet-strengthening agent which may leach out when used with solvents

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Ordering Information - FilterCup Disposable Filter Funnel

Catalog Number	Filter Media	Particle Retention Liquid (µm)	Quantity/Pack
1600-001	Grade 1	11	25
1600-003	Grade 3	6	25
1600-113	Grade 113	30	25
1600-820	Grade GF/A	1.6	25
1600-822	Grade GF/C	1.2	25
1600-825	Grade GF/F	0.7	25
FilterCup Stem with Stopper			
1600-900	-	-	1

Filter Tubes

Versatile Whatman Filter Tubes are designed to prepare and filter samples in batches using standard SPE vacuum manifolds and automated systems. The devices feature a rigid pigment-free polypropylene housing, a filter support and a choice of filter media.

The polypropylene housing is autoclavable for repeated use and ensures excellent chemical and biomolecule compatibility with minimum extractables. The filter media is securely welded into the tube to ensure that the filter cannot be bypassed and no sample is lost.

Filter Tubes are available with 1PS filters and PTFE membranes for chemical compatibility with solvents. The 1PS Filter Tube contains Whatman Phase Separator filter media and is ideal for the quick and easy separation of solvent and aqueous phase layers.

Features and Benefits

- 6, 12 and 60 mL tube capacities
- Autoclavable, saving time and money in the laboratory
- Wide solvent compatibility is ideal for combinatorial chemistry applications

Applications
- Sample preparation and cleanup
- Combinatorial chemistry
- Drug synthesis
- Sample and batch filtration
- Custom made SPE device

Typical Data - Filter Tubes

Housing	Polypropylene (pigment free)
Inlet Connection	Standard tube opening
Outlet Connection	Male slip luer
Maximum Force	100 psi for PTFE (not available for 1PS)
Filtration Area:	
6 mL	1.2 cm^2
12 mL	1.4 cm^2
60 mL	5.3 cm^2
Weight:	
6 mL	3.2 g
12 mL	4.8 g
60 mL	18.8 g
Bubble Point for PTFE Filter Tubes (in Isopropanol):	
1.0 µm	9 psi
5.0 µm	2 psi

Ordering Information - Filter Tubes

Catalog Number	Membrane	Pore Size (µm)	Capacity (mL)	Quantity/Pack
6984-0610	PTFE	1.0	6	50
6984-0650	PTFE	5.0	6	50
6984-1210	PTFE	1.0	12	40
6984-1250	PTFE	5.0	12	40
6987-0699	1PS	-	6	50
6987-1299	1PS	-	12	40
6987-6099	1PS	-	60	100

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Bottle-top Filters

For Residue Analysis

VACUFLO

Features and Benefits
- Filter cakes can be used for microscopic analysis
- Complete units with tubing nozzle, 125 mL funnel and receiver vessel, both graduated
- Rapid filtration thanks to exchangeable mixed esters membrane filter 50 mm diameter with glass fiber prefilter

VACUFLO

ZapCap®

For filtration of medium volumes, cell culture media and HPLC solutions.

Features and Benefits
- Complete 500 mL units with tubing nozzle; for attaching to bottles (bottle-top)
- Connection seals on any standard bottles 33-450 mm
- Membrane diameter 76 mm, filter area 39.2 cm^2
- ZapCap-S with included borosilicate prefilter for high flow rates
- ZapCap-S Plus with integral borosilicate prefilter for very high flow rates
- ZapCap-CR, the chemical-resistant bottle-top filter
- Can be used up to 50º C

ZapCap

Typical Applications - Bottle-top Filter Unit

Residue analysis in environmental analysis	VACUFLO
Filtration of cell culture media	ZapCap-S
1. Cellulose acetate membrane filters (CA) with extremely low protein binding for cell culture media and other aqueous solutions.	
2. Sterile filtration of solutions which cannot be autoclaved	
Sterile filtration and clarification of difficult-to-filter aqueous solutions	ZapCap-S Plus
Filtration of HPLC solutions	ZapCap-CR
1. Polyamide membrane filters (NL) for the retention of fine particles and microorganisms in HPLC/FPLC solutions when the column packing is 10 µm.	
2. PTFE membrane filters (TE) for the retention of particles in organic solutions, strong acids or aldehydes.	

Ordering Information - VACUFLO and ZapCap Bottle-top Filters

Description	Pore Size (µm)	Membrane/Housing*	Color Code	Quantity/Pack	Catalog Number
Residue analysis					
VACUFLO PV 050/3*	0.2	ME-GF/PS	blue	10	10 443 301
VACUFLO PV 050/2*	0.45	ME-GF/PS	white	10	10 443 311
Filtration of medium volumes, cell culture media					
ZapCap S CA[1]	0.2	CA/PS	-	12	10 443 401
ZapCap S CA[1]	0.45	CA/PS	-	12	10 443 411
ZapCap S Plus CA[1]	0.2	CA-GF/PS	-	12	10 443 430
ZapCap S Plus CA[1]	0.45	CA-GF/PS	-	12	10 443 435
Filtration of HPLC solutions					
ZapCap CR NL	0.2	NL/PP	-	12	10 443 421
ZapCap CR NL	0.45	NL/PP	-	12	10 443 423
ZapCap CR TE	0.45	TE/PP	-	12	10 443 425

[1] Sterilized by gamma radiation
* CA – Cellulose acetate
GF – Glass microfiber
NL – Nylon
PP – Polypropylene
PS – Polysulfone

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Venting Filters

Whatman Venting Filters are disposable devices designed and manufactured with a high purity polypropylene housing to maintain sample purity and are available with a choice of filtration media to suit a range of venting applications. No glue, adhesive, metal, epoxy or other extraneous materials are used in construction. All seals are fused. This design provides the finest in disposable filter devices available today.

*Poly*VENT™/SteriVENT™

*Poly*VENT/SteriVENT is an integral filter product for sterile venting of vessels and tanks. These devices are constructed from a single, standardized set of materials - PTFE membranes and polypropylene housing - to simplify the approval process.

Features and Benefits

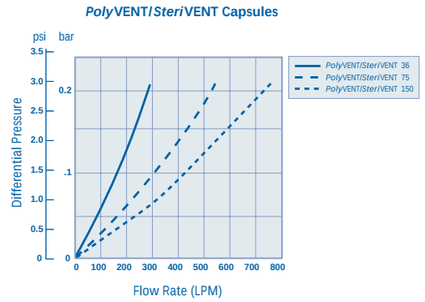
- Pass the HIMA Challenge Test for Sterilizing Grade
- Retain >107 CFU/cm² *Brevundimonas diminuta* per ASTM F838-83 standards; this microbial retention is correlated to 100% integrity testing during manufacturing (rated in liquid)
- Membrane made of hydrophobic 0.2 µm PTFE membrane
- Validated for 50 steam autoclave cycles; compatible with EtO
- Testable by Water Break Through (WBT) test or bubble point testing
- Pass USP Class VI biosafety tests for plastics
- Manufactured in clean room facilities
- Bi-directional and autoclavable

Filtration Devices

Applications

- Venting (filling)
- Isolation (incubators, autoclaves, lyophilizers, EtO sterilizers, fermenters)
- Electronics (gases)

Air Flow Rates*



* Flow rates are indicative and vary by type of end fitting

Technical Properties - *Poly*VENT/SteriVENT

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 Break Through	29 psi (2 bar)/15 seconds
Flow Direction	Supported bi-directionally. Certain applications may require orientation, i.e. vents. The pressure rating is not the same in both directions. Reverse flow only for low-pressure applications.
Biosafety	Materials pass USP Class VI
Sterilization	Can be autoclaved at 121° C for 20 minutes (maximum 132° C). 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. Compatible with EtO sterilization.
Non-pyrogenic	LAL total, non-reactive
Filtration Area	36 mm Capsule: 500 cm^2 75 mm Capsule: 1,000 cm^2 150 mm: 2,000 cm^2 50 mm Disc: 16 cm^2 25 mm Disc: 4 cm^2

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Ordering Information - *Poly*VENT/SteriVENT

Catalog Number	Membrane[1]	Pore Size (µm)	Housing Type	Connections* Inlet	Outlet	Quantity/Pack
*Poly*VENT/SteriVENT 36						
6713-5036	PTFE	0.2	Capsule	SB	SB	1
2103	PTFE	0.2	Capsule	½" SB	½" SB	1
*Poly*VENT/SteriVENT 75						
6713-1075	PTFE	0.2	Capsule	½" SB	½" SB	1
*Poly*VENT/SteriVENT 150						
2107	PTFE	0.2	Capsule	½" SB	½" SB	1
2108	PTFE	0.2	Capsule	1½" Sanitary	1½" Sanitary	1
*Poly*VENT Discs						
6713-0425	PTFE	0.2	25 mm Disc	SB	SB	50
6713-1650	PTFE	0.2	50 mm Disc	SB	SB	10
6713-1651	PTFE	0.2	50 mm Disc	SB	SB	100

[1] PTFE – Polytetrafluoroethylene
* SB – Stepped Barb for 6-10 mm ¼"-⅜" tubing
½ SB – Stepped Barb for 10-2 mm ⅜"-½" tubing
FNP – Female National Pipe Thread

BugStopper®

BugStopper is a unique, reusable closure, providing an ideal sterile vent for culture vessels. It replaces traditional methods of venting at minimal cost and maintains sample integrity. The device is manufactured from biosafe silicone rubber and the vent is a hydrophobic ultra-fine glass microfiber filter reinforced with polyester monofilament laminates. A stainless steel reinforcement ring surrounds the vent for added support.

The device prevents bacteria or viruses from entering or exiting the culture vessel while at the same time allowing the free passage of air and gases through the vent layer. It has a filter rating of 99.9% bacterial filtration efficiency (BFE) and viral efficiency (VFE).

BugStopper is available in two sizes and simply pushes onto a variety of culture vessels. The device fits inside typical 250 mL to 2500 mL flasks and on the outside of typical 125 mL flasks. The silicone portion of the smaller BugStopper device can be penetrated with needles for use as a sample port or for gas infusion. BugStopper 10 fits flasks which accept size 8½ to 10½ stoppers.

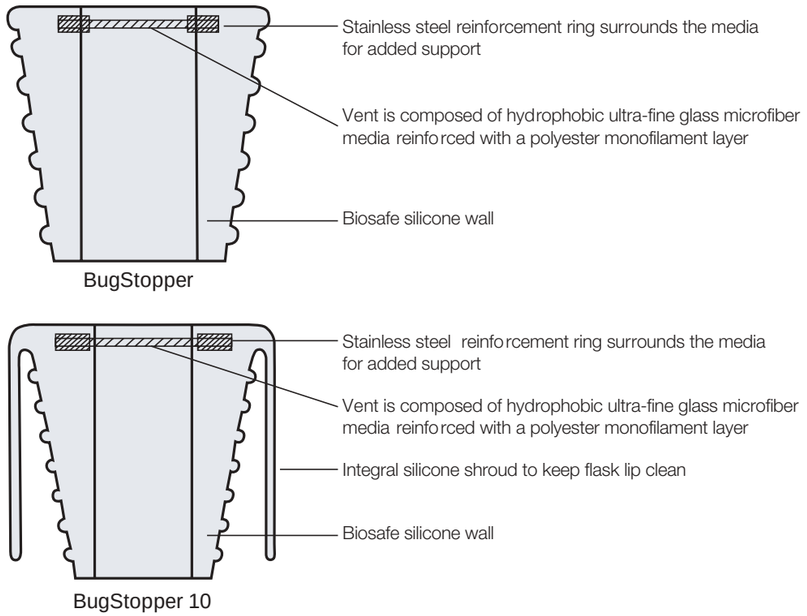
Filtration Devices

Features and Benefits

- Autoclavable in use to maintain solution integrity
- Available in two sizes to fit a wide variety of culture flasks
- Repeated use minimizes cost
- Quick and easy-to-use BugStopper pushes into place and is ready to use

Applications

- Bacterial cultures
- Viral cultures
- Cell cultures



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Typical Data - BugStopper

	BugStopper	BugStopper 10
Device	Biosafe silicone	Biosafe silicone
Vent Material	Hydrophobic Ultra-fine Glass Microfiber	Hydrophobic Ultra-fine Glass Microfiber
Support Ring	Stainless steel	Stainless steel
Top Diameter	43 mm	54 mm
Bottom Diameter:		
Internal	21 mm	22 mm
External	28 mm	37 mm

Ordering Information - BugStopper

Catalog Number	Description	Quantity/Pack
6713-3010	BugStopper	10
6713-3100	BugStopper	100
6713-6010	BugStopper 10	10
6713-6050	BugStopper 10	50

HEPA-VENT™ and HEPA-CAP™

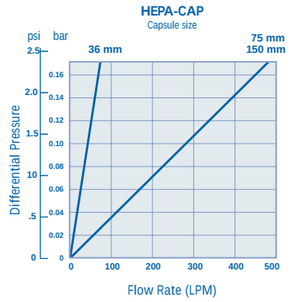
HEPA filter media are used throughout the scientific, research and industrial environments in a variety of air and gas filtration applications where high retention, dirt-holding capacity and flow rates are required.

Filtration Devices

Features and Benefits

- Glass filter media strengthened by dual lamination with a tough polyester monofilament
- Retains 99.97% of all particles ≥ 0.3 µm 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 gas inline filter
- Able to be sterilized by autoclaving with steam
- Available in a variety of end-fitting configurations
- Manufactured in clean room facilities under ISO Quality Systems
- Repeatedly autoclavable at 121° C for 20 minutes (132° C max) for assured sterility
- Allows bi-directional flow
- Depth filter design allows for high loading capacity
- Preventing bacterial, algal or fungal contamination in fermentors or incubators
- Tissue culture applications

Air Flow Rates*



* Flow rates are indicative and vary by type of end fitting

Applications

- Gas line filter
- Particulate removal from gases
- Prefilters for suction

Technical Properties - 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
Sterilization	Autoclavable
Filtration Area	36 mm Capsule: 625 cm^2 (97 in^2)
	75 mm Capsule: 1,300 cm^2 (201 in^2)
	150 mm Capsule: 2,590 cm^2 (402 in^2)
	50 mm Disc: 16 cm^2

Ordering Information - HEPA Venting Filters

Catalog Number	Housing Type	Connections*		Quantity/Pack
		Inlet	Outlet	
HEPA-CAP 36				
6702-3600	Capsule	SB	SB	1
2609T	Capsule	⅜" FNPT	⅜" FNPT	5
HEPA-CAP 75				
6702-7500	Capsule	½" SB	½" SB	1
2709T	Capsule	⅜" FNPT	⅜" FNPT	5
HEPA-CAP 150				
6702-9500	Capsule	⅜" FNPT	⅜" FNPT	1
HEPA-VENT				
6723-5000	50 mm disc	SB	SB	10

* SB – Stepped barb for 6–10 mm ¼"–⅜" tubing
½ SB – Stepped barb for 10–12 mm ⅜"–½" tubing
FNPT – Female national pipe thread

Microbiology Products:
A broad range of high quality products for microbiological quality control in food and beverage (wine, beer, soda, water) and pharmaceutical testing.

Microbiology

Microbiological Quality Control

Whatman offers a broad range of high-quality products for microbiological quality control in the food and beverage, pharmaceutical and water testing industries.

We develop solutions for microbiological applications and set today's standards in many areas. This is a result of long-term relationships with our customers who provide input to new ideas and product improvements.

Membrane Filtration

The technical requirements for membrane filters used in microbiological quality control are subject to strict national and international standards.

At the same time, the requirements of the market are changing continually as a result of the introduction of new products, such as soft drinks, alcoholic mixed drinks or pharmaceuticals.

Whatman offers a wide and versatile range of membrane filter products with a very high level of consistent quality.

MicroPlus and ME Membranes

Membranes for Microbiological Control

To protect the consumer, the absence of microbial contamination in foods and beverages, pharmaceuticals and cosmetics must be assured.

In these products the microorganism counts are very low and are therefore determined quantitatively via enrichment methods. Production processes are monitored continuously at their critical points (tanks, pipelines, filling units) as are the finished products. The membrane filtration method is the optimal analytical method for doing this.

Method

The liquid is filtered through a membrane. The microorganisms collect on the membrane surface. The filter is incubated on a nutrient medium and the individual colonies can then be evaluated. The method is also suitable for large sample volumes and low microorganism counts.

Reliability

Our quality control and product design offers users decisive advantages. The membrane filters are strictly controlled and fulfill or exceed the requirements according to DIN, ASTM, HIMA and ISO.

Test Parameters

The following parameters of all membranes used for microbiological quality control are tested systematically in order to ensure the same high-quality from batch to batch: bubble point; flow rate for bacterial retention; recovery rate.

MicroPlus Membranes

Features and Benefits

- Special membrane filters made from cellulose nitrate developed for microbiological quality control
- High mechanical strength
- High flow rate
- Ideal for samples with a high particle content and viscous samples
- Sterile, individually packed
- Pore size 0.45 µm
- All membrane filters have a high-contrast grid (3.1 mm)
- Type STL in dispenser boxes with 100 numbered membrane filters for easy removal and safe handling with the Membrane-Butler (supplied in 4 boxes each with 100 membrane filters)

ME Membranes

Features and Benefits

- Economical
- Specifically for aqueous solutions
- Hydrophilic
- For use up to 125º C

Ordering Information - MicroPlus and ME Membranes

Catalog Number	Description	Color/Grid	Diameter (mm)	Quantity/Pack
10 407 112	MicroPlus-21 STL	White/Black	47	4 x 100
10 407 114	MicroPlus-21 STL	White/Black	50	4 x 100
10 407 713	MicroPlus-21 ST	White/Black	47	1 x 100
10 407 714	MicroPlus-21 ST	White/Black	50	1 x 100
10 407 132	MicroPlus-31 STL	Black/White	47	4 x 100
10 407 134	MicroPlus-31 STL	Black/White	50	4 x 100
10 407 734	MicroPlus-31 ST	Black/White	50	1 x 100
10 407 170	MicroPlus-41 STL	Green/Black	47	4 x 100
10 407 172	MicroPlus-41 STL	Green/Black	50	4 x 100

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Catalog Number	Description	Color/Grid	Diameter (mm)	Quantity/Pack
ME (mixed cellulose ester)				
10 407 312	ME 25/21 STL	White/Black	47	4 x 100
10 407 314	ME 25/21 STL	White/Black	50	4 x 100
10 406 870	ME 25/21 ST	White/Black	47	1 x 100
10 406 872	ME 25/21 ST	White/Black	50	1 x 100
10 407 332	ME 25/31 STL	Black/White	47	4 x 100
10 407 334	ME 25/31 STL	Black/White	50	4 x 100
10 407 370	ME 25/41 STL	Green/Black	47	4 x 100
10 407 372	ME 25/41 STL	Green/Black	50	4 x 100
10 409 470	ME 25/41 ST	Green/Black	47	1 x 100
10 409 472	ME 25/41 ST	Green/Black	50	1 x 100

STL - Sterile: for use with Whatman Membrane-Butler
ST - Single sterile packed

Microbiological Monitors

Presterilized and Very Versatile

Microbiological monitors are ideal for monitoring contaminants in liquid samples from raw materials to finished products.

After the filtration is complete, 2 mL of microbiological media is added and the unit is converted into a Petri dish for culturing the contaminants collected.

Microbiological monitors from Whatman offer significant workload reduction. The presterilized and ready-to-use units for filtration and subsequent incubation of microbiological samples eliminate many time consuming daily activities in the laboratory.

Features and Benefits

- Sterilized and ready for use
- Easy handling
- Effective time savings - up to 70%
- Black membranes for better contrast
- Comprehensive range of media

56 mm and 47 mm Monitors

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Monitor Workflow

Microbiological monitors have been developed specifically for membrane filter methods for aqueous samples of up to 100 mL. It has never been so easy to identify microorganisms.

1. Add sample and filter
2. Remove the funnel
3. After filtration simply add 2 mL of microbiological media
4. Replace the lid and incubate the unit

1

2

3

4

Ordering Information - Microbiological Monitors

Description	Size (mm)	Pore Size (µm)	Quantity/Pack	Catalog Number
Monitor, 100 mL, White/Black Grid	56	0.2	50	10 497 603
Monitor, 100 mL, White/Black Grid	56	0.45	50	10 497 600
Monitor, 100 mL, White/Black Grid	56	0.45	50	10 497 601
Monitor, 100 mL, White/Black Grid	56	0.8	50	10 497 602
Monitor, 100 mL, White/Black Grid	47	0.2	50	10 497 511
Monitor, 100 mL, White/Black Grid	47	0.45	50	10 497 500
Monitor, 100 mL, White/Black Grid*	47	0.45	50	10 497 501
Monitor, 100 mL, White/Black Grid	47	0.45	50	10 497 502
Monitor, 100 mL, White/Black Grid	47	0.8	50	10 497 503

* Individually wrapped

Analytical Funnels

Ready-to-use Filtration Units for Microbiology

Whatman analytical funnels are ready-to-use 100 mL filtration units with removable membrane and culturing devices.

After filtration, the membrane of the analytical funnel can be used for a wide range of qualitative and quantitative biological analyses.

Features and Benefits

- Saves up to 50% in time with no flaming and sterilization required
- Minimizes the risk of cross contamination
- Easy release of membrane

Analytical Funnel Workflow

1. Perform sample filtration
2. Remove the upper part from the base
3. Place the base on the membrane lifting device
4. Separate the membrane from the pad and transfer the membrane into a Petri dish with sterile pad

1

2

3

4

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Ordering Information - Analytical Funnels

Description	Pore Size (µm)	Quanity/Pack	Catalog Number
47 mm diameter			
White/Black Grid	0.2	50	10 497 507
White/Black Grid*	0.2	50	10 497 510
White/Black Grid	0.45	50	10 497 504
White/Black Grid*	0.45	50	10 497 506
Black/White Grid	0.45	50	10 497 508
Black/White Grid*	0.45	50	10 497 509

* Individually packaged

MBS I

Microbiological Filtration System

MBS I is the ideal system for optimal microbiological control using membranes. The overall procedure time is reduced to a minimum. The design of the system, which consists of an electrical membrane dispenser, a funnel dispenser and a vacuum manifold, leads to more reproducible results.

MBS 1 - Bringing a System into Your Quality Control

The special sealing technique guarantees easy handling and a good integrity of the funnel and membrane during filtration. This reduces any cross contamination to a minimum.

Features and Benefits

- Simple to use
- Safe sealing mechanism
- Shorter preparation time
- High reproducibility
- Less waste and better economy due to 50 autoclave cycles
- Large funnel capacity for foaming liquids
- Easier to validate
- Risk of cross contamination is minimized

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Http://www.ictsl.net · E-mail: información@ictsl.net

A Unique Combination of Comfort and Progress

The combination of the funnel dispenser and the Membrane-Butler E in the MBS I system is unique. When a funnel is taken from the dispenser, the butler automatically dispenses a membrane from the sterile pack ready to use.

Find the Right Funnel

The autoclavable plastic funnel for the MBS I is a true innovation. Unlike tedious flaming of stainless steel filtration equipment for sterilization, the new funnel is simple to use and ensures perfect sterility. The new funnels are provided sterile in a magazine and save time especially when a large number of samples need to be processed by one apparatus.

The funnels (350 mL) are of high grade polypropylene and can be autoclaved up to 50 times. For applications in which funnels are only used once, the system offers another solution: a 100 mL funnel which is presterilized and supplied ready for immediate use. A special closure mechanism at the extraction edge ensures that the funnel seals tightly with the membrane.

Sealing Mechanism MBS I

MBS I Workflow

1. When taking a new presterilized funnel, the membrane is dispensed automatically
2. Membrane is placed onto the filter base and the funnel installed
3. Liquid is poured into the funnel and vacuum is applied
4. Easy removal of the membrane after filtration

1

2

3

4

MicroPlus Membrane Filter - The Plus for Stability

MicroPlus membrane filters from Whatman are the ideal addition to the MBS I for the beverage industry. Wherever viscous or particle loaded solutions are being filtered, MicroPlus filters with their matchless stability and non blocking design are the best choice. Filtration speed due to optimized through-flow, ease of use and high reproducibility contribute to the unmatched quality of MicroPlus.

Ordering Information - MBS I

Product	Description	Quantity/Pack	Catalog Number
AS 220	2-Place Vacuum Filtration Manifold	1	10 445 890
Steel frit		1	10 445 863
Dispenser for funnels	For 100 mL and 350 mL Funnel	1	10 445 870
Funnel - 100 mL	Plastic Funnel of PP (autoclavable)	20	10 445 861
Funnel - 100 mL	Plastic Funnel of ABS*	20	10 445 865
Funnel - 350 mL	Plastic Funnel of PP (autoclavable)	20	10 445 866
Autoclaving bags	For Autoclaving Funnels	20	10 445 868
Tower	For Stacking Two Membrane-Butler E	1	10 477 112
Membrane-Butler E	Dispenser for Membranes	1	10 477 110
PZ 001	Forceps, Stainless Steel	1	10 477 602

*Acrylonitrile butadiene styrene

Membrane-Butler

Membrane Filter Dispenser for Microbiological Control

Membrane filters for microbiological checks must be handled carefully to ensure that they remain sterile and that quantitative results are being obtained.

The Membrane-Butler offers optimal handling for all MicroPlus and ME membrane filters with the type name ‘STL’. The dispenser box is placed in the Membrane-Butler, the sterile packaging is inserted into the roller system and the system is ready. With each turn (Manual Butler) or by pressing the push button or the foot pedal (Butler E) a membrane filter is ejected from its sterile packing and can be removed easily with forceps.

Features and Benefits
- High reliability
- Simple handling with foot switch and stepper motor (applies only to Butler E)
- Cross contamination risks are minimized
- Membrane dispensed rapidly
- Ideal for use on sterile benches
- Compact dimensions for portable use

Removing a Sterile Membrane from Butler E

Manual Dispenser for Single Sterile Membranes

Ordering Information - Membrane-Butler

Catalog Number	Description	Use	Quantity/Pack
10 477 100	Membrane-Butler	Manual dispenser	1
10 477 110	Membrane-Butler E	Electrical dispenser	1
10 477 112	Butler Tower	For two Butler E	1
10 477 113	Foot Pedal	For Butler E automatic dispensing	1

MBS II

Microbiological Filtration System

Membrane filtration is a common method of quantifying microorganisms in liquids. However, in other filtration systems, the handling is not always easy. The ready-to-use MBS II from Whatman is easy to use and reduces the risk of cross contamination.

MBS II has been developed specifically for microbiological quality control in the pharmaceutical industry. This means that the filtration system is perfectly suited for bio-burden tests on raw materials, preparations and non-sterile end products. Water investigations and checks on water for injection purposes are also preferred applications for MBS II.

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MBS II saves valuable laboratory time, allowing for increased dedication to more demanding laboratory tasks and to an increase in laboratory productivity. The filtration unit allows for variable vacuum arrangement with high filtration speed and consistently high recovery rates.

Features and Benefits
- Rapidity - ready-to-use filtration unit shortens the preparation time
- Sterility - minimizes the risk of cross contamination
- Reliability - easier handling means more reliable usage
- Compatibility - used with most agar Petri dish formats
- Security - in accordance with EP and USP requirements
- Safety - sterile venting during filtration

MBS II - Filtration Unit with Sterile Vent

MBS II Workflow
1. Filtration of the sample with the MBS II filtration funnel
2. Detach the filtration unit
3. Remove the membrane from the filtration unit
4. Transfer the membrane onto the appropriate media

1

2

3

4

The handling of the system is particularly practical with the filtration funnel and membrane combined to form a sterile filtration unit. When filtration is finished, the membrane is transferred to an agar plate or a Petri dish with a simple double-click, ensuring reproducible results. The MBS II system also offers less danger of cross contamination in comparison to other filtration methods.

Ordering Information - MBS II

Product	Description	Quantity/Pack	Catalog Number
MBS II-Filtration Unit;	Nitrocellulose, 0.45 µm, White, Black Grid	24	10 445 900
ready-to-use, 100 mL	Nitrocellulose, 0.45 µm, Black, White Grid	24	10 445 901
PP - funnel with	Mixed Ester Cellulose, 0.2 µm, White, Black Grid	24	10 445 902
built-in membrane	Regenerated Cellulose 0.45 µm, White	24	10 445 904
AS 230	2-place Vacuum Filtration Manifold	1	10 445 990
Validation Guide	Quality Control Tools for MBS II, English	1	10 445 999
Validation Guide	Quality Control Tools for MBS II, German	1	10 455 998

PP - Polypropylene

Media

Liquid Media

Ready-to-use media considerably reduce the preparation time in quality control laboratories and also effectively reduce the risks of cross contamination. Whatman is cooperating closely with quality assurance managers in the industry in the development of its own media and test kits.

This intensive product development has produced a range of products that is being used to monitor production plants and conduct microbiological checks on raw materials through to final product release in laboratories in more than 40 countries.

Features and Benefits

- Wide range of products satisfies even special customer requirements
- Optimal media stability, sterility and reproducibility
- Less time-consuming, higher productivity
- Manufacturing process and product checks according to the requirements of pharmacopoeia throughout the world
- Batch-specific quality certificate in each pack

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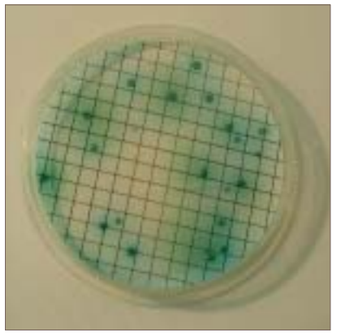
Media Variety and Flexibility

Do you use ready-to-use media in 2 mL ampoules? Are you looking for nutrient media or agar plates that are specifically suited to the cultivation of colonies after microfiltration? Would you perhaps like to fill your own agar plates? No matter what your specific needs, our extensive range of ready-to-use or prepared media products is available for just about any application.

Liquid media products come with a host of advantages, too. Aseptic preparation of nutrient media saves you valuable time and keeps costs to a minimum. All media undergo detailed quality control checks in accordance with recognized methods, guaranteeing uniform media preparation at all times. Lastly, our more comprehensive end product tests ensure optimal growth as well as stable and sterile media.

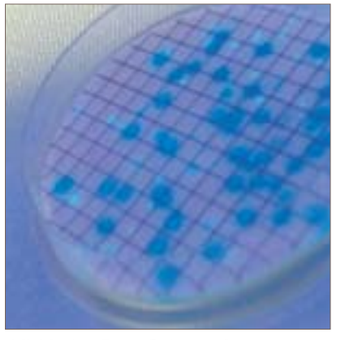
Brilliant Green Bile Broth



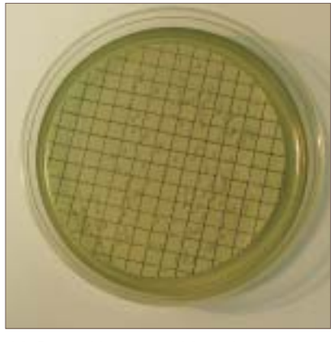
*Pseudomonas Media: Typical Growth of **Pseudomonas aeroginosa** ATCC 10145*

*EC-Broth: Vial Left: Control; Vial Right: Broth Inoculated with **Escherichia coli** ATCC 25922*

2 mL Ampouled Media



*MI-Media: Pure Culture of **Escherichia coli** ATCC 25922 with UV Light*



M-Green Yeast and Mold Agar: Typical Fungal Growth on Agar with White Membrane Filter

Whatman goes to great lengths to ensure that all legal regulations are met, much the same way we observe the standards of the pharmaceutical industry. We put this assurance in writing, too. Each package is accompanied by a batch-specific quality certificate.

Dilution Bottles

Our pre-filled and sterile dilution vials are designed for sample dilution of water, dairy products, foods and pharmaceuticals prior to microbiological testing. Final pH for all solutions is 7.2 pH ± 0.2 pH at 25° C. They come in an easy open, flip-top container with a tamper-evident seal.

Butterfield's Phosphate Buffer contains monobasic potassium phosphate and is used extensively in the food, dairy and pharmaceutical industries. Offered in 90 mL and 99 mL volumes for easy 1:10 dilutions. It is recommended as a general diluent in laboratory procedures by the Federal Drug Administration and in the Bacteriological Analytical Manual. This product is prepared according to Standard Methods for the Examination of Water and Wastewater for use in water testing.

Phosphate Buffer with Magnesium Chloride is used as the diluent for the preparation of dilutions in plate counts in the dairy and food industries. It is recommended by the APHA for the recovery of injured microorganisms from dairy and food samples. Contains deionized water, monopotassium phosphate and magnesium chloride.

Media Descriptions

Brilliant Green Bile Broth 2%

BGBB contains two inhibitors of both gram-positive and selected gram-negative organisms, namely, oxgall and brilliant green dye. Fermentation is detected by gas production.

Cetrimide Broth

Pseudomonas aeruginosa is characterized by the production of pyocyanin (a blue green, water soluble, non-fluorescent, phenazine pigment) which is stimulated by the inclusion of magnesium chloride and potassium sulfate in the broth.

Cetrimide (N-cetyl-NNN-trimethylammonium bromide) is added to inhibit bacteria other than *Pseudomonas aeruginosa*. Its action as a quaternary ammonium cationic detergent causes nitrogen and phosphorous to be released from bacterial cells other than *Pseudomonas aeruginosa*.

EC Broth

EC Broth contains casein peptone as a source of nutrients. Lactose provides the carbohydrate fermented by coliform bacteria and *Escherichia coli*. In addition, lactose-positive bacteria metabolize lactose with gas formation. Gram-positive bacteria are inhibited by the mixture of bile salts.

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EC Broth with MUG

The presence of the fluorescence using a long-wave UV light source confirms the presence of Escherichia coli and no further confirmation is required. MUG detects anaerogenic strains, which may not be detected in the conventional procedure. Lactose is a source of energy. Casein peptone provides additional nutrients. The mixture of bile salts is inhibiting for gram-positive bacteria, particularly bacilli and fecal streptococci. The substrate 4-methylumbelliferyl-b-D-glucuronide is hydrolyzed by an enzyme, b-glucuronidase, possessed by most Escherichia coli and a few strains of Salmonella, Shigella and Yersinia, to produce a fluorescent end product, 4-methylumbelliferone.

Enterococcus Broth

Enterococcus broth is a modified version of the improved media described by Slanetz and Bartley with TTC. The membrane filtration method is simple to perform, does not require confirmation and permits a direct count of enterococci in 48 hours.

Eugon Broth

Eugon media was developed to obtain eugonic (luxuriant) growth of fastidious microorganisms. The unenriched media supports rapid growth of lactobacilli associated with cured meat products, dairy products and other food. The high concentration of Dextrose is the energy source for rapid growth of bacteria. *L-cystine* and sodium sulfite are added to stimulate growth. Sodium chloride maintains the osmotic balance of the media. The high carbohydrate content along with high sulfur (cystine) content improves growth with chromogenicity.

HPC Broth with TTC

HPC is used to determine total count at incubation temperatures of 35º C. All bacteria develop on HPC with indicator media and produce a red color as a result of the precipitation of formazan following the reduction of 2,3,5-triphenyltetrazolium chloride (TTC) by bacteria.

KF-*Streptococcus* Broth

KF-Streptococcus Broth is selective for the determination of fecal streptococci in polluted surface waters. Maltose and lactose are fermentable carbohydrates, sodium azide is the selective agent and brom cresol purple is the indicator dye.

Lauryl Sulfate or Lauryl Tryptose Broth

This media was developed for the detection of coliform organisms by the American Public Health Association (APHA). It is now the standard medium of choice in the presumptive phase of the standard coliform MPN test for the microbiological examination of water.

Mannitol Salt Broth

Because of the amount of peptones and beef extract, Mannitol Salt is a nutrient rich medium. Most bacteria (other than staphylococci) are inhibited by the high concentration of sodium chloride. Organisms capable of fermenting mannitol, e.g. Staphylococcus aureus, cause a pH change in the media. With phenol red as the pH indicator the colonies appear with a yellow coloration.

Membrane Lauryl Sulfate Broth

This media was developed for the detection of coliform organisms and is now the media of choice for the enumeration of total coliforms and *Escherichia coli* in the United Kingdom. This media replaced membrane enriched broth containing 0.4% Teepol 610.

M-Endo Coliform Broth
M-Endo is a red colored media, which needs to be stored in the dark to prevent discoloration. Gram-positive bacteria are inhibited on this media by the desoxycholate and lauryl sulfate. The addition of ethanol increases the antibacterial nature of the formulation. Lactose fermenting organisms form aldehydes, which react with Schiff's reagent (basic fuchsin and sodium sulfite) to give red colored zones around the colonies. Coliform colonies are therefore red with a characteristic metallic sheen.

M-FC Broth
Allows the development of fecal coliforms at elevated temperatures (44.5° C).

M-FC with Rosolic Acid
M-FC with Rosolic Acid acts and functions in the same way as m-FC Broth. Rosolic acid inhibits bacterial growth in general, except for fecal coliforms.

M-Green Select Broth
M-Green Select Broth is an improved modification of the liquid media, m-Green Yeast and Mold Broth and was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of Chloramphenicol further inhibits the growth of bacteria to allow for the development and enumeration of yeast and mold. The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH which aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow.

M-Green Yeast and Mold
M-Green is an improved modification of the liquid media, m-Yeast and Mold Broth and was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH which aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow.

MI Broth and MI Agar
MI Broth detects the presence of coliform bacteria by the production of β-galactosidase, which cleaves the substrate MUGal to produce 4-Methylumbelliferone, which fluoresces on exposure to UV light. Non-coliforms do not produce this enzyme and therefore do not fluoresce on the medium. *Escherichia coli* is detected by the compound IBDG. The β-glucuronidase produced by *Escherichia coli* cleaves the substrate to produce a blue indigo color in the colonies. As *Escherichia coli* is also a total coliform, and also produces β-galactosidase, it will also fluoresce. The antibiotic cefsulodin is added to inhibit the growth of gram-positive bacteria and some non-coliform gram-negative bacteria that can cause false positive reactions.

MRS Broth
MRS medium supports luxuriant growth of all lactobacilli, even the slow growing species.

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M-TGE Total Count Media
All bacteria develop on TGE media and produce a range of different colored and sized colonies.

Orange Serum Media
Organisms known to grow in single strength and concentrated juices are lactic acid and acetic acid bacteria and yeast. *Lactobacilli*, *Leuconostoc* and yeast have all been identified as spoilage organisms by numerous authors. Orange serum at pH 5.4 to 5.6 has been reported to yield maximum counts of all types of spoilage organisms in mixed cultures and in single culture comparison tests.

Potato Dextrose Broth and Agar Media
Potato Dextrose Broth is recommended in Standard Methods as the media that gives the most consistent and highest counts for the recoveries of yeast and mold in dairy products. The inclusion of potato extract encourages the growth and development of fungi. Sterile tartaric acid may be added to lower the pH to 3.5 ± 0.2 to further inhibit the growth of conflicting bacteria.

Pseudomonas Broth
Pseudomonas aeruginosa is characterized by the production of pyocyanin (a blue green, water soluble, non-fluorescent, phenazine pigment) which is stimulated by the inclusion of magnesium chloride and potassium sulfate in the broth. Irgasan, an antimicrobial agent, selectively inhibits gram-positive and gram-negative bacteria other than pseudomonads. Glycerol serves as both an energy source and helps in the promotion of pyocyanin.

R2 Broth
R2 broth can be used to determine heterotrophic plate count at 35º C. When incubated at lower temperatures (25–30º C) for longer periods of 72–96 hours, it can also be used to recover environmentally stressed organisms, or those that are chlorine tolerant.

Sabouraud Dextrose Broth
Peptone in the media is used as a nitrogen source for the development of fungi. Dextrose acts as an energy source for the growth of microorganisms. The low pH is favorable for the development of fungi, especially dermatophytes, but at the same time inhibits the development of contaminating bacteria from clinical specimens.

Standard Methods Agar
All bacteria develop on Standard Methods and produce a range of different colored and sized colonies.

Total Count Media with TTC
All bacteria develop on Total Count Media with indicator and produce a red color as a result of the precipitation of formazan following the reduction of 2,3,5-triphenyltetrazolium chloride (TTC) by bacteria.

Trypticase Soy Broth – Single Strength
General-purpose medium used in qualitative procedures for the cultivation of fastidious and non-fastidious microorganisms. Trypticase Soy Broth – Single Strength complies with the demands of the DIN Norm 10167 for the detection of Escherichia coli serotype 0157:H7 in foods and FDA-BAM for the isolation of enterohemorrhagic *Escherichia* coli (EHEC). In addition the media conforms to the formula of the U.S. Pharmacopoeia.

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Trypticase Soy Broth – Double Strength
TSB broth is a medium that will support the growth of a wide variety of microorganisms including aerobic, facultative and anaerobic bacteria and fungi.

Wallerstein Nutrient Broth (WL) and WLDifferential Broth (WLD)
Use of the medium at pH 5.5 and incubation at 25° C will give reliable counts for brewer's yeast. Adjustment of the pH to 6.5 and incubation at 30° C allows for the selective growth of baker's and distiller's yeast.

Ordering Information - Liquid Media

Description	Use	Quantity/ Pack	Catalog Number
2 mL Ampoules			
Cetrimide Broth	*Pseudomonas aeruginosa*	50	10 496 146
Enterococcus Broth	Isolation and enumeration of enterococci	50	10 496 120
Eugon Broth	Wide variety of microorganisms	50	10 496 126
HPC Broth with TTC	Heterotrophic plate counts	50	10 496 151
KF-*Streptococcus* Broth	Isolation and enumeration of fecal streptococci	50	10 496 125
Mannitol Salt Broth	Selective isolation and enumeration of staphylococci	50	10 496 121
Membrane Lauryl Sulfate Broth	Presumptive identification of coliforms and *E. coli*	50	10 496 187
M-Endo Coliform Broth	Enumeration of coliforms	50	10 496 103
M-FC Broth	Coliform detection in water pollution	50	10 496 124
M-FC Broth with Rosolic Acid	Fecal coliform detection	50	10 496 114
M-Green Select Broth	Enumeration of yeasts and mold in soft drinks and fruit juices	50	10 496 116
M-Green Yeast and Mold	Enumeration of yeast and mold in soft drinks and fruit juices	50	10 496 101
MI Broth	Coliform detection according to Surface Water Treatment Rule (USEPA) and Total Colifrom Rule (USEPA)	50	10 496 192
MRS Broth	Isolation and cultivation of lactobacilli	50	10 496 112
M-TGE Total Count Media	Non-selective development and enumeration of all aerobic bacteria	50	10 496 102
Orange Serum Media	Acid-tolerant microorganisms	50	10 496 104
Pseudomonas Broth	Isolation of *Pseudomonas*	50	10 496 119
R2 Broth	Heterotrophic plate counts	50	10 496 161
Total Count TTC Indicator	Colony count	50	10 496 113
Wallerstein Nutrient Broth (WL)	Cultivation and enumeration of yeast	50	10 496 108
WL Differential Broth (WLD)	Bacterial counts	50	10 496 109
Liquid Media in 9 mL Tubes			
Brilliant Green Bile Broth 2%	Coliform detection	20	10 496 710
EC Broth	Coliform detection @ 37º C and *E. coli* @ 44.5º C	20	10 496 714
EC Broth with MUG	*E. coli* in water and food samples by fluorogenic procedure	20	10 496 709
Lauryl Sulfate/Tryptose Broth	Coliform detection	20	10 496 722
Bottled Media			
M-Endo Coliform Broth - 50 mL	Coliforms	8	10 496 700

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Description	Use	Quantity/ Pack	Catalog Number
MI Broth - 50 mL	Coliform detection according to Surface Water Treatment Rule (USEPA) and Total Colifrom Rule (USEPA)	1	10 496 851
MI Agar - 50 mL	Coliform detection	1	10 496 847
Orange Serum Agar - 100 mL	Acid-tolerant microorganisms	1	10 496 713
Potato Dextrose Agar - 100 mL	Cultivation and enumeration of yeast and mold	1	10 496 731
Standard Methods Agar - 100 mL	Microbiological plate counts	1	10 496 706
Trypticase Soy Broth Single Strength - 100 mL	Cultivation of fastidious and non-fastidious microorganisms	1	10 496 707
Trypticase Soy Broth Double Strength - 100 mL	Cultivation of fastidious and non-fastidious microorganisms	1	10 496 708
Dilution Bottles			
Butterfield's Buffer	Potassium Phosphate	99 mL	10 498 503
Butterfield's Buffer	Potassium Phosphate	90 mL	10 498 504
Phosphate Buffer	Potassium Phosphate with Magnesium Chloride	99 mL	10 498 505
Petri Dishes			
Petri Dishes with Sterile Pads	47 mm diameter	100	10 498 544
Petri Dishes with Sterile Pads	50 mm diameter	50	10 445 905

NutriDisk® Nutrient Pads

Dehydrated Media for Microbiological Testing

NutriDisk is an alternative to traditional Agar plates. Colony counting identifications and selective microbial determinations can be carried out particularly easily with NutriDisk.

A cellulose pad is impregnated with a dehydrated nutrient base that becomes a nutrient medium when moistened with sterile water. The pad is a stable carrier that does not alter the nutrient medium or influence the growth of the microorganisms in any way. Growth is usually more uniform and quicker than on conventional agar nutrient plates.

Hydrating the Nutrient Pad

One Method, Many Advantages

New Packaging Format
NutriDisk is now supplied without membranes giving you more flexibility to choose your required membrane. The sterile NutriDisks are available in 10 packs of 10 pieces.

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Versatile Applications
NutriDisk is available with a wide range of different nutrient media formulations to provide a broad spectrum of applications covering all fields of microbiological analysis.

Reduced Risk of Contamination
Simple handling, compact assembly and the ready-to-use nutrient media offer a high degree of safety from contamination.

Exact Results
Cellulose pad, nutrient media formulation and impregnation process are monitored by us so that your results are always comparable, both within a single batch and from batch to batch.

Long Shelf Life
If stored dry at room temperature, NutriDisk has a shelf life of one year.

Standard NutriDisk Products

Azide NutriDisk
Selective medium for the detection of fecal streptococci in water, food, and other test materials.
Note: Streptococci form small dark red colonies.
- Recommended incubation condition: 24-48 hours at 37° C
- Recommended membrane filter: white, gridded, 0.45 µm

Caso NutriDisk
For the determination of the colony count and for the detection of predominant or subtly damaged microorganisms in pharmaceuticals, cosmetics and other products.
- Recommended incubation condition: 48 hours at 37° C
- Recommended membrane filter: green, gridded, 0.45 µm

Cetrimide NutriDisk
Selective medium for the determination of *Pseudomonas aeruginosa* in water, pharmaceuticals and cosmetics, as well as other test material (USP, DIN).
Note: *Ps. aeruginosa* forms blue colonies with blue halo.
- Recommended incubation condition: 48 hours at 37° C
- Recommended membrane filter: white, gridded, 0.45 µm

Endo NutriDisk
Selective medium for the detection of *E. coli* and coliform bacteria in water, foods and other substances (DEV, APHA).
Note: *E. coli* develops dark red colonies with a greenish-metallic surface sheen.
- Recommended incubation condition: 24 hours at 35° C
- Recommended membrane filter: white, gridded, 0.45 µm

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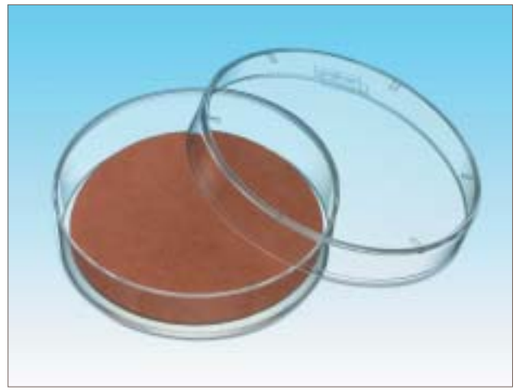
M-FC NutriDisk
Selective medium for the detection of *E. coli* and faecal coliforms in water, foods and other substances.
Note: As a rule *E. coli* already develops blue colonies after 16 hours.
- Recommended incubation condition: 16-24 hours at 44° C
- Recommended membrane filter: white, gridded, 0.45 µm

Orange Serum NutriDisk
For the detection of acidophilic and acid tolerant microorganisms in beverages and foods (APHA).
Note: Anaerobic incubation also initiates growth of the fastidious lactobacilli.
- Recommended incubation condition: 48-72 hours at 30° C
- Recommended membrane filter: green, gridded, 0.45 µm



Orange Serum NutriDisk

Plate Count NutriDisk
For the determination of the colony count of water, milk, foods, etc. (DLC, APHA).
- Recommended incubation condition: 48-72 hours at 30° C
- Recommended membrane filter: green, gridded, 0.45 µm

Sabouraud NutriDisk
For the detection of yeasts and molds in pharmaceuticals, cosmetics, packaging material, for isolating dermatophytes and for pure cultures (USP).
- Recommended incubation condition: 48-120 hours at 25-30° C
- Recommended membrane filter: black, gridded, 1.2 µm

Schaufus Pottinger NutriDisk
For the detection of yeasts and molds in beverages and sugar.
Note: Sugar fermenters develop yellowish colonies, non-acid formers are blue-green (ICUMSA).
- Recommended incubation condition: 48-72 hours at 30° C
- Recommended membrane filter: green, gridded, 1.2 µm

Standard TTC-NutriDisk
For the determination of the colony count of water and waste water, with triphenyltetrazoliumchloride (TTC).
Note: As all bacteria develop pink colonies (formazane formation from TTC) routine tests are optically easy to evaluate.
- Recommended incubation condition: 48-72 hours at 20° C or 48 hours at 30° C
- Recommended membrane filter: green, gridded, 0.45 µm

Tergitol-TTC NutriDisk
Selective medium for the detection of *E. coli* and coliform bacteria in water, foods and other substances.
Note: After 12-16 hours (early recognition) *E. coli* develops small yellowish, later orange colonies surrounded by a yellow halo.
- Recommended incubation condition: 12-24 hours at 37° C
- Recommended membrane filter: white, gridded, 0.45 µm

Wort NutriDisk
For the detection of yeasts and molds in beverages, foods and other products.
- Recommended incubation condition: 48-72 hours at 25° C
- Recommended membrane filter: black, gridded, 0.6 µm

Growth or positive reaction to selective medium should be regarded with suspicion. For safe diagnosis further comparative material is necessary (e.g.'IMVIC-Test'). Respect the national epidemics control law.

Ordering Information - NutriDisk

		Recommended Membranes for NutriDisk								
NutriDisk Grade	Catalog Number	ME 25/21	ME 25/41	ME 26/31	ME 27/31	ME 27/41	ME 28/31	ME 28/41	MicroPlus -21	MicroPlus -41
Azide	10 434 165	x							x	
Caso	10 434 166		x							x
Cetrimide	10 434 167	x							x	
Endo	10 434 162	x							x	
M-FC	10 434 168	x							x	
Orange Serum	10 434 160		x							x
Plate Count	10 434 163		x							x
Sabouraud	10 434 169				(x)		(x)	x		
Schaufus Pottinger	10 434 161				(x)	(x)	(x)	x		
Standard TTC	10 434 164		x							x
Tergitol TTC	10 434 170	x							x	
Wort	10 434 159			x						

(x): Alternatives

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Ordering Information - Recommended Membranes for NutriDisk

	Catalog Numbers				
Membrane Type	Description	St, 47mm	St, 50mm	Stl, 47mm	Stl, 50mm
ME 25/21	0.45 µm, White, Gridded	10 406 870	10 406 872	10 407 312	10 407 314
ME 25/41	0.45 µm, Green, Gridded	10 409 470	10 409 472	10 407 370	10 407 372
ME 26/31	0.6 µm, Black, Gridded	10 409 870	10 409 872	-	10 409 834
ME 27/31	0.8 µm, Black, Gridded	10 409 270	-	-	10 407 345
ME 27/41	0.8 µm, Green, Gridded	-	10 405 672	-	10 407 615
ME 28/31	1.2 µm, Black, Gridded	-	10 408 372	-	10 407 374
ME 28/41	1.2 µm, Green, Gridded	-	10 408 472	-	-
MicroPlus-21	0.45 µm, White, Gridded	10 407 713	10 407 714	10 407 112	10 407 114
MicroPlus-41	0.45 µm, Green, Gridded	-	-	10 407 170	10 407 172

Swabs

Hygiene Monitoring: Every Microorganism Under Control

Hygiene is essential in the food industry. The microbiological contamination of surface areas in production plants and laboratories must be monitored and controlled on a daily basis. SwabChecks from Whatman offer a rapid and reliable solution.

SwabCheck™

The SwabCheck Principle

The surface is wiped with a cellulose swab and any bacteria collected are transferred via the swab into a tube containing a special medium with an indicator dye, which is then incubated. Even a single bacterium is sufficient to cause a color change. This means that SwabChecks are about 1000 times more sensitive than the conventional ATP method. This accuracy is particularly important in the food industry. With this simple method, it is possible to identify microorganisms such as *Listeria monocytogenes*, which must not be present in any concentration in food and beverages.

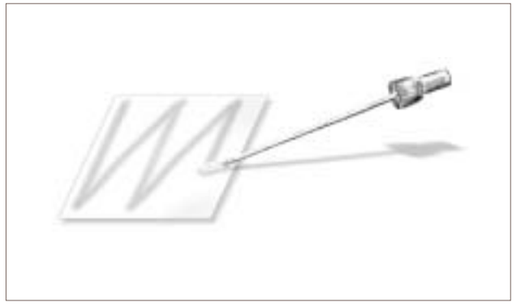
Features and Benefits

- The right test for each type of contamination
- Qualitative and semi-quantitative hygiene control
- Sterile packed and ready-for-use
- Easy to handle
- Rapid results
- Long shelf-life

SwabCheck Use

Handling is easy. Open the sterile pack, remove the swab and wipe it over an area of about 10 x 10 cm. Then twist off the cap of the medium tube and insert the swab so that the cap fits tightly. Label the sample tube and incubate at appropriate temperature.

A change in color indicates the presence of the microorganism in question. The quicker the color change occurs, the higher the bioburden. If no color change has been observed after the maximum incubation period has elapsed, then the corresponding microorganism is not present. Whatman offers SwabChecks in packs of 25 pieces. Shelf-life of 12 months.



Swab Products

Neutralizing Buffer Swabs

Neutralizing buffer swabs are used in the monitoring of surfaces for total bacterial count. Neutralizing buffer inactivates the bactericidal and bacteriostatic effects of chlorine and quaternary ammonium detergents. However, neutralizing buffer exhibits no toxic effects on microorganisms. This permits the transfer of swabbed organisms to the laboratory without loss in viability. Neutralizing buffer is not designed to culture and enumerate microorganisms.

Total Count Swab Kit

Buffer Swabs

Used for the collection of surface contamination from flat or convoluted surfaces prior to transport to a laboratory for culture and enumeration. Buffer swabs contain no bacteriostatic or bactericidal compounds and cannot suppress the action of detergents.

SwabCheck

Used as an indication of hygiene on contact surfaces. SwabCheck changes color from purple to yellow. The color change is based on acid reaction with the indicator. The more rapid the color change, the higher the level of bacteria in the sample. SwabCheck is useful in determining the sanitation levels of preparation surface, filling ports and processing areas in beverage and food processing plants, dairies, restaurants and healthcare facilities.

Coliform SwabCheck

Escherichia coli and Coliforms are used traditionally as indicator organisms for fecal contamination in water and other environmental samples. Detection of these organisms usually points to poor hygiene at some stage in the production process or pollution of water at source. The presence of coliforms is indicated by a color change from red to yellow. The more rapid the color change the higher the level of coliform bacteria.

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Hygiene SwabCheck

Easy to use: The Hygiene SwabCheck shows an obvious color change from red to yellow. The time taken for this change is an indication of the level of contamination. This should be used in conjunction with known specification levels of your process/product. Rapid screening hygiene test is a same day test that will detect gross bacterial and fungal contamination of work surfaces, equipment machinery or other sampling sites.

Listeria SwabCheck

Listeria Isolation SwabCheck is designed to be used alongside traditional selective methods to improve the quality system and minimize the risk of *Listeria* contamination. This simple to use diagnostic test can be applied anywhere in the environment and on foodstuffs where the presence of *Listeria* species would be critical. *Listeria sp* and specifically *Listeria monocytogenes* are rapidly becoming the most important pathogen in the food industry; regulatory bodies from around the world are insisting that all food products are *Listeria* free. *Listeria* Isolation SwabCheck works on an enhanced Esculin media formulation. The hydrolysis of esculin gives a distinctive black/brown precipitate. Inhibitors and antibiotics are present in the media, which will inhibit the growth of non- *Listeria* species.

SwabCheck *Escherichia coli*

Used for the detection of *Escherichia coli* on surfaces. The presence of fluorescence using a long-wave UV light source confirms the presence of *Escherichia coli*, and any further confirmation is not required. MUG detects anaerogenic strain that may not be detected in the conventional procedure. Lactose is a source of energy. Casein peptone provides additional nutrients. The mixture of bile salts is inhibiting for gram-positive bacteria, particularly bacilli and fecal. The substrate 4-methylumbelliferyl-β-D-glucuronide is hydrolyzed by an enzyme, β-glucuronidase, possessed by most *Escherichia coli* and a few strains of *Salmonella, Shigella* and *Yersinia*, to produce a fluorescent end product, 4-methylumbelliferone. The presence of *Escherichia coli* is detected by the appearance of fluorescence throughout the tube.

Total Count Swab Kit

Used for the non-selective development and enumeration of all aerobic bacteria on surfaces in accordance with HACCP. The kit includes the swabs and culture medium, packaged with a membrane device, providing a quantitative result. All bacteria develop on TGE media and produce a range of different colored and sized colonies. It is not possible using TGE to presumptively identify any bacteria. Identification can only be undertaken using traditional microbiology techniques following initial colony development.

Coliform SwabCheck

Hygiene SwabCheck

Listeria SwabCheck

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Yeast and Mold Swab Kit

Used for the enumeration of yeast and molds on surfaces in accordance with HACCP. The kit includes the swabs and culture medium, packaged with a membrane device, providing a quantitative result. M-Green yeast and mold is an improved modification of the liquid medium, and was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH that aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow. Green opaque colonies against a yellow background are indicative of the growth of yeasts. Mold colonies are green and filamentous.

Yeast and Mold Swab Kit

Polywipe Sponge

Used for the recovery of microorganisms from a surface. Polywipe is a blue sponge that is premoistened with neutralizing buffer to neutralize the effects of surface disinfectants. The sponge material is selected to be free of the preservatives found in commercially available sponges, which can inhibit microorganism growth. Polywipe sponges are biocide free and tested for zero toxicity to microorganisms. Each sponge is individually wrapped in a peel pouch and gamma irradiated to ensure sterility. Each box of 50 sponges are packed with 50 sterile gloves to allow aseptic handling and 50 sterile sampling bags to allow the sponge to be hydrated.

Polywipe Sponge

Technical Specifications - Swabs and SwabChecks

Quality Control and Recommended Incubation Conditions:	Formulation:
Neutralizing Buffer Swabs	
Positive control: Undertaken on cultured organisms after transfer to standard methods agar plates from neutralizing buffer. *Escherichia coli* ATCC 25922, incubated at 35º C for 24 hours. Negative control: Not undertaken. Sterility test: 7 days plated sterility test.	Per liter of water adjusted to pH 7.2 ± 0.5 Monopotassium phosphate 42.5 g Sodium thiosulfate 160 mg Aryl sulfonate complex 5.0 g

contd >

Quality Control and Recommended Incubation Conditions:	Formulation:
SwabCheck	
Positive control: *Escherichia coli* ATCC 25922, 24-48 hours at 35-37º C. Negative control: Not undertaken. Sterility: 7 days plated sterility test.	Proprietary
Buffer Swabs	
Undertaken on cultured organisms after transfer to standard methods agar plates from the buffer solution. Positive control: *Escherichia coli* ATCC 25922, incubated at 35º C for 24 hours. Negative control: Not undertaken. Sterility: 7 days plated sterility test.	Make to 1 liter and adjust pH to 7.2 ± 0.5 Stock solution 1.25 ml/l Potassium di-hydrogen phosphate 34 g
ColiCheck	
Positive control: *Escherichia coli* ATCC 25922, incubated at 35° C for 48 hours. Negative control: Sterile water incubated at 35° C for 48 hours. Sterility test: 14 days plated sterility test.	Per liter of water and adjusted to pH 6.8 ± 0.2 Beef extract 3.0 g Pancreatic Digest of Gelatin 5.0 g Lactose 7.5 g Pancreatic Digest of Casein 10.0 g Dipotassium phosphate 1.375 g Monopotassium phosphate 1.375 g Sodium chloride 2.5 g Sodium lauryl sulfate 50 mg Bromocresol purple 8.5 mg
ColiCheck with MUG	
Positive control: *Escherichia coli* ATCC 25922, incubated at 35° C for 48 hours. Checked for fluorescence at 366 nm. Negative control: Sterile water incubated at 35º C for 48 hours. Sterility test: 14 days plated sterility test. Organisms Characteristics: *E. coli* ATCC 25922 Growth *E. aerogenes* ATCC 13048 Growth *E. faecalis* ATCC 29212 Inhibited Organisms Coloring: *E. coli* ATCC 25922 Yellow, fluorescence *E. aerogenes* ATCC 13048 Yellow, no fluorescence *E. faecalis* ATCC 29212 Red, no fluorescence	Per liter of water and adjusted to pH 6.8 ± 0.2 Beef extract 3.0 g Pancreatic Digest of Gelatin 5.0 g Lactose 7.5 g Pancreatic Digest of Casein 10.0 g Dipotassium phosphate 1.375 g Monopotassium phosphate 1.375 g Sodium chloride 2.5 g Sodium lauryl sulfate 50 mg Bromocresol purple 8.5 mg MUG 125 mg
SwabCheck *Escherichia coli*	
Positive control: *Escherichia coli* ATCC 25922, 24-48 hours at 35-37º C. Negative control: *Enterobacter aerogenes* ATCC 13048, 24-48 hours at 35-37º C. Growth but not fluorescence. Sterility: 7 days plated sterility test.	Per liter of water adjusted to pH 6.9 ± 0.2 Pancreatic Digest of Casein 20.0 g Lactose 5.0 g Bile Salts Mixture 1.5 g Dipotassium Phosphate 4.0 g Monopotassium Phosphate 1.5 g Sodium Chloride 5.0 g 4-methylumbelliferyl-β-D-glucuronide 50 mg

contd >

Microbiology Products

Quality Control and Recommended Incubation Conditions:	Formulation:
Total Count Swab Kit	
Positive control: *Escherichia coli* ATCC 25922, 24-48 hours at 35º C.	Per liter of water and adjusted to pH 7.0 ± 0.2
Negative control: Not undertaken.	Pancreatic Digest of Casein 10.0 g
Sterility: 7 days plated sterility test.	Yeast extract 5.0 g
	Dextrose 2.0 g
Yeast and Mold Swab Kit	
Positive control: *Candida albicans* ATCC 10231, 48 hours at 25-30º C.	Per liter of water adjusted to pH 4.6 ± 0.2
Negative control: Not undertaken.	Dipeptone 10.0 g
Sterility: 7 days plated sterility test.	Yeast extract 9.0 g
	Dextrose 50.0 g
	Magnesium sulfate 2.1 g
	Potassium phosphate 2.0 g
	Drastase 50 mg
	Thiamine 50 mg
	Bromocresol green 26 mg

Ordering Information - Swabs and SwabChecks

Description	Quantity/Pack	Catalog Number
Neutralizing Buffer Swabs, 4 mL	125	10 498 303
Neutralizing Buffer Swabs, 4 mL	500	10 498 304
Buffer Swabs, 4 mL	125	10 498 305
Buffer Swabs, 4 mL	500	10 498 306
SwabCheck, 4 mL	125	10 498 404
SwabCheck, 4 mL	500	10 498 405
SwabCheck, *E. coli*, 4 mL	125	10 498 402
Total Count Swab Kit	30	10 498 315
Yeast and Mold Swab Kit	30	10 498 316
Coliform SwabCheck	25	10 498 406
Hygiene SwabCheck	25	10 498 407
Listeria SwabCheck	25	10 498 408
Polywipe Sponges Single Packed	50	10 498 521

Rapid Test

Contamination Testing

The Lactobacillus Rapid Test is based on the membrane filtration method. In addition the quantitative results are available within 24 hours.

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Lactobacillus Rapid Test

For the rapid detection of *Lactobacillus* contamination in soft drinks. In the spoilage of soft drinks, carbonated soft drinks in particular, *Lactobacilli* play an important role. In the LST-45 test the membrane filter is incubated on a nutrient medium and the colonies are then colored blue with a reagent solution. Even dense growth can be easily recognized. After a maximum of 24 hours, even a single colony can be detected on the membrane filter. Package includes: 50 membrane filters, reagent solution and special nutrient media pads for 50 tests.

Yeast Rapid Test

For the rapid detection of yeast contamination in soft drinks. Yeast concentrations of 1000 yeast cells/mL can be detected in only 8 hours. The membrane filter is incubated on a nutrient medium and colored blue with reagent solution. After only 24 hours incubation, even a single colony can be detected. Package includes: 50 membrane filters, reagent solution and special nutrient pads for 50 tests.

Yeast and Lactobacillus Rapid Test

ColiCheck

Used for the presumptive identification of coliforms in water samples by a presence/absence technique. Bromocresol purple is a pH indicator that demonstrates a color change from purple to yellow in the presence of acid. Lactose fermenting organisms produce acid, which initiates the color change. The presence of coliforms is detected with greater sensitivity by use of a relatively large sample volume (100 mL) in a single bottle.

ColiCheck with MUG

Used for the presumptive identification of coliforms and the determination of the presence of *Escherichia coli* in water samples by a presence/absence technique. The addition of MUG (4-methylumbelliferyl-β-D-glucuronide) which is a fluorogenic enzyme allows the media to selectively identify *Escherichia coli*. MUG is hydrolyzed by the *Escherichia coli* specific enzyme β-glucuronidase to release 4-Methylumbelliferone which fluoresces under ultraviolet light (approx. 366 nm wavelength).

ColiCheck with MUG

Ordering Information - Rapid Test

	Quantity/Pack	Catalog Number
Lactobacillus Rapid Test (LST-45)*	50	10 433 410
Yeast Rapid Test (HST-45)*	50	10 433 406
ColiCheck Test Kit with Sample Bottles	30	10 496 744
ColiCheck with MUG Test Kit with Sample Bottles	30	10 496 745

* Package includes: 50 membrane filters, reagent solution and special nutrient media pads for 50 tests

Membrane Filtration Accessories

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

Vacuum Filtration Equipment

MV 050 Series

All MV series vacuum filtration devices are made of stainless steel, which is especially suitable for microbiological applications.

The system can be used up to 200º C, is autoclavable and can be sterilized by dry heat up to 180º C.

Applications

- Microbiology (e.g. *Escherichia coli* detection), biochemistry, hydrobiology
- Drinks (e.g. cold sludge in beer), foodstuffs (e.g. ice cream), pharmaceuticals, cosmetics, water, wastewater
- Residue analysis, precipitate analysis, contamination tests

MV 050/0

MV 050A/0

Multiple Vacuum Filtration Apparatus

AS 300 and 600 Series

The stainless steel manifold for 3 or 6 filtration units is fitted with stainless steel units. The apparatus can be autoclaved and sterilized by dry heat at up to 180º C. Suitable only for vacuum operation. If flushing tubes are used, do not exceed 1.3 bar (300 mbar over-pressure).

AS 300/3

AS 610/3

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Applications

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

Accessories for Vacuum Filtration Apparatus

Vacuum and Pressure Pumps

The vacuum pumps are required especially in the fields of microbiological quality control, analyses, medicine and production technology. The pumps are used for pumping gases, taking samples (even liquids in a vacuum) and evacuating vessels.

Features and Benefits

- AC models
- Contamination free pumping of air, gases and vapors
- High performance and minimum size
- Extremely quiet and smooth running
- Suitable for liquids in vacuum (VP007 only)
- Equipped with thermo switch and standard fuse
- Simple to use
- Maintenance free
- Oil-free membrane pumps

Vacuum Pump VP003

Vacuum Pump VP007

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 ideal for handling membrane filters. They are autoclavable and can be flame sterilized with ethanol.

Witt's Bottle WT 100

Forceps PZ 001

Technical Data - Vacuum Filtration - Stainless Steel Apparatus

Apparatus Selection:	
MV 050 Series	
- Filter Size:	47/50 mm
- Filter Volume:	100 or 500 mL
- Filter Area:	12.5 cm^2
- Pre filter:	40 mm dia.
- 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
Apparatus Selection:	
AS 300 and 600 Series - Multiple Vacuum Filtration Apparatus	
- 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

Performance Data - Vacuum and Pressure Pumps

	Delivery (l/min)	Vacuum (mbar absolute)	Pressure (bar)	Weight (kg)
VP003	3.6 m^3/hr	<100	4	11
VP007	1.7 m^3/hr	350	1.1	7

Technical Data - Witt's Bottle WT 100

Size:	100 mm diameter
Height:	160 mm
Capacity:	1000 mL
Vacuum Connection:	Tubing nozzle 8 mm (inside diameter)

Ordering Information - Vacuum Filtration - Stainless Steel Apparatus

Product	Funnel Volume (mL)	Rapid Closure Clamp	Height x Diameter* mm	Quantity/Pack	Catalog Number
MV 050 Series					
MV 050A/2	100	yes	230 x 60	1	10 440 220
MV 050/0	500	-	320 x 110	1	10 440 000
MV 050A/0	500	yes	320 x 110	1	10 440 020
AS 300 and 600 Series - Multiple Vacuum Filtration Apparatus (Unit from MV Series)					
Three-Place Filtration					
AS 300/5	100	-	230 x 60	1	10 445 850
AS 300/3	500	-	320 x 110	1	10 445 830
AS 310/3	500	yes	320 x 110	1	10 445 835
Stainless Steel Filter Funnel Manifold				1	10 498 761
Six-Place Filtration					
AS 600/5	100	-	230 x 60	1	10 444 850
AS 600/3	500	-	320 x 110	1	10 444 830
AS 610/3	500	yes	320 x 110	1	10 444 835
Stainless Steel Filter Funnel Manifold				1	10 498 762

* Without clamp

Ordering Information - Vacuum and Pressure Pumps

	Catalog Number
VP003	10 470 300
VP007	10 470 310

Ordering Information - Accessories

Product	Quantity/Pack	Catalog Number
ML 050/0/03 - Steel Frit with Ring	1	10 464 103
Witt's Bottle WT 100	1	10 477 601
Suction Flask SF100 - 1000 mL	1	10 477 600
Rubber Tubing - SV 006: 1 m length; 8 mm inside diameter; 18 mm outside diameter	1	10 471 700
Forceps PZ 001 - Stainless Steel	1	10 477 602

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Extraction Products:
Used to determine the oil and fat content in food, an indispensable tool for food manufacturers and health practitioners. Also used to test for pesticides.

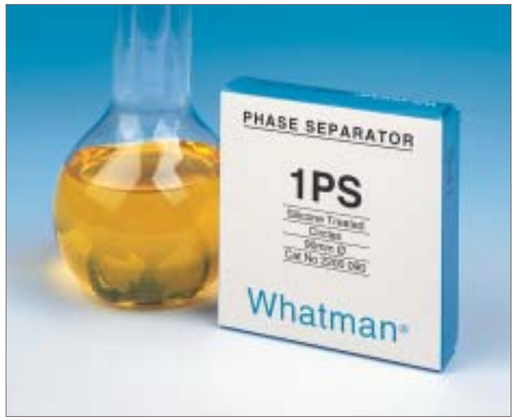
Extraction Products

Whatman offers a unique line of high-quality extraction products to meet a wide range of extraction applications. These products are manufactured from high-alpha cellulose cotton linters for purity and consistent performance.

Separator Paper

Whatman 1PS Phase Separator

The 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.



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 chief benefit of the 1PS method is that cut-off is automatic and complete just as soon as the solvent phase has passed through*. The result is no skilled operators are required.

* Water may break through upon prolonged standing

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

Ordering Information - 1PS Phase Separators (Circles)

Catalog Number	Diameter (cm)	Quantity/Pack
2200-070	7	100
2200-090	9	100
2200-110	11	100
2200-125	12.5	100
2200-150	15	100
2200-185	18.5	100
2200-240	24	100
2200-270	27	100

Solid Phase Extraction (SPE)

Whatman SPE devices are designed to concentrate or isolate analytes from complex sample matrices. Available with a variety of packing media, these devices offer the advantage of working with different types of interactions between the sample components, sorbent and suitable eluent. The polarity (polar, non-polar) or charge (anion, cation) of the analyte of interest will determine the proper choice of sorbent and solvent.

Whatman SPE devices have silica-based chemistries and are available in several configurations. Column capacities include 3, 6 and 12 mL sizes. A cartridge format for use with a syringe is also available.

Solid phase extraction is a chromatographic technique used to prepare samples for subsequent analysis by removing interfering substances that may be present. This is done either by retaining the substance of interest and washing off everything else or by retaining the interfering substances and eluting the product of interest.

Whatman SPE devices contain high quality sorbents for LC chromatographers.

Solid Phase Extraction Columns

Features and Benefits
- Available in a range of packing media
- Whatman quality sorbents for consistent results

Applications
- Isolate analytes from complex sample matrices
- Remove interfering substances in order to prepare samples for subsequent analysis
- Drug metabolites in biological fluids
- Food analysis
- Environmental analysis

Solid Phase Extraction (SPE) Discs

The Whatman SPE disc utilizes C-18 derivatized silica, incorporated into a glass microfiber matrix. The high flow and high loading capacity of the glass microfiber media allow for rapid aqueous sample flow rates, while oil, grease and other organic analytes are efficiently extracted and retained by the reverse phase silica material.

Features and Benefits
- High quality Whatman glass microfiber media for superior flow and high loading capacity
- Efficient grease analyte extraction and retention
- Prefilters available for difficult samples

Applications
- Oil and grease analysis, EPA Method 1664A

Sample Drying Device

A sodium sulfate sample drying device is available for removal of water from water-immiscible organic solvent extracts. It attaches to the male luer outlet of a syringe in which the extract has been collected. Traces of water are removed as the sample is pushed through the drying device into a collection vial.

Typical Data - Solid Phase Extraction (SPE) Discs

Product	Key to Sorbent Abbreviations	Description
ODS-4	Octadecyl silane	14% of carbon load, end capped
ODS-5	Octadecyl silane	18% of carbon load, end capped
C-8	Octyl silane	8.5% of carbon load, end capped
FLO	Florisil®	Magnesium silicate (US Silica Company)
SCX	Strong cation exchanger–aromatic benzene sulfonic acid functional groups	-
SAX	Strong anion exchanger–quaternary amino groups (-NR3+)	-

Ordering Information - Solid Phase Extraction (SPE) Discs

Catalog Number	Product Code	Column Volume	Quantity/Pack
Column Type			
6803-0505	ODS-5	500 mg/3 mL	50
6803-0507	ODS-5	500 mg/6 mL	30
6803-0509	ODS-5	1000 mg/12 mL	20
6803-1205	C-8	500 mg/3 mL	50
6803-1809	FLO	1000 mg/12 mL	20
6803-2005	SAX	500 mg/3 mL	50
6803-2605	SCX	500 mg/3 mL	50
Cartridge Type*			
6804-0405	ODS-4	500 mg/unit	50
6804-0505	ODS-5	500 mg/unit	50

* For use with a syringe or vacuum manifold after removing male outlet collar

Ordering Information - Solid Phase Extraction (SPE) Discs

Catalog Number	Description	Filter Media	Diameter (mm)	Pore Size (µm)	Quantity/Pack
6805-3042	SPE Disc for Oil and Grease	-	47	-	20
6805-3043	SPE Disc for Oil and Grease	-	47	-	80
6805-3048	SPE Disc for Oil and Grease	-	90	-	20
6805-3049	SPE Disc for Oil and Grease	-	90	-	80
6805-8034	DFP Prefilter	PP	42.5	5	48
6805-8035	DFP Prefilter	PP	47	5	48
6805-8037	DFP Prefilter	PP	90	5	16

Ordering Information - Sample Drying Device

Catalog Number	Product	Size (mg)	Quantity/Pack
Cartridge Type with Polypropylene Filter			
6805-8020	Sodium sulfate with 0.45 µm - PP filter and tube tip	1500	50

Extraction Thimbles

Whatman cellulose and glass microfiber extraction thimbles are known for their purity and consistent high quality. The thimbles are widely used in Soxhlet extraction units providing a safe, convenient and efficient method of solvent extraction of solids and semi-solids. Soxhlet extraction is a widely used technique for the analysis of fats or pesticides in foods and soil materials and many other procedures that involve a solid-liquid extraction.

High Performance Cellulose Extraction Thimbles

Cellulose extraction thimbles are produced from high-quality alpha cellulose cotton linter and have excellent mechanical strength and retention.

Standard single thickness thimbles have a wall thickness of approximately 1 mm (10 µm nominal particle retention).

Double thickness thimbles have a wall thickness of approximately 2 mm (6 µm nominal particle retention) for applications where higher retention and increased wet or dry strength or rigidity is required.

Standard Cellulose Extraction Thimbles

Thimbles of type 603 are made from high-quality cellulose or pure borosilicate glass fibers. The high purity of the materials ensures reliable and reproducible analytical results. For all automated extraction apparatus in common use, Whatman offers thimbles whose dimensions are matched exactly to those of the thimble holders to guarantee perfect fit.

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Typical Data - Standard Extraction Thimbles

Grade	Material	Retention Rate to BS 4400%	Max. Temperature °C
603	Cellulose	-	120
603 g	Borosilicate Glass Fibers*	99	500

* With inorganic binder

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 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/fat content of foods (e.g. French fries)
- Analysis of oil and grease in solid wastes

Thimble Size Selection

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 millimetres. Therefore, an extra allowance for wall thickness should be made 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 Extraction Thimbles

Single Thickness[1] Catalog Number	Double Thickness[2] Catalog Number	Dimensions (mm)*	Quantity/Pack
Cellulose Thimbles			
2800-105	-	10 x 50	25
2800-166	2810-166	16 x 60	25
2800-185	-	18 x 55	25
2800-199	-	19 x 90	25
2800-226	-	22 x 65	25
2800-228	2810-228	22 x 80	25
2800-258	2810-258	25 x 80	25
2800-259	-	25 x 90	25
2800-250	2810-250	25 x 100	25
2800-266**	2810-266	26 x 60**	25
2800-280	-	28 x 100	25
2800-282	-	28 x 120	25
2800-288	-	28 x 80	25
2800-307	-	30 x 77	25
2800-308	2810-308	30 x 80	25
2800-300	-	30 x 100	25
2800-338	2810-338	33 x 80	25
2800-339	2810-339	33 x 94	25
2800-330	-	33 x 100	25
2800-373	-	37 x 130	25
2800-412	-	41 x 123	25
2800-331	2810-331	33 x 118	25
2800-432	2810-432	43 x 123	25
2800-608	-	60 x 180	25
2800-900	-	90 x 200	25

* Internal diameter and external lengths
** Fits Soxtec™ extractor
[1] Single wall thickness = 1 mm
[2] Double wall thickness = 2 mm

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Ordering Information - Extraction Thimbles for Standard Soxhlet Apparatus

Extractor Volume	Dimensions	Wall Thickness (mm)	Quantity/Pack	Catalog Number
According to DIN 12 449				
30	22 x 80	1.5	25	10 350 211
100	33 x 94	1.5	25	10 350 242
250	33 x 205	1.5	25	10 350 250
According to BS 2071				
200	41 x 123	1.0	25	2800-412

Ordering Information - Extraction Thimbles for Automated Extraction Apparatus - Grade 603

Extraction System	Dimensions	Wall Thickness (mm)	Quantity/Pack	Catalog Number
BÜCHI - Extraction System B-811	25 x 100	1.5	25	10 350 219
	22 x 80	1.5	25	10 350 211
	33 x 94	1.5	25	10 350 242
	43 x 123	2.0	25	10 350 267
GERHARDT - Soxtherm Automatic	33 x 80	1.5	25	10 350 240
FOSS Soxtec	31 x 80	1.0	25	10 350 437
Avanti 2050 Auto System				
DIONEX ASE 200*	for 11 mL cell	1.0	25	10 350 106
	for 22 mL cell	1.0	25	10 350 108
	for 33 mL cell	1.0	25	10 350 109
DIONEX ASE 100/300*	for 34 mL cell	1.0	25	10 350 328
	for 66 mL cell	1.0	25	10 350 327
	for 100 mL cell	1.0	25	10 350 315

* Non-stick thimble

Ordering Information - Standard Extraction Thimbles

Dimensions	Wall Thickness (mm)	Quantity/Pack	Catalog Number
Grade 603 (Cellulose)			
22 x 60	2.0	25	10 350 306
22 x 80	1.5	25	10 350 211
25 x 50	1.5	25	10 350 116
25 x 60	1.5	25	10 350 215
25 x 70	1.0	25	10 350 216
25 x 80	1.5	25	10 350 217
25 x 100	1.5	25	10 350 219
26 x 60	1.5	25	10 350 220
27 x 80	1.5	25	10 350 223
27 x 100	1.5	25	10 350 224
28 x 60	1.5	25	10 350 225
28 x 80	1.5	25	10 350 226
28 x 100	1.5	25	10 350 227
30 x 80	1.5	25	10 350 234
30 x 90	1.5	25	10 350 235
30 x 100	1.5	25	10 350 236
33 x 60	1.5	25	10 350 238
33 x 80	1.5	25	10 350 240
33 x 90	1.5	25	10 350 241
33 x 94	1.5	25	10 350 242
33 x 100	1.5	25	10 350 243
33 x 118	1.5	25	10 350 245
33 x 120	1.5	25	10 350 246
33 x 130	1.5	25	10 350 247
33 x 205	1.5	25	10 350 250
34 x 130	1.5	25	10 350 252
35 x 120	1.5	25	10 350 254
35 x 150	1.5	25	10 350 255
40 x 85	2.0	25	10 350 261
41 x 123	2.0	25	10 350 265
43 x 123	2.0	25	10 350 267
48 x 145	2.0	25	10 350 273
48 x 200	2.0	25	10 350 274
44 x 230	2.0	25	10 350 275
75 x 250	2.5	25	10 350 287
80 x 250	3.0	25	10 350 324

Ordering Information - Glass Microfiber Extraction Thimbles

Dimensions	Wall Thickness (mm)	Quantity/Pack	Catalog Number
Grade 603 g (Glass Fiber)			
10 x 38	1.5	25	10 371 103
16 x 50	1.0	25	10 371 005
19 x 90	1.0	25	10 371 007
22 x 80	1.5	25	10 371 011
25 x 65	1.5	25	10 371 014
25 x 80	1.5	25	10 371 017
25 x 100	1.5	25	10 371 019
26 x 63	1.5	25	10 371 122
26 x 100	1.5	25	10 371 023
28 x 60	1.5	25	10 371 025
30 x 100	1.5	25	10 371 036
33 x 94	1.5	25	10 371 042
33 x 100	1.5	25	10 371 043
33 x 118	1.5	25	10 371 045
33 x 205	1.5	25	10 371 050
35 x 150	1.5	25	10 371 055
23.8 x 68*	1.5	25	10 371 114
44 x 230	1.5	25	10 371 075
Glass Microfiber Thimbles – Grade HP-GF			
19 x 90	-	25	2814-199
30 x 100	-	25	2814-300
43 x 123	-	25	2814-432

* Type GOTHE (outer diameter 26.8 mm)

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Specialty Products:
Separate the organic from the inorganic. Protect lab surfaces. Test the pH levels in swimming pools. A range of products for a variety of tasks.

Specialty Products

Whatman offers a range of specialty products to meet your specific testing requirements. Made with traditional Whatman quality, these products combine ease-of-use with unsurpassed accuracy and consistency.

Ashless Cellulose Powder Filter Aid

Whatman ashless cellulose powder enhances filtration speed by coagulating precipitates or suspensions to form a thick retentive 'prefilter' layer on top of normal filter paper.

Easily dispersible, the powder is of a purity similar to that of Whatman ashless quantitative papers. Maximum ash content is 0.015%. It is supplied with a two-ended scoop for measuring 0.50 g or 2.5 g quantities.

Ordering Information - Ashless Cellulose Powder Filter Aid

Catalog Number	Description	Size
1700-025	Ashless Powder	250 g
1703-050	Ashless Clippings	500 g

Benchkote® and Benchkote Plus™

Benchkote

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. This makes both Benchkote and Benchkote Plus excellent products that comply with OSHA Regulation 29CFR 1910.1030 for Occupational Exposure to Bloodborne Pathogens.

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 liquids preventing liquids from going through to the working surface
- Spillages are trapped in the absorbent paper
- Benchkote can be picked up and burnt very easily 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

Ordering Information - Benchkote and Benchkote Plus

Catalog Number	Description	Dimensions	Quantity/Pack
Benchkote			
2300-916	Sheets	46 cm x 57 cm	50
2300-594	Pads	46 cm x 57 cm	50
2300-731	Reel	46 cm x 50 m	1
2300-772	Reel	92 cm x 50 m	1
Benchkote Plus			
2301-6150	Sheets	50 cm x 60 cm	50
2301-6160	Reel	60 cm x 50 m	1

CryptTest® Membrane Filter Cartridge

Whatman introduces a new, convenient membrane filter cartridge for the concentration and recovery of water-borne protozoan cysts and oocysts which has been approved by the EPA for Method 1623, *Cryptosporidium* and *Giardia* in water by filtration.

The CryptTest Cartridge captures protozoan cysts and oocysts from sample water pumped through the disposable cartridge contained in a reusable housing. The CryptTest contains a 1.0 µm pore size Nuclepore polycarbonate track-etched membrane.

Protozoan cysts and oocysts are recovered from the membrane cartridge by using a simple backwashing procedure. The eluant, containing cysts and oocysts, is decanted from the housing into a collection vessel.

Further concentration, purification and separation by centrifugation, immunomagnetic separation or flow cytometry/cell sorting is then performed. Enumeration and confirmation of the cysts and oocysts is done using epifluorescence and DIC procedures.

Features and Benefits

- Nuclepore polycarbonate track-etched membrane provides total surface capture
- Simple backwashing procedure yields consistent high recovery
- Convenient for field sampling - sample water pumped through disposable cartridge contained in durable, reusable housing
- Simple to use

CryptTest Membrane Filter Cartridge

Ordering Information - CryptTest Membrane Filter Cartridge

Catalog Number	Description	Quantity/Pack
610064	CryptTest Cartridge	1
71503	Cartridge Housing, AMETEK 5" Clear Polycarbonate	1

Method

The CryptTest Cartridge was developed for efficient concentration and recovery of protozoan cysts and oocysts in water. The following method is recommended for processing water samples.

Materials and Equipment

- CryptTest Cartridge - Catalog Number 610064
- Cartridge housing, AMETEK 5" clear polycarbonate - Catalog Number 71503
- 1/2" male pipe threads with male hose connectors (2)
- Laboratory tubing, Tygon formula R-3603, or equivalent, to which cysts/oocysts will not adhere
- Flow control valve - 2 liters/minute (0.5 gallons/minute)
- Water flow meter
- Peristaltic pump
- Ultrasonic bath

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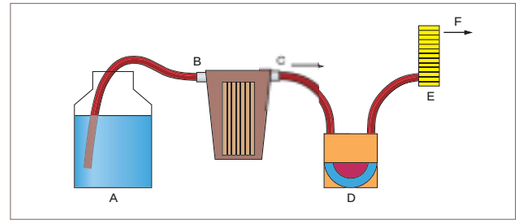
Elution Buffer

- NaCl - 8.0 g
- KH_2PO_4 - 0.2 g
- Na_2HPO_4 ($12H_2O$) - 2.9 g
- KCl - 0.2 g
- Sodium lauryl sulfate (SDS) - 0.2 g
- Tween 80 - 0.2 mL
- Antifoam A* - 0.02 mL
- Adjust volume to 1 liter with reagent water
- Adjust pH to 7.4 with 1 N NaOH or HCl

* Sigma Chemical Co - Catalog Number A5758

Sample Filtration

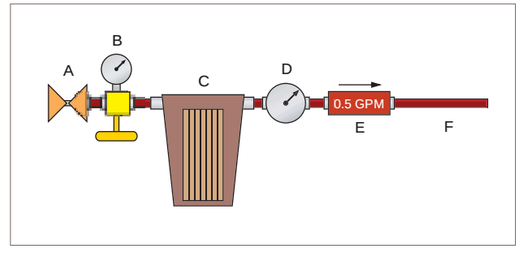
Key
A - Sample
B - Filter Inlet
C - Filter Outlet
D - Peristaltic Pump
E - Flowmeter
F - To Waste



Sampling from Carboy

1. Clean and rinse cartridge housing
2. Attach male pipe threads to inlet and outlet of cartridge housing cap
3. Attach new or well-cleaned tubing to male hose connectors on inlet and outlet of cartridge housing. Secure both with band clamps.
4. Install the cartridge filter in the housing
5. When filtering sample water from a carboy, thread the outlet tubing through the peristaltic pump and immerse the open end of the inlet tubing in the carboy. Alternatively attach open end of inlet tubing directly to feed line.
6. Turn on pump and adjust the flow rate to 2 liters/min
7. Turn off the pump when the desired sample volume has been filtered

Key
A - Sample Tap
B - Pressure Regulator and Gauge
C - Filter in Housing
D - Flow Totalizer
E - Flow Control Valve
F - Drain Hose



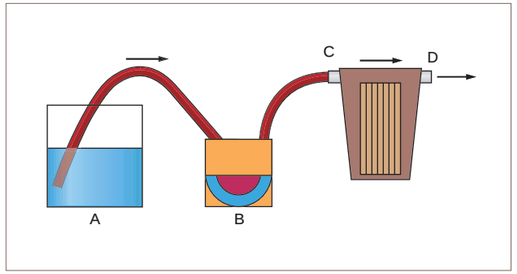
Sampling from Feed Line

Backwashing the Cartridge to Elute Cysts/Oocysts

1. Detach tubing from housing inlet and decant any water remaining in the inlet side of the housing into a 1 liter sample bottle
2. Attach the housing outlet to the discharge tubing of the peristaltic pump. Place the free end of this tubing into a beaker of elution buffer.
3. Start the pump and run at approximately 400 mL/min until the filter outlet core and the housing inlet cavity are filled (approximately 300 mL)
4. Cap the housing inlet and outlet and place the housing in the ultrasonic bath for 2 minutes
5. Remove the inlet cap and decant the liquid from the inlet side into the collection bottle
6. Repeat steps 3, 4 and 5 and then proceed to step 7
7. Connect housing outlet to regulated compressed air source and gradually increase pressure to 5-10 psi as necessary to drive remaining elution buffer from the outlet side to the inlet side and into the collection bottle

After backwashing the cartridge and collecting the eluate, further purification, detection and enumeration of cysts/oocysts may be performed using EPA recommended methods.

Key
A - Eluting Solution
B - Peristaltic Pump
C - Filter Outlet
D - Filter Inlet



Backwash

Cleaning the Cartridge Housing

The following procedure is recommended for cleaning the cartridge housing between samples.

1. Wash thoroughly with water and laboratory detergent, using a brush to clean all crevices
2. Soak in 6% sodium hypochlorite solution for 30 minutes
3. Rinse thoroughly with tap water
4. Rinse with laboratory water

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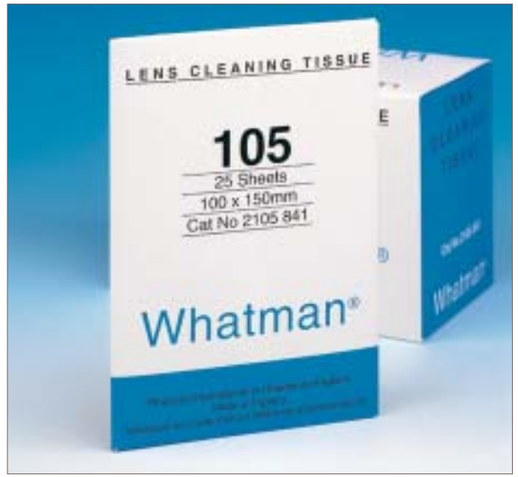
Lens Cleaning Tissue

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 ideal 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 Tissue

Catalog Number	Dimensions	Quantity/Pack
Lens Cleaning Tissue		
2105-841	100 x 150 mm	25 wallets of 25 sheets
2105-862	200 x 300 mm	100 sheets
2105-918	460 x 570 mm	500 sheets

pH Indicators and Test Papers

Whatman offers a range of pH indicator and test papers to meet your specific needs. Made with traditional Whatman quality, these products combine ease-of-use with unsurpassed 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.

Specialty Products

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
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
Each test strip has a central segment of indicator dye and, printed alongside, 8 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. Ideal for colored solutions, when any changes in color of the paper stock are automatically cancelled out.

Dispensers Type TC
The strip has 3 separate indicator dye color bands. The unique 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
A full range and some narrow ranges in this popular pH indicator dispenser.

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.

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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 pre-blackening 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.).

Ordering Information - pH Indicators and Test Papers

Catalog Number	Type	Description	pH Range	pH Unit Graduation	Dimensions	Packaging
Strips						
2613-991	CF	Color Bonded	0–14	1.0	11 mm x 100 mm	100 Strips
2614-991	CF	Color Bonded	4.5–10.0	0.5	11 mm x 100 mm	100 Strips
2612-990	CS	Integral Comparison Strip	1.0–12.0	1.0	11 mm x 100 mm	200 Strips
2626-990	CS	Integral Comparison Strip	1.8–3.8	0.2–0.3	11 mm x 100 mm	200 Strips
2627-990	CS	Integral Comparison Strip	3.8–5.5	0.2–0.3	11 mm x 100 mm	200 Strips
2628-990	CS	Integral Comparison Strip	5.2–6.8	0.2–0.3	11 mm x 100 mm	200 Strips
2629-990	CS	Integral Comparison Strip	6.0–8.1	0.3	11 mm x 100 mm	200 Strips
2630-990	CS	Integral Comparison Strip	8.0–9.7	0.2–0.3	11 mm x 100 mm	200 Strips
2631-990	CS	Integral Comparison Strip	9.5–12.0	0.5	11 mm x 100 mm	200 Strips

contd >

Specialty Products

Catalog Number	Type	Description	pH Range	pH Unit Graduation	Dimensions	Packaging
Dispensers						
2611-628	TC	Three Colors	1.0–11.0	1	10 mm x 5 m	Pack of 1 Dispenser
2600-100A	SR	Standard Full Range	1.0–14.0	1.0–2.0	7 mm x 5 m	Pack of 1 Dispenser
2600-101A	SR	Standard Narrow Range	0.5–5.5	0.5–1.0	7 mm x 5 m	Pack of 1 Dispenser
2600-102A	SR	Standard Narrow Range	4.0–7.0	0.5	7 mm x 5 m	Pack of 1 Dispenser
2600-103A	SR	Standard Narrow Range	6.4–8.0	0.5	7 mm x 5 m	Pack of 1 Dispenser
2600-104A	SR	Standard Narrow Range	8.0–10.0	0.5	7 mm x 5 m	Pack of 1 Dispenser

Ordering Information - Test Papers

Catalog Number	Description	Packaging
Acid Alkali Test Papers		
Dispensers		
2600-201A	Litmus Blue	Pack of 1 Dispenser
2600-202A	Litmus Red	7mm x 5m
2600-203A	Congo Red	
2600-204A	Phenolphthalein	
Books		
2600-601	Litmus Blue	Carton of 10 packs of 10 Books
2600-602	Litmus Red	20 Leaves per Book
2600-500	pH Indicator Booklet pH 1 - 11	10 Strips per Book 10 Books per Pack 20 Packs per Carton
Specialized Test Paper Dispensers		
2602-501A	Lead Acetate	Pack of 1 Dispenser
2602-500A	Potassium Iodide	7 mm x 5 m

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.

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Ordering Information - PANPEHA – Universal Indicator Papers

Catalog Number	Measuring pH Range	pH Color Change	Size (mm)	Quantity/Pack
PANPEHA				
10 362 030	1-11	1	7 mm x 5 m	1
PANPEHA Plus*				
10 362 000	0-14	1	6 x 85	100
10 362 010	2-9	0.5	6 x 85	100
PANPEHA Nr. 112				
10 360 005	0-14	0.5/1**	10 x 75	200
Litmus blue				
10 360 300	8-5	blue-red	10 x 75	100
Litmus red				
10 360 400	5-8	red-blue	10 x 75	100
Phenolphthalein				
10 360 700	8.3-10	white-red	10 x 75	100

* Non-bleeding

** From pH 0-9 in 0.5 pH steps; from pH 9-14 in 1 pH steps

Clinical Papers

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 disks 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.

Papers for Clinical Applications

- Grade 557: Tallquist hemoglobin scale (for direct rapid testing of the hemoglobin value in blood)
- Grade 470: Soft surface. For gelatinous samples. Used for the absorption of culture media, as blotting paper, for electrophoresis and amino acid chromatography.

Ordering Information - Antibiotic Assay Paper

Catalog Number	Size (mm)	Quantity/Pack
Grade 557		
10 320 390	95 x 135	1 booklet (250 leaves)
Grade 470		
10 318 487	200 x 200	100
10 318 493	460 x 570	100
10 318 489	203 x 305*	25
AA Discs		
2017-006	6 mm	1000
2017-013	13 mm	1000

* Corresponds 8" x 12"

Seed Testing Papers

All seed testing papers meet the specifications published by the ISTA (International Seed Testing Association) and AOSA (Association of Official Seed Analysts). For the most common test methods (TP = top of paper, PP = pleated paper) several grades of paper are offered.

Owing to their extremely high purity our seed testing papers always provide reliable and reproducible results. The 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 better 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 which we use have been thoroughly investigated and have no influence on the growth of the seeds.

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Product Selection - Seed Testing Papers

Grade	Description	Thickness (mm)	Weight (g/m²)
PP method			
3014	Pleated Strips, White*	0.23	113
3236	Pleated Strips, Gray*	0.22	110
TP method			
597	For Petri Dishes or Jacobsen/Copenhagen Tanks, White	0.19	85
598	For Petri Dishes or Jacobsen/Copenhagen Tanks, White	0.32	140
3621	Blotter, Light Blue	1.45	700
3633	Blotter, Light Blue	0.65	300
3644	Blotter, Blue	1.42	700
3645	Yellow	0.35	165
BP method			
3663	Brown, Creped	0.23	65

* 50 double pleats

Application - Seed Testing Papers

	Grade
Medium-large and Coated Seeds (e.g. sugar beet, fodder beet, grain, sunflower, rapeseed, mustard)	3014, 3236
Small Seeds (e.g. grasses, flowers)	597, 598
Seeds with Small White Rootlets	3621, 3633, 3645
Particularly Sensitive Seeds	3014

Ordering Information - Seed Testing Papers

Grade	Size (mm)	Quantity/Pack	Catalog Number
597	70	100	10 311 808
	90	100	10 311 809
598	90	100	10 312 209
3014	110 x 20	1000	10 344 672
	110 x 20	1000	10 344 676
3236	110 x 20	1000	10 345 572
	110 x 20	1000	10 345 576
3621	80 x 120	10 x 100	10 342 577
3633	90	1000	10 342 710
	270 x 410	100	10 342 766
3644	140 x 200	10 x 100	10 342 580
3645	110 x 170	100	10 342 583

Weighing Papers

Kjeldahl Weighing Boats

Features and Benefits

- Ideal 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 nitrogen-free parchment paper without any glue or additives

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.

The fastest, safest and most comfortable way to transfer Kjeldahl samples.

Parchment Paper

Features and Benefits

- Transparent and smooth
- Simple weighing out of a wide range of different samples
- Quantitative transfer from paper

Typical Properties - Weighing Papers

Product	Grade	Thickness (mm)	Weight (g/m^2)
Weighing Boats, Nitrogen-free	609	0.07	80
Pergamyne Paper	2122	0.03	40
Parchment Paper, Nitrogen-free	B-2	0.04	43

Ordering Information - Weighing Papers

Grade	Size (mm)	Quantity/Pack	Catalog Number
Kjeldahl Weighing Boats	55 x 10 x 10	100	10 313 032
2122	100 x 100	500	10 347 893
	150 x 150	500	10 347 890
B-2	3" x 3"*	500	10 347 671
	4" x 4"*	500	10 347 672
	6" x 6"*	500	10 347 673
	12" x 12"*	500	10 347 670

* 1" = 25.4 mm

Chromatography Products:
From pesticide analysis to drugs QC, our chromatography solutions detect and separate individual chemical constituents for testing and analysis.

Chromatography

Whatman is known as an experienced manufacturer of chromatography products including chromatography paper, chromatography separation media, High Performance Liquid Chromatography (HPLC) columns and thin layer chromatography plates.

Today's pharmaceutical, chemical and biotechnology industries are facing demands for purity in the development of commercially important products. As a result, chromatography has become a major purification technique on a process and preparative scale. Separation media with guaranteed uniformity and reproducibility have become vital components in the ultimate goal of bringing a new product to market. Whatman has a complete line of chromatography products to suit these exacting requirements.

Chromatography Cellulose Media

Whatman offers an extensive product line of chromatography cellulose media for applications ranging from the separation of biopolymers such as proteins, peptide and hormones to the purification of monoclonal antibodies, vaccines, synthetic pharmaceuticals and agrochemicals.

Technological innovations in product development and manufacturing processes and a dedication to excellence are combined to ensure batch-to batch reproducibility of these chromatography cellulose media.

Cellulose Powders

Whatman cellulose powders are used for column and Thin Layer Chromatography (TLC). Four high-purity cellulose powders are available for separations using the partition mode.

CC31
Pure, microgranular cellulose powder for column separations.

CC41
Pure, binder-free microgranular cellulose powder for TLC.

CF1
Fibrous, long cellulose for batch separations.

CF11
Fibrous, medium cellulose powder for general column chromatography.

Ordering Information - Cellulose Powders

Catalog Number	Product	Description	Size
4020-050	CF1	Fibrous cellulose for batch separations	500 g
4021-050	CF11	Fibrous cellulose powder for column work	500 g
4021-500	CF11	Fibrous cellulose powder for column work	5 kg
4014-050	CC31	Microgranular cellulose powder for column work	500 g
4014-200	CC31	Microgranular cellulose powder for column work	2 kg
4061-050	CC41	Microgranular cellulose for TLC	500 g

Specialty Products for Protein Separations

CDR (Cell Debris Remover)
Aids in protein purification through initial cleanup of cell lysates; removes unwanted suspended, colloidal and insoluble matter, leaving target proteins in solution.

Ordering Information - CDR

Catalog Number	Product	Description	Size
4025-050	CDR	Cell Debris Remover	500 g
4025-200	CDR	Cell Debris Remover	2 kg

Advanced Ion Exchange Cellulose

Whatman Advanced Ion Exchange Cellulose (AIEC) and Column Chromatography (CC) products are ideal for the separation of biopolymers and are suitable for a wide variety of applications. Available as:

- Preswollen microgranular AIEC for high load capacity fast kinetics and resolution; saves time by eliminating need for precycling prior to buffer equilibration
- Dry microgranular AIEC for similar performance characteristics as preswollen media after precycling; reduces possibility of bacterial growth

- Fibrous AIEC for maximum throughput at high flow rates
- Commonly used anion and cation exchange functional groups: DEAE (diethylaminoethyl tertiary amine) and CM (ether-linked carboxymethyl)
- Orthophosphate bifunctional cation exchanger for sharp separation of medium molecular weight molecules

Anion Exchangers

The DE weak anion exchangers are based on the diethylaminoethyl (DEAE) tertiary amine functional group. QA52 is a strongly basic anion exchange medium, containing quaternary amine groups.

DE23 (Dry Fibrous)
Allows fast flow rates especially after fines removal; suitable for negative charged biopolymers.

DE32 (Dry Microgranular)
Similar performance characteristics as DE52 after precycling.

DE51 (Preswollen, Microgranular)
Low overall net charge. For use with proteins bearing a high negative charge and for nucleic acids. Suitable for isocratic elution systems.

DE52 (Preswollen, Microgranular)
Probably the most widely used DEAE cellulose in the world; used for biopolymers with low to high negative charges; exhibits excellent resolution with good flow rates.

DE53 (Preswollen, Microgranular)
Partially quaternized DEAE anion exchanger, highly substituted and with higher capacity than DE52; can be used in series with DE51 and DE52 media.

QA52 (Preswollen, Microgranular)
A strongly basic, quaternary amine-bearing anion exchange medium, moderately substituted, with high protein capacity. Fully ionized, bears constant change under all pH conditions; excellent for high pH applications.

Typical Data - Anion Exchange Media

Physical Form	Functional Group	Normal pH Range	Small Ion Capacity (meq/dg*)	Protein Capacity[1] Dry Gram (mg/dg*)	Protein Capacity[1] Bed Volume (mg/mL)	gExchanger/ mL Bed Volume
Dry Fibrous						
DE23	Diethylaminoethyl	2–9.5	0.88–1.08	425[b]	60	0.15
Dry Microgranular						
DE32	Diethylaminoethyl	2–9.5	0.88–1.08	700[b]	140	0.20

contd>

Physical Form	Functional Group	Normal pH Range	Small Ion Capacity (meq/dg*)	Protein Capacity[1] Dry Gram (mg/dg*)	Protein Capacity[1] Bed Volume (mg/mL)	gExchanger/ mL Bed Volume
Preswollen Microgranular						
DE51	Diethylaminoethyl	2–9	0.20–0.25	175[a]	30	1.20
DE52	Diethylaminoethyl	2–9.5	0.88–1.08	700[b]	130	0.90
DE53	Diethylaminoethyl	2–12	1.8–2.2	750[b]	150	1.05
QA52	Quaternary Ammonium	2–12	1.1	750[b]	150	1.20

* dg = dry gram
[1] Protein capacity quoted:
[a] 0.005 M pH 8.5 phosphate buffer – Bovine serum albumin
[b] 0.01M pH 8.5 phosphate buffer – Bovine serum albumin

Ordering Information - Anion Exchangers DEAE and QA Celluloses

Catalog Number	Product	Description	Size
4053-010	DE23	Fibrous DEAE Cellulose	100 g
4053-025	DE23	Fibrous DEAE Cellulose	250 g
4055-010	DE32	Dry Microgranular DEAE Cellulose	100 g
4056-050	DE51	Preswollen Microgranular DEAE Cellulose	500 g
4057-050	DE52	Preswollen Microgranular DEAE Cellulose	500 g
4057-200	DE52	Preswollen Microgranular DEAE Cellulose	2 kg
4058-050	DE53	Preswollen Microgranular DEAE Cellulose	500 g
4058-200	DE53	Preswollen Microgranular DEAE Cellulose	2 kg
4065-050	QA52	Quaternary Amine Substituted	500 g
4065-200	QA52	Quaternary Amine Substituted	2 kg

Cation Exchangers

CM32 (Dry Microgranular)
High-capacity medium for proteins, hormones, polypeptides and other biopolymers bearing low to high positive charges; excellent resolution with good column flow rates. Requires precycling to restore swelling. Equivalent to CM52 when swollen.

CM52 (Preswollen, Microgranular)
High-capacity medium for proteins, hormones, polypeptides and other biopolymers bearing low to high positive charges; excellent resolution with good column flow rates.

P11 Cellulose Phosphate
Dry fiber. Recommended for column separations.

Typical Data - Cation Exchange Media

Physical Form	Functional Group	Normal pH Range	Small Ion Capacity (meq/dg*)	Protein Capacity[1] Dry Gram (mg/dg*)	Protein Capacity[1] Bed Volume (mg/mL)	gExchanger/ mL Bed Volume
Preswollen Microgranular						
CM52	Carboxymethyl	3–10	0.90–1.15	1180[a]	210	1.05
Dry Microgranular						
CM32	Carboxymethyl	3–10	2.1–2.8	1180[b]	200	0.17
Dry Fibrous						
P11	Orthophosphate	2–10	3.2–5.3	400–500	-	0.17

* dg = dry gram

[1] Protein capacity quoted:

[a] 0.01M pH 5.0 acetate buffer – Lysozyme

[b] 0.01M pH 4.4 acetate buffer – Lysozyme

Ordering Information - Cation Exchangers - CM Celluloses and P Phosphates

Catalog Number	Product	Description	Size
4035-010	CM32	Dry Microgranular CM Cellulose	100 g
4035-050	CM32	Dry Microgranular CM Cellulose	500 g
4037-050	CM52	Preswollen Microgranular CM Cellulose	500 g
4037-200	CM52	Preswollen Microgranular CM Cellulose	2 kg
4071-010	P11	Dry Bifunctional Cation Exchange Cellulose	100 g
4071-050	P11	Dry Bifunctional Cation Exchange Cellulose	500 g
4071-200	P11	Dry Bifunctional Cation Exchange Cellulose	2 kg

Ion Exchangers - EXPRESS-ION® High Flow Rate Media

EXPRESS-ION media are matrices whose flow characteristics have been greatly improved. The manufacturing process has been optimized so that the matrix retains its inherent property of fast kinetics of adsorption and desorption. They are supplied as moist powders, so pre-cycling and fines removal are not required.

EXPRESS-ION D

A weak anion exchange cellulose substituted with diethylaminoethyl (DEAE) groups and recommended for separations between pH 2 and pH 9.

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EXPRESS-ION Q

A strong anion exchange cellulose having general applicability in separations requiring an anion exchange step, with the benefit of wide pH versatility. The N,N,N-trimethyl hydroxypropyl amine (quaternary amine) group is fully ionized throughout pH range 2–12.

EXPRESS-ION C

A moderately acidic cation exchange cellulose. A weak ion exchanger recommended for separations between pH 4.5 and pH 10 to ensure the carboxymethyl functional group remains ionized.

EXPRESS-ION S

A strongly acidic cation exchange cellulose having general applicability in separations requiring a cation exchange step, with the benefit of wide pH versatility. The sulfoxyethyl functional group is fully ionized throughout the pH range 2–12.

Typical Data - EXPRESS-ION High Flow Rate Media (cm/h)

	Pressure (psi) 5	7.5	10
EXPRESS-ION D	171.6	213.6	238.5
EXPRESS-ION Q	134.7	173.6	212.4
EXPRESS-ION C	94	127.2	165.3
EXPRESS-ION S	94	127.2	160.8

Column dimensions 45 cm ID x 15 cm

Properties - EXPRESS-ION High Flow Rate Media

	EXPRESS-ION D	EXPRESS-ION Q	EXPRESS-ION C	EXPRESS-ION S
Type	Weak Anion	Strong Anion	Weak Cation	Strong Cation
Working pH range	2–9	2–12	4.5–10	2–12
Typical Protein	-	-	-	-
Capacity mg/mL:				
BSA	60	55	-	-
Lysozyme	-	-	162	153
Small Ion Capacity	←	1 meq/dg	→	
Fiber Length	←	60–130 µm	→	
Base Matrix	←	Microgranular cellulose	→	
Typical Flow Rate	←	150 cm/hr	→	
Physical Stability	←	Negligible volume changes due to ionic strength or pH	→	
gExchanger/mL Bed Volume	0.72	0.64	0.7	0.8

Ordering Information - EXPRESS-ION High Flow Rate Media

Catalog Number	Description	Size
4079-0025	EXPRESS-ION D	250 g
4079-3025	EXPRESS-ION Q	250 g
4079-1025	EXPRESS-ION C	250 g
4079-2025	EXPRESS-ION S	250 g

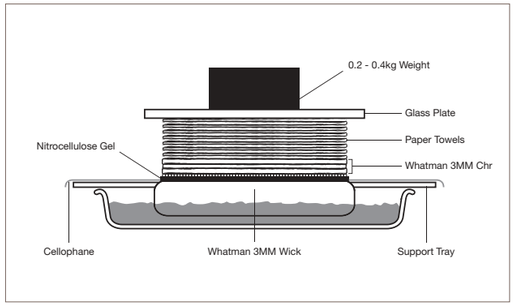
Chromatography Paper

Whatman chromatography papers are the most widely used papers for chromatography worldwide. This acceptance and usage reflect the purity, high quality and consistency of Whatman papers. These qualities are relied upon by chromatographers and are essential to successful, reproducible chromatography. Whatman 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. The chromatography paper product line includes standard cellulose and ion exchange grades.

Cellulose Chromatography Papers

3MM Chr
Though widely used as a blotting paper, 3MM Chr is used in both electrophoresis and for general chemistry. A medium thickness paper (0.34 mm) used extensively for general chromatography and electrophoresis. Flow rate is 130 mm/30 min.

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 ideal for preparative paper chromatography and electrophoresis.



3MM Chr Paper Typical Blotting Apparatus

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

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 Whatman range. Thick paper with fairly soft surface. Principal application is in electrophoresis of large molecules.

1 Chr
The world standard chromatography paper. A smooth surface, 0.18 mm thick with a linear flow rate (water) of 130 mm/30 min. Good resolution for general analytical separations.

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.

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.

2668 Chr
Thickness 0.9 mm. Flow rate 155 mm/10 min. For separation of relatively large molecules by electrophoresis.

2727 Chr
Thickness 1.40 mm. Flow rate 180 mm/30 min. For separation of very large amounts of substance.

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.

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 - this ensures the wicking capability and uniformity of capillary action that is important in obtaining clean and even transfers during blotting

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Ordering Information - Whatman Pure Cellulose Chromatography Papers

Size (cm)	Catalog Number	Quantity/Pack
3MM Chr Precut Sheets		
11 x 14	3030-6185	100
12 x 14	3030-6132	100
15 x 17.5	3030-153	100
15 x 20	3030-6188	100
18 x 34	3030-221	100
20 x 20	3030-861	100
26 x 41	3030-6461	100
35 x 43	3030-347	100
35 x 45	3030-392	100
31.5 x 35.5	3030-335	100
46 x 57	3030-917	100
58 x 68	3030-931	100
4 x 5¼"	3030-6189	100
6 x 8"	3030-6187	100
8 x 10"	3030-866	100

Ordering Information - Chromatography Paper Rolls*

Length (m) x Width (cm)	1 Chr	3MM Chr	4 Chr	54 SFC
100 x 1	3001-604	-	-	-
100 x 2	3001-614	3030-614	3004-614	-
100 x 3	3001-640	-	-	-
100 x 4	3001-652	-	-	-
100 x 5	3001-653	-	-	-
100 x 7.5	-	3030-662	-	-
100 x 10	3001-672	3030-672	-	-
100 x 12.5	-	3030-675	-	-
100 x 15	3001-681	3030-681	-	-
100 x 19	-	3030-690	-	-
100 x 23	-	3030-700	-	-
100 x 27	-	3030-704	-	-
100 yards x 1"	3001-633	-	-	-
100 yards x 1½"	3001-651	-	3004-651	3454-651

* One roll per pack

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Ordering Information - Chromatography Sheets*

Size (cm)	1 Chr	2 Chr	3 Chr	4 Chr	17 Chr	20 Chr	31ET Chr	2668 Chr	2727 Chr
46 x 57	3001-917	3002-917	3003-917	3004-917	3017-915**	3020-917	3031-915**	-	-
20 x 20	3001-861	-	-	-	-	-	-	-	-
58 x 68	3001-931	-	-	-	-	-	-	-	-
10 x 30	3001-845	-	-	-	-	-	-	-	-
25 x 25	3001-878	-	-	-	-	-	-	-	-
58 x 60	-	-	-	-	-	-	-	10 382 461	10 382 562
19 x 19	-	-	-	-	-	-	-	-	10 382 581

* 100 sheets per pack
** 25 sheets per pack

Ordering Information - Chromatography Strips

Size (cm)	1 Chr - CRL
Chromatography Strips	
11 x 21.3; 12 strips, 15 mm	3001-964

1 Chr divided into 15 mm lanes for running up to 12 samples in parallel

Ion Exchange Papers

DE81
A thin (0.20 mm) DEAE cellulose paper - a weakly basic anion exchanger with diethylaminoethyl functional groups. The ion exchange capacity is 1.7 µeq/cm² and flow rate is 95 mm/30 min. For use with reverse transcriptase assays and DNA polymerase.

P81
A thin (0.23 mm) cellulose phosphate paper. Strong cation exchanger of high capacity. Ion exchange capacity is 18.0 µeq/cm² and the flow rate is 125 mm/30 min. For use with protein kinase assay with peptide substrates.

SG81
A unique paper (0.27 mm thick) combining cellulose and large pore silica gel. Suitable for separations in which both partition and adsorption are important, including the separation of phospholipids, steroids, phenols and dyes. Flow rate is 110 mm/30 min.

Features and Benefits
- Simultaneous development of multiple samples on the same sheet under identical conditions
- Sequential development of the same samples with different solvents and/or different concentrations of the same solvent
- Suitability for two-dimensional chromatography (change in direction of the solvent front) with possible improved resolution

Ordering Information - Ion Exchange Papers

Catalog Number	Description	Diameter (cm)	Quantity/Pack
Ion Exchange Cellulose Paper Circles			
3658-023	DE81 DEAE Cellulose	2.3	400
3658-323	DE81 DEAE Cellulose	2.3	100
3658-324	DE81 DEAE Cellulose	2.4	100
3658-325	DE81 DEAE Cellulose	2.5	100
3698-321	P81 Cellulose Phosphate	2.1	100
3698-325	P81 Cellulose Phosphate	2.5	100
Ion Exchange Cellulose Paper Sheets			
3658-915	DE81 DEAE Cellulose	46 x 57	25
3698-915	P81 Cellulose Phosphate	46 x 57	25
3668-915	SG81 Silica Gel Loaded Paper	46 x 57	25

Bulk Silica Media for Column Chromatography

The Whatman bulk silica media are used for low pressure columns. Same base silica and chemistries as those used for Whatman TLC plates. Particularly useful for scaling up separations optimized by TLC. In addition, Whatman offers an all-purpose media for general column chromatography. Applicable for preparative low pressure column separations scaled up from Partisil analytical HPLC columns.

Bulk Silica Media for Column Chromatography

Bulk Silica Media

Features and Benefits

- High resolution
- Good flow characteristics
- High surface area

Ordering Information - Bulk Silica Media for Low Pressure Column Chromatography

Catalog Number	Product	Particle Size (µm)	Other Specifications	Weight	
4776-001	LRP-2 ODS bonded silica gel	37–53	Reversed phase	LPS-2 silica bonded with 16% C; - may be dry packed; end-capped	100 g
4776-005	LRP-2 ODS bonded silica gel	37–53	Reversed phase	LPS-2 silica bonded with 16% C; - may be dry packed; end-capped	500 g

Ordering Information - Bulk Silica Media for General Column Chromatography

Catalog Number	Product	Particle Size (µm)	Other Specifications	Weight
4132-100	ODS-3 (C-18)	32-75	Reversed Phase	Octadecyl-bonded; end-capped; polymeric; 10.5% carbon load	100 g
4132-301	ODS-3 (C-18)	32-75	Reversed Phase	Octadecyl-bonded; end-capped; polymeric; 10.5% carbon load	1 kg
4790-010	Silica, 60Å	230-400 mesh (38-63)	Adsorption	Bulk media for column or dry chromatography	1 kg
4790-050	Silica, 60Å	230-400 mesh (38-63)	Adsorption	Bulk media for column or dry chromatography	5 kg
4790-250	Silica, 60Å	230-400 mesh (38-63)	Adsorption	Bulk media for column or dry chromatography	25 kg
4791-005	Silica, 60Å	70-230 mesh (63-212)	Adsorption	Bulk media for column or dry chromatography	500 g
4791-010	Silica, 60Å	70-230 mesh (63-212)	Adsorption	Bulk media for column or dry chromatography	1 kg
4791-050	Silica, 60Å	70-230 mesh (63-212)	Adsorption	Bulk media for column or dry chromatography	5 kg
4791-250	Silica, 60Å	70-230 mesh (63-212)	Adsorption	Bulk media for column or dry chromatography	25 kg

Purasil™ 60Å Silica Gel

Silica Gel Media for Flash Chromatography

Whatman Purasil high purity silica gel provides an excellent separation medium for flash chromatography purification of target molecules. Narrow particle size distribution and minimal fines enable fast separations with no loss of chromatographic performance.

Features and Benefits

- High resolution
- Excellent flow rates
- Direct scalability

Typical Data - Purasil 60Å Silica Gel

Iron Content	<0.02%
Chloride Content	<0.10%
Loss on Drying	<7%
pH (10% suspension)	7 ± 0.5
Pore Volume	60–80 mL/g
Surface Area	500–600 m^2/g

Ordering Information - Purasil 60Å Silica Gel

Catalog Number	Product	Quantity/Pack
4745-010	230–400 mesh (38–63 µm)	1 kg
4745-250	230–400 mesh (38–63 µm)	25 kg
4746-010	70–230 mesh (63–210 µm)	1 kg
4746-250	70–230 mesh (63–210 µm)	25 kg

High Performance Liquid Chromatography (HPLC)

Whatman offers an extensive product line of High Performance Liquid Chromatography (HPLC) products ranging from the Partisil high-purity silica gel for normal phase separations to seven different bonded phases for reversed phase or ion exchange separations. In addition, the PartiSphere®, 5 µm spherical media are available with different chemistries in a void sealing column configuration for optimum speed and resolution.

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Partisil® Media for High Performance Liquid Chromatography

Partisil Silica Media Characteristics

The following describes the characteristics of each of the Partisil media.

Adsorption (Normal Phase) Media

Partisil 5

A high efficiency stationary phase for adsorption chromatography that provides good selectivity and high loading capacity for maximum resolution and fast analysis. Partisil 5 is available prepacked in Whatman Void Sealing (WVS) and Analytical and Rapid Analysis Column (RAC) configurations. Partisil 5 is the support on which the 5 µm bonded phases are based.

Partisil 10

The stationary phase for routine separations, Partisil 10 is the support material for the 10 µm bonded media. This medium is used when higher flow rates are indicated and back pressure must be minimized. In addition to bulk media, it is available prepacked in most column configurations.

Ion Exchange Media

Partisil SAX (10 µm)

A strong anion exchanger based on quaternary ammonium groups ($-NR_{3+}$). Supplied in the H_2PO_4 form in methanol, Partisil 10 SAX has been widely reported in literature and is best known for separation of nucleotides. Stable over pH range 1.5-7.5 when used in conjunction with a Solvecon mobile phase conditioning column. Obtains the highest anion exchange efficiencies and resolution. Applicable to separations of nucleic acids, organic acids and inorganic anions. Check prepacked column ordering information for availability of specific combinations of columns.

Partisil SCX (5 µm and 10 µm)

Based on aromatic benzene sulfonic acid groups. Supplied in the ammonium form (NH_{4+}). Excellent for separation of nucleic acids, amino acids, polyamines, drugs and other cationic species. Capable of being loaded with specific metallic cations for use in ligand exchange chromatography. Stable over pH range 1.5-7.0 when used in conjunction with a Solvecon mobile phase conditioning column. Exceptionally stable Si-O-Si-C bond, both thermally and chemically. Check prepacked column ordering information for availability of specific combinations of columns.

Reversed Phase Media

Partisil ODS (10 µm)

A C-18 phase with a 5% carbon load for both normal adsorption and reversed phase partitioning. Dual-mode operation for added selectivity with 50% residual silanols. Lightly loaded C-18 packing is particularly effective for compounds having greater water solubility when used in the reversed phase mode. Creates a moderately polar surface, different from that of pure silica, in normal phase mode. Check prepacked column ordering information for availability of specific columns.

Chromatography Products

Partisil ODS-2 (10 µm)
The high carbon load (16%) of this polymeric phase makes it the most nonpolar and, therefore, the most retentive of the reversed phases. An alternative to end-capped C-18 where different elution order is desirable for optimum separation. High sample load capacity and 10 µm particle size are very suitable for preparative work.

Partisil ODS-3 (5 µm and 10 µm)
A C-18 polymeric phase with a 10.5% carbon load. Medium of choice for improved speed, efficiency and resolution in applications requiring C-18 phases. End-capped for deactivation of silanols to minimize the need for ion suppression or ion pairing agents. Used in a wide range of applications with optimal selectivity, including pharmaceuticals, natural products, food, biological and environmental pollutants.

Partisil C-8 (5 µm and 10 µm)
An end-capped C-8 monomeric phase with at least 8.5% carbon load. Provides high efficiency and rapid mass transfer while maintaining excellent peak shape and stability over a range of aqueous mobile phase compositions. Recommended for ion pair chromatography.

Partisil PAC (5 µm and 10 µm)
A polar amino cyano bonded phase with secondary amine groups for good thermal and chemical stability. Selectivity and rapid equilibrium allow a range of separation mechanisms to be used, including adsorption, reversed phase and weak anion exchange. Extremely fast equilibration across the entire range of solvents from heptane to water. The media of choice for carbohydrate separations.

UniSep C-8
Hydrophobic octyl chain on hydrophilic silica surface.

PartiSphere® Spherical Media
Available in prepacked columns and a choice of 5 µm high performance phases. In addition to its efficient pure silica and monomeric C-18 and C-8, Whatman has added WCX (Weak Cation Exchanger) as well as SAX, SCX and PAC. PartiSphere media feature narrow particle size distribution and excellent reproducibility.

Typical Data - Partisil Media for High Performance Liquid Chromatography

Product	Specifications
Partisil Bonded Phase	
Silica	Irregular. Pore Size 85Å
ODS-3	10.5% carbon load; end-capped; polymeric
ODS-2	16% carbon load; polymeric
C-8	8.5% carbon load; end-capped; monomeric brush
PAC	0.85% N
SAX	0.85% $-NR_{5+}$
SCX	0.40% S
PartiSphere Bonded Phase	
Silica	Spherical. Pore Size 120Å
C-18	10% carbon load; end-capped; brush

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Product	Specifications
C-8	6% carbon load; end capped; brush
PAC	0.85% N
SAX	0.8% $-NR_{3+}$
SCX	0.40% S
PartiSphere RTF Bonded Phase	
C-18	22% carbon load; monomeric brush

Ordering Information - Partisil for Customer Packed Columns

Catalog Number	Products	Package	Bonded Phase	Particle Size (µm)
Partisil Media				
4138-010	Partisil 5 ODS-3	10 g	C-18 polymeric; 10.5% carbon load; end-capped	5
4128-010	Partisil 10 ODS-3	10 g	C-18 polymeric; 10.5% carbon load; end-capped	10
4139-010	Partisil 5 C-8	10 g	C-8 monomeric; 8.5% carbon load; end-capped	5
4129-010	Partisil 10 C-8	10 g	C-8 monomeric; 8.5% carbon load; end-capped	10
4124-010	Partisil 10 ODS-2	10 g	C-18 polymeric; 16% carbon load; uncapped	10
4123-010	Partisil 10 ODS	10 g	C-18 polymeric; 5% carbon load; uncapped	10
4135-010	Partisil 5 PAC	10 g	Alkyl groups containing amino-cyano groups in a (2:1) ratio	5
4125-010	Partisil 10 PAC	10 g	Alkyl groups containing amino-cyano groups in a (2:1) ratio	10
4115-010	Partisil 5 Silica	10 g	None	5
4116-010	Partisil 10 Silica	10 g	None	10
4126-010	Partisil 10 SAX	10 g	Quaternary amino groups ($-NR_{3+}$)	10
4127-010	Partisil 10 SCX	10 g	Aromatic benzene sulfonic acid functional groups; may also be loaded with metallic cations for ligand exchange chromatography	10

Application Specific HPLC Columns

TAC 1*
For great discoveries such as Taxol, Whatman technology optimally separates the closely eluting taxanes of Pacific yew trees.

Whatman worked closely with two leading customers to develop a specific bonded phase that achieves baseline resolution of the paclitaxel molecule from its closest impurity. Each lot of TAC 1 (Taxane Analysis Column) is tested with a paclitaxel chromatographic purity separation to ensure the best possible reproducibility.

*Richheimer SL et al. Anal Chem. 1992; 64: 2323-2326

MAX-1
For use in specialized separation for corn and soy protein.

Ordering Information - Application Specific HPLC Columns

Catalog Number	Product	Particle Size (µm)	Dimensions (mm)	Quantity/Pack
4601-1001	TAC 1	5	4.6 x 250	1
4120-001	MAX-1	5	4.6 x 250	1

Both in Whatman Void Sealing (WVS) format

Partisil® High Performance Liquid Chromatography (HPLC) Columns

Whatman offers a wide range of high-quality columns to meet your specific needs. In addition to the innovative Whatman Void Sealing Columns, Whatman makes available a selection of standard end fitting column configurations for your analytical and preparative needs. They are specifically designed for compatibility with all HPLC instrumentation.

Whatman Partisil® is a high purity irregular silica gel available in both 5 µm and 10 µm particle sizes with a pore size of 80Å. The choice of column packing includes Silica, C-18 polymeric phases (ODS-3,ODS-2) and C-8. Also available are SAX (Strong Anion Exchanger), SCX (Strong Cation Exchanger) and PAC (Polar Amino Cyano). These columns provide reproducible results, column to column, lot to lot.

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Due to the greater surface area of the irregular Partisil, the medium offers enhanced selectivity and loading capacity. Through uniform particle sizing, back pressure is minimized. Also, the neutral pH of Partisil provides for better peak symmetry without the need for mobile phase modifiers.

Standard Analytical
4.6 mm ID x 25 cm long, standard analytical column for research, methods development and routine separations. After optimization, other sizes can be considered for greater speed or capacity. Allows direct scale-up or scale-down to other size columns. Supplied with Whatman Compression Screw (WCS) end fittings.

RAC II
4.6 mm ID x 10 cm long. Second-generation rapid analysis chromatography for faster analytical separations and reduced solvent consumption. Operates at low back pressure, even at high flow rates, prolonging column life. Connects easily to most LC instrumentation with convenient Whatman Compression Screw (WCS) end fittings.

Magnum 9 (50 cm)
9.4 mm ID x 50 cm long. Semi-preparative columns for microgram to gram quantities. Unique coned outlet allows high load capacity with minimal peak distortion. Durable construction ensures extended service. Magnum 9 columns are compatible with today's HPLC instruments, allowing you to use the same equipment for analytical and preparative work.

Magnum 9 (25 cm)
9.4 mm ID x 25 cm long.

Magnum 20 (50 cm)
22 mm ID x 50 cm long. Preparative columns for multigram separations. Coned outlet allows high load capacity with minimal peak distortion. Durable construction ensures extended service. Magnum 20 columns provide sufficient yield and resolving power to accomplish difficult separations on a single pass, achieving high product purity.

Magnum 20 (25 cm)
22 mm ID x 25 cm long.

Ordering Information - Partisil High Performance Liquid Chromatography (HPLC) Columns (with WCS Standard End-Fittings)

Catalog Number	Column Configuration	Particle Size (µm)	Dimensions	
Bonded Phase				
Partisil Silica				
4215-001	Standard Analytical	5	4.6 x 250 mm	
4216-001	Standard Analytical	10	4.6 x 250 mm	
4230-120	Magnum 9	10	9.4 x 250 mm	
4230-220	Magnum 9	10	9.4 x 500 mm	
4232-220	Magnum 20	10	22 x 500 mm	contd >

Catalog Number	Column Configuration	Particle Size (µm)	Dimensions
Bonded Phase			
Partisil ODS-3			
4222-225	RAC II	5	4.6 x 100 mm
4238-001	RAC II	5	4.6 x 250 mm
4228-001	RAC II	10	4.6 x 250 mm
4230-125	Magnum 9	10	9.4 x 250 mm
Partisil C-8			
4222-232	RAC II	5	4.6 x 100 mm
4239-001	Standard Analytical	5	4.6 x 250 mm
4229-001	Standard Analytical	10	4.6 x 250 mm
Partisil SAX			
4222-227	RAC II	5	4.6 x 100 mm
4226-001	Standard Analytical	10	4.6 x 250 mm
4250-001*	Standard Analytical	10	4.6 x 250 mm (with Solvecon)
Partisil SCX			
4222-228	RAC II	5	4.6 x 100 mm
4227-001	Standard Analytical	10	4.6 x 250 mm
4251-001*	Standard Analytical	10	4.6 x 250 mm
Partisil PAC			
4235-001	Standard Analytical	5	4.6 x 250 mm
4225-001	Standard Analytical	10	4.6 x 250 mm
Partisil 10 ODS			
4223-001	Standard Analytical	10	4.6 x 250 mm
Partisil 10 ODS-2			
4224-001	Standard Analytical	10	4.6 x 250 mm
4230-124	Magnum 9	10	9.4 x 250 mm
Accessories			
4334-225	Frits, ¼" Diameter, 2 µm Porosity, 10/Pack		

* With Solvecon pre-column

UniSep High Performance Liquid Chromatography (HPLC) Columns

The UniSep HPLC column is the newest C-8 reverse phase HPLC column from Whatman. Using state-of-the-art technology, UniSep was developed for conditions that call for a highly aqueous mobile phase.

The advantage of the UniSep C-8 column over a traditional C-8 column is the UniSep silica is hydrophilic, or able to be wetted out. This change in hydrophobicity is achieved by attaching an ether linkage in close proximity to the silica backbone. Since the ether group is polar, water can easily penetrate and hydrate the silica surface, allowing the analyte greater access to the binding sites.

The advantage to the chromatographer is the flexibility gained when developing a method for highly water soluble compounds.

Features and Benefits

- C-8-RP
- 100Å pore size
- 16% carbon load
- Easy scale up
- Whatman Void Sealing (WVS) format

Applications

- Life science
- Food and beverage
- Pharmaceutical

Ordering Information - UniSep HPLC Columns

Catalog Number	Particle Size (µm)	Dimensions	Quantity/Pack
4550-4605	5	4.6 mm x 50 mm	1
4550-4610	5	4.6 mm x 100 mm	1
4550-4615	5	4.6 mm x 150 mm	1
4550-4625	5	4.6 mm x 250 mm	1

Whatman Void Sealing (WVS) Columns

Whatman WVS columns are renowned for their high quality, innovative design and exceptional durability.

Features and Benefits

- Void sealing columns can last twice as long as standard end fitting columns, saving as much as 50% on cost per test
- Available packed with spherical and irregular media
- Integral void sealing mechanism prolongs column life
- Reusable, hand tightened end-fittings save money, allow for wrench-less installation and rapid column changes
- Require no holder or module, meaning fewer components, reduced cost

Optimum Resolution

Typical column efficiencies for:

- Partisil 10 µm media - 45,000 N/m
- Partisil 5 µm media - 65,000 N/m
- PartiSphere 5 µm media - 90,000 N/m

Partisil Irregular Media

Available in prepacked, replaceable columns and a choice of 5 µm and 10 µm phases. These include Silica, our popular ODS-3 and the other reversed phase packings ODS-2 and C-8. Also available are SAX (Strong Anion Exchanger), SCX (Strong Cation Exchanger) and PAC (Polar Amino Cyano).

Due to the greater surface area of the irregular Partisil, the medium offers enhanced selectivity and loading capacity. Through uniform particle sizing, back pressure is minimized. Also, the neutral pH of Partisil provides for better peak symmetry without the need for mobile phase modifiers.

PartiSphere Spherical Media

Available in prepacked columns and a choice of 5 µm high performance phases. In addition to its efficient pure silica and monomeric C-18 and C-8, Whatman has added WCX (Weak Cation Exchanger) as well as SAX, SCX and PAC. PartiSphere media feature narrow particle size distribution and excellent reproducibility.

PartiSphere WVS Columns: Engineered to Provide Unsurpassed Consistency and Longevity

PartiSphere RTF

PartiSphere RTF (Reduced Tailing Factor) HPLC columns are base-deactivated columns. They employ a unique proprietary process that effectively ‘deactivates’ the secondary chromatographic effect due to residual silanols. In addition, these columns are extremely stable and can be used from pH 2 to pH 8 with no loss in performance. Excellent for separation of basic compounds without the need for amine-modified mobile phases. PartiSphere RTF is available prepacked in Whatman Void Sealing (WVS) and Analytical (WCS) column configurations and in a choice of C-18, C-8 and cyano phases.

Features and Benefits

- All PartiSphere columns are guaranteed to perform reproducibly every time, thanks to multiple quality control tests for both primary and secondary separation mechanisms
- Polished internal column walls ensure packing symmetries and efficiencies
- PartiSphere RTF (Reduced Tailing Factor) employs a unique proprietary process that effectively ‘deactivates’ the secondary chromatographic effect due to residual silanols

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Ordering Information - WVS Columns

Catalog Number	Particle Size (µm)	Column Type	Column Size (mm)
Partisil[1] 5 µm and 10 µm Columns Only*			
Partisil 5 Silica			
4681-1501	5	Whatman Void Sealing	4.6 x 250
Partisil 5 ODS-3			
4681-0502	5	Whatman Void Sealing	4.6 x 125
4681-1502	5	Whatman Void Sealing	4.6 x 250
Partisil 5 SAX			
4681-0505	5	Whatman Void Sealing	4.6 x 125
4681-1505	5	Whatman Void Sealing	4.6 x 250
Partisil 5 SCX			
4681-1507	5	Whatman Void Sealing	4.6 x 250
Partisil 5 ODS-2			
4681-1509	5	Whatman Void Sealing	4.6 x 250
Partisil 10 ODS-3			
4682-1502	10	Whatman Void Sealing	4.6 x 250
Partisil 10 SAX			
4682-1505	10	Whatman Void Sealing	4.6 x 250
Partisil 10 SCX			
4682-1507	10	Whatman Void Sealing	4.6 x 250
PartiSphere[2] 5 µm Columns*			
PartiSphere Silica			
4621-0501	5	Whatman Void Sealing	4.6 x 125
4621-1501	5	Whatman Void Sealing	4.6 x 250
PartiSphere C-18			
4621-0502	5	Whatman Void Sealing	4.6 x 125
4621-1502	5	Whatman Void Sealing	4.6 x 250
PartiSphere C-8			
4621-0503	5	Whatman Void Sealing	4.6 x 125
PartiSphere SAX			
4621-0505	5	Whatman Void Sealing	4.6 x 125
4621-1505	5	Whatman Void Sealing	4.6 x 250
PartiSphere SCX			
4621-0507	5	Whatman Void Sealing	4.6 x 125
4621-1507	5	Whatman Void Sealing	4.6 x 250
PartiSphere PAC			
4621-0508	5	Whatman Void Sealing	4.6 x 125
4621-1508	5	Whatman Void Sealing	4.6 x 250
Whatman Base-Deactivated (WCS) HPLC Columns - PartiSphere[2] 5 µm RTF (Reduced Tailing Factor)			
PartiSphere RTF C-18			
4522-0102	5	Standard Analytical	4.6 x 250
4522-0202	5	Standard Analytical	4.6 x 150

contd >

* Requires one-time purchase of 4.6 mm ID WVS end fittings, Catalog Number 4631-1001
[1] Irregular media
[2] Spherical media

HPLC Guard Cartridge System

The prepacked, disposable plastic guard cartridge retains unwanted materials that can harm your analytical column. Used in a wide range of applications, the HPLC guard cartridge system offers high efficiency, convenience and cost savings. The guard cartridge holder is available in two configurations. The integral system attaches directly to and becomes an integral part of the WVS replacement column requiring no connecting tubing. Because of this, there is virtually no loss in efficiency.

The universal system can be used with any standard analytical column, bringing guard cartridge convenience to traditional HPLC columns. Guard cartridges are available in four phases: silica, reversed phase, anion exchanger and cation exchanger.

Zero-Dead-Volume

Guard columns offer protection by trapping unwanted compounds that would otherwise be strongly retained on the HPLC column. One of the problems inherent with other guard columns is that they either contribute too much dead volume or add to the analysis times of the separation (especially in short, high speed columns). Whatman has overcome this by developing a zero-dead-volume HPLC guard cartridge system which eliminates almost all extra void volume and does not detrimentally affect the separation.

Ordering Information - HPLC Guard Cartridge System

Catalog Number	Product	Quantity/Pack
Guard Cartridge Holders		
4631-1003	Integral Guard Cartridge Holder (for use with WVS Analytical Column)	WVS Small 1
4631-1004	Universal Guard Cartridge Holder	WCS Small 1
Guard Cartridge System Replacement Cartridges (for both cartridge holders)		
4641-0001	SIL Cartridge	5
4641-0002	RP Cartridge	5
4641-0005	SAX Cartridge	5
4641-0007	SCX Cartridge	5
4641-0008	PAC Cartridge	5
PartiSphere RTF Guard Cartridges		
4641-1002	PartiSphere RTF C-18	5
WVS Analytical Hardware		
4631-1001	Column end fittings: WVS type (for void sealing columns)	1 pair

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Thin Layer Chromatography (TLC)

Product innovations from Whatman have made thin layer chromatography (TLC) a practical laboratory tool for both qualitative and quantitative analysis.

Features and Benefits

- Stringent quality standards assure a consistent level of resolution, accuracy and reproducibility
- Multiple samples and standards can be run simultaneously under identical conditions
- Wide range of chemistries and sizes to suit your application needs
- Sample preparation is simplified because plates are disposable
- Mobile phase need not be compatible with detector
- Available with or without fluorescent indicator

Linear-K: Fast, Accurate Spotting

Whatman pioneered the linear preadsorbent layer for easy, rapid and accurate sample application. The layer actually acts as a sponge to preconcentrate the sample before it interacts with the silica layer. In order to facilitate sample application and the preconcentrating power of the preadsorbent layer, Whatman made it thicker than the silica layer. This allows the analyst to apply sample in amounts never before attainable with standard TLC plates, and to apply dilute samples without sacrificing resolution.

TLC Plates: Designations/Formats

Whatman has designed nomenclature as a simple and convenient way of distinguishing among the different types of plates.

The symbol for silica gel is K (for Kieselgel), followed by a qualifying number. K5: 10-12 µm silica, of pore size 150Å; K6: 10-12 µm silica, of pore size 60Å.

The high performance silica is prefixed by the letters HP: HP-K 4.5 µm silica, pore size 60Å.

Reversed phase plates, with a bonded alkyl group, are represented by a K followed by the length of the alkyl chain: KC-18 10-12 µm silica, 60Å, octadecyl bonded phase.

Additional format information is provided for each plate through the following letter codes:

L Preadsorbent Layer

This compresses each sample into a narrow horizontal band. Hence, it is known as Linear-K; prefix L.

D Channelled Plates

2 mm channels of clear glass separate each sample lane, preventing crossover. D indicates division.

F Fluorescent Indicator
Fluorescent plates glow bright green under shortwave UV light. Samples which absorb shortwave UV at 254 nm are detected due to fluorescence quenching.

M Microscope Slide
Plate size 1" x 3".

P Preparative Layer
Has 500 µm or 1000 µm thickness for large sample sizes.

Using these letter codes it is easy to define any TLC plate, for example: PLK6DF = preparative K6 silica 60Å pore diameter featuring a channeled, fluorescent plate and the preadsorbent layer.

Typical Data - Thin Layer Chromatography (TLC)

Type	Separation Mode	Application	Layer Thickness (µm)	Plate Size (cm)	Fluorescent Linear-K	Channeled	Fluorescent Indicator
C-18	Reversed Phase	General Hydrophobic Molecules	200 1000	1" x 3" 10 x 10 5 x 20 20 x 20	Available	-	Available
C-2	Reversed Phase	Hydrophobic & Small Polar Molecules	200	5 x 20 20 x 20	-	-	Available
Diamond	Adsorption	General	250	2½" x 7½" 10 x 10 5 x 20 10 x 20	Available	Available	Available
Silica Gel (K6)	Adsorption (60Å Pore Diameter)	General; Untreated Samples	250 500 1000	1" x 3" 5 x 10 5 x 20 10 x 20 20 x 20	Available	Available	Available
Silica Gel (K5)	Adsorption (150Å Pore Diameter)	General; Untreated Samples	250 500 1000	5 x 10 5 x 20 20 x 20	Available	Available	Available

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Type	Separation Mode	Application	Layer Thickness (µm)	Plate Size (cm)	Fluorescent Linear-K	Channeled	Indicator
HPTLC (HP-K)	Adsorption (4.5 µm Particle Size)	Small Samples; (Nanograms and Picograms)	200	5 x 5 10 x 10 10 x 20	Available	Available	Available
Flexible	Adsorption	General Anionic	250	20 x 20	-	-	Available
	Ion Exchange	Anionic Biopolymers	100	20 x 20			

Diamond Series TLC Plates

Whatman Diamond Series TLC Plates exhibit gem-like qualities of hardness and reflectance. These technologically advanced plates facilitate dipping and spraying and will not crack or flake. They allow you to perform scanning densitometry with the lowest noise backgrounds for maximum range in detection. The smooth surface of the plates prevents ripples from interfering with scanning or development.

Features and Benefits
- Highly reflective surface minimizes background noise while scanning
- Superior organic binder prevents surface deterioration even when using the strongest reagent
- Uniform particle size and distribution add to efficiency by reducing band spreading
- The 60 Å pore 450 m^2/g surface area provides optimum characteristics for most clinical, educational and general analytical applications. Fast development of spots with excellent resolution makes the Diamond Series plates very suitable for screening and toxicology work. They are ideal for the analysis of micro samples.

The plates will withstand most solvent systems and any applied developing reagent without silica falling off the plate or reacting with reagents. They can be charred to 180° C with cupric acetate/phosphoric acid reagents.

Because 85% of all TLC users employ fluorescent plates, Diamond Series offers the best for UV quenching and visual work. All plates are silica gel with UV-254 fluorescent indicator and available with channeling and linear preadsorbent spotting area for faster, more accurate sample application.

Ordering Information - Diamond Series TLC Plates

Catalog Number	Product Code	Plate Size (cm)	Linear-K	Channeled	Fluorescent Indicator	Quantity/Pack
Diamond Series TLC Plates (250 µm Layer)						
4500-101	MK6F	1" x 3"	-	-	Yes	500
4500-105	K6F	20 x 10	-	-	Yes	25
4500-303	LK6DF	5 x 20	Yes	4 channels	Yes	75
4500-305	LK6DF	20 x 20	Yes	19 channels	Yes	25

EH6 Extra Hard TLC Plates

Whatman EH6 series extra hard TLC plates address chromatographers' need for harder, smoother, more abrasion-resistant layers. These technologically advanced plates facilitate dipping and spraying and will not crack or flake. The plates will withstand most solvent systems and any applied visualization reagent without silica falling off the plate or reacting with the reagents. They can be charred to 180° C with cupric acetate/phosphoric acid reagents.

Each lot of EH6 TLC plates undergoes extensive quality control testing including a pendulum hardness test to ensure outstanding lot-to-lot reproducibility.

Features and Benefits

- Extra hard surface makes it easier to write on with a pen or pencil
- Highly reflective surface minimizes background noise while scanning
- Superior organic binder prevents surface deterioration even when using the strongest reagent
- Uniform particle size and distribution add to efficiency by reducing band spreading
- Available in bulk quantities

Applications

- The 60 Å pore 450 m^2/g surface area silica used provides optimum characteristics for most clinical, educational and general analytical applications
- Moderate development times and bands with excellent resolution make the EH6 Series plates very suitable for screening and toxicology work
- Ultra low noise backgrounds allow you to perform scanning densitometry with maximum detection range

Ordering Information - EH6 Extra Hard TLC Plates

Catalog Number	Description	Size (cm)	Layer Thickness (µm)	Fluorescent Indicator	Quantity/Box
4841-820	EH6F	20 x 20	250	Yes	25
4841-125	EH6F	2.5 x 7.5	250	Yes	500

Flexible TLC Plates

Flexible backed TLC plates (supplied in a single 20 cm x 20 cm size) offer you economy and convenience. They can be cut with scissors to match individual separation requirements, making them ideal for applications that require rapid sample isolation or elution prior to other analytical techniques (e.g. scintillation counting).

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Features and Benefits

- Silica gel 60Å flexible plates exhibit similar selectivity to the glass backed K6 plates and are widely applicable for moderately to strongly polar analytes (Available on aluminum or polyester backing material)
- Ion exchange plates (DEAE - diethylaminoethyl tertiary amine) are used for anionic species and are available on polyester backed material
- Aluminum backing is particularly useful for applications requiring charring
- Polyester backed plates can be heated up to 110° C and are compatible with mobile phases containing strong acids or bases

Ordering Information - Flexible TLC Plates

Catalog Numbers	Type	Product Code	Flexible Backing	Layer Thickness (µm)	Plate Size (cm)	Fluorescent Indicator	Quantity/Pack
4410-221	Silica Gel 60Å	PE SIL G	Polyester	250	20 x 20	-	25
4410-222	Silica Gel 60Å	PE SIL G/UV254	Polyester	250	20 x 20	Yes	25
4420-221	Silica Gel 60Å	AL SIL G	Aluminum	250	20 x 20	-	25
4420-222	Silica Gel 60Å	AL SIL G/UV254	Aluminum	250	20 x 20	Yes	25
4410-224	DEAE cellulose (Diethylaminoethyl)	PE CEL300 DEAE	Polyester	100	20 x 20	-	25

Partisil High Performance TLC Plates

Whatman HPTLC plates can be used for your most sensitive separations. These plates consist of a 4.5 µm particle size silica gel plus an inert binder in a uniform 200 µm layer on glass. They exhibit product characteristics typical of Whatman silica gel media: narrow particle size distribution, homogeneity and overall uniformity. The results are performance and reproducibility, giving you the ultimate in TLC resolution and sensitivity.

Features and Benefits

- Dense, uniform layer provides stable baseline in densitometry
- Short development distance and times
- Low band diffusion provides very compact sample bands and increased detection sensitivity
- Micro samples (nanograms and picograms) can be analyzed
- Reproducibility inherent in Whatman chromatography products

Whatman HPTLC plates are referenced in a patented procedure for fetal lung maturity testing.

Patent holders: Juan G. Alvarez and Jack Ludmir.

Ordering Information - Partisil High Performance TLC Plates

Catalog Number	Product Code	Plate Size (cm)	Linear-K	Channeled	Fluorescent Indicator	Quantity/Pack
200 µm Layer						
4807-050	HP-K	5 x 5	-	-	-	100
4802-050	HP-KF	5 x 5	-	-	Yes	100
4807-400	HP-K	10 x 10	-	-	-	100
4802-400	HP-KF	10 x 10	-	-	Yes	100
4807-425	HP-K	10 x 10	-	-	-	25
4802-425	HP-KF	10 x 10	-	-	Yes	25
4807-700	HP-K	10 x 20	-	-	-	50
4802-700	HP-KF	10 x 20	-	-	Yes	50
4805-410	LHP-K	10 x 10	Yes	-	Yes	100
4806-410	LHP-KF	10 x 10	Yes	-	Yes	100
4805-420	LHP-K	10 x 10	Yes	-	-	25
4806-420	LHP-KF	10 x 10	Yes	-	Yes	25
4805-421	LHP-KD	10 x 10	Yes	9 channels	-	25
4806-421	LHP-KDF	10 x 10	Yes	9 channels	Yes	25
4805-710	LHP-K	20 x 10	Yes	-	-	50
4806-710	LHP-KF	20 x 10	Yes	-	Yes	50
4805-711	LHP-KD	20 x 10	Yes	19 channels	-	50
4806-711	LHP-KDF	20 x 10	Yes	19 channels	Yes	50

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Partisil® K6 and K5 Adsorption TLC Plates

Whatman Partisil K6 60Å and K5 150Å plates provide a choice of high-purity silica gels and polarity for normal phase separations. They give superior performance compared to silica gel 'G' through better resolution, higher sensitivity and more durability. Moderate layer hardness makes possible convenient spot recovery with the aid of a sample recovery tube.

Features and Benefits

- Excellent reproducibility; negligible moisture uptake
- Chemically and optically inert organic binder
- Outstanding layer stability
- Fast separation with excellent resolution
- Quality separation of moderately to strongly polar compounds
- Aggressive reagent resistance
- Wide applicability, including carbohydrates, antibiotics, alkaloids, amino acids and phospholipids

Ordering Information - Partisil K6 and K5 Adsorption TLC Plates

Catalog Number	Product Code	Plate Size (cm)	Linear-K Preadsorbent	Channelled	Fluorescent Indicator	Quantity/ Pack
K6 Adsorption (Silica Gel) 60Å TLC Plates (250 µm Layer)						
4861-110	MK6F	1" x 3"	-	-	Yes	500
4860-320	K6	5 x 10	-	-	-	150
4861-320	K6F	5 x 10	-	-	Yes	150
4860-620	K6	5 x 20	-	-	-	75
4861-620	K6F	5 x 20	-	-	Yes	75
4860-720	K6	10 x 20	-	-	-	50
4861-720	K6F	10 x 20	-	-	Yes	50
4860-820	K6	20 x 20	-	-	-	25
4861-820	K6F	20 x 20	-	-	Yes	25
4861-830	PK6F*	20 x 20	-	-	Yes	22
4861-840	PK6F**	20 x 20	-	-	Yes	20
4865-620	LK6	5 x 20	Yes	-	-	75
4866-620	LK6F	5 x 20	Yes	-	Yes	75
4865-621	LK6D	5 x 20	Yes	4 channels	-	75
4866-621	LK6DF	5 x 20	Yes	4 channels	Yes	75
4865-820	LK6	20 x 20	Yes	-	-	25
4866-820	LK6F	20 x 20	Yes	-	Yes	25
4865-821	LK6D	20 x 20	Yes	19 channels	-	25
4866-821	LK6DF	20 x 20	Yes	19 channels	Yes	25

contd >

Catalog Number	Product Code	Plate Size (cm)	Linear-K Preadsorbent	Channelled	Fluorescent Indicator	Quantity/ Pack
K5 Adsorption (Silica Gel) 150Å TLC Plates (250 µm Layer)						
4851-320	K5F	5 x 10	-	-	Yes	150
4850-620	K5	5 x 20	-	-	-	75
4851-620	K5F	5 x 20	-	-	Yes	75
4850-720	K5	10 x 20	-	-	-	50
4851-720	K5F	10 x 20	-	-	Yes	50
4850-820	K5	20 x 20	-	-	-	25
4851-820	K5F	20 x 20	-	-	Yes	25
4850-830	PK5*	20 x 20	-	-	-	20
4850-840	PK5**	20 x 20	-	-	-	20
4851-830	PK5F*	20 x 20	-	-	Yes	20
4851-840	PK5F**	20 x 20	-	-	Yes	20
4855-840	PLK5**	20 x 20	Yes	-	-	20
4856-840	PLK5F**	20 x 20	Yes	-	Yes	20
4855-620	LK5	5 x 20	Yes	-	-	75
4855-621	LK5D	5 x 20	Yes	4 channels	-	75
4856-621	LK5DF	5 x 20	Yes	4 channels	Yes	75
4855-820	LK5	20 x 20	Yes	-	-	25
4856-820	LK5F	20 x 20	Yes	-	Yes	25
4855-821	LK5D	20 x 20	Yes	19 channels	-	25
4856-821	LK5DF	20 x 20	Yes	19 channels	Yes	25
4855-840	PLK5**	20 x 20	Yes	-	-	20
4856-840	PLK5F**	20 x 20	Yes	-	Yes	20

* Preparative 500 µm layer
** Preparative 1000 µm layer

Partisil® Reversed Phase TLC Plates

With reversed phase plates, Whatman provides a choice of two carbon chain lengths - C-18 and C-2 - and Multi-K dual phase layers. The chain length of the hydrocarbon functional groups primarily affects retention and the ability to accommodate the water content of solvent systems. The shorter carbon chain is used for increased polarity and affinity for aqueous solutions while the longer chains give greater retention and hydrophobicity. KC-18 plates are also available with a preadsorbent zone which facilitates sample application.

Features and Benefits

- Proven performance, quality and reliability
- Compatibility with highly aqueous solvent systems, for greater flexibility
- Ready correlation with reverse phase HPLC results

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Multi-K Dual Phase for Demanding Samples

Multi-K combines silica gel and reversed phase C-18 layers side by side on the same plate. They can be successfully used for the separation of mixed polarity samples by two-dimensional chromatography utilising two different separation mechanisms. Additionally, they offer single step sample cleanup.

Ordering Information - Multi-K Dual Phase for Demanding Samples

Catalog Number	Type	Product Code	Plate Size (cm)	Linear-K Preadsorbent	Fluorescent Indicator	Quantity/Pack
Reversed Phase TLC Plates (200 µm Layer)						
4803-110	C-18 Microslide	MKC-18F	1" x 3"	-	Yes	100
4801-600	C-18	KC-18	5 x 20	-	-	75
4803-600	C-18	KC-18F	5 x 20	-	Yes	75
4801-425	C-18	KC-18	10 x 10	-	-	25
4803-425	C-18	KC-18F	10 x 10	-	Yes	25
4801-800	C-18	KC-18	20 x 20	-	-	25
4803-800	C-18	KC-18F	20 x 20	-	Yes	25
4800-600	C-18 with Linear-K	LKC-18	5 x 20	Yes	-	75
4800-620	C-18 with Linear-K	LKC-18F	5 x 20	Yes	Yes	75
4800-800	C-18 with Linear-K	LKC-18	20 x 20	Yes	-	25
4800-820	C-18 with Linear-K	LKC-18F	20 x 20	Yes	Yes	25
4800-840	C-18 with Linear-K* (Preparative)	PLKC-18F	20 x 20	Yes	Yes	20
4809-800	C-2	KC-2	20 x 20	-	-	25
4809-820	C-2	KC-2F	20 x 20	-	Yes	25
Reversed Phase TLC Plates (250 µm Layer)						
4804-820	Multi-K C-S5 Dual Phase (3 cm C-18 Strip on Silica Gel Layer)	-	20 x 20	-	Yes	25

* 1000 µm layer

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BioScience Products

To find out more about the BioScience products on the next few pages, as well as many others, please refer to our new Whatman BioScience Product Guide - # 12006B

Nucleic Acid and Protein Sample Preparation

FTA® Card

Collect, archive, transport and purify nucleic acids, all at room temperature. Whatman FTA provides a remarkably easy way to collect and isolate nucleic acid samples for analysis. Simply apply virtually any type of biological sample to the FTA matrix and the nucleic acids are instantly captured and stabilized. Pathogens are inactivated, making samples safe to handle and ship. Store samples, including clones, at room temperature and analyze whenever you're ready.

FTA® Elute

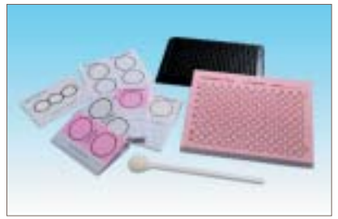
The FTA Elute matrix is chemically treated with proprietary reagents that lyse cells upon contact causing the release of nucleic acids. DNA is recovered from the FTA Elute matrix through a simplified elution process using water and heat. Captured nucleic acid is easily released for multiple downstream applications in less than 30 minutes. FTA Elute Cards are stored at room temperature before and after sample application, reducing the need for laboratory freezers. FTA Elute rapidly inactivates organisms including blood-borne pathogens and eliminates the risk of contamination for the individuals handling the sample.

CloneSaver® Card

FTA Technology in a 96 Well format for high throughput applications. Designed for the collection, storage and purification of plasmid and BAC DNA from bacterial clones. DNA is stable at room temperature for at least 5 years (real-time data).

Elutrap®

The Elutrap System is designed to isolate nucleic acids and proteins from agarose or polyacrylamide gel slices by electroelution. Samples are concentrated in as little as 200 µl with excellent recoveries and without sample pretreatment or special buffers. Samples pass through a membrane which restricts the gel slice and are trapped by a molecular weight cutoff membrane for retention. The Elutrap System works with most horizontal gel electrophoresis chambers.



FTA

FTA Elute

CloneSaver Card

Elutrap

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Multiwell Plates

Protein Precipitation UNIFILTER® FF

Fast, easy and automatable protein precipitation. A fast, effective protein removal method for plasma and serum for high-throughput labs measuring drugs and metabolites. This high-quality filter plate replaces the lengthy centrifugation process with a vacuum filtration method, making sample preparation three times faster. It allows you to automate acetonitrile precipitation and speed up your research.

Protein Kinase Assay UNIFILTER®

Kinase assay in a 96 Well format. The Whatman Protein Kinase Assay filter plate incorporates a P81 filter in each well. P81 is a cation exchanger that binds peptides but does not bind unincorporated ATP, resulting in low non-specific background noise and high sensitivity in kinase assay.

ELISA UNIFILTER®

Better kinetics and simpler washing for ELISA. The Whatman ELISA plate allows researchers to utilize the excellent protein binding characteristics of nitrocellulose ~49 - µg IgG per well in a 96 Well format. Solutions are easily vacuumed to waste using a vacuum manifold.

Phase Separation UNIFILTER®

Quick separation of halogenated solvents from an aqueous phase in a 96 Well format with no carryover and no close manual contact. Whatman 1PS media sealed into each well is a silicone treated media which remains impervious to aqueous solutions but organic solvents can go through.

Multi-Chem™ Microplates

Chemically resistant and low binding material microplate. Ideal for aggressive organic solvents such as DMF, TFA, THF, acetonitrile, chloroform and methylene chloride. Non-binding properties also make them ideal for storage of biological materials.

UNIPLATE™ 'V' Bottom Microplates

'V' bottom ensures maximum sample recovery. The 96 and 384 Well format UNIPLATE with 'V' bottom are ideal for applications with small sample volumes. The vertical sides of the well, combined with the 'V' design at the base of each well, ensure that all the material runs down the side walls and is channeled into the well base.

Protein Precipitation UNIFILTER FF

Protein Kinase Assay UNIFILTER

ELISA UNIFILTER

Phase Separation UNIFILTER

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Cross Reference

Capmats
Flexible capmats individually seal the top of each well. Capmats may be used on either filter or collection microplates.

BugStopper® Microplate Capmat
Sterile venting closures for 24 Well microplate cultures. 24 cultures (5-7 mL/sample) can be grown in a microplate, allowing easier handling than 24 test tubes. The autoclavable venting capmats significantly reduce evaporation rate and are perfect for extended growth of slow growing bacteria and fungi.

Multi-Chem Microplates

BugStopper Microplate Capmat

Protein Microarrays

FAST Quant®
FAST Quant kits are designed for high-throughput multiplex cytokine quantitation analyses. Each kit contains 64 arrays on FAST Slide surfaces with 8-10 monoclonal antibodies against a wide variety of cytokines per array, in triplicate. The most common cytokines for both human and mouse are represented in the FAST Quant system. The MicroSpot ELISA reaction is concentration dependent, making FAST Quant the fastest and most sensitive method of quantitating cytokines in a multiplex format.

Serum Biomarker Chip
The Serum Biomarker Chip allows proteomics researchers to pattern the molecular signature of human serum. The Serum Biomarker Chip is a single capture antibody array built on the FAST Slide dual pad platform. Each slide has an identical arrays of antibodies printed in triplicate. Two color fluorescent detection permits the comparison of the molecular signature of 120 human serum proteins between matched serum samples.

Protein Array Services
Several services are available for protein array researchers. Based on the FAST Quant System, the Quantitative Cytokine Array Processing & Data Analysis service will construct custom arrays from our antibody menu of 40 human and 19 murine specificities. Using the Serum Biomarker Chip service, researchers can send matched serum samples for analysis of 120 human serum proteins. Contract printing services are available to those researchers who wish to design their own protein array experiments. Whatman also offers a FAST Slide Scanning and Data Analysis service for smaller laboratories who do not wish to invest in instrumentation but want the value protein array experiments can bring them. Scientists at Whatman can also discuss and design entire protein array experiments from start to finish for those researchers just beginning protein array work.

FAST Quant

Serum Biomarker Chip

Protein Array Services

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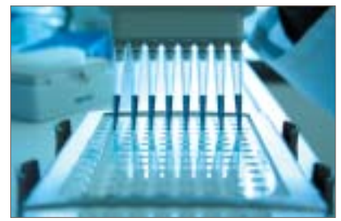
Blotting Products

Protran®
Protran nitrocellulose membranes are the most frequently specified transfer media in the world for a wide range of applications. Protran is made with 100% pure nitrocellulose for high binding capacities and low background. Protran is compatible with a variety of detection methods, including isotopic, chemiluminescent (luminol-based), colorimetric and fluorescent. Protran is wetted with an aqueous buffer which is ideal for proteins in aqueous environments. Protran is available in pore sizes of 0.1 µm, 0.2 µm and 0.45 µm for a wide variety of molecules.

Protran

Minifold® I
The Minifold System is for dot-, spot- or slot-blot arrays. The dot-, spot- or slot-blot plates are interchangeable on the vacuum manifold base, making the Minifold I System versatile for DNA or protein arrays. The spot- and dot-blot are in a 96-well format and the slot-blot has a 48-well format ideal for densitometric scanning. The Minifold I System is used with Protran, Optitran or Nytran membranes for blotting applications.



Minifold I

TurboBlotter™
The TurboBlotter is a rapid downward blotting device for the high-resolution transfer of DNA and RNA from agarose gels to blotting membranes. The traditional transfer setup has been turned upside down; no heavy weights are required for transfer. Alkaline DNA transfers can be performed in as little as 1 hour while neutral (SSC) transfers of DNA or RNA take only 3 hours. Complete kits have components for 5 transfers and replacement transfer packs are available.

TurboBlotter

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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? Whatman has assembled this compilation of basic filtration concepts and terms to clarify the various options available to you and speed the process of selection.

Airborne Particle Retention

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. In the United States, the Dioctyl Phthalate (DOP) test is commonly used wherein the filter is challenged with an aerosol containing 0.3 µm particles.

Ash Content

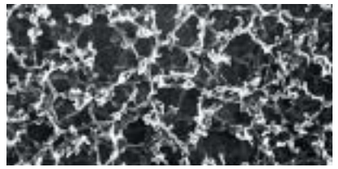
Determined by ignition of the cellulose filter at 900°C in air. Ash content is essential in gravimetric applications and also a useful measure of the level of general purity.

Chemical Compatibility

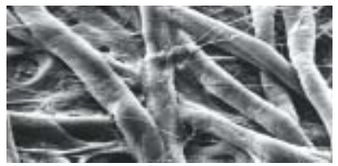
It is very important to ensure that the pore structure of the filter media will not be impaired by exposure to certain chemicals. In addition, exposure to these chemicals should not cause the filter to shed fibers or particles, or add extractibles. Length of time exposure, temperature, concentration and applied pressure can all effect compatibility. Whatman has provided chemical compatibility charts to aid your membrane selection (see page 260).

Depth Filters

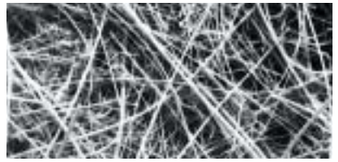
Depth filters are usually characterized as those which retain particles on the surface and within the filter matrix. All conventional fibrous filters (whether manufactured from cellulose, borosilicate glass microfiber or other fibrous material) are depth filters and are normally characterized by exhibiting good loading capacity.



Membrane filters allow the efficient retention of submicron particulates and organisms.



Whatman cellulose filter papers exhibit particle retention levels down to 2.5 µm.



Glass microfiber filters are manufactured by Whatman from 100% borosilicate glass.

Multigrade GMF 150 combines two filters in one for fast, effective multilayered filtration.

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Herzberg Method

Whatman quantifies liquid flow rate for its range of filters by using a Herzberg flow rate test. Prefiltered deaerated water is applied to the test filter (effective area 10 cm^2) at a constant hydrostatic head (10 cm). 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. It is not considered to be as reliable or consistent as the Herzberg test.

Hydrophilic

Because hydrophilic filters possess an affinity for water and can be wetted with virtually any liquid, they are typically used for aqueous solutions.

Hydrophobic

These types of filters repel water, and are thus best suited for venting or gas filtration applications.

Liquid Flow Rate

Under practical filtration conditions, the liquid flow rate will depend on a number of factors, many of which will be specific to the solid/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 is tested with prefiltered, deaerated water using a flat filter subjected to a constant hydrostatic head. Test methods based on quadrant folded filters are considered unreliable.

Loading Capacity

This relates to 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 are inherently low in loading capacity. 'Choking life' is a measure of loading capacity.

Particle Retention (Liquid)

In a filtration process, the particle retention efficiency of a depth-type filter is expressed in terms of the particle size (in µm) at which a retention level of 98% of the total number of particles initially challenging the filter is obtained. It is customary to quote the retention levels at 98% efficiency to allow for secondary filtration effects. All Whatman depth filter grades have a published nominal retention rating determined on this basis.

Pore Size

The pore size, usually stated in micrometers (µm), of Whatman filter media is defined by the diameter of particles retained by the filter matrix. Pore size ratings, which can be either nominal or absolute, refer to the size of organisms or particles retained by the filter media.

Prefilters

Prefilters are traditionally depth filters placed upstream from a membrane filter to significantly reduce the particulate loading in the system and thereby allow the membrane to operate efficiently at a light particulate loading.

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 Whatman membrane filters is one of their major features.

Filter Types and Filter Holders

Filter Papers

Whatman qualitative and quantitative filter papers are, with few exceptions, 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. There is a wide choice of retention/flow rate combinations to match numerous laboratory applications. The different groups of filter paper types offer increasing degrees of purity, hardness and chemical resistance. Whatman quantitative filter papers have extremely high purity for analytical and gravimetric work.

Glass Microfiber Filters (GMF)

The unique properties of borosilicate glass microfibers enable Whatman to manufacture filters with retention levels extended 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 choking life is considerably extended beyond the life of a cellulose filter of similar retention. Whatman 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 µm and allow the efficient retention of sub-micron particulates and organisms. Water microbiology and air pollution monitoring are major applications of membranes.

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.

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.

Diameter (cm)	Volume (mL)
9	15
11	20
12.5	35
15	75
18.5	135
24	300

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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/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). The Whatman 3-Piece Filter Funnel is fully demountable 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 in-line filters are also available. Large diameter membranes are typically used in pressure holders.


1


2

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.


3


4

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Appendix A

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

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Typical Particle Sizes

Gelatinous Precipitates	µm
Metal Hydroxides	25–40
Precipitated Silica	25–40
Crystalline Precipitates	
Ammonium Phosphomolybdate	20
Calcium Oxatate	15
Lead Sulfate	10
Barium Sulfate (hot ppt.)	8
Barium Sulfate (cold ppt.)	3
Blood Cells	
Platelets	2–3
Erythrocytes (average)	7.0
Polymorphs	8–12
Small Lymphocytes	7–10
Large Lymphocytes	12–15
Monocytes	16–22
Bacteria*	
Cocci	0.5
Bacilli	1.0 x (1.0–1.0)
Serratia marcescens	0.5 x (0.5–1.0)
Pneumococcus	1.0
Bacillus tuberculosis	0.3 x (2.5–3.5)
Amoeba	12-30
E. coli	0.5 x (1.0–3.0)
Smallest Bacteria	0.22
Other Microorganisms, etc.	
Yeast Cells	2.0–8.0
Tobacco Smoke	0.5
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 brackets

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Product Selection

Compatibility of Membranes

Solvent	ANP	CA	CN	PC	PE	GMF	NYL	PP	dpPP	PSU	PES	PTFE	PVDF
Acetic Acid, 5%	R	LR	R	R		R	R	R	R	R	R	R	R
Acetic Acid, Glacial	R	NR	NR			R	LR	R	R	R	R	R	R
Acetone	R	NR	NR	NR	R	R	R	R	R	NR	NR	R	NR
Acetonitrile	R	NR	NR			R	R	R	R	NR	R	R	R
Ammonia, 6N	NR	+	NR	NR	LR	LR	R	R	R	R	R	R	LR
Amyl Acetate	LR	NR	NR	R	R	R	R	R	R	NR	LR	R	LR
Amyl Alcohol	R	R	R			R	R	R	R	R	NR	R	R
Benzene*	R	R	R	LR	R	R	LR	LR	LR	NR	R	R	R
Benzyl Alcohol*	R	LR	LR	LR	R	R	LR	R	R	NR	NR	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
Butyl Chloride*		+				R	NR	NR	NR	+	+	R	R
Carbon Tetrachloride*	R	NR	R	LR	R	R	LR	LR	LR	NR	R	R	R
Chloroform*	R	NR	R	NR	R	R	NR	LR	LR	NR	NR	R	R
Cyclohexanone	R	NR	NR			R	NR	R	R	NR	NR	R	R
Chlorobenzene	R	+	R			R	+	+	+	+	NR	R	R
Citric Acid		+	+			R	LR	+	+	+	R	R	R
Cresol		NR	R			R	NR	R	R	NR	NR	R	NR
Cyclohexane	R	R	R	R	R	R	R	R	R	R	R	R	R
Diethyl Acetamide		R	NR			R	R	R	R	NR	+	R	NR
Dimethyl Formamide	LR	NR	NR			R	R	R	R	NR	NR	R	NR
Dioxane	R	NR	NR	NR	R	R	R	R	R	NR	LR	R	LR
DMSO	LR	NR	NR	NR	R	R	R	R	R	NR	NR	R	LR
Ethanol	R	R	NR	R	R	R	R	R	R	R	R	R	R
Ethers	R	LR	LR	R	R	R	R	R	R	R	R	R	LR
Ethyl Acetate	R	NR	NR	LR	R	R	R	R	R	NR	NR	R	LR
Ethylene Glycol	R	LR	LR	R	R	R	R	R	R	R	R	R	R
Formaldahyde	LR	LR	R	R	R	R	R	R	R	R	R	R	R
Freon TF	R	R	R	R	R	R	R	R	R	R	R	R	R
Formic Acid		LR	LR			R	NR	R	R	LR	R	R	R
Hydrochloric Acid, Conc	NR	NR	NR	R	NR	R	NR	LR	LR	R	R	R	R
Hydroflouric Acid		NR	NR			NR	NR	LR	LR	+	+	R	R
Hexane	R	R	R	R	R	R	R	R	R	R	R	R	R
Isobutyl Alcohol	R	R	LR	R	R	R	R	R	R	R	+	R	R
Isopropyl Alcohol	R	R	LR			R	R	R	R	NR	+	R	R
Methanol	R	R	NR	R	R	R	R	R	R	R	R	R	R
Methyl Ethyl Ketone	R	LR	NR	LR	R	R	R	R	R	NR	NR	R	R

contd >

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Solvent	ANP	CA	CN	PC	PE	GMF	NYL	PP	dpPP	PSU	PES	PTFE	PVDF
Methylene Chloride*	R	NR	LR			R	NR	LR	LR	NR	NR	R	R
Nitric Acid, Conc		NR	NR	R	NR	R	NR	NR	NR	NR	NR	R	NR
Niric Acid, GN		LR	LR			R	NR	LR	LR	LR	LR	R	LR
Nitrobenzene*	LR	NR	NR	NR	R	R	LR	R	R	LR	NR	R	R
Pentane	R	R	R	R	R	R	R	R	LR	R	R	R	R
Perchloro Ethylene	R	R	R			R	R	R	LR	NR	NR	R	R
Pyridine	R	NR	NR	NR	R	R	LR	R	R	NR	NR	R	R
Phenol 0.5%	LR	LR	R			R	R	R	R	NR	NR	R	R
Sodium Hydroxide, 6N	NR	NR	NR	NR	NR	NR	LR	R	R	R	R	R	NR
Sulfuric Acid, Conc	NR	NR	NR	NR	NR	R	NR	NR	R	NR	NR	R	NR
Tetrahydrofuran	R	NR	NR			R	R	LR	LR	NR	NR	R	R
Toluene*	R	LR	R	LR	R	R	LR	LR	LR	NR	NR	R	R
Trichloroethane*	R	NR	LR	NR	R	R	LR	R	R	NR	R	R	R
Trichloroethylene*	R	+	R			R	NR	R	R	NR	NR	R	R
Water	R	R	R	NR	R	R	R	R	R	R	R	NR	R
Xylene*	R	R	R			R	LR	LR	LR	NR	LR	R	R

R = Resistant; LR = Limited Resistance; NR = Not Recommended; + = Insufficient Data; * = Short Term Resistance of Housing
The above data is to be used as a guide only. Testing prior to application is recommended.

Membrane Abbreviations:
ANP – Anopore
CA – Cellolose Acetate
CN – Cellulose Nitrate
PC – Polycarbonate
PE – Polyester
GMF – Glass Microfiber
NYL – Nylon
PP – Polypropylene
dpPP – Depth Polypropylene
PSU – Polysulfone
PES – Polyethersulfone
PTFE – Teflon
PVDF – Polyvinylidene Fluoride

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Trademarks

Trademarks and Registered Trademarks of Companies within the Whatman Group

Trademarks

AccuFlow™
Aqueous IFD™
AUTOCUP™
Autovial™
BackPulse™
Benchkote Plus™
Butterfly™
Carbon Cap™
Chip Clip™
Clear View™
ColiCheck™
CombiClamp™
EasyClone™
EasyDisc™
EpiCount™
Extractor™
FilterCup™
GenPrep™
GenSpin™
GenXTrak™
Hemafil™
HEPA-CAP™
HEPA-VENT™
IFD™
MicroCaster™
Micro Punch™
Mini-UniPrep™
Multi-Chem™
NC™
PCR Cleanup™
PlantSaver™
Polycap™
Polydisc™
PolyVENT™
Pop-Top™
Puradisc™
Purasil™
Solvent IFD™
SteriVENT™
SwabCheck™
Swin-Lok™
TurboBlotter™
UniCell™
UniPCR™
UNIPLATE™
UniSeal™
UniVac™
UVMax™
VacAssist™
VACU-GUARD™
VectaSpin™
VectaSpin™ 3
VectaSpin™ 20
VectaSpin™ Micro

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Anotop®
AOX®
Benchkote®
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CENTREX®
CloneSaver®
Cyclopore®
CrypTest®
Elutip-d®
Elu-Quik®
Elutrap®
EXPRESS-ION®
FAST®
FAST Quant®
FTA®
FTA® Elute
GD/X®
GF/C®
Membra-Fil®
Minifold®
Nuclepore®
NutriDisk®
Nytran®
Optitran®
Partisil®
PartiSphere®
POLYTRAP®
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Triton® is a registered trademark of Rohm & Haas Co.
Tween® and Tween 20® are registered trademarks of ICI Americas
ULS® is a registered trademark of KREATECH Biotechnology BV
Vitron® is a registered trademark of DuPont
Zymark® is a registered trademark of Caliper Life Sciences

The PCR process is covered by patents owned by Hoffmann-LaRoche, Inc.

These trademarks and registered trademarks are accurate to the best of our knowledge at the time of printing.

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innovating
refining
defining

Welcome to Whatman, the world's leading developer of high-end laboratory separations products and with the acquisition of Schleicher & Schuell in November 2004, a rapidly growing name in biosciences. From blotting products for nucleic acid and protein analysis, to arrays for cancer research, Whatman innovation and solutions for life sciences, worldwide, enable scientists and medical researchers to carry out their work more easily, quickly, accurately and safely. Whether it's for the collection, storage and manipulation of DNA for forensic applications; the use of multiwell plates for high throughput sample preparation and screening in drug discovery and genomic research; or the preparation of antibodies in diagnostics, from sector to sector, country to country, Whatman has become the watchword for quality, reliability, trust and innovation.

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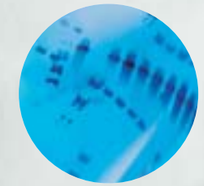
1 clear united vision

Whatman is known throughout the world for its expertise in separations technology for analytical laboratories, bioscience and healthcare applications. Through quality assurance programs, automation, technical support, state-of-the-art manufacturing and dependable delivery, our goal is to provide superior solutions that are reliable, trusted, innovative and internationally competitive. By getting closer to our customers, focusing on key markets, channeling our experience and expertise into new areas and applying our thinking and technologies to develop new, quality-rich products, Whatman will continue to evolve and improve. Our recent acquisition of Schleicher & Schuell clearly demonstrates our determination to remain pivotal to the analytical and life sciences.



Genomics and Proteomics
Whatman products facilitate genomic studies of humans, animals, plants and microorganisms. Collection, storage and analysis of DNA benefit from our innovative FTA® range of products and CloneSaver® Cards. Our blotting membranes are used for protein analysis. Our other market leading product is the UNIFILTER® multiwell filtration plate for high-throughput nucleic acid sample preparation.

Basic Analytical Testing
In the vast and disparate world of analytical chemistry, Whatman products are considered the standard for basic laboratory processes that range from simple clarification to solvent extraction. Products ranging from filter papers, thimbles and Benchkote®, to membrane filters, phase separator papers and thin layer chromatography plates.

Environmental Monitoring
Whatman solutions are used extensively in EPA, ASTM and ISO protocols for environmental monitoring. Total suspended solids analysis methods for waste water, for example, require Whatman 934-AH® glass microfiber papers. Asbestos analysis is accomplished with Whatman Nuclepore® track-etched membranes. Our solutions, such as the FTA Filter Funnel, are also used to purify, isolate and identify organisms in fluids.

Pharmaceutical
Whatman helps pharmaceutical companies increase productivity. Mini-UniPrep™ Syringeless Filters reduce HPLC sample preparation time and consumables usage. DE52 ion-exchange resins are used for purification of critical therapeutics. Multiwell plates enable high-throughput sample preparation and screening in drug discovery. Our track-etched and Anopore® membranes are also vital to making liposomes for encasing and targeting drugs.

Food and Beverage
Quality control for food and beverage is a growing market for our filtration, monitors and media, and separations products. Partisil® HPLC columns are used for the analysis of caffeine by a major manufacturer, while GD/X® syringe filters enable the clarification of a leading orange juice brand. Our products are also used to discover disease states and harmful bacteria.

application finder

AGRICULTURAL IDENTIFICATION

Animal Identification
Genetic analysis, purifying DNA for microsatellite and SNP typing to identify individual animals and important genetic traits in research and livestock production settings

Animal Disease Diagnostics
Nucleic acid based molecular diagnostic testing and analysis in R&D, protein based disease diagnostics via immunoassay and Western blot analysis

Animal Genotyping and Tracking
Genetic analysis, purifying DNA for genetic analysis of economically important traits, meat and meat products traceability

Animal Research
Nucleic acid and protein based analysis in basic research, molecular biology and immunological assays

Plant Research and Breeding
Molecular biology analysis, nucleic acids isolation and gene detection

Plant Genotyping
Analysis of advantageous growth genes, screening transgenic plants, germplasm identification and identity preservation

GMO Analysis
Detection of genetically modified organisms via DNA based or immunological methods, R&D, basic research

MICROBIAL GENOMICS

Microbial Identification
Identification of bacterial species by DNA based and immunological methods, basic research, R&D

Water Analysis
Detecting microorganisms in water samples, molecular identification, basic research, R&D, monitoring

Air Analysis
Detecting microorganisms in air samples, molecular identification, basic research, R&D, monitoring

Food Safety and Analysis
Detecting microorganisms in food samples, molecular identification, basic research, R&D

Homeland Security
Identification of bioterrorism agents, toxicology, molecular and protein analysis

FORENSICS

Databanking
Collection analysis and long-term archiving of DNA samples

Evidence Collection
Collection, analysis and long-term archiving of DNA samples collected at crime scenes

GENOMICS

Clone Archiving
Room temperature clone storage and management, basic research, R&D

HUMAN IDENTIFICATION

Child Safety and Military Identification
Child and adult identification, genetic identification

Paternity
Parent/child relationships, family relationships, ancestry tracing

Population Screening
Neonatal testing, genetic screening, basic research, clinical, R&D

MOLECULAR DIAGNOSTICS

Disease Identification
Molecular diagnostics, oncology, disease tracking, basic research, clinical research, R&D

Genetic Markers
Identification of genetic disease markers, screening, basic research, clinical research, R&D

PHARMACOGENOMICS

Clinical Trials
Sample collection, analysis and archiving, genetic analysis, genotyping, basic research, clinical research, pharmaceutical R&D

BioBanking/DNA Repositories
Sample collection, analysis and long term archiving, genetic analysis, genotyping, basic research, clinical research, pharmaceutical R&D

I.C.T, S.L.
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contents

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Nucleic Acid and Protein Sample Preparation:
Take the DNA from a plant, store it on an FTA® Card, track plant mutations and create a gene library. Just two applications of many.

Nucleic Acid and Protein Sample Preparation

Whatman has been manufacturing quality paper products since 1740 and is recognized as the world leader in filter separation technologies and products.

With all this knowledge and remarkable testimonies to quality, Whatman has taken its products to a new level, in the genomics/proteomics industry. Our area of expertise in this evolving industry lies in sample preparation, where our FTA Cards - an innovative patented technology for collecting, transporting, purifying and archiving DNA and RNA all on a single card stored at room temperature - have become market leaders.

The nucleic acid sample preparation products incorporate unique Whatman technologies, which offer several outstanding advantages to molecular biologists. These include the encapsulation of solid media into devices, DNA separation products, services and products designed for the collection, transportation, purification and analysis of nucleic acids. All of these new Whatman products create breakthrough applications that yield accurate results much faster than previously possible. Offering an extensive, leading-edge product range and an efficient contract service means that all your DNA processing requirements are met by one established provider.

FTA Classic Card

Whatman offers an extensive range of products to facilitate genomic studies of humans, animals, plants and microorganisms. Collection, storage and analysis of DNA and RNA all benefit from the use of FTA and other Whatman tools.

Collection, Storage and Purification

FTA Technology
Collect, Transport, Archive and Isolate Nucleic Acids - All at Room Temperature

FTA Cards utilize patented Whatman FTA Technology that simplifies the handling and processing of nucleic acids.

FTA Cards contain chemicals that lyse cells, denature proteins and protect nucleic acids from nucleases, oxidation and UV damage. FTA Cards rapidly inactivate organisms, including blood-borne pathogens, and prevent the growth of bacteria and other microorganisms. Try FTA, and you'll soon find it's an indispensable part of your DNA toolbox. US Patent Nos. 5496562, 5756126, 5807527, 5972386, 5985327 and other patents pending.

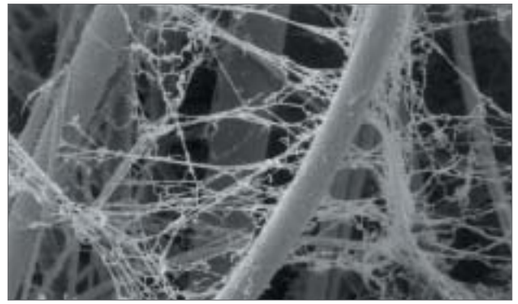
Features and Benefits

- Capture nucleic acid in one easy step
- Captured nucleic acid is ready for downstream applications in less than 30 minutes
- Nucleic acids collected on FTA Cards are stable for years at room temperature
- FTA Cards are stored at room temperature before and after sample application, reducing the need for laboratory freezers
- Suitable for virtually any cell type
- Indicating FTA Cards change color upon sample application to facilitate handling of colorless samples
- FTA Cards are available in a variety of configurations to meet application requirements
- Custom configurations are available on request


Whatman FTA Cards

Applications

- Forensics
- Transgenics
- Transfusion Medicine
- Plasmid Screening
- Food and Agriculture Testing
- Drug Discovery
- Genomics
- STR Analysis
- Animal Identification
- Diagnostics
- Pharmacogenomics
- Molecular Biology


Electron micrograph showing DNA entrapped within the FTA matrix (magnification x 10,000)

Capture Nucleic Acids in One Easy Step

Simply apply your sample to the FTA Card. Cell membranes and organelles are lysed and the released nucleic acids are entrapped in the fibers of the card. The nucleic acids remain immobilized and are stabilized for transport, immediate processing or long-term room temperature storage.

Since captured nucleic acids are stabilized, FTA Cards facilitate sample collection in remote locations and simplify sample transport. For example, you can collect samples deep in a rain forest without worrying about immediate refrigeration. Ship your samples back to the lab without expensive special handling or dry ice, and process at your convenience.

Indicating FTA Cards are recommended for colorless samples. These FTA Cards change from pink to white when sample is applied, verifying the location of the sample.

Nucleic Acid and Protein Sample Preparation

FTA Cards Used With Virtually Any Sample Type

- Blood
- Cultured Cells
- Buccal Cells
- Plant Material
- Bacteria
- Plasmids
- Microorganisms
- Solid Tissue
- Viral Particles
- M13 Plaques...and more

Captured Nucleic Acid is Ready for Downstream Applications in Less than 30 Minutes

Captured nucleic acids are ready for purification when you are. Just take a punch from the FTA Card, wash with FTA Purification Reagent and rinse with TE^{-1} buffer. DNA on the washed punch is ready to use in applications such as PCR, SNP analysis and RT-PCR. Since PCR products remain in solution, the punch can be used for multiple amplifications.

Store Nucleic Acids at Room Temperature for Years

Genomic DNA stored on FTA Cards at room temperature for over 14 years (and counting) has been successfully amplified by PCR.

Sample integrity is optimized when FTA Cards are stored in a Multi-Barrier Pouch with a Desiccant Packet.

FTA Cards offer a compact room-temperature storage system that reduces the need for precious freezer space.

FTA Classic Card

Four sample areas for application of up to 500 µL whole blood or 100 µL plant homogenate per card. Convenient for multiple applications of the same specimen or collection of multiple animal or plant samples on one card. Different samples can be processed independently.

Indicating FTA Classic Card

Same as FTA Classic Card with a color indicator that changes from pink to white when sample is applied. Recommended for use with colorless samples such as buccal or cultured cells.

FTA Mini Card

Two sample areas for application of up to 250 µL whole blood or 50 µL plant homogenate per card. Convenient for protocols that require different locations for testing and archiving samples. Different samples can be processed independently.

Indicating FTA Mini Card

Same as FTA Mini Card with a color indicator that changes from pink to white when sample is applied. Recommended for use with clear samples such as buccal or cultured cells.

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FTA Micro Card

One sample area for application of up to 125 µL whole blood or 25 µL plant homogenate per card. Recommended when only one sample is needed.

Indicating FTA Micro Card

Same as FTA Micro Card with a color indicator that changes from pink to white when sample is applied. Recommended for use with clear samples such as buccal or cultured cells.

FTA Gene Card

An FTA Card enclosed in a rigid card frame. Three sample areas for application of up to 225 µL whole blood or 30 µL plant homogenate per card. Can be utilized in many automatic dispensing/pipetting systems when used with the FTA Gene Card Tray (WB100030).

FTA Plant Kit

PlantSaver™ FTA Card

Plant friendly FTA Card, in a Classic Card format. Features a laminated flap that allows you to vigorously pound the plant sample into the FTA matrix without damaging the FTA Card.

FTA Kit

Includes: 25 FTA Micro Cards, 2 x 25 mL FTA purification reagent, 2 Harris Uni-Core Punches with cutting mat, instructions.

FTA Plant Kit

Includes: 20 FTA PlantSaver cards, 2.0 mm UniCore Punch with cutting mat, 2 x 25 mL FTA purification reagent, 1 pair of nitrile gloves and 1 cutting mat and round bottom test tube for sample application, instructions.

FTA Starter Pack

Includes: 1 FTA Classic Card, 1 FTA Mini Card, 1 FTA Micro Card, 1 Indicating FTA Mini Card, 1 FTA Indicating Micro Card, 2 foam-tipped applicator swabs, 1 multi-barrier pouch with desiccant, 25 mL FTA purification reagent, 2 Harris Uni-Core Punches with cutting mat, instructions.

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Ordering Information - FTA Nucleic Acid Collection, Storage and Purification

Catalog Number	Description	Cards/Pack	Sample Areas/Card	Maximum Volume/ Sample Area (µL)	Maximum Total Volume/Card (µL)
WB120067	FTA Kit [1]	25	-	-	-
WB120068	FTA Plant Kit [2]	20	-	-	-
WB120061	FTA Starter Pack	N/A	-	-	-
WB120305	FTA Classic Card	25	4	125	500
WB120205	FTA Classic Card	100	4	125	500
WB120306	Indicating FTA Classic Card	25	4	125	500
WB120206	Indicating FTA Classic Card	100	4	125	500
WB120355	FTA Mini Card	25	2	125	250
WB120055	FTA Mini Card	100	2	125	250
WB120356	Indicating FTA Mini Card	25	2	125	250
WB120056	Indicating FTA Mini Card	100	2	125	250
WB120310	FTA Micro Card	25	1	125	125
WB120210	FTA Micro Card	100	1	125	125
WB120311	Indicating FTA Micro Card	25	1	125	125
WB120211	Indicating FTA Micro Card	100	1	125	125
WB120308	FTA Gene Card	25	3	75	225
WB120208	FTA Gene Card	100	3	75	225
WB120365	PlantSaver FTA Card	25	4	-	-
WB120065	PlantSaver FTA Card	100	4	-	-
WB120217	FTA Card/Pouch/Desiccant	1000	-	-	-

[1] Includes: 25 FTA Micro Cards, 2 x 25 mL FTA purification reagent, 2 x Uni-Core Punches with cutting mat, instructions
[2] Includes: 20 FTA PlantSaver cards, 2.0 mm Uni-Core Punch and cutting mat, 2 x 25 mL FTA purification reagent, 1 pair of nitrile gloves with 1 cutting mat and round bottom test tube for sample application, instructions.

FTA® Elute

FTA Elute Technology
Collect, Transport, Archive and Isolate Nucleic Acids - All at Room Temperature

FTA Elute Cards utilize patented Whatman FTA Technology that simplifies the handling and processing of nucleic acids. DNA can be extracted in an easy step, providing you with DNA for your amplification needs.

The FTA Elute matrix is chemically treated with proprietary reagents that lyse cells upon contact causing the release of nucleic acids. DNA is recovered from the FTA Elute matrix through a simplified elution process using water and heat. Inhibitory components, such as hemoglobin, are retained on the FTA Elute matrix.

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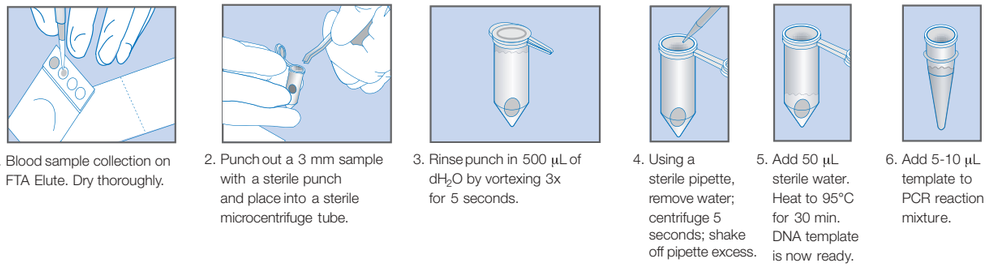
Features and Benefits

- Capture nucleic acid in one easy step
- Captured nucleic acid is easily released for multiple downstream applications in less than 30 minutes
- Sample processing requires a simple water elution procedure to isolate DNA eliminating the cost of using a purification kit
- DNA collected on FTA Elute Cards are stable for years at room temperature
- FTA Elute Cards are stored at room temperature before and after sample application, reducing the need for laboratory freezers
- FTA Elute rapidly inactivates organisms including blood borne pathogens and eliminates the risk of contamination for the individuals handling the sample
- FTA Elute Cards are available in a variety of configurations to meet application requirements
- Custom configurations are available on request

FTA Elute

Collect and Isolate Samples Quickly and Easily



1. Blood sample collection on FTA Elute. Dry thoroughly.
2. Punch out a 3 mm sample with a sterile punch and place into a sterile microcentrifuge tube.
3. Rinse punch in 500 µL of dH_2O by vortexing 3x for 5 seconds.
4. Using a sterile pipette, remove water; centrifuge 5 seconds; shake off pipette excess.
5. Add 50 µL sterile water. Heat to 95°C for 30 min. DNA template is now ready.
6. Add 5-10 µL template to PCR reaction mixture.

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Use FTA Elute for a wide range of applications:

- Multiple PCR
- Sequencing
- SNP Analysis
- STR Analysis
- HLA Typing
- Whole Genome Amplification
- Quantitative PCR

FTA Elute Classic Card

Four sample areas for application of sample per card. Convenient for multiple applications of the same specimen or collection of multiple samples on one card. Different samples can be processed independently.

FTA Elute Micro Card

One sample area for application of sample per card. Recommended when only one sample is needed.

Ordering Information - FTA Elute Technology

Catalog Number	Description	Cards/Pack	Sample Areas/Card
WB120403	FTA Elute Classic Card	25	4
WB120405	FTA Elute Classic Card	100	4
WB120401	FTA Elute Micro Card	25	1
WB120410	FTA Elute Micro Card	100	1

FTA® Reagent and Accessories

For Collection, Storage, Processing and Shipping FTA Cards

FTA Purification Reagent

- For purification of nucleic acids stored on FTA Cards
- Ensures superior quality DNA for PCR or SNP analysis
- Removes heme, PCR inhibitors and other potential contaminants
- Non-toxic, hypoallergenic aqueous solution

FTA Gene Card Tray

- Holds 2 FTA Gene Cards for use in automatic dispensing/pipetting systems
- Tray footprint conforms to SBS Standards

Harris Micro Punches (1.2 mm, 2.0 mm or 3.0 mm) and Cutting Mat

- Recommended for the precise punching of FTA Cards. No sample carryover when recommended procedures are used. Tips provide up to 2000 punches. Polished steel tip is case hardened and can be sterilized. The cutting mat ensures clean sample cuts and extends the life of the cutting tip.
- 1.2 mm punch recommended for use with FTA Cards containing whole blood and samples with high DNA content
- 2.0 mm punch recommended for use with FTA Cards containing buccal cells, plasmids and other samples with lower DNA content
- 3.0 mm punch recommended for use with FTA Elute Cards

Harris Uni-Core Punches

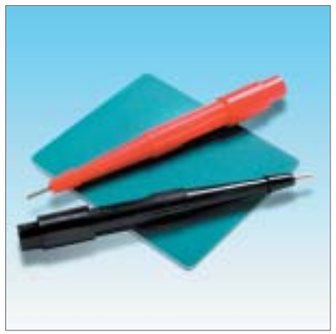
- Disposable punch recommended for punching of FTA Cards. No sample carryover when recommended procedures are used.
- 1.2 mm punch recommended for use with FTA Cards containing whole blood and samples with high DNA content
- 2.0 mm punch recommended for use with FTA Cards containing buccal cells, plasmids and other samples with lower DNA content
- 3.0 mm punch recommended for use with FTA Elute Cards

Sterile Foam Tipped Applicator

- For the collection of saliva and buccal cells
- Non-abrasive foam head is same size as sample area on Indicating FTA Cards to facilitate sample application

FTA Purification Reagent

Harris Micro Punches



Harris Uni-Core Punches

Nucleic Acid and Protein Sample Preparation

Sterile Omni Swab

This is a non-invasive device for the collection of saliva and cheek buccal cells. Sterile Omni Swab features a unique brush-like swab head that easily ejects from the stem of the swab for transfer of samples into tubes and multiwell plates. Sterile Omni Swabs are pre-sterilized and individually wrapped for single use.

Sterile Omni Swab

Multi-Barrier Pouches

Large

- For transporting or storing FTA and FTA Elute Classic Cards
- Seven laminated layers protect the card from exposure to gas or liquid contamination
- Tamper-evident seal maintains sample security
- Outer paper surface for labeling or writing

Small

- Same construction in a smaller size for storing FTA Gene Cards, Mini Cards or Micro Cards

Desiccant Packets

- Ensure that FTA Cards remain dry during transport or storage
- Change from blue to pink to indicate absorption of moisture

Multi-Barrier Pouches

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Ordering Information - FTA Reagent and Accessories

Catalog Number	Description	Quantity/Pack
WB120204	FTA Purification Reagent	500 mL
WB100030	FTA Gene Card Tray	20
WB100032	Sterile Foam Tipped Applicators	100
WB100005	Harris Micro Punch 1.2 mm (with cutting mat)	1
WB100006	Replacement Tip 1.2 mm	1
WB100007	Harris Micro Punch 2.0 mm (with cutting mat)	1
WB100038	Harris Micro Punch 3.0 mm (with cutting mat)	1
WB100008	Replacement Tip 2.0 mm	1
WB100020	Replacement Cutting Mat	1
WB100036	Multi-Barrier Pouch, Small (8 x 7 cm)	100
WB100037	Multi-Barrier Pouch, Large (9 x 15 cm)	100
WB100003	Desiccant Packets (1 gm)	1000
WB100025	Harris Micro Punch 1.2 mm Replacement Plunger	1
WB100026	Harris Micro Punch 2.0 mm Replacement Plunger	1
WB100028	Harris Uni-Core Punch 1.2 mm	4
WB100029	Harris Uni-Core Punch 2.0 mm	4
WB100039	Harris Uni-Core Punch 3.0 mm	4
WB100040	Harris Uni-Core Punch 6.0 mm	4
WB100035	Sterile Omni Swab	100

Clone Archiving

Whatman offers a unique patented technology to collect, store, back-up and process clone samples. This revolutionary FTA technology is available in two formats: 96 Well card and 384 Well plate.

CloneSaver® Card

FTA Technology in 96 Well Format for High-Throughput Applications

Designed for the collection, long-term storage and purification of plasmid and BAC DNA from bacterial clones in a 96 Well format.

Nucleic Acid and Protein Sample Preparation

Prepare BAC and Plasmid DNA with Amazing Ease

- Apply 5 µL bacterial culture, resuspended colony or glycerol stock. Cells are lysed and plasmid or BAC DNA is stabilized for long-term storage or immediate processing.
- Bacteriophages are inactivated
- DNA is easily accessible for downstream applications
- Store up to 96 samples on each card

Store Sample DNA for Years at Room Temperature

Plasmid DNA stored on CloneSaver Cards is stable at room temperature for at least four years...and counting.

DNA is Easily Accessible for Downstream Applications

Transformation

Plasmid DNA can be eluted or used directly on a punch to transform bacteria either by electroporation or heat-shock methods.

PCR

Immobilized plasmid DNA on a CloneSaver Card punch can be used directly in a PCR. The PCR products remain in solution, do not bind to the punch and are easily recoverable. Plasmid DNA can also be eluted for PCR or other studies.

Sequencing

Plasmid DNA eluted from a CloneSaver punch can be amplified by rolling circle amplification, such as GE Healthcare's (formerly Amersham Biosciences) TempliPhi™ and then sequenced without the need for culture regrowth and plasmid purification.

CloneSaver Resealable Multi-Barrier Pouches

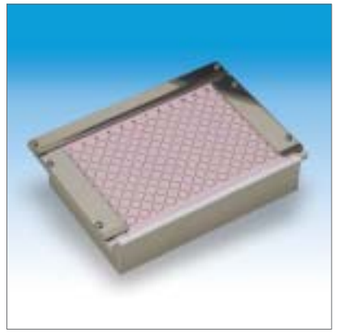
Used for transporting or storing the CloneSaver Card. The pouch is constructed with seven laminated layers that protect the card from exposure to gas or liquid contamination. There is a zip-lock resealable closure for easy access to the CloneSaver Card. The tamper-evident seal maintains sample security and the outer paper surface can be used for labeling or writing.

SPOT CloneSaver Holder

SPOT CloneSaver Holder is a rigid frame that allows automated spotting to standard CloneSaver Cards. It keeps the card flat for uniform and precise spotting of biological samples. The 96 Well card is easily inserted into the SBS-compatible frame, which can then be placed onto a liquid-handling deck just like a multiwell plate.

Sample Application to CloneSaver Card

CloneSaver Card with Multi-Barrier Pouches



SPOT Holder

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The SPOT CloneSaver Holder is compatible with standard liquid handlers manufactured by companies such as Beckman Coulter and Tecan Instruments.

CloneSaver Starter Kit

Includes: 2 CloneSaver Cards, 2 Uni-Core Punches (2 mm) with cutting mat and instructions.

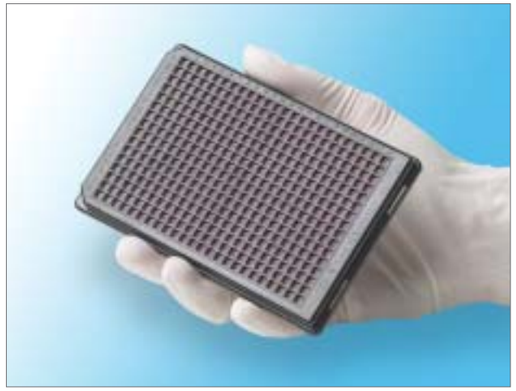
Ordering Information - Clone Archiving

Catalog Number	Description	Cards/Pack	Sample Areas/Card	Maximum Volume/ Sample Area (µL)	Maximum Total Volume/Card (µL)
WB120052	CloneSaver Starter Kit	N/A	96 Well format	5	480
WB120028	CloneSaver Card	2	96 Well format	5	480
WB100024	CloneSaver Resealable Multi-Barrier Pouch	50	N/A	N/A	N/A
WB100034	SPOT CloneSaver Holder for Semi-Automated Spotting	1	N/A	N/A	N/A

EasyClone™ 384 Plate

The Whatman EasyClone 384 Plate replaces traditional freezer storage methods and offers a first of its kind, single device for entire sample archiving and purification workflow, enabling faster DNA mining and discovery.

The EasyClone 384 Plate can be used by biotechnology, pharmaceutical, government and academic laboratories for archiving, shipping and purifying clones - all at room temperature.



EasyClone 384 Plate

Relying on proven Whatman FTA technology, which allows for the collection, storage and purification of DNA from a variety of biological samples, EasyClone consists of a 384 Well storage and extraction plate with a piercable foil bottom and FTA disks pre-cut into each well. The design and format of the EasyClone 384 plate enables the genomics market to use FTA as a replacement for both purification kits and freezer storage.

Ordering Information - EasyClone 384 Plate

Catalog Number	Description	Quantity/Case
WB120069	EasyClone 384 plate	50

DNA/Protein Purification

Whatman offers a line of DNA purification kits to simplify your testing processes.

GenSpin™ Genomic DNA Purification Kit

The GenSpin Purification Kit is designed to purify high quality, PCR-ready, single-stranded DNA in solution from whole blood and cultured cells in as little as 25 minutes.

This simple protocol uses a single micro centrifuge tube and small sample volume (5-50 µL) to produce high quality DNA for amplification by PCR. DNA for up to 80 amplification reactions can be obtained from a 50 µL fresh or anticoagulant-treated blood sample.

GenSpin incorporates patented FTA technology, which lyses cell and nuclear membranes on contact. The DNA is reversibly entrapped within this type of FTA filter matrix and can be stored for weeks at room temperature prior to purification. Cellular debris and proteins are removed by washing with GenSpin buffer and TE^{-1} buffer using a centrifuge. The purified DNA is released from this specialized filter matrix by heat elution and is ready for immediate PCR amplification.

GenSpin Genomic DNA Purification Kit

GenSpin™ Genomic DNA Purification Kit

Features and Benefits

- Simple, single tube protocol. Purify single stranded DNA from whole blood and cultured cells in less than 25 minutes.
- FTA technology lyses cells, denatures proteins and inactivates viral contaminants. Allows room temperature storage of DNA and safe sample transport and handling prior to purification.
- High quality DNA. Enables full length PCR amplification.
- Highly efficient method. Enables purification of DNA for up to 80 amplification reactions from a 50 µL blood sample.
- No precipitation steps. DNA is ready for immediate analysis.

Apply Sample
Archivable for weeks at room temperature.

GenSpin Buffer Wash
Add GenSpin buffer and centrifuge. Discard eluate and repeat wash twice.

TE^{-1} Buffer Wash
Add 0.5 mL TE^{-1} buffer and centrifuge. Discard eluate and repeat wash once.

Incubation
Transfer DNA isolation filter basket to a clean collection tube and add Nuclease-Free Water. Heat to release the DNA from the filter matrix.

Collection
Centrifuge to collect the DNA solution. DNA can be used immediately (in PCR) or stored.

Ordering Information - GenSpin Genomic DNA Purification Kits

Catalog Number	Description	Size
WB120005	GenSpin Genomic DNA Purification Kit	50 purifications
WB120111	GenSpin Sample Kit	5 purifications

GenSpin Genomic DNA Purification Kit Contents

Quantity	Item
50	DNA Isolation Filter Baskets in 2 mL Microcentrifuge Tubes
50	2 mL Microcentrifuge Tubes
1	GenSpin Buffer 110 mL
1	Nuclease Free Water 25 mL
1	User Manual

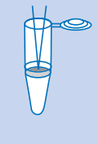
GenSpin™ Plant DNA Purification Kit

The GenSpin Plant DNA Purification Kit is designed for the rapid preparation of double-stranded DNA in solution from small quantities of plant material for PCR analysis.

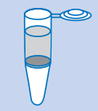
Using a single micro centrifuge tube, this simple protocol enables the recovery of DNA for more than 50 amplification reactions from just 10 mg of plant tissue. The small sample capability is ideally suited for rapid analysis studies such as identification of genetically-modified plants and cultivar screening.

Plant material is homogenized at room temperature and applied to the GenSpin Filter Basket, which incorporates FTA technology to immediately stabilize the DNA at room temperature. Nucleases are inactivated and the DNA is protected from UV and environmental damage. The immobilized DNA is entrapped in the fibers of the matrix and can either be purified immediately or stored at room temperature for more than four weeks. The filter is washed with two reagents to remove contaminants that would inhibit PCR. The DNA is then eluted from the filter by heating and collected by centrifugation.

Apply Sample
Apply plant homogenate to GenSpin Filter Basket. Spin for 15 seconds. Archive for weeks if desired.



Wash Reagent
Add wash reagent and centrifuge for 1 minute. Discard eluate and repeat wash.



Rinse Reagent
Add rinse reagent and centrifuge for 1 minute. Discard eluate and repeat rinse.

Incubation
Transfer filter basket to a clean collection tube and add TE^{-1} buffer. Heat to release the DNA from the matrix.

Collection
Centrifuge to collect the DNA solution. DNA can be used immediately (in PCR) or stored.

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Features and Benefits

- Simple, single tube protocol. Eliminates need for organic solvents, liquid nitrogen and time-consuming precipitation steps.
- Fast purification of DNA. Purify DNA in less than 30 minutes for quick sample screening. Up to 50 amplifications from only 10 mg of plant material.
- PCR-ready double-stranded DNA. Reliable amplification of DNA for a wide range of applications including cultivar screening and identification of genetically modified plants.
- FTA technology protects DNA from degradation. Enables room temperature storage for weeks.

Table 1. Comparison of GenSpin Plant and a Common Manual DNA Isolation Method

Extraction Time	GenSpin Plant 25 minutes	Manual Method* 90 minutes
Homogenization	Room Temperature	Liquid Nitrogen
Precipitation/Resuspension	Not Required	Required
All Reagents Aqueous	Yes	No
Archiving Capability	Yes	No
PCR of Low-Copy Loci	Yes	Yes
Double-Stranded DNA	Yes	Yes
gDNA Isolation from Other Cell Types (bacteria, blood)	Yes	No
Pathogen Inactivation	Yes	No

* Manual method (Dellaporta et. al. 1983) does not include time required for full resuspension after DNA precipitation
Reference: Dellaporta et. al. (1983) A plant DNA minipreparation. *Plant Molecular Biology Reporter* 1:19-21

Table 2. Plant Species - Typical DNA Yields from 10 mg of Young Leaf Tissue

Plant Species	Double-Stranded DNA Yield (ng)
Alfalfa	800
Arabidopsis thaliana	110
Barley*	670
Brassica sp.	800
Corn*	120
Cotton	450
Potato	2200
Rice	120
Ryegrass	340
Soybean*	500
Spinach	340
Tobacco	1100
Tomato	1800
Wheat*	710

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Nucleic Acid and Protein Sample Preparation

* Extraction of these plant species requires the addition of DTT to Homogenization Buffer
DNA yields can vary depending on plant species, tissue age and growing conditions
Double-stranded DNA was quantified using PicoGreen™ Reagent

Ordering Information - GenSpin Plant DNA Purification Kits

Catalog Number	Description	Size
WB120046	GenSpin Plant DNA Purification Kit	50 Purifications
SWB120046	GenSpin Plant DNA Purification Sample Kit	5 Purifications

GenSpin Plant DNA Purification Kit Contents

Quantity	Item
50	GenSpin Purification Tube with Filter Basket
50	GenSpin Collection Tube
1 bottle	Homogenization Buffer 25 mL
1 bottle	Wash Reagent 60 mL
1 bottle	Rinse Reagent 60 mL
1	Instruction Booklet

Elu-Quik® DNA Purification Kit

The Elu-Quik kit provides a convenient and versatile method for purifying DNA from 500-base to 200 Kb. The kit is recommended for the isolation of genomic DNA from whole cells and tissues, as well as purification of single- and double-stranded fragments from gel slices or plasmid minipreps.

The Elu-Quik Kit relies on the affinity of DNA for glass particles in the presence of sodium perchlorate binding buffer. After several washing steps to remove contaminants and cellular debris, the DNA is eluted from the glass in TE^{-1} buffer or water. The highly pure DNA is ready for further experiments without the need for ethanol precipitation. The optimized buffers in the kit provide high yields, and unique rod-shaped glass particles reduce shearing of genomic DNA. Yields typically are greater than 650 µg from 10^8 cells.

Elu-Quik DNA Purification Kit

Features and Benefits

- Optimized buffer system provides high DNA yields
- Versatile kit allows isolation of DNA from a variety of sources
- Samples are eluted in TE^{-1} buffer or water, ready for further assays without ethanol precipitation
- Uniform glass rods minimize shearing of DNA

Ordering Information - Elu-Quik DNA Purification Kit

Description	Catalog Number
Elu-Quik DNA Purification Kit* includes:	10 462 620
5 mL Glass Concentrate in Binding Buffer	
125 mL Sodium Perchlorate Binding Buffer	
20 mL Lysis Buffer	
125 mL Wash Buffer Concentrate (2x)	
125 mL Salt Reduction Buffer	

* For 250 isolations

Elutip-d® Purification Minicolumns

High Recovery of DNA

The Elutip-d minicolumns are designed for purification of DNA with high recovery rates. They provide a simple and convenient method for purification of DNA in the15-base to 50 Kb range.

The Elutip-d columns are ideal for removal of unincorporated nucleotides and other contaminants from radiolabeling reactions to reduce background levels and increase sample activity. They also provide an excellent method for isolation of nucleic acids from low-melt agarose gels.

Elutip-d

Nucleic Acid and Protein Sample Preparation

The Elutip-d column matrix binds nucleic acids in high quantities upon sample application under low salt conditions. Contaminants are washed through the column and the purified DNA is then eluted with high salt. The eluted sample is ready for use in a variety of assays that require high purity of the nucleic acid.

Elutip-d columns are used with standard syringes. Optional prefilters contain non-binding cellulose acetate membranes and are designed to increase efficiency by removing gel pieces that could otherwise clog the column.

Features and Benefits

- High recovery of single- and double-stranded DNA
- Eliminates contaminants that can cause high background or interfere with sample activity
- Sample is eluted in a small volume
- 100 µg capacity

Ordering Information - Elutip-d Purification Minicolumns

Description	Quantity/Pack	Catalog Number
Elutip-d Starter Kit includes: 15 Columns 15 Elutip Prefilters (0.45 µm Cellulose Acetate Membrane)	1	10 462 615
Elutip-d Columns	50	10 462 617
Elutip-d Columns	250	10 462 618
Elutip-d Prefilters	50	10 484 224

Elutrap® Electroelution System

Elution of Nucleic Acids and Proteins from Gel Slices

The Elutrap System is designed to isolate nucleic acids and proteins from agarose or polyacrylamide gel slices by electroelution. Samples are purified with excellent recovery into volumes as low as 200 µL, without requiring sample pretreatment or special buffers.

The Elutrap System can be used with most horizontal gel electrophoresis chambers. The Elutrap Electrophoresis Chamber allows for the most efficient flow of current through the device and can be used for up to four samples simultaneously.

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Assembly of the Elutrap System is very easy. Gel slices are placed in the middle of the Elutrap device, which is then placed into a horizontal electrophoresis chamber. Molecules migrate from the gel slice into a trap area formed by BT1 and BT2 membranes. The membrane placement is adjustable, allowing final elution trap volumes to be optimized for the particular assay. The Elutrap System can also be used for concentration of dilute solutions.

Features and Benefits

- Versatile system can be used for nucleic acids and proteins
- Purifies nucleic acids 14-bases to 150 Kb; proteins larger than 3-5 kD
- No salt cushions or special buffers required for elution
- Adjustable trap allows optimization of final sample volume
- Electrophoresis chamber holds up to four Elutraps simultaneously

Elutrap Electroelution System

Ordering Information - Elutrap Electroelution System

Description	Catalog Number
Elutrap Starter Kit includes: 1 Elutrap Device, 50 BT1 Membranes, 50 BT2 Membranes	10 447 700
Elutrap System Starter Kit includes: 1 Elutrap Device, 1 Electrophoresis Chamber, 50 BT1 Membranes, 50 BT2 Membranes	10 447 724
Elutrap System Kit - 4-pack - includes: 4 Elutrap Devices, 1 Electrophoresis Chamber, 50 BT1 Membranes, 50 BT2 Membranes	10 447 705
Replacement Membranes	
BT1 - 100/pk	10 404 090
BT2 - 100/pk	10 404 092

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PCR Cleanup UNIFILTER®

Process 96 or 384 samples quickly with greater than 85% recovery. The Whatman PCR Cleanup UNIFILTER eliminates time-consuming precipitations and labor-intensive resin purifications. Purified DNA is ready for sequencing, hybridization assays and microarrays.

The PCR Cleanup UNIFILTER can be used with both vacuum and centrifuge techniques. (Centrifugation is recommended for final elution with the 384 Well UNIFILTER.)

Ordering Information - PCR Cleanup UNIFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Filter Media	Quantity/Case
7700-2810	96	800	Clear Polystyrene	DNA Binding	25
7701-5250*	96	250	Natural Polypropylene	N/A	50
7700-2110	384	100	Clear Polystyrene	DNA Binding	50
7701-1100	384	100	Clear Polystyrene	N/A	50

*Does not comply with SBS standards

Dye Terminator Removal UNIFILTER® 96 Well and 384 Well

The Whatman Dye Terminator Removal plates are available in 96 Wells and 384 Well formats. These plates can be used with gel filtration media for high-throughput sequencing reaction cleanup, including removal of dye blobs.

They are constructed from rigid polystyrene that can withstand centrifugation. Laboratory packing of gel filtration media is less expensive than pre-packed plates or spin columns.

Ordering Information - 96 Well Dye Terminator Removal UNIFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Well Bottom	Quantity/Case
7700-2801	96	800	Polystyrene	Filter, LDD*	25
7701-5750	96	750	Natural Polypropylene	Round	25

* Long drip director

Ordering Information - 384 Well Dye Terminator Removal UNFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Well Bottom	Quantity/Case
7700-1101	384	100	Polystyrene	Filter, LDD*	50
7701-5101	384	80	Natural Polypropylene	Round to V	50

* Long drip director

GenXTrak™ Purification Service

Whatman provides a comprehensive contract service for the purification, quantification and normalization of DNA. The service is specifically designed to meet the individual needs of the client on a confidential basis at all stages of the project.

Please note: This service is only available in Europe.

Plasmid/BAC Sample Preparation

96 Well Bacterial Growth Plate

The Whatman high-throughput Bacterial Growth Plate can simplify and accelerate the growth of 96 individual 1.5 mL bacterial cultures. It is used for both overnight cultivation and the initial 'spin down' of bacteria. Made of medical grade polypropylene with a clear polystyrene lid, this gamma-irradiated plate eliminates the need to grow multiple, discrete cultures. It also optimizes space and efficiency in the incubator.

96 Well Lysate Clarification UNIFILTER

The Whatman Lysate Clarification UNIFILTER can utilize either vacuum or a centrifuge. The vacuum process is significantly easier to automate with consistency across all wells. It also has an average DNA recovery rate 10-30% higher than the manual centrifuge method. This method filters out cell debris to obtain plasmid DNA in the aqueous phase. Whatman filter technology results in high particle retention and fast flow rates while producing a clean lysate. The Lysate Clarification plate is an important tool for high-throughput plasmid DNA purification.

96 Well DNA Binding UNIFILTER

Whatman Plasmid DNA Binding UNIFILTER works either as a stand-alone or as part of our high-throughput miniprep system. Plasmid DNA is bound to the filter under chaotropic conditions, washed twice and then vacuumed to dryness on a vacuum manifold. The plasmid DNA is eluted by vacuum in a final volume of 100 µL into a non-binding polypropylene collection plate using water or TE^{-1} buffer. The DNA is ready to use and further ethanol precipitation is unnecessary. The final concentration is 50-100 ng/µL, depending on the original culture. The OD260/280 ratio is 1.9 and the yields in all 96 wells 'max out' at 6 µg. Full protocol is available at www.whatman.com

The Plasmid DNA Binding plate can be used with both vacuum and centrifuge techniques, making it a vital and flexible tool in every high-throughput lab.

384 Well DNA Binding UNIFILTER

The 384 Well DNA Binding UNIFILTER plate effectively binds and purifies DNA molecules. It provides highly reproducible results with yields exceeding 2 µg/well, from bind-wash-elute processing with collection by filtration. Minimal liquid hang up allows for reduced elution volume, enabling DNA concentration as high as 150 ng/µL. Further ethanol precipitation is unnecessary. The DNA is ready to use.

High-Throughput Genomics UNIFILTER

With increasing demand for simple and fast methods to purify DNA from bacterial cultures, the Whatman Genomics microplate is the ideal solution for the clarification of lysates containing large insert vectors.

This microplate has a cellulose acetate membrane with a special support, which clears non-chaotropic bacterial lysates, and long drip directors. Without further purification, the DNA is clean enough for further enzymatic manipulation. Cellulose acetate acts as both a depth filter and a fine particle filter. The 0.45 µm pores do not block because of the depth effect of the membrane. Cellulose acetate is also inert and does not bind either DNA or protein.

Ordering Information - Plasmid/BAC Sample Preparation

Catalog Number	Well Format	Well Volume	Plate Material	Irradiated with Lid	Quantity/Case
96 Well Bacterial Growth Plate					
7701-5205	96	2 mL	Polypropylene	Yes	25 (individually bagged)
96 Well Lysate Clarification UNIFILTER					
7720-2830	96	800 µL	Clear Polystyrene	Lysate Clarification	25
96 Well DNA Binding UNIFILTER					
7700-2810	96	800 µL	Clear Polystyrene	DNA Binding	25
384 Well DNA Binding UNIFILTER					
7700-2110	384	100 µL	Clear Polystyrene	DNA Binding	50
7701-1100	384	100 µL	Clear Polystyrene	N/A	50
High-throughput Genomics UNIFILTER					
7700-2808	96	800 µL	Clear Polystyrene	0.45 µm CA *	25
7701-5203	96	2 mL	Natural Polypropylene	N/A	25
7701-5205	96	2 mL	Natural Polypropylene	N/A	25
7701-5750	96	750 µL	Natural Polypropylene	N/A	25 (individually bagged)

* CA = cellulose acetate

Neonatal Screening Products:
Originally used to test for phenylketonuria (PKU) these cards now screen for more than 30 potential diseases. Simple. Accurate. Effective. Lifesaving.

Neonatal Screening

Whatman offers a line of products for neonatal and population screening. These products are used in physician's offices, home blood sample collection kits and in methods for sample archiving.

Specimen collection papers allow researchers to collect samples for analysis from a wide range of sources. Samples can be collected in a controlled laboratory environment or in more challenging field environments.

It is important that the paper selected for specimen collection is extremely pure and consistent and has excellent absorption characteristics.

Neonatal Screening

903® Specimen Collection Paper

For Body Fluid Sample Collection and Transport

Since Dr. Robert Guthrie first published procedures for screening newborns for phenylketonuria (PKU), the 903 specimen collection paper has been the international standard for body fluid sample collection, transport, analysis and archiving.

The 903 paper, an FDA-registered *in vitro* Class II medical device, is used in virtually all US newborn screening programs and in most newborn screening programs throughout the world. Widespread testing for phenylketonuria (PKU) has led to early detection and intervention for tens of thousands of babies worldwide. Newborn screening programs today screen for, depending on the state or country, anywhere from three to eleven or more analytes, including congenital hypothyroidism, galactosemia, branched-chain ketonuria, maple sugar urine disorder and sickle-cell anemia. More recently, with the advent of tandem mass spectrometry technology, many programs are adding less frequently occurring disorders to their panel of analytes, including MCAD, cystic fibrosis and a range of amino acid disorders.

Guaranteed Consistency

Whatman maintains statistical process control (SPC) over the manufacture of 903 specimen collection paper. State-of-the-art equipment ensures uniformity and adherence to specified parameter ranges. Since the stability of the collected sample can be affected by the composition of the paper, Whatman carefully controls the manufacturing process to ensure consistent composition, uniform thickness, flow-rate, absorbency and purity.

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Manufacturing Quality Assurance

The 903 paper is manufactured from 100% pure cotton linters with no wet-strength additives. Whatman guarantees to the newborn screening community that each lot of paper that is manufactured will last for at least 12 months at current usage levels.

Since it is a medical device, 903 paper is manufactured and tested according to FDA Quality System Regulations and must meet a performance standard. The critical parameters, as defined in the CLSI consensus standard for newborn screening sample collection, are blood absorbency, serum uptake and circle size for a specified volume of blood.

Whatman Quality Assurance tests 903 paper for blood absorbency and circle size throughout the manufacturing run. In addition, the same tests, plus serum uptake, are also conducted for each lot of 903 paper by an independent testing laboratory and by the Centers for Disease Control Newborn Screening Quality Assurance Program. Only when all test results confirm that a lot of 903 paper meets the CLSI specifications is that lot released for use for specimen collection.

Post-printing Quality Assurance

For most applications, the 903 paper is printed and provided as part of a form that includes detailed demographic information about the patient being tested. The process for the printing of specimen collection paper to be used for neonatal screening is strictly defined in the NCCLS standard. Improper printing can calender or crush the paper, negatively impacting its absorption characteristics. This can result in unacceptably long absorption times, 'layering' of blood spots and incomplete absorption. Because of this, Whatman Quality Assurance tests a random sampling of forms from all printed collection form lots for blood absorption time, circle size and caliper. A certificate of analysis is available upon request for each lot of printed blood collection forms.

Beyond Neonatal Testing

While initially used for newborn screening from dried blood spots (DBS), 903 paper is now also widely used for the collection of many types of samples, including collection of blood samples for HIV, HCV and glycated hemoglobin A1c testing. In addition, there are a number of tests that incorporate 903 paper for physician's office collection of samples that are then sent to a central laboratory for analysis, e.g., blood lead-level monitoring. The 903 paper is an ideal medium on which to collect samples for epidemiological studies.

Dry Rak for Collection Card Drying

The Whatman Dry Rak is designed to accommodate multiple collection forms at one time, safely and properly air-drying the blood specimens in a suspended horizontal position (CLSI Document LA4-A3, vol. 17 No. 16). The Dry Rak is easily assembled and can be affixed to a wall or counter top with optional velcro stickers.

Whatman offers a variety of generic collection cards that meet the requirements for many sampling programs.

Dry Rak

Neonatal Screening Products

903 Multiple-part Neonatal Card

The multiple-part neonatal card includes a demographic portion in duplicate where information about the newborn, parents, physician and care can be entered. Each card has a unique sequential number and bar code. The tipped-on 903 collection paper is imprinted with five half-inch circles and has a wrap-around cover to protect the 903 paper before and after sample collection. Each circle holds 75-80 µL of blood.

Multiple-part Neonatal Card

903 Protein Saver Card

The sample collection area of the 903 Protein Saver Card contains five half-inch circles. Each circle holds 75-80 µL of sample. Wrap-around cover has spaces for name and date of collection and is imprinted with the universal biohazard symbol in conformance with USPS regulations. It carries the CE mark for the European Union and fits into Whatman foil barrier ziplock bags for storage.

903 Protein Saver Card

903 Protein Saver Snap-apart Card

The 903 paper in this device, imprinted with four half-inch circles, is enclosed between two pieces of cover stock. Each circle holds 75-80 µL of sample. To use, one cover is snapped off, the sample is collected and the remaining cover is folded over the sample. This cover is imprinted with the universal biohazard symbol in conformance with USPS regulations.

Protein Saver Snap-apart Card

Regulation Disclaimer - CE mark

Under regulations that went into effect in December 2003, specimen collection cards, including neonatal screening cards, which are to be used for human diagnostic tests, are classified as 'other' IVD devices under the European IVD Directive and require the CE mark if sold within the European Union. All 903 specimen collection devices manufactured and printed by Whatman for human diagnostic testing in the EU undergo post-printing quality control and carry the CE mark. Whatman will assume no responsibility for the quality or performance of 903 collection devices converted, printed or packaged by third party suppliers.

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Training Materials

Educational materials illustrating the proper method for collecting neonatal samples are available from Whatman in six languages: English, German, French, Italian, Spanish and Brazilian Portuguese. Please contact our Technical Support for more information.

Ordering Information - 903 Specimen Collection Paper

Description	Quantity/Pack	Catalog Number
903 Multiple-part Neonatal Card	100	10 537 279
903 Protein Saver Card (EU)	100	10 531 018
903 Protein Saver Card	100	10 534 612
903 Protein Saver Snap-apart Card	100	10 534 320
Desiccant Packs	100	10 548 234
Foil-barrier Ziplock Bags	100	10 534 321
Plastic Ziploc Storage Bags 4" x 6"	100	10 548 232
Glassine Envelopes 3 ¼" x 4 ⅞"	100	10 548 236
Biohazard Labels ⅞" x ⅞"	1000	10 534 150
Dry Rak (with Velcro)	10	10 539 521
Dry Rak (without Velcro)	10	10 537 173
Hand Punch 3.1 mm	1	10 495 010

Specimen Collection Devices

Custom Printing

Whatman offers customized collection devices for use in large sampling studies. Specimen collection papers enable researchers and clinicians to obtain samples for analysis from a wide range of sources.

Regardless of where a sample is collected, information about the sample must be recorded and cataloged for each sample. Whatman custom printed forms are designed with this function in mind.

Whatman can develop individually designed collection matrices which can be used as a single-part form or incorporated into multiple-part specimen collection forms.

Customized Collection Devices

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Custom Collection Device Options

Sequential Numbering
Forms can be provided with sequential numbering for tracking and identification.

Cassette Format
Custom cassette formats are ideally suited for automated processing.

Dual Paper Specimen Collection Cards
With increasing frequency, newborn screening programs and diagnostics companies are doing both protein-based and molecular testing from the same blood spots, often in different laboratories. To assist in this process, Whatman has developed a variety of sample collection card designs that incorporate two pieces of filter paper, one sheet of FTA and one sheet of 903, or two sheets of 903. In order to ensure accuracy of identification, the papers can be bar-coded.

Specimen Collection Forms

Bar Codes
Forms can be provided with bar-coding on the demographic portion of the form and/or directly on the specimen collection paper in any bar code format that can print alpha-numeric characters (letters, digits and some special symbols). Data integrity is fortified by the use of modulus check digit characters.

OCR-scannable Format
Whatman can use special inks for printing forms that are invisible to optical character recognition (OCR) scanners, ensuring that scanners will detect only the variable demographic information.

Parent Information Sheets/Pamphlets
Parent information sheets that are part of the neonatal collection device and include the device numbers can be provided as the first part of a multiple-part form. Alternatively, detailed parent information pamphlets can be glued to the form.

Parent Information Pamphlets

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Transfer or Mailing Envelopes
Whatman can provide custom envelopes for mailing of samples to the central laboratory, for sending a screening form home with the parent for follow-up sampling, or sending samples to separate laboratories for non-standard screening tests, e.g. for DNA testing or supplemental screening. These envelopes are frequently color-coded.

Hearing Section
It is possible to add a section to a form for hearing test results. This puts all the screening results together in a database under a single control number.

Envelopes

Tip-ons
This is an economical alternative to using a full sheet of collection paper. Whatman can tip a small piece of 903 filter paper onto the end of a form, minimizing costs while ensuring high-quality results.

Color Coding
Custom printed forms can be color-coded to simplify form distribution before and after sample collection and to readily identify samples that require non-standard or supplemental testing.

Colored Inks and Papers
Forms can be printed in colored inks and/or screen tints as well as your choice of colored papers.

Multiple-part Forms
Printing of up to 8-part forms offers convenience and maintains integrity of information on all parts.

Wrap-around Covers
Offering a variety of wrap-around covers to ensure long-term sample integrity. Some of the options include 28-pound paper, translucent glassine or clear moisture-proof barrier.

Custom Packaging
A specified coding system can be printed on every package, carton and shipping box. Outside cartons can be labeled to reflect the sequential numbering of the forms enclosed.

Snap-apart Format
903 Specimen collection paper is protected prior to use. After sample application, the cover folds over and tucks into the flap in ‘matchbook’ fashion.

All customized specimen collection devices and 903 Neonatal Screening Cards now carry the CE Mark in the European Union.

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Protein Microarrays:
Although these have many uses, one important application is for cancer research. After taking a patient sample, early warning protein markers can then be identified.

Protein Microarrays

Protein microarrays are tools that can be used in many different areas of research, including basic and translational research. Protein arrays can take on many different formats and can be used to do more than simple expression profiling of samples.

Recent publications have demonstrated that protein microarrays can be used to phenotype leukemia cells, identify novel protein-protein interactions, screen entire proteomes for new proteins and profile hundreds of patient samples simultaneously. Whatman has led the way in protein array technology starting with the development of the FAST Slide: the premier protein arraying surface. We now offer kits, reagents and protocols for scientists who wish to develop their own arrays, as well as off-the-shelf arrays and protein array services.

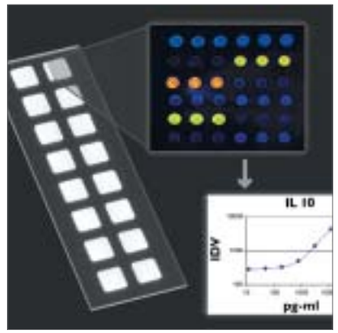
Proteomic Arrays

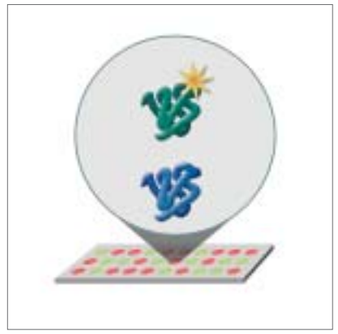
Proteomic arrays are typically high-density arrays (>1000 elements/array) that are used to identify novel proteins or protein-protein interactions. The library that is arrayed can come from many possible sources, including expression libraries, and can contain known, as well as unknown, elements. The sample to probe the array can come from virtually any source.

To detect proteins that are bound to the array, the samples must be labeled directly with a fluorophore or a hapten. Alternatively, in some applications, antibodies can be used to detect binding events. One common use is for antibody screening.

Microspot ELISA and Antibody Arrays

Microspot ELISA and antibody arrays are used for quantitative profiling of protein expression in cell cultures or clinical specimens. Typically these arrays are low-density (9-100 elements/array). In these arrays, known antibodies are arrayed and used to capture antigens from unknown samples. To detect antigen that is bound to the array, the antigen either needs to be labeled directly with a fluorophore, or a second binder/antibody can be used. The latter option creates a sandwich assay similar to a traditional ELISA, only in a microspot format.





Proteomic Arrays

Microspot ELISA and Antibody Arrays

Single-Capture Antibody Arrays

Single-capture antibody arrays consist of multiple, known antibodies arrayed to a solid surface and used to profile the presence of specific antigens from a pooled sample, usually consisting of both a normal and disease-present sample. A single capture antibody array utilizes a direct or hapten labeling system, which does not require a matched antibody. Single-capture antibody arrays offer a qualitative profiling tool to detect binding events. The Whatman Serum Biomarker Chip offers an example of a single-capture antibody array.

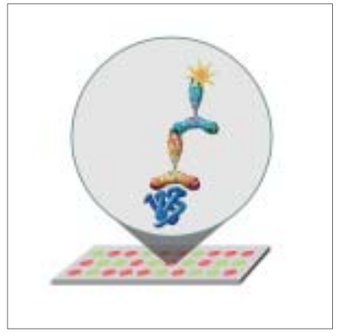
Reverse Arrays

Reverse arrays are used to profile dozens or hundreds of samples (research or clinical) for the presence of a small number of antigens (1-3). Cell lysates, material from laser capture microdissection, or serum samples, are arrayed. This creates an array of 'unknowns' that can be probed with a small number of antibodies. Visualization can be performed with a detection or 'top' antibody linked to a fluorophore or color detection reagent.

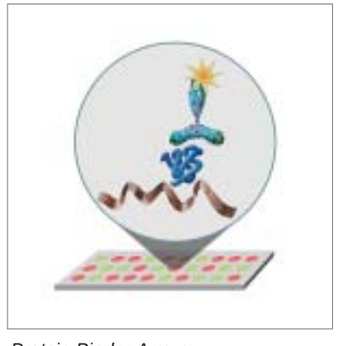
Protein Binder Arrays

Protein arrays can be used to identify novel protein binding motifs or protein-protein interactions. Engineered or synthetic proteins, or peptides with various binding motifs are arrayed, and the array is probed with complex protein samples. Detection with a known antibody allows the researcher to identify previously unknown binding events.

Single-Capture Antibody Arrays



Reverse Arrays



Protein Binder Arrays

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FAST® Slides

Protein Microarray Surface

FAST Slides are the premier surface for protein microarray applications.

FAST Slides are glass slides coated with a proprietary nitrocellulose polymer. The polymer binds proteins in a non-covalent, irreversible manner and can be probed using the same method as in traditional blots.

The three-dimensional surface of a FAST Slide maintains reactivity of proteins and gives excellent reproducible results. It is usable with fluorescent, chemiluminescent or radiographic detection systems and is compatible with microarray scanners and robots.

Perhaps the most significant advantage of FAST Slides over modified glass surfaces is that the matrix retains arrayed proteins in near-quantitative fashion. This property translates into antibody arrays with unparalleled sensitivity down to antigen concentrations of 1 pg/mL. These qualities make FAST Slides the most reliable surface for microarray experiments and provide a level of confidence that no other surface has.

Features

- Superior protein binding capacity
- Highest sensitivity and dynamic range
- Excellent long-term stability of printed proteins
- Compatible with all detection methodologies
- Compatible with commercially available arraying robots

FAST Slides are suitable for many types of protein microarrays including antibody arrays and microarray Westerns. There are tremendous advantages to using FAST Slides over traditional ELISAs and Westerns including less sample required, better sensitivity, linearity and quantitation. The largest advantage is hundreds or thousands of antibodies or samples can be screened simultaneously.

Microarray Westerns

An alternative strategy for protein microarrays is to array samples containing multiple proteins on the FAST Slide and probe with labeled antibody or set of antibodies. The advantage of the micro format is that extracts from various treatments and time points can be arrayed on the same slide. Once arrayed, the levels of multiple proteins can be measured and compared simultaneously.

Product Specifications - FAST Slides

Slide: 25 x 76 mm (1" x 3")
Surface: Nitrocellulose
Thickness: 11 µm

	Description
FAST Slide - 1-pad	Up to 10,000 spots (150 µm spot size, 300 µm pitch) Bar-coded
FAST Slide - 2-pads	2x up to 3600 spots (150 µm spot size, 300 µm pitch) Bar-coded
FAST Slide - 8-pads	Pad spacing: 9 mm (microplate spacing) 8x up to 256 spots (150 µm spot size, 300 µm pitch) Not bar-coded
FAST Slide - 16-pads	Pad spacing: 9 mm (microplate spacing) 16x up to 256 spots (150 µm spot size, 300 µm pitch) Not bar-coded

Ordering Information - FAST Slides

Description	Pad Dimensions (mm)	Quantity/Pack	Catalog Number
FAST Slides - 1-pad *	20 x 51	20	10 484 182
FAST Slides - 2-pads *	20 x 20	10	10 485 317
FAST Slides - 8-pads	6 x 6	10	10 485 320
FAST Slides - 16-pads	6 x 6	10	10 485 323

* Bar-coded

FAST® PAK

Protein Array Kits

FAST PAK protein array kits provide the necessary components for researchers to conveniently build and process protein microarrays.

FAST PAK kits are available for all FAST Slide formats (1-, 2-, 8- and 16-pads) and include protein arraying buffer, protein array blocking buffer, protein array wash buffer and incubation chambers.

Protein Microarrays

Features and Benefits

- 1-, 2-, 8- or 16-array pads on each slide
- Each pad can be processed separately to increase the number of arrays on each slide and reduce sample volume
- Ideal for multiplex experiments, side-by-side comparisons and control experiments all on the same slide
- Reproducible results from slide-to-slide and pad-to-pad
- Increased protein stability and enhanced signal intensity with FAST PAK array buffer
- Proprietary protein array blocking buffer ensures optimum signal-to-noise ratios and promotes specific binding
- Flexibility for detection by fluorescent, chemiluminescent, colorimetric and radiographic methods

Applications

- ELISA format (sandwich assay) experiments using antibody arrays
- Reverse phase (micro-Western) arrays using cell or tissue lysates
- Purified protein arrays
- Carbohydrate arrays
- Lipids and other materials which can be arrayed on nitrocellulose

Ordering Information - FAST PAK - Protein Array Kits

Description	Catalog Number
FAST PAK, 1-pad (original) 10 FAST Slides, 10 Incubation Chambers, 40 Chamber Covers, 10 mL 2x Protein Arraying Buffer, 15 mL Protein Array Blocking Buffer, 125 mL 10x Protein Array Wash Buffer	10 485 262
FAST PAK, 2-pad 10 FAST Slides, 10 Incubation Chambers, 40 Chamber Covers, 10 mL 2x Protein Arraying Buffer, 15 mL Protein Array Blocking Buffer, 125 mL 10x Protein Array Wash Buffer	10 485 319
FAST PAK, 8-pad 10 FAST Slides, 10 Incubation Chambers, 40 Chamber Covers, 10 mL 2x Protein Arraying Buffer, 15 mL Protein Array Blocking Buffer, 125 mL 10x Protein Array Wash Buffer	10 485 322
FAST PAK, 16-pad 10 FAST Slides, 10 Incubation Chambers, 40 Chamber Covers, 10 mL 2x Protein Arraying Buffer, 15 mL Protein Array Blocking Buffer, 125 mL 10x Protein Array Wash Buffer	10 485 325
FAST Frame for 4 slides	10 486 001
Chip Clip for 1 slide	10 486 081

(Detection reagents must be provided by the end-user)
For the latest protocols visit www.arraying.com

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FAST Quant® System

MicroSpot ELISA for High-Throughput Multiplex Cytokine Quantification

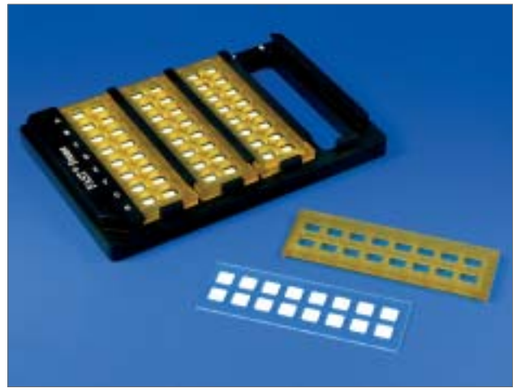
FAST Quant represents a quantum leap forward in protein microarray technology. With FAST Quant, a researcher can accurately determine the concentration of several cytokines in dozens of biological samples simultaneously, using familiar ELISA immunochemistry.

Built on FAST technology, the high protein binding capacity surface chemistry, FAST Quant combines the power of array technology with the quantitative nature and high-throughput capabilities of traditional ELISA. FAST Quant exhibits sensitivity and reproducibility better than traditional ELISA.

FAST Quant System

Each FAST Quant kit contains 64 arrays of 8-10 monoclonal antibodies with affinities for common human or mouse cytokines. The antibodies are arrayed in a quantitative fashion in triplicate on each array.

Using four 16-pad FAST Slides placed in a FAST Frame (sold separately) FAST Quant offers an 8 x 12 cm footprint - the same as the traditional microplate format. A standard curve can be generated by creating a dilutional series from recombinant antigen mass standards. Due to the solid-phase nature of a microspot assay, it is not necessary to take duplicate measurements of each sample.
The MicroSpot ELISA reaction is entirely concentration dependent, unlike an ELISA where the reaction is both concentration and volume dependent.



FAST Frame

FAST Quant antibody arrays offer a variety of human and mouse menus. All arrays come in a four-slide kit with recombinant antigens standard, detection antibodies and processing buffers.

Data analysis is seamless using data reduction software, ArrayVision FAST, the cutting edge utility for protein array image analysis. The software provides rapid data acquisition and comprehensive reports. ArrayVision analyzes any .tif image from virtually all commercial imaging instruments. The application provides standard curve data, concentrations of unknowns, and percent coefficient of variation for each analyte. FAST Quant is another clear example of Whatman commitment to providing the scientific community with the best solution for multiplex cytokine measurements.

Ordering Information - FAST Quant System

Description	Catalog Number
FAST Quant Human Th1/Th2	10 486 031
FAST Quant Mouse Th1/Th2	10 486 061
FAST Quant Human II	10 486 060
FAST Quant Mouse II	10 486 062
FAST Quant Human Angiogenesis	10 486 063
FAST Quant Human Chemokine	10 486 064
FAST Frame Slide Holder (4 slides)	10 486 001
Chip Clip Slide Holder (single slide)	10 486 081

Each kit includes:

Four 16-pad FAST Slides; each pad is pre-arrayed with a panel of cytokine antibodies (choice of six panels)

Four silicon 16 well chambers

Recombinant antigen standard cocktail for dilutional series (standard curve)

Biotinylated detection antibody cocktail

Whatman Protein Array Buffer, Protein Array Wash Buffer and Protein Array Blocking Buffer

Human and Mouse Panels

FAST Quant® Systems

FAST Quant antibody arrays offer a variety of human and mouse menus. All arrays come in a four-slide kit with recombinant antigens standard, detection antibodies and processing buffers.

FAST Quant Human and Mouse Menus

			Catalog Number				Catalog Number
FAST Quant Human Th1/Th2			10 486 031	FAST Quant Mouse Th1/Th2			10 486 061
Cytokines commonly associated with the Th1/Th2 immune response system				Cytokines commonly associated with the Th1/Th2 immune response system			
IL-1b	IL-5	IL-13		IL-1b	IL-5	IL-13	
IL-2	IL-6	TNFα		IL-2	IL-6	TNFα	
IL-4	IL-10	IFNγ		IL-4	IL-10	IFNγ	
FAST Quant Human II			10 486 060	FAST Quant Mouse II			10 486 062
IL-1b	IL-10	-		IL-1b	IL-12p70	-	
IL-2	IL-12p70	-		IL-2	GM-CSF	-	
IL-4	GM-CSF	-		IL-4	RANTES	-	
IL-8	RANTES	-		IL-6	IFNγ	-	
IL-6	MCP-1	-		IL-10	-	-	
FAST Quant Human Angiogenesis			10 486 063	FAST Quant Human Chemokine			10 486 064
PDGF-BB	KGF	-		Eotaxin	MCP-4	-	
VEGF	TIMP-1	-		RANTES	IL-8	-	
FGFβ	ICAM-1	-		MCP-1	IP-10	-	
Angiogenin	Angiopoietin-2	-		MCP-2	MIP-1α	-	
-	-	-		MCP-3	-	-	

FAST® Macro

Membrane-based Antibody Arrays

Whatman FAST Macro membrane-based antibody arrays are used to simultaneously evaluate the relative abundance of 20 different cytokines between different biological samples, such as disease state versus normal state, using chemiluminescent detection.

The FAST Macro Human I and Mouse I arrays consist of 20 anti-cytokine antibodies arrayed on Whatman Protran nitrocellulose (BA-83, 0.2 µm), a surface which is well known for high protein binding capacity and excellent signal-to-noise ratios.

FAST Macro Membrane-based Antibody Array

Designed as a screening tool to compare relative expression levels of cytokines/growth factors in different samples, one human panel and one mouse panel are included. The FAST Macro Kit includes either four or eight arrayed membranes, FAST Macro Wash and Blocking Buffers, and a biotinylated antibody cocktail. Arrays are visualized* using streptavidin/HRP-based chemiluminescent detection and x-ray film or a phosphor imager.

FAST Macro is an inexpensive way to discover the power of multiplex antibody arrays with sensitivity as low as 15 pg/mL that can be used with serum, cell lysates and culture media samples. Results are comparable to ELISA results. No special instrumentation or software is required for detection and analysis.

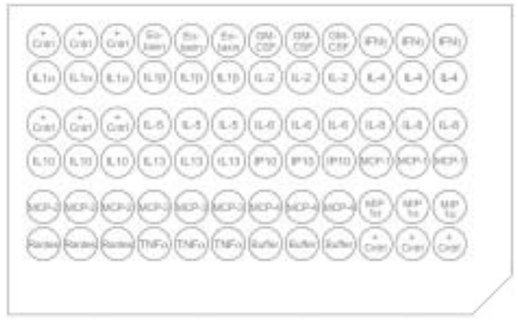
* Detection reagents must be provided by the end-user.

Features

- Requires as little as 650 µL of sample
- Array-to-array reproducibility
- Cytokines are arrayed in triplicate with 9 positive and 3 negative control spots per membrane
- Tested for cytokine specificity - virtually no cross reactivity
- Membrane is notched in one corner for orientation
- Cytokine spots are visible on the unprocessed membrane - inert dye disappears during membrane wet-out

Samples as small as 400 µL can be processed using the optional Whatman Chip Clip in conjunction with a Whatman dual-well array incubation chamber and a standard, untreated glass microscope slide.

FAST Macro Kit



FAST Macro Human I Array Map

Ordering Information - FAST Macro

Description	Quantity/Pack	Catalog Number
Membrane-Based Microarrays		
FAST Macro Human I Kit (4 arrays)	1	10 486 151
FAST Macro Human I Kit (8 arrays)	1	10 486 152
FAST Macro Mouse I Kit (4 arrays)	1	10 486 166
FAST Macro Mouse I Kit (8 arrays)	1	10 486 167
Chip Clip Slide Holder	1	10 486 081
Dual-Well Array Incubation Chambers	10	10 486 087

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Serum Biomarker Chip

High-Density Profiling

The Serum Biomarker Chip enables proteomics researchers to profile and pattern the molecular signature of human serum. The chip addresses the need for a high-throughput technology to enable research in the fields of risk stratification, disease prognosis, drug eligibility, prediction of safety and efficacy, and therapeutic monitoring.

The Serum Biomarker Chip is a single-capture antibody array built on the FAST Slide dual-pad platform. Each slide has two identical arrays of antibodies printed in triplicate. Two-color fluorescent detection permits the researcher to reproducibly pattern the relative abundance of 120 human serum proteins between two samples, such as serum samples from diseased and healthy individuals.

Serum Biomarker Chip Kit

The Serum Biomarker Chip Kit includes two arrayed dual-pad slides, two incubation chambers and Whatman protein array wash and blocking buffers. The slide holder and labeling/detection reagents are available separately. The chip can be scanned with any standard fluorescence scanner.

Biomarker - Specific Antibodies

Alpha fetoprotein	Haptoglobulin	MMP-2
Alpha 1 antichymotrypsin	Hemoglobin	MMP-3
Alpha 2 macroglobulin	Hepatocyte growth factor	MMP-9
Angiogenin	ICAM-1	Myeloperoxidase
Angiopoietin-2	IgA	Myoglobin
Angiostatin	IgG	Neuron-specific enolase
Apolipoprotein	IgM	RANTES
Apolipoprotein J	IL-1α	Osteopontin
Beta-2 microglobulin	IL-1β	PDGF (all isoforms)
Bone sialoprotein	IL-2	PDGF (BB isoform only)
CA 15-3	IL-2 receptorα	Placental alkaline phosphatase
CA 19-9	IL-2 receptorβ	Plasminogen
CA 50	IL-3	Plasminogen activator inhibitor
CA 125	IL-4	Prostatic acid phosphatase
Carcinoembryonic antigen (group 2 specific)	IL-5	PSA (free)
Carcinoembryonic antigen (group 4 specific)	IL-6	PSA (total)
Cathepsin B	IL-7	PSA-ACT complex
Ceruloplasmin	IL-8	S100 contd>

Chondroitin sulfate	IL-10	Serum albumin
Chorionic gonadotropinα	IL-12p40	Sialyl Lewis X
Chorionic gonadotropinβ	IL12-p70	TAG-72
Chromagranin	IL-13	Tetranectin
Collagen type I	IL-17	TGFα
Complement C4	Insulin	TGFβ
C-reactive protein	Insulin growth factor binding protein 3	Thrombospondin-1
Cyclin-dependent kinase inhibitor 2A	Insulin-like growth factor 1	Thrombopoietin
Cytokeratin fragment 21-1 (CYFRA 21-1)	Interferonγ	Thyroglobulin
Eotaxin	IP-10	TIMP1
Epidermal growth factor	Kallikrein-5	TIMP2
Epidermal growth factor receptor	Kallikrein-9	TNFα
ErbB2	Kallikrein-12	TNFβ
E-selectin	Kallikrein-14	Transferrin
Estrogen receptor	Laminin	Tumor-associated trypsin inhibitor
Fas	Low-density lipoprotein	Tyrosinase
Fas ligand	MCP-1	Urokinase plasminogen activator
Ferritin	MCP-2	VCAM-1
Fibroblast growth factor-7	MCP-3	VE-cadherin
Fibroblast growth factor-basic	MCP-4	VEGF
G-CSF	M-CSF	VEGF-D
GM-CSF	MIP-1α	Von Willebrand factor

Ordering Information - Serum Biomarker Chip

Description	Quantity/Pack	Catalog Number
Serum Biomarker Chip Kit	1	10 486 077
Each Kit includes:		
Serum Biomarker Chip Arrayed FAST Slides	2	
Dual-Pad Incubation/processing Chambers	2	
Protein Array Wash Buffer	1 x 125 mL	
Protein Array Blocking Buffer	1 x 5 mL	
Fast Frame Slide Holder - for 4 slides	1	10 486 001
Chip Clip Slide Holder for 1 slide	1	10 486 081

The Serum Biomarker Chip is intended for research purposes only, not for diagnostic use

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Two-Color Labeling and Detection System

The Whatman Two-Color Labeling and Fluorescent Detection Kit is designed to label two protein samples. The labeled proteins are pooled and probed against arrayed antibodies in a competitive binding assay, and detected using indirect fluorescence.

The kit is intended for use with the 2-pad FAST Slides, including the Serum Biomarker Chip. The kit contains the Universal Linkage System (ULS) chemistry to label samples containing approximately 250 µg of protein in serum, plasma or a whole cell lysate. The kit is designed to label two different protein samples, each with a different hapten. Sufficient labeling reagent is provided to perform a hapten swapping experiment.

Two-Color Labeling and Fluorescent Detection Kit

Features

- Highly efficient and uniform labeling of complex serum samples
- Reproducible labeling and signal detection
- Stable, robust and fast non-enzymatic procedure
- Reduces pH dependency of labeling efficiency
- System solution includes labeling reagents, fluorescent conjugate and bench-friendly protocol
- Accounts for hapten-specific differences in either Biotin-ULS or Fluorescein-ULS labeling efficiencies
- Averages differences in antibody-antigen binding interactions caused by steric hindrance
- Minimizes chip-to-chip variability - includes an internal control within the assay

Two-Color Labeling and Fluorescent Detection

The first pad on the slide is probed with a mixture of two different protein samples, each labeled with a different hapten; the second pad is probed with the same two protein samples but with the haptens reversed. The normalized intensity for each element of each pad is calculated as the average of the biotin- and fluorescein-labeled derived intensities from a two-pad experiment. The ratio between the signal intensity at each spot corresponds to the concentration ratio of the proteins found in the two samples. This method is attractive for antibody chips as it takes into account any hapten-specific differences in antigen-antibody interactions.

The use of the ULS labeling system minimizes background by using indirect fluorescence detection, labels multiple amino acids and requires no additional materials or reagents.

Ordering Information - Two-Color Labeling and Detection Kit

Description	Quantity/Pack	Catalog Number
Two-Color Labeling and Fluorescent Detection Kit	1	10 486 085
Each kit includes:		
Biotin-ULS	20 µL	
Fluorescein-ULS	20 µL	
10x Protein Labeling Buffer	80 µL	
10x KREAstop	80 µL	
Streptavidin-DY 647 Conjugate	150 µL	
Anti-Fluorescein Antibody-DY 547 Conjugate	350 µL	
Micro Bio-Spin Chromatography Columns	8	
User's Manual	1	

The Whatman Serum Biomarker Chip is intended for research purposes only, not for diagnostic use

ArrayVision® FAST®

Data Analysis Software

ArrayVision is a flexible software package that has been developed for the quantification of gene expression arrays. It is perfectly suited for the quantification of proteins.

It provides rapid and automated analysis for array images in a few easy steps. The software is designed with maximum flexibility to suit the needs of any size lab and uses configurable protocols to suit any array format.

ArrayVision FAST for use with FAST Quant

Features

- Quantitative analysis of protein arrays
- Template definitions and analysis parameters
- Accepts .tif images from any fluorescent scanner
- Interpolates the concentration for each analyte offered in FAST Quant
- Standard curve generation through non-linear curve fitting

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- Determination of cytokine concentration in unknown samples
- Coefficient of variation calculations
- Flexible data export to most data mining packages
- Multiple curve equations for each analyte

When ArrayVision is used with FAST Quant, data can be analyzed within minutes after scanning to provide quantitative results. ArrayVision FAST includes templates designed to fit FAST Quant and can also be used to analyze scanned Serum Biomarker Chip slides.

ArrayVision FAST - Data Analysis Software

Calculation of density values (signal intensity) for each spot on the array, combined with standard curve generation and concentration determination
Analysis of .tif images from microarray scanners
Multiple linear or non-linear curve fitting algorithms
Artifact removal and data flagging
Compatible with all major brand scanners
Supported export formats: XLS, CSV, WKS, TXT, PRN

Ordering Information - ArrayVision FAST - Data Analysis Software

Description	Catalog Number
Single user software	10 486 035
ArrayVision Demo USA/Canada	10 486 034

Protein Array Services

Whatman offers a comprehensive group of protein array services, ranging from contract arraying to slide processing to scanning and data analysis, all based on the widely accepted FAST Slide protein microarray platform.

Whatman recognizes that not all scientists have access to the instrumentation or software needed to process, image and analyze microarray data. In addition, unfamiliar microarray techniques and processing protocols may burden researchers with unforeseen obstacles or discourage researchers from adopting a new technology.

Array Room

Whatman protein array services allow the researcher to focus on the elucidation of data and the development of subsequent studies, while Whatman delivers reliable data and images.

At our protein array facility in Sanford, ME, USA, Whatman can array proteins in Class 10,000 clean room using solid pins, split pins or non-contact piezoelectric pins.

If you choose from our list of available antibodies or if you send us your own content, we can design an array, print and have slides to you within 15-20 business days of your order.

Antibody Menu

Whatman offers custom sample processing using an extensive antibody menu.

Whatman Protein Array Services - Antibody Menu

Human Cytokines Available	Sensitivity (pg/mL)	Dynamic Range (pg/mL)	Dose Response Slope	Mouse Cytokines Available	Sensitivity (pg/mL)	Dynamic Range (pg/mL)	Dose Response Slope
IL-1β	3	3-1,000	0.82	IL-1β	3	3-1,000	0.73
IL-2	3	10-1,000	0.88	IL-2	3	3-1,000	0.82
IL-4	3	10-3,000	0.84	IL-4	3	3-1,000	0.83
IL-5	10	10-3,000	1.11	IL-5	3	3-300	1.6
IL-6	3	10-3,000	0.87	IL-6	3	3-1,000	0.8
IL-8	3	3-3,000	1.1	IL-10	3.2	24-20,000	1.2
IL-10	30	100-3,000	0.68	IL-12p40	3.2	3.2-400	0.76
IL-12p40	30	30-10,000	0.85	IL-12p70	3.2	3.2-400	1.1
IL-12p70	30	100-10,000	1	IL-13	3.2	24-20,000	1.1
IL-13	100	100-3,000	0.69	TNFα	7	7-1,000	0.77
IL-17	3	3-1,000	0.7	IFNγ	3.2	6-400	1.3
IL-10	30	30-1,000	0.55	VEGF	3.2	32-2,000	1.1
ICAM-1	100	100-3,000	0.97	RANTES	10	10-1,000	0.74
TNFRII	50	100-30,000	0.63	MIP-1α	10	30-1,000	1.2
TNFα	3	3-1,000	0.93	MIP-2	1	3-1,000	0.93
IFNγ	10	10-3,000	0.58	GM-CSF	1	1-300	0.81
Angiogenin	30	30-1,000	0.79	M-CSF	3	3-1,000	0.82
VEGF	50	100-30,000	0.96	MCP-5	3	3-300	0.81
TGFβ	30	100-10,000	0.93	IL-3	3	3-1,000	0.90
RANTES	3.2	3.2-400	0.9	-	-	-	-
MIP-1α	16	16-400	0.76	-	-	-	-
GM-CSF	1	1-400	0.78	-	-	-	-
M-CSF	3.2	3.2-400	0.75	-	-	-	-

contd >

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Human Cytokines Available	Sensitivity (pg/mL)	Dynamic Range (pg/mL)	Dose Response Slope	Mouse Cytokines Available	Sensitivity (pg/mL)	Dynamic Range (pg/mL)	Dose Response Slope
MCP-1	1	3.2-400	0.9	-	-	-	-
MCP-2	1	1-300	0.74	-	-	-	-
MCP-3	1	1-300	0.87	-	-	-	-
MCP-4	3	3-300	0.88	-	-	-	-
EGF	1	1-30	0.87	-	-	-	-
IGF-1	10	10-1,000	0.62	-	-	-	-
IL6-R	1	1-1,000	0.77	-	-	-	-
Angiopoietin-2	3	3-300	0.31	-	-	-	-
Eotaxin	3	3-300	0.69	-	-	-	-
FGF-basic	10	10-1,000	0.82	-	-	-	-
IL-1α	1	1-300	0.84	-	-	-	-
IL-3	3	3-300	0.79	-	-	-	-
IL-7	1	1-100	0.92	-	-	-	-
KGF	10	10-1,000	0.76	-	-	-	-
PDGF-BB	10	10-300	1.0	-	-	-	-
TIMP-1	3	3-1,000	0.88	-	-	-	-
Tpo	30	30-1,000	1.5	-	-	-	-

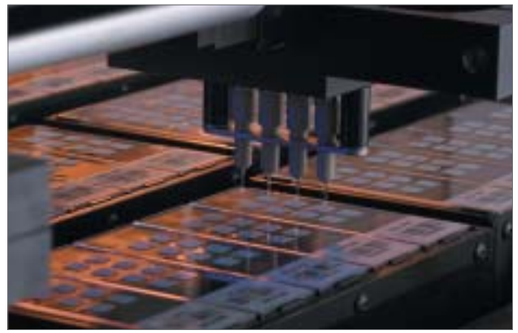
Note: Whatman is adding to its antibody menu on a continual basis. Please inquire regarding the latest additions.

Developing Custom Arrays

Creating an Antibody-based Protein Microarray

The custom array service at Whatman enables scientists who have access to microarray scanning and data analysis instrumentation to have FAST Slides printed with proteins from the Whatman antibody menu or from their own protein library.

The custom service provides the scientist complete control of proof-of-principle, assay design, processing and data analysis of the printed array.



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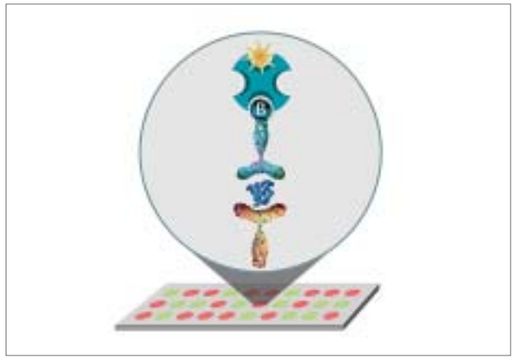
Protein Microarrays

Customer-supplied biological samples are screened against the selected specificities determining the quantitative or qualitative measurements, depending upon the customer's requirements. The deliverables to the researcher include access to raw and trimmed data, total fluorescent signal per microspot (quantitative assays only), % CV and standard deviation, signal-background per microspot intensities versus (y-axis), each analyte in the sample (x-axis), and graphed histogram of ratios, signal-background averages, and outlier recognition.

Protein array development projects are driven by certified R&D project leaders responsible for the scope, resources and timeline that meet the needs of the researcher. Project implementation, project milestones and customer communications are managed by dedicated account specialists, in collaboration with the research staff.

Protein specificities, whether they are from Whatman or customer supplied, are arrayed to the selected FAST Slide configuration - using a quill-pin contact or non-contact printing technology - in triplicate, unless otherwise specified - suspended in Whatman protein arraying buffer to achieve long-term stability.



Microspot ELISA and Antibody Arrays

Creating an Antibody-based Protein Microarray

Step 1: Are you going to print the array yourself? If yes, look to our line of FAST Slide products and array buffers to ensure outstanding results.

Step 2: Would you like to array from our available menu? If yes, simply contact us with which specificities and arrays you would like. Our experts will define the best adapted configuration to your specific arrays. Our menu is constantly expanding and we are happy to accommodate specific requests. Select the analytes you need to have printed from the antibody menu or send your own library of proteins. Receive your custom arrayed FAST Slides within 15-20 business days.

Step 3: Would you like for us to process your samples on a custom or off-the-shelf array? If yes, simply contact us and provide number and type of samples.

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Processing Arrays

Using leading-edge, automated microarray technologies and innovative scientific approaches, the protein array development, processing and data analysis service allows researchers to acquire distinct, reliable scientific data from the proteomic specialists at Whatman. Protein array development, within our facility, encompasses proof-of-principle, assay design, array design and printing, processing and data analysis.

Quantitative Cytokine Array Processing and Data Analysis

Based upon the FAST Quant System, the quantitative cytokine array processing and data analysis service offers researchers the results from the quantitative analysis of multiple cytokines processed in a FAST Slide based, micro ELISA format. Signal output from FAST Quant arrays is detected with a standard fluorescent microarray scanner and data is analyzed using the ArrayVision FAST software.

- Select from the Whatman antibody menu of 40 human and 19 murine specificities
- Preserve valuable samples - high throughput ELISA format requires as little as 140 µL of human sample per array
- Applicable sample types include serum, plasma, cell culture supernatants, cellular extracts and wound effluent
- Reduces costs associated with the cost of antibodies, capital equipment, assay development, lab personnel software acquisition and analysis
- Processed and analyzed by expert staff in dedicated array processing facility

The following FAST Quant data and images are uploaded to the FTP site:

- Total fluorescent signal per microspot
- Standard curves per cytokine
- % CV
- Standard deviation
- pg/mL value per sample

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Comparative Analysis of Known Serum Biomarkers

The Serum Biomarker sample processing service makes it simple for researchers to outsource the tests or try this new technology before adopting it in their labs.

- Customer samples sent to Whatman and processed using the Serum Biomarker Chip
- Data uploaded to a password-protected FTP site within ten business days of receipt of samples at Whatman
- Minimum order: two paired serum samples

The following Serum Biomarker Chip processing data and images are uploaded to the FTP site:

- Total fluorescent signal per microspot
- % CV
- Standard deviation
- Signal-background per microspot intensities versus (y-axis)
- Each analyte in the sample (x-axis)
- Graphed histogram of ratios
- Average of signal-background triplicate microspots
- Z score to identify outlier microspots that are significantly different from the mean

* See Specificities list in Serum Biomarker Chip section

Scanning Arrays

Whatman offers a slide scanning and data analysis service for FAST Slide users who do not have access to a fluorescent scanner.

The scanning service is limited to arrayed and processed FAST slides, processed FAST Quant slides and processed Serum Biomarker Chip slides.

Using the GenePix 4200 A Professional Microarray Scanner, FAST Slides or FAST array products can be simultaneously scanned at two wavelengths; the resulting .bmp, .tif or .jpg file formats can be easily downloaded from the Whatman password protected FTP site.

Upon ordering the slide scanning and data analysis service, the customer will receive the scanning service pack, including shipping container(s) designed to transport the slides safely, a prepaid FedEx clinical pack for shipping the slides and instructions for returning the processed slides to the array facility. Within 72 hours of receipt, the slides are scanned and images are uploaded to the FTP site.

Compatible Scanners

Any fluorescent scanner, either laser-based or major brand charge coupled device - is compatible with FAST Quant and ArrayVision FAST, as long as the following requirements are met: *Resolution: 10 microns *Capability: 1 or 2 colors *Image output: .tif format

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Ordering Information - Scanning Arrays

Description	Catalog Number
Scanning service - 4 slides	10 486 047
Scanning service - 8 slides	10 486 049

Slide Holders

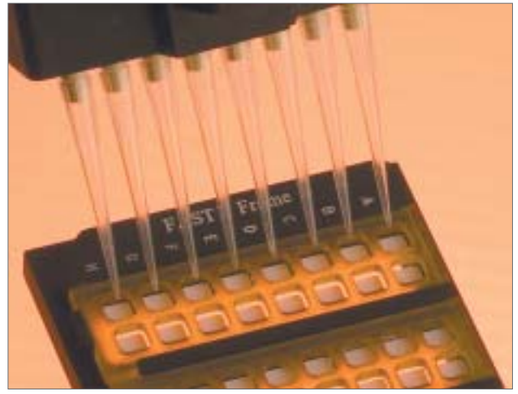
FAST Frame Multi-Slide Plate

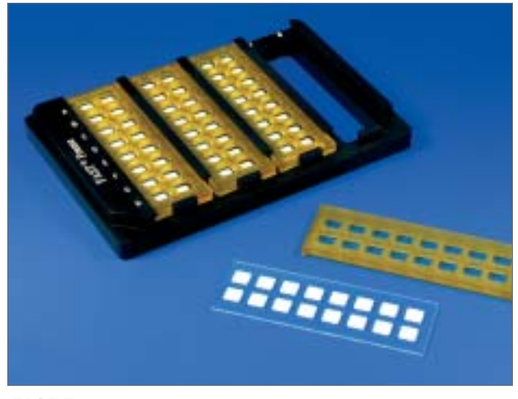
The FAST Frame multi-slide plate is designed to hold four, 16-pad FAST Slides and the corresponding multi-well incubation chambers in a microplate footprint for high-throughput processing of microarrays. The footprint dimensions meet the standards recommended by the Society for Biomolecular Screening.

The 96 Well spacing (9 mm center to center) of the array pads on FAST Slides makes the loaded FAST Frame compatible with automated liquid handling systems and 8-channel manual pipettors.

Each plate processes up to 64 arrays simultaneously. The rows and columns on each plate are labeled for easy indexing and sample application.

The FAST Frame multi-slide plate is constructed of autoclavable plastic and is compatible with standard 1" x 3" glass slides when used with Whatman reusable silicone chambers (1, 2, 16). The FAST Frame is available as a stand-alone, reusable unit or as a starter kit containing 16-pad FAST Slides, incubation chambers and chamber covers.





FAST Frame

Chip Clip™

The Single Grip Slide Holder
The Chip Clip securely holds one FAST Slide and incubation chamber for processing multiple arrays simultaneously (includes the Serum Biomarker Chip). Used in conjunction with silicone incubation chambers, the Chip Clip ensures leak-proof barriers around the arrayed pads on the slide.

The slide and incubation chamber are easily inserted into and removed from the Chip Clip slide holder; side rails hold the chamber firmly against the slide surface. The Chip Clip is compatible with 25 x 76 mm (1" x 3") slides when used with incubation chambers.

Chip Clip

Product Specifications - FAST Frame Multi-Slide Plate

FAST Frame Multi-Slide Plate	
Number of Slides:	up to 4
Row Spacing:	9 mm
Footprint:	128 mm x 86 mm
Material:	Delrin, autoclavable
Chip Clip	
Number of Slides:	1
Footprint:	50 mm x 85 mm
Material:	Delrin, autoclavable

Ordering Information - Slide Holders

Description	Quantity/Pack	Catalog Number
FAST Frame Multi-Slide Plate		
FAST Frame	1	10 486 001
FAST Frame Starter Kit includes:	1	10 486 003
FAST Frame	1	
- 16-pad FAST Slides	10	
- 16 Well Incubation Chambers	10	
Chamber Covers	40	
Chip Clip		
Chip Clip Slide Holder	1	10 486 081

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Slide Incubation Chambers

Whatman array incubation chambers are ideal for protein microarray applications on FAST Slides. The chambers provide a convenient way to carry out binding reactions on protein microarrays.

Used in conjunction with the FAST Frame or Chip Clip, the incubation chambers have a secure gasket design forming a tight, leak-proof seal with the FAST Slides. Simply remove the incubation chamber when the reaction is finished. The chambers are recommended for use at room temperature and elevated incubation temperatures up to 76º C.

Product Specifications - Slide Incubation Chambers

Single-Well Array Incubation Chamber*	
External dimension:	79 x 25.4 mm
Well dimension:	53 x 22 x 0.4 mm (LxWxD)
Volume:	600 - 700 µL
Dual-Well Array Incubation Chamber**	
External dimension:	79 x 25.4 mm
Well dimension:	21 x 21 x 4 mm (LxWxD)
Volume:	300 - 400 µL
16 Well Array Incubation Chamber***	
External dimension:	75 x 25.4 mm
Well dimension:	7 x 7 x 4 mm (LxWxD)
Volume:	60 - 100 µL

* For use with 2-pad FAST Slides, catalog 10 484 182
** For use with 2-pad FAST Slides, catalog 10 485 317
*** For use with 8- and 16-pad FAST Slides, catalog numbers 10 485 320 and 10 485 323

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Ordering Information - Slide Incubation Chambers

Description	Quantity/Pack	Catalog Number
Single-Well Array Incubation Chamber (for 1-pad FAST Slides)	10	10 486 137
Dual-Well Array Incubation Chamber (for 2-pad FAST Slides)	10	10 486 087
16 Well Array Incubation Chamber* (for 8- and 16-pad FAST Slides)	10	10 486 046
Chamber Cover for all Chambers	40	10 485 336
FAST Frame Slide Holder, for simultaneous processing of four slides	1	10 486 001
Chip Clip Slide Holder, for single slide processing	1	10 486 081

*The 16-Pad Incubation Chamber is used with both 8- and 16-pad FAST Slides

Protein Array Buffers and Reagents

Whatman protein array reagents have been optimized for use on FAST Slides. These reagents include protein arraying buffer, protein array blocking buffer and protein array wash buffer.

Protein Arraying Buffer

- Enhances long-term protein stability and molecular recognition activity
- Enhances fluorescent signal from arrayed sample
- Optimized for use on FAST Slides

Protein Array Blocking Buffer

- Demonstrates highly efficient blocking of protein microarrays
- Exhibits strong reduction of non-specific antibody-antibody interactions
- Exhibits minimal effects on specific antibody-antigen interactions
- Results in superior signal-to-noise ratios in protein microarray applications
- Superior blocking capabilities

Protein Array Buffers and Reagents

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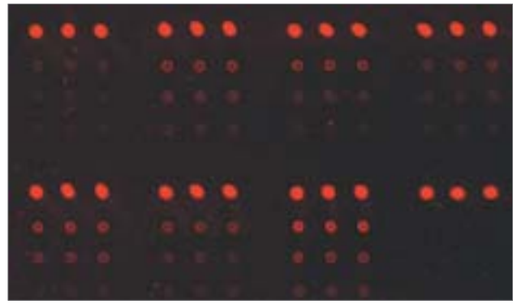
Reduction of non-specific protein-protein interaction: Monoclonal capture antibodies were arrayed on FAST Slides and probed with an antibody cocktail consisting of 16 biotinylated polyclonal antibodies followed by Streptavidin-Cy5 detection. Images were taken at identical laser/PMT setting. The first row of the array field is a positive detection control.

Blocking with Protein Array Blocking Buffer: Reduction of unspecific antibody-antibody interactions by the protein array blocking buffer.



Blocking with TBS Tween 20, 0.1% - Unspecific Binding of Biotinylated Antibodies

Protein Array Wash Buffer

- Ideal washing buffer for protein microarrays
- Conveniently supplied as 10x concentrate
- Optimized for use on FAST Slide

The Protein Array Wash Buffer has been optimized for efficient washing of protein microarrays to ensure optimum results. This buffer is used as the washing buffer in FAST PAK, FAST Quant and the Serum Biomarker Chip kits.

Blocking with Protein Array Blocking Buffer

Ordering Information - Protein Array Buffers and Reagents

Description	Quantity/Pack	Catalog Number
Protein Arraying Buffer (2x)	4 x 10 mL	10 485 331
Protein Arraying Blocking Buffer (1x)	1 x 100 mL	10 485 356
Protein Array Wash Buffer (10x)	4 x 125 mL	10 485 330

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MicroCaster™ Arrayer

Handheld Microarraying System

The MicroCaster is an economical, entry-level manual microarraying system for principle and pilot studies. With the MicroCaster 8-Pin hand tool, samples can be loaded from 96 Well or 384 Well microtiter plates.

The MicroCaster slide holder holds two slides. It has a built-in indexing system that enables precise printing of up to 768 spots in an array of 32 x 24 spots. It is very easy to set up and use with processing time of 5-20 minutes per slide.

The MicroCaster is designed for 1-Pad FAST Slides with 20 mm x 51 mm pad size and is compatible with other slide surfaces.

MicroCaster Arrayer

Product Specifications - MicroCaster Arrayer

Number of Spots:	up to 768
Horizontal Pitch:	(x-axis): 1250 µm
Vertical Pitch:	(y-axis): 750 µm
Spot Size:	500 - 1000 µm
Print Volume: (varies with buffer and viscosity)	20 - 70 nL

Ordering Information - MicroCaster Arrayer

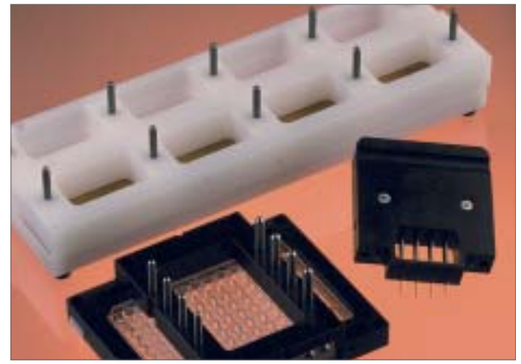
Description	Quantity/Pack	Catalog Number
MicroCaster System*	1	10 485 047
MicroCaster Pin Conditioner	100 mL	10 485 061
MicroCaster Replacement Pin	1	10 485 326
MicroCaster Pad (pin support pad)	1	10 485 370

* MicroCaster System includes: MicroCaster 8-Pin System Hand Tool, MicroCaster 8-Pin System Slide Holder, MicroCaster Pin Conditioner, Spare Replicator Pins

MicroCaster Accessories

The MicroCaster accessories can be used to increase the flexibility of the manual arrayer system by providing accurate source-plate indexing and reliable pin-tool cleaning.

The MicroCaster accessories are compatible with standard 96 Well microplates and they reduce hassle with pin-tool cleaning.



Ordering Information - MicroCaster Accessories

Description	Dimensions (mm)	Quantity/Pack	Catalog Number
Lint Free Blotting Paper	80 x 115	10	10 486 042
Wash and Blot Station	-	1	10 486 043
96 Well Microplate Indexer	-	1	10 486 044

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Blotting Products:
Whether you are blotting for proteomics, testing for diseases, analyzing genetic mutations or profiling DNA, our blotting products are extensively used around the world.

Blotting Products

Whatman offers an extensive line of blotting products for all of your application requirements. This includes premium blotting membranes and blotting devices for screening many samples on one membrane.

Blotting Membranes

An extensive line of premium transfer membranes is available, used in a wide range of applications.

Colony and Plaque Lift Membranes

Circular membranes are offered in a variety of membrane types, ideal for colony hybridization and plaque lift applications.

Protran nitrocellulose, Optitran reinforced nitrocellulose and Nytran SPC and N nylon membranes are available in disc formats. These membranes provide high signal intensities and low backgrounds and are compatible with isotopic and non-isotopic detection methods. Nytran and Optitran membranes offer high strength for assays where multiple reprobings are required.

The 82 mm and 87 mm sizes are designed to fit 100 mm plates; 132 and 137 mm fit 150 mm plates.

Features and Benefits

- Wide variety of membranes available in circular format
- High signal and low backgrounds in colony and plaque lift applications
- Available in sizes to fit 100 and 150 mm plates
- Butterfly membranes have asymmetric notches (tabs) for easier handling, improved orientation and identification of colony and plaque lifts

Butterfly™ Membranes

Ordering Information - Colony and Plaque Lift Membranes

Catalog Number	Pore Size (µm)	Diameter (mm)	Quantity/Pack
Nytran SuPerCharge			
10 416 216	0.45	82	50
10 416 264	0.45	87	50
10 416 224	0.45	132	50
Nytran N			
10 416 116	0.45	82	50
10 416 124	0.45	132	50
10 416 147	0.45	137	50
Nytran SPC Nylon - Non-printed Butterfly membrane			
10 416 249	0.45	82	50
Optitran Supported Nitrocellulose - BA-S 83			
10 439 316	0.2	82	50
Optitran Supported Nitrocellulose - BA-S 85			
10 439 116	0.45	82	50
10 439 124	0.45	132	25
10 439 126	0.45	132	50
Protran Nitrocellulose - BA83			
10 401 316	0.2	82	50
10 402 426	0.2	132	50
Protran Nitrocellulose - BA85			
10 401 116	0.45	82	50
10 402 579	0.45	82.5	50
10 401 164	0.45	87	50
10 401 124	0.45	132	25
10 402 525	0.45	132	50
10 401 147	0.45	137	25
10 402 548	0.45	137	50
10 405 316	0.45 (5 mm grid)	82	50

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Nytran® Nylon Membranes

Whatman Nytran nylon membranes are available in two formats. The Nytran N is moderately charged and the Nytran SuPerCharge (SPC) has a very high positive charge.

Nytran Nylon

The Whatman Nytran Nylon membrane is ideal for applications that require a lower charge. It is designed for Southern and Northern blotting as well as colony and plaque lifts and Dot-/Slot-Blots. Nytran N is compatible with isotopic and non-isotopic detection methods.

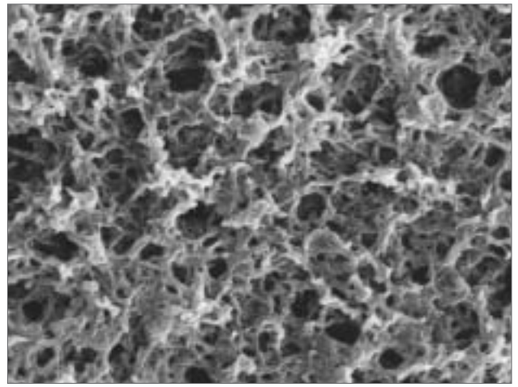
Nytran N membrane allows for excellent signal-to-noise ratios. The membrane is cast uniformly on both sides of a support matrix, demonstrating excellent symmetry. This gives the membrane the ability to lie flat without curling. Nytran N membrane is a highly consistent membrane with uniform pore size and distribution. It is available in 0.2 µm and 0.45 µm pore sizes for optimal retention of oligos and larger DNA fragments.

Nytran Nylon N Membranes

Nytran SuPerCharge (SPC)

Nytran SPC nylon membranes have a very high positive charge. Improvements in the manufacturing process result in a membrane with a higher density of nylon per unit area. The increased charge and greater nylon density provide increased binding sites for your samples.

Nytran SPC membranes show a very uniform pore size and pore distribution compared to typical nylon membranes. They are free of surface microvoids which are common in other membranes. These characteristics lead to greater reproducibility of results across a membrane and from blot to blot.



Nytran SuPerCharge nylon membrane (1250x magnification)

Nytran SPC membrane is cast uniformly on both sides of a support matrix, demonstrating excellent symmetry. This gives the membrane the ability to lie flat without curling.

With typical manufacturing techniques, increasing positive charge tends to increase background. Nytran SPC membranes are manufactured using a process that allows the combination of high positive charge with low background. Whether using radioactive or non-radioactive detection techniques, Nytran SPC consistently gives high signal with extremely low background.

Ordering Information - Nytran N Nylon Membranes*

Catalog Number	Pore Size (µm)	Dimensions	Quantity/Pack
Circles			
10 416 116	0.45	82	50
10 416 124	0.45	132	50
10 416 147	0.45	137	50
Sheets			
10 416 085	0.2	20 x 20 cm	10
10 416 063	0.2	25 x 25 cm	10
10 416 080	0.2	30 x 60 cm	5
10 416 185	0.45	20 x 20 cm	10
10 416 130	0.45	11 x 14 cm	10
10 416 163	0.45	25 x 25 cm	10
10 416 180	0.45	30 x 60 cm	5
10 416 188	0.45	10.2 x 13.3 cm¹	10
Rolls			
10 416 094	0.2	20 cm x 3 m	1
10 416 096	0.2	30 cm x 3 m	1
10 416 194	0.45	20 cm x 3 m	1
10 416 196	0.45	30 cm x 3 m	1

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Ordering Information - Nytran SuPerCharge (SPC) Nylon Membranes*

Catalog Number	Pore Size (µm)	Dimensions	Quantity/Pack
Circles			
10 416 216	0.45	82	50
10 416 264	0.45	87	50
10 416 224	0.45	132	50
10 416 249	0.45	82 (Butterfly format)	50
Sheets			
10 416 289	0.45	10 x 15 cm	10
10 416 287	0.45	15 x 20 cm	10
10 416 285	0.45	20 x 20 cm	10
10 416 230	0.45	11 x 14 cm	10
10 416 284	0.45	15 x 15 cm	10
10 416 263	0.45	25 x 25 cm	10
10 416 280	0.45	30 x 60 cm	5
10 416 288	0.45	10.2 x 13.3 cm[1]	10
10 416 293	0.45	6.3 x 22.8 cm[2]	10
10 416 291	0.45	22.2 x 22.2 cm[3]	48
Rolls			
10 416 294	0.45	20 cm x 3 m	1
10 416 296	0.45	30 cm x 3 m	1
Microwell Plate Format			
10 416 257	0.45	82 x 120 mm Black Grid	10

* Nytran binding capacity: >400 µg/cm²

[1] The corners are notched for use with the Minifold I System

[2] Cut to fit the Minifold II Slot-Blot System

[3] Macroarray membrane size

Optitran® Nitrocellulose Membranes

Reinforced Nitrocellulose Membranes

Optitran membranes consist of pure 100% nitrocellulose cast onto both sides of an inert polyester support material. The support in no way affects transfer conditions or results and gives the membrane exceptional handling characteristics, allowing it to be reprobed repeatedly.

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The Optitran nitrocellulose membrane provides high sensitivity with very low non-specific binding. Using standard nitrocellulose protocols, stringent washing and blocking conditions are not necessary.

The combination of flexibility, strength and excellent signal-to-noise ratios makes the Optitran membrane ideal, especially when experiments involve repeated stripping and reprobing.

Optitran supported nitrocellulose membranes combine sensitivity, strength and savings.

Optitran Nitrocellulose Membranes

Ordering Information - Optitran Nitrocellulose Membranes*

Catalog Number	Pore Size (µm)	Dimensions	Quantity/Pack
Circles			
Optitran - BA-S 83			
10 439 316	0.2	82	50
Optitran - BA-S 85			
10 439 116	0.45	82	50
10 439 126	0.45	132	50
10 439 124	0.45	132	25
Sheets			
Optitran - BA-S 83			
10 439 388	0.2	10.2 x 13.3 cm[1]	10
10 439 351	0.2	15 x 15 cm	5
10 439 361	0.2	20 x 20 cm	5
10 439 391	0.2	20 x 20 cm	25
10 439 362	0.2	25 x 25 cm	5
10 439 380	0.2	30 x 60 cm	5
Optitran - BA-S 85			
10 439 188	0.45	10.2 x 13.3 cm[1]	10
10 439 251	0.45	15 x 15 cm	5
10 439 282	0.45	20 x 20 cm	5
10 439 191	0.45	20 x 20 cm	25
10 439 262	0.45	25 x 25 cm	5
10 439 180	0.45	30 x 60 cm	5

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Catalog Number	Pore Size (µm)	Dimensions	Quantity/Pack
Rolls			
Optitran - BA-S 83			
10 439 394	0.2	20 cm x 3 m	1
10 439 396	0.2	30 cm x 3 m	1
Optitran - BA-S 85			
10 439 194	0.45	20 cm x 3 m	1
10 439 196	0.45	30 cm x 3 m	1

* Optitran binding capacity: 75-90 µg/cm^2; autoclavable (liquid cool cycle)
[1] The corners are notched for use with the Minifold I System

Protran® Nitrocellulose Membranes

100% Pure Nitrocellulose Membranes

Protran nitrocellulose membranes are the most frequently specified transfer media in the world for a wide range of applications. Protran membranes are manufactured using 100% pure nitrocellulose to ensure the highest binding capacity possible.

Protran Nitrocellulose Membrane

Other membranes referred to as 'nitrocellulose' may actually contain large amounts of cellulose acetate which will lower the protein binding capacity. Protran membranes have the best handling strength of all pure nitrocellulose membranes. They are compatible with a variety of detection methods, including isotopic, chemiluminescent (luminol-based), colorimetric and fluorescent.

Unlike PVDF membranes, Protran nitrocellulose does not require a methanol pre-wetting step. This makes Protran the membrane of choice for proteins which prefer aqueous environments. Prior to transfer, the membrane is simply wetted in water, and then placed in the transfer buffer. No other pre-treatment steps are necessary.

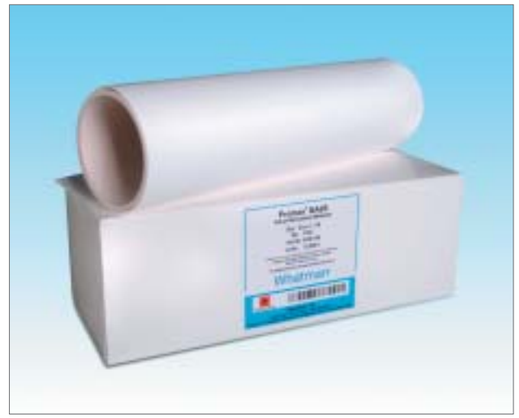
High Binding, Low Background

In addition to high binding capacity, Protran nitrocellulose membranes inherently have very low background. The superior surface properties of the membrane guarantee superior signal-to-noise ratios, without the need for stringent washing conditions.

High Retention of Small Proteins

The 0.2 µm pore size of the Protran (BA83) nitrocellulose membrane ensures high retention of small proteins below 20 kD by reducing 'blow-through'. The 0.45 µm pore size membrane (BA85) is ideal for larger molecular weight samples. BA79, with 0.1 µm pore size, is the membrane of choice for smaller proteins below 7 kD.

A unique benefit of the proprietary Protran nitrocellulose formula is the proven excellent shelf life of proteins. Empirical evidence shows that proteins maintain molecular recognition activity for five years on Protran.



Protran BA85 Nitrocellulose Membrane

Ordering Information - Protran Nitrocellulose Membranes*

Catalog Number	Pore Size (µm)	Dimensions	Quantity/Pack
Circles			
Protran - BA83			
10 401 316	0.2	82	50
10 402 426	0.2	132	50
Protran - BA85			
10 402 506	0.45	25	100
10 402 578	0.45	25	1000
10 401 116	0.45	82	50
10 402 579	0.45	82.5	50
10 401 164	0.45	87	50
10 401 124	0.45	132	25
10 402 525	0.45	132	50
10 401 147	0.45	137	25
10 402 548	0.45	137	50
10 405 316**	0.45 (5 mm grid)	82	50
Protran - BA85 Butterfly - Phosphor-printed			
10 401 166	0.45	82	50
Sheets			
Protran - BA79			
10 402 088	0.1	10.2 x 13.3 cm[1]	10
10 402 093	0.1	6.3 x 22.8 cm^2	10
10 402 062	0.1	20 x 20 cm	5

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Catalog Number	Pore Size (µm)	Dimensions	Quantity/Pack
10 402 091	0.1	20 x 20 cm	25
10 484 212	0.1	33 x 56 cm	5
Protran - BA83			
10 402 488	0.2	10.2 x 13.3 cm[1]	10
10 402 493	0.2	6.3 x 22.8 cm[2]	10
10 402 405	0.2	15 x 15 cm	5
10 401 465	0.2	15 x 20 cm	10
10 402 452	0.2	20 x 20 cm	5
10 401 391	0.2	20 x 20 cm	25
10 402 453	0.2	25 x 25 cm	5
10 401 380	0.2	30 x 60 cm	5
10 402 480	0.2	33 x 56 cm	5
Protran - BA85			
10 402 588	0.45	10.2 x 13.3 cm[1]	10
10 402 593	0.45	6.3 x 22.8 cm[2]	10
10 402 606	0.45	15 x 15 cm	5
10 401 261	0.45	15 x 15 cm	25
10 402 680	0.45	20 x 20 cm	5
10 401 191	0.45	20 x 20 cm	25
10 402 694	0.45	25 x 25 cm	5
10 401 180	0.45	30 x 60 cm	5
10 402 580	0.45	33 x 56 cm	5
Rolls			
Protran - BA79			
10 402 096	0.1	30 cm x 3 m	1
Protran - BA83			
10 402 468	0.2	15 cm x 3 m	1
10 402 495	0.2	20 cm x 3 m	1
10 401 396	0.2	30 cm x 3 m	1
Protran - BA85			
10 402 594	0.45	15 cm x 3 m	1
10 401 197	0.45	20 cm x 3 m	1
10 401 196	0.45	30 cm x 3 m	1

* Protran binding capacity: 75-110 µg/cm²; autoclavable (liquid cool cycle)
** 5 mm grid
[1] Fits Minifold® I System
[2] Fits Minifold® II System

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Westran® PVDF Membranes

Whatman Westran PVDF membranes are available in two formats: the Westran S used for protein sequencing and the Westran Clear Signal used for Western blotting.

Westran S

Westran S PVDF is a 0.2 µm pore size hydrophobic membrane designed specifically for protein sequencing applications. The small pore size of this membrane eliminates 'blow-through' and increases protein retention over a wide range of molecular weights.

Westran PVDF Membranes

Features and Benefits

- Protein binding capacity (over 200 µg/cm²) for easy signal detection
- Chemical resistance needed for N-terminal sequencing
- High protein retention even after harsh wash steps
- Maximum capture of proteins during transfers minimizing sample loss
- 0.2 µm pore size for better retention of low molecular weight proteins
- Compatible for use with Western blotting applications
- Available in popular pre-cut sizes for your application

Westran Clear Signal

Westran Clear Signal PVDF is a 0.45 µm membrane specifically designed for Western blotting and protein dot-blotting applications.

Features and Benefits

- Protein binding ability 125 µg/cm²
- Extremely low backgrounds with chemiluminescent and colorimetric applications providing you with clear signals and sharp bands
- Excellent results with general protein stains such as Coomassie® Brilliant Blue, Amido Black, and Ponceau S Red
- Increased strength allows for multiple stripping and reprobing, which results in savings

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Ordering Information - Westran PVDF Membranes

Catalog Number	Pore Size (µm)	Dimensions	Quantity/Pack
Westran S			
Sheets			
10 413 052	0.2	10 x 10 cm	10
10 485 290	0.2	15 x 15 cm	10
10 485 291	0.2	20 x 20 cm	10
Roll			
10 413 096	0.2	26 cm x 3 m	1
Westran Clear Signal			
Sheets			
10 485 286	0.45	10 x 10 cm	10
10 485 287	0.45	15 x 15 cm	10
10 485 288	0.45	20 x 20 cm	10
Roll			
10 485 289	0.45	30 cm x 3 m	1
Microwell Plate 96 Well Format			
10 413 054	0.2	74 x 116 mm	10

PVDF - polyvinylidene fluoride

Blotting Papers

Whatman 3MM Chr paper is the world's most widely used blotting paper.

This acceptance and usage reflect the high quality, purity and consistency that are relied upon by researchers doing Southern, Northern and Western transfers. 3MM Chr paper is now available in the most widely used sizes. A medium thickness paper (0.34 mm) used extensively in electrophoresis for lifting of sequencing gels.

3MM Chr

GB003
A general purpose blotting paper made from pure raw materials with a high absorbency used as a membrane gel support. A thick (0.8 mm) paper recommended for the lysis/denaturation of colony or plaque lifts and Western blots.

GB004
A thick gel blotting paper (1.0 mm) used for wicking purposes only. Provides higher absorbency and more consistent wicking than paper towels. Recommended for applications where fewer layers of gel blotting paper must still ensure a high capacity. Fewer layers of blotting paper reduce the risk of trapping air bubbles. Recommended for capillary blotting of nucleic acids.

GB005
A thick (1.2 mm) highly absorbent paper recommended for applications where fewer layers of blotting paper must still ensure a high capacity. Recommended for semi-dry blotting of proteins.

Gel Blot Paper

17 Chr
A thick (0.92 mm) and highly absorbent paper.

31 ET Chr
An extremely fast and thick paper (0.5 mm) with a fairly soft surface.

Features and Benefits

- Pure cellulose produced entirely from the highest quality cotton linters with no additives of any kind. Ensures that no contamination will occur during the transfer steps.
- Manufactured and tested specifically for chromatographic techniques. This ensures the wicking capability and uniformity of capillary action that is important in obtaining clean and even transfers during blotting.
- Whatman 3MM Chr is considered the industry standard for blotting procedures
- Convenient sizes available in sheets precisely cut to the most popular gel and transfer membrane sizes. Allows 'out-of-the-box' usage and eliminates sheet-to-sheet variations.

Ordering Information - Pure Cellulose Blotting Sheets

Size (cm)	Catalog Number	Quantity/Pack
3MM Chr Blotting Sheets		
11 x 14	3030-6185	100
12 x 14	3030-6132	100
15 x 17.5	3030-153	100

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Blotting Products

Size (cm)	Catalog Number	Quantity/Pack
15 x 20	3030-6188	100
18 x 34	3030-221	100
20 x 20	3030-861	100
26 x 41	3030-6461	100
35 x 43	3030-347	100
35 x 45	3030-392	100
31.5 x 35.5	3030-335	100
46 x 57	3030-917	100
58 x 68	3030-931	100
4" x 5 ¼"	3030-6189	100
6" x 8"	3030-6187	100
8" x 10"	3030-866	100
GB003 Blotting Sheets		
10 x 10	10 426 880	50
10.2 x 13.3[1]	10 427 824	100
15 x 15	10 427 810	100
15 x 20	10 427 812	100
16 x 18	10 427 813	100
20 x 20	10 427 818	100
30 x 60	10 426 890	25
46 x 57	10 427 826	100
58 x 60	10 426 892	50
GB004 Blotting Sheets		
7 x 10	10 484 124	100
10 x 15	10 427 900	100
11 x 14	10 427 902	100
12 x 14	10 427 904	100
15 x 15	10 427 910	100
15 x 20	10 427 912	100
15 x 25	10 427 914	100
20 x 20	10 427 918	100
20 x 24	10 427 920	100
20 x 25	10 427 922	100
46 x 57	10 427 926	100
GB005 Blotting Sheets		
15 x 15	10 426 972	25
20 x 20	10 426 981	25
58 x 58	10 426 994	25
17 Chr Blotting Sheets		
2.5 x 22	3017-8793	100
46 x 57	3017-917	100
46 x 57	3017-915	25
31 ET Chr Blotting Sheets		
46 x 57	3031-915	25

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Ordering Information - Pure Cellulose Blotting Rolls

Length (m) x Width (cm)	Catalog Number	Quantity/Pack
3MM Chr Blotting Rolls		
100 x 2	3030-614	1
100 x 7.5	3030-662	1
100 x 10	3030-672	1
100 x 12.5	3030-675	1
100 x 15	3030-681	1
100 x 19	3030-690	1
100 x 23	3030-700	1
100 x 27	3030-704	1

[1] Corners are notched for use with the Minifold® I Dot Blot System

Blotting Devices

Whatman offers a line of blotting devices to simplify your testing processes. These provide a method for screening many samples on one membrane.

The product line includes the TurboBlotter™ for rapid downward transfers and the Minifold Systems for Dot-, Spot- and Slot-Blot techniques.

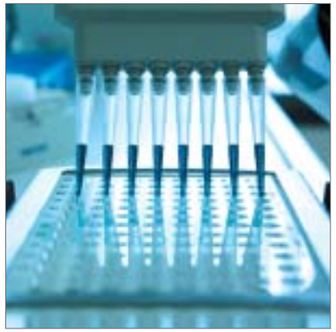
Minifold® I System

Superior 96 and 48 Well Manifolds for Proteins and Nucleic Acids: Dot-, Spot- and Slot-Blot Array Systems

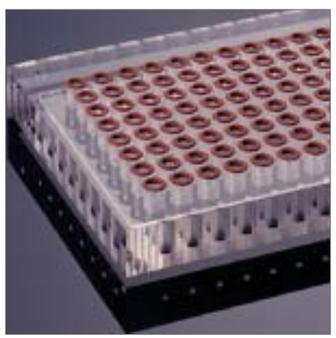
The Minifold I system consists of four basic components: sample well plate, filter support plate, vacuum plenum and metal clamping plate. The sample well plate is available in three configurations for producing spots, dots or slots.

The Minifold I System is compatible with multichannel pipettes. All three plates are interchangeable and can be purchased as an accessory plate or in conjunction with a complete system. The tension on the clamping is adjustable, permitting use of a variety of blotting and filtration media.

Minifold I Dot-Blot System - 96 Well
Unique O-ring design - ensures discrete dot formation without leakage of samples by cross lateral flow.



Minifold I System



Minifold I Dot-Blot System - 96 Well

Blotting Products

Generates even, uniform dots that eliminates uneven test areas resulting from manual sample application.

Two materials available - standard acrylic or autoclavable Delrin®.

Minifold I Spot-Blot System - 96 Well

Small volume required - sample volumes as low as 25 µL can be applied using less of your precious sample.

Very high signal intensity - 2 mm² sample application area results in increased signal intensity.

Standard microtitration format - 96 samples on a single membrane, same as the standard Minifold Dot-Blot System.

Minifold I Spot-Blot System - 96 Well

Minifold I Slot-Blot System - 48 Well

Preferred format for densitometric scanning, since slots can be easily quantitated.

Concentrated signal - 6 mm² sample application area results in high signal intensity.

Easy to survey format - 48 samples on your membrane are easier to view than 96 samples.

Minifold I Slot-Blot System - 48 Well

Specifications - Minifold I System

Description	Material	Filter Area	Max Capacity	Pressure
96 Well Dot-Blot Plate	Acrylic or Delrin	12.5 mm² dot	500 µL/well, 96 wells	0.9 bar, vacuum
96 Well Spot-Blot Plate	Acrylic	2 mm² spot (1 x 2 mm)	200 µL/well, 96 wells	0.9 bar, vacuum
48 Well Slot-Blot Plate	Acrylic	6.24 mm² slot (7.8 x 0.8 mm)	1000 µL/well, 48 wells	0.9 bar, vacuum

Ordering Information - Minifold® I

Description	Quantity/Pack	Catalog Number
Complete Systems		
Minifold I Spot-Blot* System, complete 96 Well (Acrylic)	1	10 447 850
Minifold I Dot-Blot* System, complete 96 Well (Acrylic)	1	10 447 900
Minifold I Slot-Blot* System, complete 48 Well (Acrylic)	1	10 447 941
Minifold I Dot-Blot* System, complete 96 Well (Delrin)	1	10 447 910

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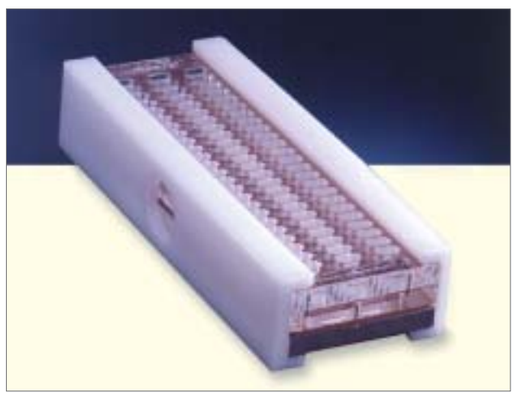
Description	Quantity/Pack	Catalog Number
Replacement Parts		
Minifold I Spot-Blot Plate	1	10 447 852
Minifold I Slot-Blot Plate	1	10 447 906
Minifold I Dot-Blot Plate	1	10 447 905
Minifold I Clamping Plate	1	10 447 960
Filter Support Plate	1	10 447 903
Vacuum Plenum	1	10 447 968
O-rings	50	10 447 902
Accessory Products		
Incubation Plate	1	10 447 909
Cutting Template	1	10 447 901
Membranes - 10.2 x 13.3 cm to fit Minifold I Systems		
Protran, BA79 0.1 µm	10	10 402 088
Protran, BA83 0.2 µm	10	10 402 488
Protran, BA85 0.45 µm	10	10 402 588
Optitran, BA-S 83 0.2 µm	10	10 439 388
Optitran, BA-S 85 0.45 µm	10	10 439 188
Nytran N, 0.45 µm	10	10 416 188
Nytran SuPerCharge, 0.45 µm	10	10 416 288
GB003 Blotting Paper	100	10 427 824

* Complete systems include: manifold apparatus, 5 sheets of Protran, 5 sheets of pre-cut 3MM Chr paper
Delrin is a registered trademark of DuPont

Minifold® II System

72 Well Slot-Blot Array System

The Minifold II System is designed for precise, quantitative solid-phase assays with three rows of 24 slots, spaced according to multi-tip pipette format. The smaller slot surface area results in higher signal intensity and requires less sample than standard dot-blot formats. The resulting blot can be read with a densitometer.



72 Well Slot-Blot Array System

Features and Benefits

- Higher signal intensity - smaller slot surface area results in increased signal
- Less sample - small slot dimensions require less sample than dot-blotters
- Faster results - more intense signal generated with the slot-blotter allows one to visualize results in less time

Blotting Products

- Accepts all types of transfer membranes - allows for choice of membrane with the highest binding capacity
- Easy to assemble - beveled side rails assure rapid and accurate assembly

Specifications - Minifold II System

Material	Membrane Size	Filter Area	Capacity	Pressure
Acrylic	6.3 cm x 22.8 cm	6.0 mm²/well (0.75 mm x 8.0 mm slots)	600 µL/slot	0.9 bar, vacuum

Ordering Information - Minifold II System

Description	Quantity	Catalog Number
Minifold® II Slot-Blot System, Complete*	1	10 447 800
Replacement Parts		
Sample Well Plate	1	10 447 801
Vacuum Filter Support with ¼" Vacuum Tube Adapter	1	10 447 864
Silicone O-Ring	1	10 447 813
Silicone Sheet	5	10 447 805
Vacuum Connector	1	10 447 866
Membranes and Blotting Paper - 6.3 x 22.8 cm to fit Minifold II System		
Protran BA79, 0.1 µm	10	10 402 093
Protran BA83, 0.2 µm	10	10 402 493
Protran BA85, 0.45 µm	10	10 402 593
Nytran SPC, 0.45 µm	10	10 416 293

* Complete system includes manifold apparatus, five sheets of pre-cut Protran BA85 nitrocellulose and five sheets of pre-cut 3MM Chr paper

TurboBlotter™

Rapid Downward Transfer System

The TurboBlotter system is a rapid downward blotting device for high-resolution transfer of DNA and RNA.

The conventional Southern transfer stack has been turned upside down in order to take advantage of gravity. No heavy weights are required on the top of the transfer stack, eliminating the messy set-up of standard upward capillary transfers.

TurboBlotter

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The TurboBlotter System offers greater speed, target resolution and convenience versus traditional blotting procedures. Alkaline DNA transfers can be performed in as little as one hour, while neutral (SSC) transfers of DNA and RNA take only three hours.

TurboBlotter Set-up

Features and Benefits

- Rapid - unique downward capillary transfer allows for alkaline buffer transfers in one hour and neutral (SSC) transfers in three hours
- Economical - reusable blotting device requires less buffer and blotting paper. Convenient refill packs available.
- Compact - has a smaller footprint than most homemade devices and is stackable. Up to five units can be stacked on top of each other during transfers
- Easy to use - very easy to set up and works without power or vacuum source

Each TurboBlotter System contains a transfer device, as well as the blotting paper and membranes for five transfers. The refill packs contain the blotting paper and membranes for five transfers.

Ordering Information - TurboBlotter System

Description	Size	Catalog Number
The TurboBlotter Systems below each include one 12 x 16 cm transfer device, which can accommodate gel sizes from 7 x 8 cm to 11 x 14 cm.		
Nytran SuPerCharge TurboBlotter Kits*	7 x 10 cm	10 416 328
	9 x 11 cm	10 416 336
	10 x 15 cm	10 416 300
	11 x 14 cm	10 416 304
Nytran SuPerCharge TurboBlotter Refill**	7 x 10 cm	10 416 330
	9 x 11 cm	10 416 338
	10 x 15 cm	10 416 302
	11 x 14 cm	10 416 306
The TurboBlotter Systems below each include one 21 x 26 cm transfer device, which can accommodate gel sizes from 12 x 21 cm to 20 x 25 cm.		
Nytran SuPerCharge TurboBlotter Kits*	12 x 21 cm	10 416 308
	15 x 15 cm	10 416 312
	15 x 20 cm	10 416 316
	20 x 20 cm	10 416 320
	20 x 25 cm	10 416 324

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Description	Size	Catalog Number
Nytran SuPerCharge TurboBlotter Refills**	12 x 21 cm	10 416 310
	15 x 15 cm	10 416 314
	15 x 20 cm	10 416 318
	20 x 20 cm	10 416 322
	20 x 25 cm	10 416 326

* Each TurboBlotter Kit includes: transfer device, 5 sheets of membrane, 40 sheets of 3MM Chr, 100 sheets of GB004 and 5 wicks of 3MM

** TurboBlotter Refills include: 5 sheets of membrane, 40 sheets of 3MM Chr, 100 sheets of GB004 and 5 wicks of 3MM

Blotting Accessories

Whatman offers a line of blotting accessories to simplify your testing processes. The product line includes membrane marking pens and reaction folders (sealable hybridization bags).

Membrane Marking Pen

For Marking Nitrocellulose and Nylon Transfers

The membrane marking pen is a high-xylene, felt-tipped marker that permanently writes on nitrocellulose and nylon membranes used in standard transfer procedures.

This indispensable tool ensures easy identification and orientation of gel transfers, colony and plaque lifts and Western blots, even when membrane is damp. It is compatible with hybridization and incubation buffers. An ideal marker for keeping records of transfers.

Membrane Marking Pen

Ordering Information - Membrane Marking Pen

Description	Quantity/Pack	Catalog Number
Membrane Marking Pen	10	10 499 001

Reaction Folders

Sealable Hybridization Bags

Whatman Reaction Folders are sealable bags for hybridization and incubation reactions.

The folders are open on three sides to allow easier insertion of a wet membrane when compared to standard hybridization bags. The folders can be sealed with a standard heat-sealer. Available in 8" x 10" size.

Sealable Hybridization Bags

Ordering Information - Reaction Folders

Description	Size	Quantity/Pack	Catalog Number
Reaction Folders	20.3 cm x 25.4 cm (8" x 10")	50	10 483 064

Waste Reduction

Whatman offers products to safely reduce waste and protect the laboratory environment. This includes the Extractor® System for removal of ethidium bromide from gel-staining solutions and Benchkote, an absorbent, impermeable material designed to protect laboratory surfaces.

Benchkote® and Benchkote Plus™

Benchkote

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 liquids, preventing them from reaching the working surface
- Spillages are trapped in the absorbent paper
- Benchkote can be picked up and burnt very easily after use; the polyethylene layer does not melt or drip but is rapidly consumed in the flames
- Complies with OSHA Regulation 29CFR 1910.1030 for Occupational Exposure to Bloodborne Pathogens

Benchkote

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

Ordering Information - Benchkote and Benchkote Plus

Catalog Number	Description	Dimensions	Quantity/Pack
Benchkote			
2300-916	Sheets	46 cm x 57 cm	50
2300-594	Pads	46 cm x 57 cm	50
2300-731	Reel	46 cm x 50 m	1
2300-772	Reel	92 cm x 50 m	1
Benchkote Plus			
2301-6150	Sheets	50 cm x 60 cm	50
2301-6160	Reel	60 cm x 50 m	1

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Extractor™ EtBr System

Ethidium Bromide (EtBr) Waste Reduction System

The Extractor System is a one-step filtration funnel device for the rapid removal of ethidium bromide from gel-staining solutions.

This disposable unit contains an activated carbon matrix, which removes >99% of ethidium bromide from electrophoretic buffer quickly and easily. Each device can decontaminate up to 10 liters of gel-staining solution. After filtration, the decontaminated solution can be safely poured down the laboratory drain.

The Extractor funnel device fits most standard laboratory flasks and bottles (neck size 33-45 mm), and the unit includes a cap for storage between uses. The polypropylene housing is chemically resistant to organics. Also included in the package are glass fiber pre-filters, which remove gel pieces and other debris to avoid premature clogging of the carbon filter.

Extractor EtBr System

Ordering Information - Extractor EtBr System

Description	Quantity/Pack	Catalog Number
Extractor - Starter Pack	2	10 448 030
Extractor - Standard Pack	6	10 448 031

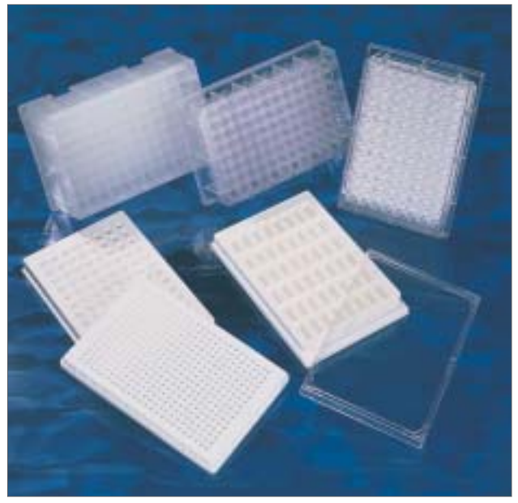
Multiwell Plates:
Their novel design allows for numerous applications, such as sample preparation, drug discovery, genomics and filter based assays and SPE.

Multiwell Plates

Whatman is dedicated to providing the most advanced technology for sample preparation to meet the growing demands of the life sciences market. Whatman filters are used worldwide for research, analysis and quality control in the pharmaceutical and biotechnology industries. These high-quality filters are provided in a range of multiwell analytical plates for pharmaceutical and life science research.

Whatman utilizes a unique patented process to encapsulate the filter media, which ensures no cross talk or contamination between wells. This patented technology allows for use of a variety of Whatman filter media. In addition, to further optimize the filter plates for specific applications, novel polymers, surface treatments, well densities, profiles and accessories are incorporated into the process. Our microplate technology is applied by a team of engineers, scientists, polymer engineers and filtration experts to ensure Whatman is at the leading edge of new developments.

The Whatman multiwell range of products is extremely diverse. The novel design of the filter plates allows for a large number of applications. Applications for disciplines such as sample preparation, genomics and filter based assays are served by the multiwell approach to filtration technology. Some core applications include sample cleanup, cell-based immunoassay, isolation of nucleic acids and compound library generation using parallel synthesis procedures.



Whatman Multiwell Plates

Application Specific Plates

Whatman has developed consistent and reproducible microplates and microplate systems to improve throughput and reduce cost for a number of biological sample preparations and cleanup procedures.

Comprehensive protocols are provided to enable implementation by all types of users. Whatman microplates conform to the proposed ANSI/SBS standards and are engineered for fast and convenient processing applications.

UNIFILTER Plate

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384 Well DNA Binding UNIFILTER®

The 384 Well DNA Binding UNIFILTER plate effectively binds and purifies DNA molecules. It provides highly reproducible results with yields exceeding 2 µg/well, from bind-wash-elute processing with collection by filtration. Minimal liquid hang up allows for reduced elution volume, enabling DNA concentration as high as 150 ng/µL. Further ethanol precipitation is unnecessary. The DNA is ready to use.

384 Well DNA Binding UNIFILTER

Features and Benefits

- High efficiency bind-wash-elute processing with collection by filtration
- Simplifies automation with no cross contamination
- Highly reproducible results yielding DNA purity exceeding 2 µg per well, sufficient for sensitive downstream applications
- Minimal liquid hang up allows for reduced elution volume with DNA concentration as high as 150 ng/µL

Ordering Information - 384 Well DNA Binding UNIFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Filter Media	Quantity/Case
7700-2110	384	100	Clear Polystyrene	DNA Binding	50
7701-1100*	384	100	Clear Polystyrene	N/A	50

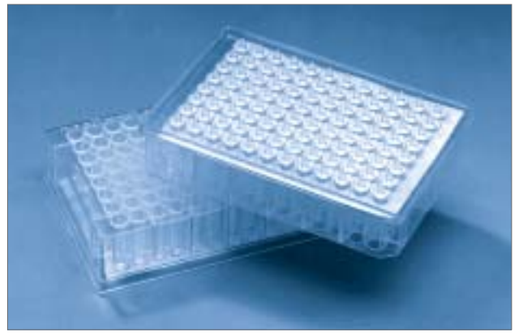
* Collection plate

Dye Terminator Removal UNIFILTER® 96 Well and 384 Well

The Whatman Dye Terminator Removal plates are available in 96 Well and 384 Well formats. These plates can be used with gel filtration media for high-throughput sequencing reaction cleanup, including removal of dye blobs.

They are constructed from rigid polystyrene that can withstand centrifugation. Laboratory packing of gel filtration media is less expensive than pre-packed plates or spin columns.

Protocol provides long and readable fragments, eliminating the common 'dye blob' problem. The protocol is optimized for Applied Biosystems BigDye® Terminator chemistry.



96 Well Dye Terminator Removal UNIFILTER

Ordering Information - 96 Well Dye Terminator Removal UNIFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Well Bottom	Quantity/Case
7700-2801	96	800	Polystyrene	Filter, LDD*	25
7701-5750**	96	750	Natural Polypropylene	Round	25

* Long drip director
** Collection plate

Ordering Information - 384 Well Dye Terminator Removal UNFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Well Bottom	Quantity/Case
7700-1101	384	100	Polystyrene	Filter, LDD*	50
7701-1100**	384	100	Polystyrene	Flat	50

* Long drip director
** Collection plate

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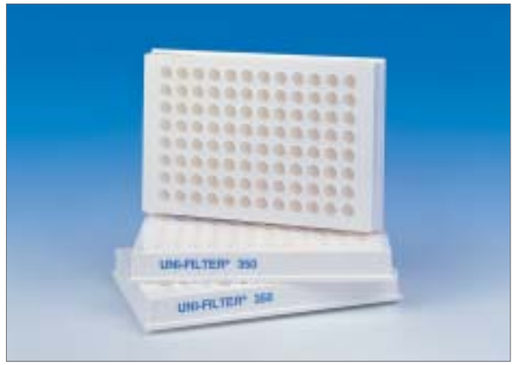
ELISA UNIFILTER®

Traditional ELISA is performed in plastic microplates. Whatman offers speed, sensitivity, and simple washing protocols with nitrocellulose filter plates.

ELISA performed with the Whatman ELISA UNIFILTER takes less time than traditional methods using regular microplates. Coating the nitrocellulose filter with antibody takes only minutes, compared with overnight procedures employed for coating polystyrene microplates. Also, the use of vacuum filtration greatly reduces the time required and enables quantitative collection of filtrate into a collection plate.



ELISA UNIFILTER

Ordering Information - ELISA UNIFILTER

Catalog Number	Well Format	Well Volume	Plate Material	Filter Media	Well Bottom	Quantity/Case
7700-3307	96	350 µL	White Polystyrene	0.45µm CN**	Filter	50
7701-1350*	96	300 µL	Clear Polystyrene	N/A	Flat	50
7701-5200*	96	2 mL	Natural Polypropylene	N/A	Round	25
7705-0107	UniVac™ Vacuum to Collect Manifold, acrylic					1
7704-0001	Clear Polyester Thin Cold Sealing Film Adhesive Backing					100

* Collection plate
** CN = cellulose nitrate

High-Throughput Genomics UNIFILTER®

With ever increasing demand for simple, fast methods to purify DNA from bacterial cultures, the Whatman Genomics microplate is the ideal solution for the clarification of lysates containing large insert vectors.

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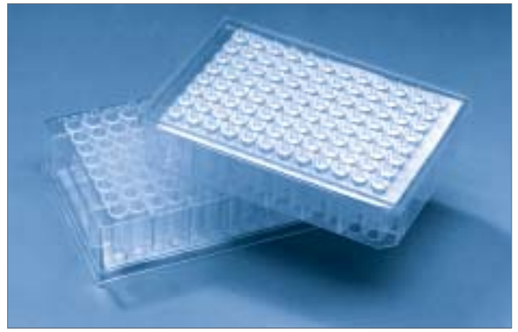
Multiwell Plates

This microplate has a cellulose acetate membrane with a special support, which clears non-chaotropic bacterial lysates, and long drip directors to eliminate cross talk between wells. Without further purification the DNA is clean enough for further enzymatic manipulation. Cellulose acetate acts as both a depth filter and a fine particle filter. The 0.45 µm pores do not block because of the depth effect of the membrane. Cellulose acetate is also inert and does not bind either DNA or protein.



High-Throughput Genomics UNIFILTER

Ordering Information - High-Throughput Genomics UNIFILTER

Catalog Number	Well Format	Well Volume	Plate Material	Filter Media	Well Bottom	Quantity/Case
7700-2808	96	800 µL	Clear Polystyrene	0.45 µm CA**	N/A	25
7701-5205*	96	2 mL	Natural Polypropylene	N/A	Round	25
7701-5200*	96	2 mL	Natural Polypropylene	N/A	Round	25
7701-5750*	96	750 µL	Natural Polypropylene	N/A	Round	25

* Collection plate
** CA = cellulose acetate

PCR Cleanup™ UNIFILTER®

Process 96 or 384 samples quickly by a bind-wash-elute method with greater than 85% recovery. The PCR Cleanup UNIFILTER eliminates time-consuming precipitations and labor-intensive resin purifications. Purified DNA is ready for sequencing, hybridization assays and microarrays.

The PCR Cleanup UNIFILTER can be used with both vacuum and centrifuge techniques. (Centrifugation is recommended for final elution with the 384 Well UNIFILTER).

96 Well PCR Cleanup UNIFILTER

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Ordering Information - PCR Cleanup UNIFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Filter Media	Quantity/Case
7700-2810	96	800	Clear Polystyrene	DNA Binding	25
7701-5250*	96	250	Natural Polypropylene	N/A	50
7700-2110	384	100	Clear Polystyrene	DNA Binding	50
7701-1100**	384	100	Clear Polystyrene	N/A	50

* Does not comply with SBS standards
** Collection plate

Phase Separation UNIFILTER®

The Phase Separation Plate allows for a quick separation of halogenated solvents from an aqueous phase, with no carryover and no close manual contact. The plate consists of a 2 mL, 96 Well, rigid glass-filled polypropylene body. It has long drip directors to ensure accurate dispensing of the filtrate. Whatman 1PS media is sealed into each well.

Whatman 1PS is a silicone-treated medium which remains impervious to aqueous solvents but allows the unimpeded passage of organic solvents. Providing that the solvent layer is in contact with the 1PS, the organic solvent layer will drain under gravity until the aqueous interface is reached, when flow will stop automatically. If subsequent harvesting of the aqueous layer is required, a vacuum can then be applied to collect this layer.

Phase Separation UNIFILTER

Ordering Information - Phase Separation UNIFILTER

Catalog Number	Well Format	Well Volume	Plate Material	Well Bottom	Quantity/Case
7720-7229-01	96	2 mL	Glass Filled Polypropylene	Phase Separation	1
7701-5750*	96	750 µL	Natural Polypropylene	Round Bottom	25
7701-5200*	96	2 mL	Natural Polypropylene	Round Bottom	25

* Collection plate

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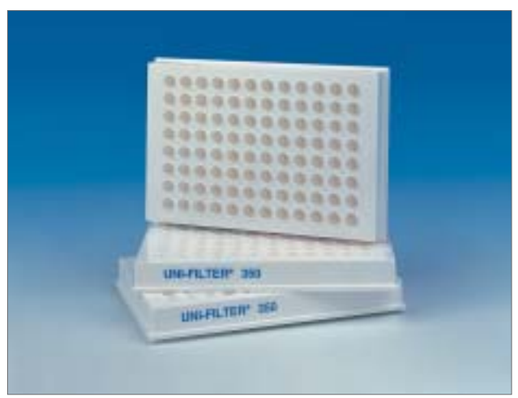
Protein Kinase Assay UNIFILTER®

The Protein Kinase Assay filter plate incorporates a P-81 filter in each well. P-81 is a cation exchanger that binds peptides but does not bind unincorporated ATP, resulting in low non-specific background noise and high sensitivity in kinase assay.

The filter plate is produced to SBS standards in rigid white polystyrene or Barex to eliminate optical cross talk problems during liquid scintillation counting. The 150 µL UNIFILTER has shallow wells enabling higher detection sensitivity.



Protein Kinase Assay UNIFILTER

Ordering Information - Protein Kinase Assay UNIFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Filter Media	Well Bottom	Drip Director	Quantity/Case
7700-3312	96	350	White Polystyrene	Whatman P-81	Filter	Short	50
7700-4312	96	350	White Polystyrene	Whatman P-81	Mesh	Mesh	50
7700-0512	96	150	White Barex	Whatman P-81	Mesh	Mesh	50
7705-0101*	96	N/A	Polyurethane	N/A	-	-	1

* Vacuum to waste manifold

Protein Precipitation UNIFILTER® FF

The Protein Precipitation UNIFILTER FF (Fast Flow) is optimized for removing acetonitrile precipitated proteins from plasma or serum samples. Made with 2 mL, 96 Well, rigid glass-filled polypropylene microplates, it is both robust and chemically resistant.

The plates contain specially formulated dual membranes with two distinct layers. The top layer acts as a prefilter to remove coarse particulates. The bottom layer is oleophobic for retaining the well contents without dripping. This provides a final filter for removing fine particulate matter when a vacuum is applied.

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Features and Benefits

- 96 samples purified at the same time
- Purified samples available in less than 10 minutes
- Precipitation and filtration in the same well
- No laborious pipetting and/or centrifugation required and minimal liquid handling
- Dual Whatman filter media
- Ensures no fluid loss during incubation and fast flow during filtration
- Over 98% protein removal
- Sample volumes up to 150 µL for plasma and 200 µL for serum
- SBS compatible
- Robotics friendly

Protein Precipitation UNIFILTER FF

Ordering Information - Protein Precipitation UNIFILTER FF

Catalog Number	Well Format	Well Volume	Plate Material	Well Bottom	Quantity/Case
7720-7235	96	2 mL	Glass Polypropylene	Standard	1
7720-7236	96	2 mL	Glass Polypropylene	Fast Flow	5
7701-5750*	96	750 µL	Natural Polypropylene	Round Bottom	25
7701-5200*	96	2 mL	Natural Polypropylene	Round Bottom	25

* Collection plate

96 Well Bacterial Growth Plate

The high-throughput Bacterial Growth plate can simplify and accelerate the growth of 96 individual 1.5 mL bacterial cultures. It is used for both overnight cultivation and the initial ‘spin down’ of bacteria. Made of medical grade polypropylene with a clear polystyrene lid, this gamma-irradiated plate eliminates the need to grow multiple, discrete cultures. It also optimizes space and efficiency in the incubator.

96 Well Bacterial Growth Plate

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Whatman has demonstrated that culture integrity is not affected by the close proximity of neighbouring cultures and that each culture grows to the same density as it would in individual culture tubes (at 325 rpm and 37°C for 16 hours).

Features and Benefits

- Consistent cell densities across all 96 Wells
- Eliminates cross contamination between wells
- Growth comparable to individual test tubes
- Ability to automate allows for increased productivity

Ordering Information - 96 Well Bacterial Growth Plate

Catalog Number	Well Format	Well Volume (mL)	Plate Material	Irradiated with Lid	Quantity/Case
7701-5205*	96	2	Polypropylene	Yes	25 (individually bagged)

* Collection plate

96 Well DNA Binding UNIFILTER®

Plasmid DNA Binding UNIFILTER works either as a stand-alone or as part of our high-throughput miniprep system.

Plasmid DNA is bound to the filter under chaotropic conditions, washed twice and then vacuumed to dryness on a vacuum manifold. The plasmid DNA is eluted by vacuum in a final volume of 100 µL into a non-binding polypropylene collection plate using water or TE^{-1} buffer. The DNA is ready to use and further ethanol precipitation is unnecessary. The final concentration is 50-100 ng/µL, depending on the original culture. The OD260/280 ratio is 1.9 and the yields in all 96 Wells 'max out' at 6 µg. Full protocol is available at www.whatman.com

The Plasmid DNA Binding plate can be used with both vacuum and centrifuge techniques, making it a vital and flexible tool in every high-throughput lab.

96 Well DNA Binding UNIFILTER

I.C.T, S.L.
INSTRUMENTACIÓN CIENTÍFICO TÉCNICA

Features and Benefits

- DNA recovery of 6 µg per well on average
- Consistent yield across all 96 Wells
- Eluted plasmid DNA is free of genomic DNA contamination
- High quality DNA suitable for PCR, restriction digestion and sequencing
- Save time: no desalting or ethanol precipitation
- No kit required, significantly reduces costs

Ordering Information - 96 Well DNA Binding UNIFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Filter Media	Quantity/Case
7700-2810	96	800	Clear Polystyrene	DNA Binding	25

96 Well Lysate Clarification UNIFILTER®

The Lysate Clarification UNIFILTER can utilize either vacuum or a centrifuge. The vacuum process is significantly easier to automate with consistency across all wells when used with the DNA Binding UNIFILTER; it also has an average DNA recovery rate 10-30% higher than the manual centrifuge method. This method filters out cell debris to obtain plasmid DNA in the aqueous phase.

Whatman filter technology results in high particle retention and fast flow rates while producing a clean lysate. The Lysate Clarification plate is an important tool for high-throughput plasmid DNA purification.

Features and Benefits

- Processes 96 lysates in less than 10 minutes
- Increases DNA recovery by 10-30%
- Consistent yield across all 96 Wells
- User flexibility of using either centrifugation or vacuum
- 96 Well format is easily automated

96 Well Lysate Clarification UNIFILTER

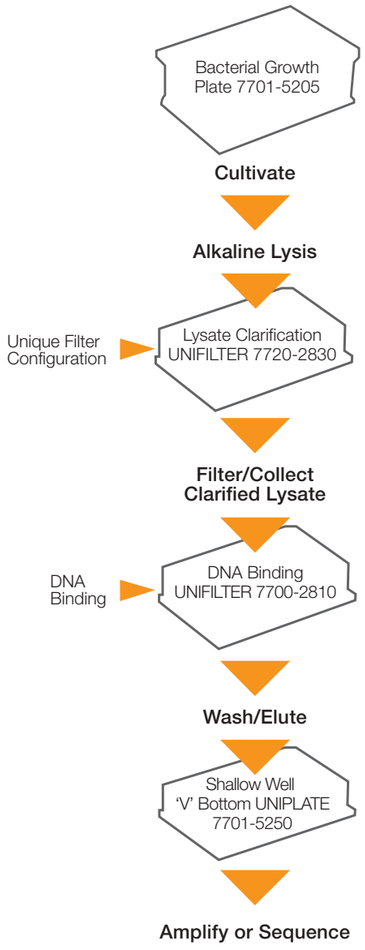
Ordering Information - 96 Well Lysate Clarification UNIFILTER

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Filter Media	Quantity/Case
7720-2830	96	800	Clear Polystyrene	Lysate Clarification	25

Plasmid Miniprep

The preparation of plasmid DNA from bacterial culture is an extremely common procedure. The Plasmid Miniprep System simplifies the process, increases the throughput and improves the purity of plasmid DNA.

The Plasmid Miniprep System consists of a few basic steps, each with an optimized microplate.



Average Yield Per Well	6.0 µg
A260/A280	1.94
EcoR1 Digest	Yes
Sequencing Accuracy (BLAST)	97% over 600 bp

Full protocol available at www.whatman.com

Ordering Information - Plasmid Miniprep

Catalog Number	Description Well Format	Well Volume	Plate Material	Well Bottom	Filter Media	Irradiated with Lid	Quantity/Case
7701-5205	96	2 mL	Natural Polypropylene	Round	-	Yes	25
7720-2830	96	800 µL	Clear Polystyrene	Filter, LDD†	Lysate Clarification	No	25
7700-2810	96	800 µL	Clear Polystyrene	Filter, LDD†	DNA Binding	No	25
7701-5200*	96	2 mL	Natural Polypropylene	Round	-	No	25
7701-5750*	96	750 µL	Natural Polypropylene	Round	-	No	25
7701-5250**	96*	250 µL	Natural Polypropylene	'V'	-	No	50
7705-0102	UniVac 3 vacuum/collect manifold						1

* Collection plate
** Does not comply with SBS standards
† LDD = Long drip director

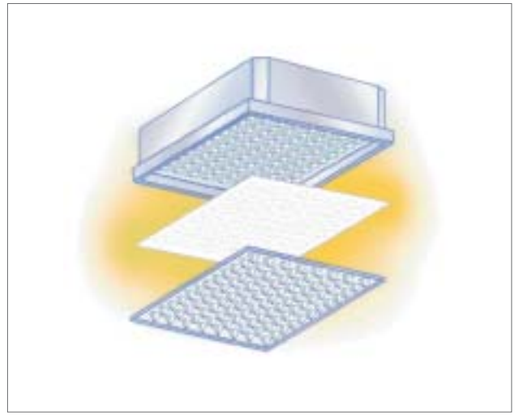
UNIFILTER® Filtration Microplates

The proprietary Whatman UNIFILTER microplates with filter-bottom wells are convenient and ready to use. Available in 24, 96 and 384 Well formats, UNIFILTER microplates offer a choice of filter media to meet exact application requirements.

The unique drip director design of Whatman UNIFILTER microplates ensures precise collection of the filtrate to allow for further processing and analysis. UNIFILTER microplates are available in a range of well volumes from 100 µL to 10 mL.

Features and Benefits

- No cross talk. Patented integral filter design prevents well-to-well cross contamination.
- Economical to use. Wide range of well volume options ensures efficient use of materials.
- Better control. Choice of filter media allows control of the flow rates and retention characteristics.
- Versatile. A broad range of filtration media is available including glass fiber, polypropylene, cellulose nitrate, cellulose acetate, nylon and ion exchange cellulose.



UNIFILTER Construction

Typical Data - UNIFILTER Filtration Microplates

Filter Media	Flow Rate*	Protein Binding	Hydrophilic	Solvent Resistance	Physical Strength	Thermal Resistance °C	General Comments
Cellulose Nitrate (CN)	4	High	Yes	Poor	Brittle	<125	Highly adsorptive membrane typically used for DNA/RNA/ protein hybridization, also for ELISA and RIA-based assays.
Cellulose Acetate (CA)	3	Low	Yes	Poor	Moderate	<120	Typically used for low protein binding applications, good wet strength. General purpose microbiological filter.
Polypropylene (PP)	2	Negligible	No	Very Good	Good	<80	Typically used for prefiltration. Sensitive to gamma sterilization. Very low extractables, chemically inert.

contd >

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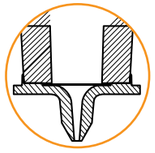
Filter Media	Flow Rate*	Protein Binding	Hydrophilic	Solvent Resistance	Physical Strength	Thermal Resistance °C	General Comments
Polyvinylidene Fluoride (PVDF) Hydrophilic**	4	Low	Yes	Good	Good	<135	Low protein binding, good chemical resistance. Widely used for sample preparation.
Glass Microfiber (GF)	5	Moderate	Yes	Very Good	Poor	High	Wide range available. Typically used as absorptive or adsorptive wicking media and prefilters. Excellent particle retention and resistance to clogging. Used for DNA binding.

* Flow rate: 1 = low, 5 = high
** Hydrophobic variants are available for high protein binding

24 Well 10 mL UNIFILTER Microplate

The 10 mL UNIFILTER microplate is widely used for applications that require very large sample or reagent volumes. Typically these applications include biomolecule purification by solid phase extraction and organic synthesis in combinatorial chemistry library generation.

The glass-filled polypropylene construction of the 10 mL UNIFILTER microplate enables chemical and heat-resistant operation. The long drip directors facilitate collection of filtrate with no cross talk.



24 Well 10 mL UNIFILTER Microplate

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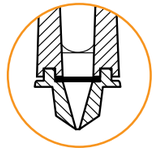
Ordering Information - 24 Well 10 mL UNIFILTER Microplate

Catalog Number	Well Format	Well Volume (mL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7700-9901	24	10	Natural Polypropylene	Long	Whatman GF/C	25
7700-9904	24	10	Natural Polypropylene	Long	25–30 µm Melt Blown Polypropylene	25
7700-9905	24	10	Natural Polypropylene	Long	1 µm PTFE Laminate	25
7700-9917	24	10	Natural Polypropylene	Long	10–12 µm Melt Blown Polypropylene	25

384 Well 100 µL UNIFILTER Microplate

The 100 µL UNIFILTER is the only 384 Well filter microplate with a 100 µL well volume to allow a large enough sample for recovery after filtration. Beneath the filter plate are long drip directors designed to eliminate well to well contamination during the filtration process.

The 384 Well filter plate has been successfully used for DNA template cleanup, cell capture and for the removal of unwanted debris.



384 Well 100 µL UNIFILTER Microplate

Ordering Information - 384 Well 100 µL UNIFILTER Microplate

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7700-1101	384	100	Clear Polystyrene	Long	Whatman GF/C	50
7700-1102	384	100	Clear Polystyrene	Long	Whatman Hydrophobic GF/C	50
7700-2106	384	100	Clear Polystyrene	Long	0.45 µm Hydrophilic PVDF	50
7700-2110	384	100	Clear Polystyrene	Long	DNA Binding	50
7700-2117	384	100	Clear Polystyrene	Long	10 µm Melt Blown Polypropylene	50

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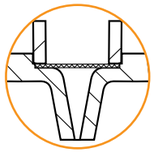
96 Well 2 mL UNIFILTER Microplate

The 2 mL UNIFILTER microplate is widely used for applications that require larger sample or reagent volumes. Typically these applications include biomolecule purification by solid phase extraction and organic synthesis in combinatorial chemistry library generation.



Glass Filled Polypropylene 96 Well UNIFILTER

The glass-filled polypropylene construction of the 2 mL UNIFILTER microplate enables chemical and heat-resistant operation. The long drip directors facilitate collection of filtrate with no cross talk.

Two filter media for the 2 mL chemically resistant filter plate are PKP and GF/D. Both are chemically resistant with the PKP used for retaining solvent, while the GF/D is used for fast flow rates.

Protein Precipitation UNIFILTER

Ordering Information - 96 Well 2 mL UNIFILTER Microplate

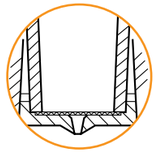
Catalog Number	Well Format	Well Volume (mL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7700-7201	96	2	Glass Filled Polypropylene	Long	Whatman GF/C	25
7700-7202	96	2	Glass Filled Polypropylene	Long	Whatman Hydrophobic GF/C	25
7700-7203	96	2	Glass Filled Polypropylene	Long	Whatman GF/B	25
7700-7204	96	2	Glass Filled Polypropylene	Long	25–30 µm Melt Blown Polypropylene	25
7700-7206	96	2	Glass Filled Polypropylene	Long	0.45 µm Hydrophilic PVDF	25
7700-7210	96	2	Glass Filled Polypropylene	Long	Whatman GF/F	25
7700-7211	96	2	Glass Filled Polypropylene	Long	Whatman GF/D	25
7700-7224	96	2	Glass Filled Polypropylene	Long	10 µm PP Membrane	25

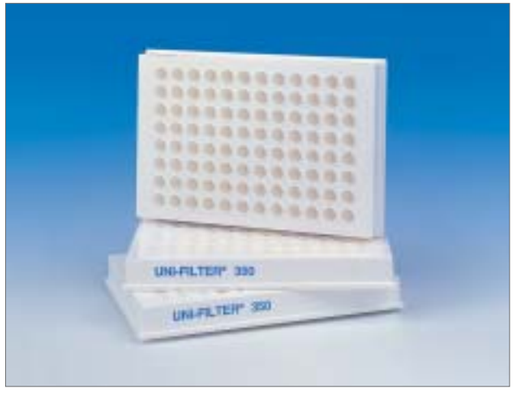
contd >

Catalog Number	Well Format	Well Volume (mL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7700-7228	96	2	Glass Filled Polypropylene	Long	Whatman Oleophobic PKP	10
7720-7229-01	96	2	Glass Filled Polypropylene	Long	Phase Separation	1
7720-7235	96	2	Glass Filled Polypropylene	Long	Protein Precipitation	1
7720-7236	96	2	Glass Filled Polypropylene	Long	FF Protein Precipitation	5

96 Well 350 µL UNIFILTER Microplate

The 350µL UNIFILTER is the plate of choice for filter-based assays in high-throughput screening (HTS). It is available in opaque white polystyrene for efficient use with liquid scintillation, fluorescence and chemiluminescence detections. The dimensions are compatible with most microplate readers for screening procedures. These plates are also available in clear polystyrene.





96 Well 350 µL UNIFILTER Microplate

Ordering Information - 96 Well 350 µL UNIFILTER Microplate

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7700-3301	96	350	White Polystyrene	Short	Whatman GF/C	50
7700-3302	96	350	White Polystyrene	Short	Whatman Hydrophobic GF/C	50
7700-3303	96	350	White Polystyrene	Short	Whatman GF/B	50
7700-3304	96	350	White Polystyrene	Short	25–30 µm Melt Blown Polypropylene	50
7700-3305	96	350	White Polystyrene	Short	0.45 µm PP Membrane	50
7700-3356	96	350	White Polystyrene	Short	0.45 µm Hydrophobic PVDF	50
7700-3306	96	350	White Polystyrene	Short	0.45 µm Hydrophilic PVDF	50
7700-3307	96	350	White Polystyrene	Short	0.45 µm Cellulose Nitrate	50
7700-3308	96	350	White Polystyrene	Short	0.45 µm Cellulose Acetate	50
7700-3310	96	350	White Polystyrene	Short	Whatman GF/F	50
7770-0001	96	350	White Polystyrene	Short	0.45 µm PVDF (phobic) and 0.45 µm PP	50

contd >

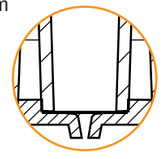
Catalog Number	Well Format	Well Volume (µL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7770-0006*	96	350	White Polystyrene	Short	0.45 µm PVDF (phobic) and 0.45 µm PP Irradiated with Lid	50
7700-3312	96	350	White Polystyrene	Short	Whatman P-81	50
7700-1301	96	350	Clear Polystyrene	Short	Whatman GF/C	50
7700-1303	96	350	Clear Polystyrene	Short	Whatman GF/B	50
7700-1305	96	350	Clear Polystyrene	Short	0.45 µm PP Membrane	50
7700-1356	96	350	Clear Polystyrene	Short	0.45 µm Hydrophobic PVDF	50
7700-1306	96	350	Clear Polystyrene	Short	0.45 µm Hydrophilic PVDF	50
7700-1308	96	350	Clear Polystyrene	Short	0.45 µm Cellulose Acetate	50

* Recommended for ELISPOT assays

96 Well 800 µL UNIFILTER Microplate

The 800 µL UNIFILTER is the microplate most typically used in purifications, isolations and separation of biomolecules, particularly DNA.

The microplate has a well volume of 800 µL, which is ideal for standard DNA plasmid miniprep chemistries. The choice of short or long drip directors is application specific. The UNIFILTER 800 µL is constructed from rigid high grade polystyrene.



96 Well 800 µL UNIFILTER Microplate

Ordering Information - 96 Well 800 µL UNIFILTER Microplate

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7700-1801	96	800	Clear Polystyrene	Short	Whatman GF/C	25
7700-1804	96	800	Clear Polystyrene	Short	25–30 µm Melt Blown Polypropylene	25
7700-1806	96	800	Clear Polystyrene	Short	0.45 µm Hydrophilic PVDF	25
7700-1808	96	800	Clear Polystyrene	Short	0.45 µm Cellulose Acetate	25
7700-1818	96	800	Clear Polystyrene	Short	5–7 µm Melt Blown Polypropylene	25

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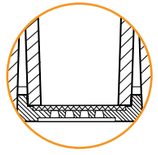
Catalog Number	Well Format	Well Volume (µL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7700-2801	96	800	Clear Polystyrene	Long	Whatman GF/C	25
7700-2803	96	800	Clear Polystyrene	Long	Whatman GF/B	25
7700-2804	96	800	Clear Polystyrene	Long	25–30 µm Melt Blown Polypropylene	25
7700-2805	96	800	Clear Polystyrene	Long	0.45 µm PP Membrane	25
7700-2806	96	800	Clear Polystyrene	Long	0.45 µm Hydrophilic PVDF	25
7700-2808	96	800	Clear Polystyrene	Long	0.45 µm Cellulose Acetate	25
7700-2809	96	800	Clear Polystyrene	Long	0.45 µm Nylon Positive	25
7700-2810	96	800	Clear Polystyrene	Long	DNA Binding Plate	25
7700-2811	96	800	Clear Polystyrene	Long	Whatman GF/D	25
7700-2817	96	800	Clear Polystyrene	Long	10–12 µm Melt Blown Polypropylene	25
7720-2830	96	800	Clear Polystyrene	Long	Lysate Clarification Plate	25
7700-2828	96	800	Clear Polystyrene	Long	Whatman Oleophobic PKP	10
7770-0062	96	800	Clear Polystyrene	Long	25 µm Melt Blown Polypropylene over 0.45 µm PP Membrane	25

96 Well UNIFILTER Microplate: Mesh Bottom

Mesh bottom UNIFILTER plates with 150 and 350 µL Wells are designed to accommodate rapid flow rates when vacuuming solutions to waste.



96 Well UNIFILTER Microplate: Mesh Bottom

Ordering Information - 96 Well UNIFILTER Microplate: Mesh Bottom

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Drip Director	Filter Media	Quantity/Case
7700-0512	96	150	White Barex	Mesh	Whatman P-81	50
7700-4301	96	350	White Polystyrene	Mesh	Whatman GF/C	50
7700-4302	96	350	White Polystyrene	Mesh	Whatman Hydrophobic GF/C	50
7700-4303	96	350	White Polystyrene	Mesh	Whatman GF/B	50
7700-4312	96	350	White Polystyrene	Mesh	Whatman P-81	50
7700-4313	96	350	White Polystyrene	Mesh	Whatman DE81	50

Collection Plates

Whatman microplates for collection and analysis are available in 24, 48, 96 and 384 Well formats, all unique to Whatman. These microplates are manufactured from polystyrene, polypropylene and Multi-Chem materials to accommodate a wide range of sampling and storage applications.

Multi-Chem™ Microplates

Multi-Chem is a chemically resistant material that exhibits extremely useful properties over a wide range of applications. Providing an excellent choice for storage applications, Multi-Chem microplates are ideal for aggressive organic solvents such as DMF, TFA, THF, acetonitrile, chloroform and methylene chloride. Non-binding properties of Multi-Chem microplates also make them ideal for storage of biological materials.

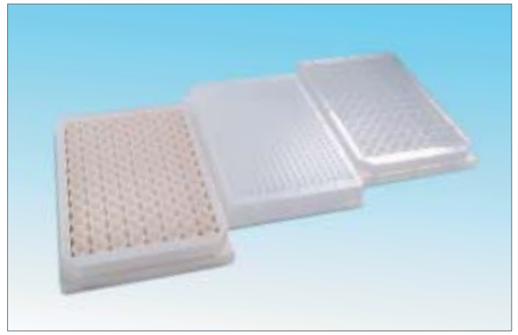
Multi-Chem Microplates

Ordering Information - Multi-Chem Microplates

Catalog Number	Well Format	Well Volume	Plate Material	Well Bottom	Quantity/Case
7701-6102	24	10 mL	Multi-Chem	Round	10
7701-6250	96	250 µL	Multi-Chem	‘V’	10
7701-6750	96	750 µL	Multi-Chem	Round	10
7701-6200	96	2 mL	Multi-Chem	Round	10
7701-6101	384	80 µL	Multi-Chem	‘V’	10

UNIPLATE™ 'V' Bottom Microplates

The 96 and 384 Well format UNIPLATE with 'V' bottom is ideal for applications with small sample volumes. The vertical sides of the well, combined with the 'V' design at the base of each well, ensure that all the material runs down the side walls and is channelled into the well base. The 'V' bottom ensures maximum sample recovery - typically approximately 99% liquid sample recovery is attained.



UNIPLATE 'V' Bottom Microplates

Ordering Information - UNIPLATE 'V' Bottom Microplates

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Well Bottom	Quantity/Case
7701-1250	96	250	Clear Polystyrene	'V'	50
7701-3250	96	250	White Polystyrene	'V'	50
7701-2250	96	250	Black Polystyrene	'V'	50
7701-5250*	96	250	Natural Polypropylene	'V'	50
7701-5101	384	80	Natural Polypropylene	'V'	50

* Does not comply with SBS standards

UNIPLATE™ Collection and Analysis Microplates

Whatman offers a wide range of UNIPLATE microplates including various well profiles, well volumes and well densities, in diverse polymer materials. Most UNIPLATE microplates conform to the ANSI/SBS microplate standard and fit most microplate readers and automated plate handling devices.

Whatman UNIPLATE microplates are suitable for a wide range of applications, including simple filtrate collection, when used in conjunction with our UNIFILTER microplates, as well as homogeneous assay techniques utilized in HTS.

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Features and Benefits

- Widest selection from a single source. Choice of well volumes ranging from 80 µL to 10 mL, well densities from 24 to 384 Wells with round or 'V' bottom for maximum recovery.
- Chemical compatibility. Available in chemically resistant polymers capable of withstanding low temperatures for long-term storage. Opaque plates prevent optical cross talk in light emitting assays.
- Conforms to SBS microplate standard.
- Guaranteed for use with robotic handlers and centrifuge carriers.

384 Well 400 µL UNIPLATE

Applications

- Sample storage
- Assay development
- High-throughput screening
- Plasmid miniprep
- ELISA assays
- Luminescence/chemiluminescence
- Cell culture
- Filtrate collection

UNIPLATE Collection Microplates

Ordering Information - UNIPLATE Collection and Analysis Microplates

Catalog Number	Well Format	Well Volume	Plate Material	Well Bottom	Irradiated with Lid	Quantity/Case
7701-0176	Single	75 mL	Clear Polystyrene	Flat with Grid	No	50
7701-7300*	24	3 mL	Black Polypropylene	Flat (Square Well)	No	25
7701-5102	24	10 mL	Natural Polypropylene	Round	No	25
7701-5110	24	10 mL	Natural Polypropylene	Round	Yes	25
7701-1150	48	1.5 mL	Clear Polystyrene	Flat	No	50
7701-5500	48	5 mL	Natural Polypropylene	Flat (Rectangular Well)	No	25
7701-5505	48	5 mL	Natural Polypropylene	Flat	Yes	25
7701-1350	96	300 µL	Clear Polystyrene	Flat	No	50

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Catalog Number	Well Format	Well Volume	Plate Material	Well Bottom	Irradiated with Lid	Quantity/Case
7701-3350	96	300 µL	White Polystyrene	Flat	No	50
7701-2350	96	300 µL	Black Polystyrene	Flat	No	50
7701-5350*	96	300 µL	Natural Polypropylene	Flat	No	50
7701-4350*	96	300 µL	White Polypropylene	Flat	No	50
7701-7350*	96	300 µL	Black Polypropylene	Flat	No	50
7701-1651	96	650 µL	Clear Polystyrene	Flat (Square Well)	No	50
7701-1750	96	750 µL	Clear Polystyrene	Round	No	25
7701-5750	96	750 µL	Natural Polypropylene	Round	No	25
7701-1800	96	800 µL	Clear Polystyrene	Flat	No	25
7701-5200	96	2 mL	Natural Polypropylene	Round	No	25
7701-5205	96	2 mL	Natural Polypropylene	Round	Yes	25
7701-1100	384	100 µL	Clear Polystyrene	Flat	No	50
7701-3100	384	100 µL	White Polystyrene	Flat	No	50
7701-2100	384	100 µL	Black Polystyrene	Flat	No	50
7701-5400	384	400 µL	Natural Polypropylene	Square to Round	No	25

* Does not comply with SBS standards

Specialty Microplates

Whatman offers a unique range of specialty microplates to meet the demanding requirements of sample preparation in the life sciences market.

Clear View™ Microplates

Whatman Clear View microplates have optically clear polymer bottoms. They eliminate the need for numerous transfer steps by providing the means to grow, observe, count and assay cells in a single device. Tissue culture treatment facilitates cell adhesion. Whatman Clear View microplates have a very low visible-wavelength absorbance background.

Ordering Information - Clear View Microplates

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Quantity/Case
No Surface Treatment, No Lid				
7706-2380	96	300	Black Polystyrene	50
7706-2103	384	100	Black Polystyrene	50
7706-3103	384	100	White Polystyrene	50
Tissue Culture Treated, Irradiated with Lid				
7716-2380	96	300	Black Polystyrene	50
7716-3380	96	300	White Polystyrene	50

Glass Bottom Microplates

Whatman Glass Bottom microplates are designed for high-sensitivity detection including fluorescent and luminescent detection and scintillation counting, where extremely low backgrounds with no cross talk are needed. Glass Bottom microplates have excellent uniformity in flatness and thickness (0.175 mm glass thickness) to provide optically clear as well as optically flat surfaces. This ensures confluence and planarity for confocal imaging and detection techniques.

Glass Bottom Microplates

They are suitable for FRET and GFP. The skirtless glass bottom plate allows the bottom of the plate to be positioned very close to microscope objectives. This is the plate of choice for Zeiss Confocal Microscopes. The Glass Bottom microplates are available in clear and black in a 96 Well format.

Features and Benefits

- Superior optical clarity
- Optics using single or dual wavelength probe
- Sensitive
- Absolute flatness

Applications

- Receptor-ligand interaction
- DNA-protein interaction
- Enzyme studies
- Cell based assays

Ordering Information - Glass Bottom Microplates

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Characteristics	Quantity/Case
Tissue Culture Treated, Irradiated with Lid, Standard Skirt					
7716-2375	96	300	Black Polystyrene	Glass	5
Tissue Culture Treated, Irradiated with Lid, Skirtless for Microscopy					
7716-2370	96	300	Black Polystyrene	Glass	5
No Surface Treatment, Standard Skirt					
7706-2375	96	300	Black Polystyrene	Glass	5
No Surface Treatment, Skirtless for Microscopy					
7706-1365	96	300	Clear Polystyrene	Glass	5
7706-2370	96	300	Black Polystyrene	Glass	5

UniCell™ Microplates

The UniCell 24 microplate is a versatile product that is specifically designed for cell culture.

The UniCell 24 consists of three components:

- 24 Well filtration microplate containing a polycarbonate membrane with a pore size of 0.4 µm
- 24 Well feeder tray with round wells which have a volume of 3.5 mL
- Polystyrene lid cover

The polycarbonate membrane is ideal for cell culture because it is not toxic to cells and will not inhibit cell growth. It is the ideal material to allow formation of a confluent monolayer of mammalian cells.

UniCell Microplates

The membrane becomes translucent when wet and retains its strength, allowing for the harvesting of cells either by sloughing or by mechanical removal off the membrane. The growth well, contained in the top microplate, sits neatly inside the feeder tray. Each well is completely sealed and sits in its own individual feeder well. The complete UniCell 24 is supplied irradiated and tissue culture treated. The clearance between the bottom of the membrane and the bottom of the feeder tray is 2 mm.

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Applications

- Permeability studies
- Co-cultivation
- Tissue resistance
- Cell migration
- Toxicology

Ordering Information - UniCell Microplates

Catalog Number	Well Format	Plate Material	Filter Media	TC Treated/Irradiated	Quantity/Case
7703-1400	24	Polystyrene	0.4 µm Polycarbonate Membrane	Yes	5

UniPCR™ Microplates

The UniPCR line of microplates is designed to meet the demanding needs of high-throughput genomics laboratories and is compatible with most thermocyclers. Suitable for PCR amplification, these microplates are produced with a special polymer for good thermal conductivity.

UniPCR Microplates

Ordering Information - UniPCR Microplates

Catalog Number	Well Format	Well Volume (µL)	Plate Material	Characteristics	Quantity/Case
7703-1901	96	200	Thin Walled, Clear Copolymer	PCR Thermal Cyclers	50
7703-1305	384	25	Thin Walled, Clear Copolymer	PCR Thermal Cyclers	50

*PCR is patented by Hoffman LaRoche Ltd

Multiwell Accessories

Whatman offers a line of multiwell plate accessories to simplify your testing processes. The product line includes capmats, seals, lids, vacuum manifolds and accessories for Biomek 2000 and F/X liquid handling systems.

Biomek® and Liquid Handling System Accessories

Designed specifically for the Biomek 2000 and F/X liquid handling systems from Beckman Coulter, Whatman Adapter Collars eliminate many of the problems common to generic vacuum systems such as cross contamination, unnecessary collection steps and the need for spacer plates.

The adapter collars are offered in two sizes to accommodate the wide range of Whatman specialty filter and collection plates - small, to enable collection into standard 300 µL collection and filter plates (~14 mm high), and medium, to accommodate collection into 800 µL collection and filter plates (~30 mm high). Chemically resistant and easy to install, Whatman Adapter Collars ensure quality is maintained in a wide range of high-throughput applications. When vacuuming to waste during wash steps, the 96 Well Filtrate Director assures crosstalk-free filtration by isolating the flow from each well without collecting it.

Adapter Collars for Biomek 2000

Ordering Information - Biomek Accessories

Catalog Number	Description	Quantity/Case
7705-0120	Small Whatman Collar	1
7705-0121	Medium Whatman Collar	1
7725-0118	96 Well Filtrate Director	25
Protocol*	PCR Cleanup 96-Biomek Protocol	1
Protocol*	Plasmid Miniprep 96-Biomek Protocol	1

* Note: Downloadable protocols are available at www.whatman.com

BugStopper® Microplate Capmat

Whatman BugStopper Capmats provide a simple and reliable method for venting cultures being grown in a 24 Well microplate. This reusable sterile closure, which is produced using chemically resistant biosafe silicone rubber, incorporates hydrophobic microfilters which provide an ideal vent for each well.

More efficient than plastic lids, test comparisons confirm that BugStopper Capmats improve cell growth and significantly reduce evaporation. The silicone rubber portion of the capmat reseals after puncture, thus keeping cell cultures sterile during inoculation or aspiration.

BugStopper Microplate Capmat

Sterile Venting Closures for Microplate Cultures

- More efficient than plastic lids. Perfect for extended growth of slow growing bacteria and fungi.
- Positive seal for every well. Significantly reduces evaporation rate and eliminates well-to-well cross contamination.
- Autoclave and reuse. Cost-effective; repeated autoclave cycles do not affect gas exchange or retention capabilities.
- Rated 99.9% efficient for bacteria and viruses. Restricts microorganisms while allowing O_2 and CO_2 to pass through the membrane.
- Prevents aerosol formation. Suitable for growth of infectious microorganisms.

Ordering Information - BugStopper Microplate Capmat

Catalog Number	Well Format	Item	Material	Quantity/Case
7704-0014	24	BugStopper Venting Capmat for 10 mL Microplates	Silicone Rubber	5
7701-5102*	24	Growth Plate, 10 mL, Round-bottom	Polypropylene	25

* Collection plate

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Flexible Capmats

Whatman Flexible Capmats individually seal the top of each well. Capmats may be used on either filter or collection microplates.

Flexible Capmats

Ordering Information - Flexible Capmats

Catalog Number	Well Format	Capmat Material	Microplate Compatibility	Quantity/Case
Capmats				
7704-0004	96	Square Format EVA	2 mL Microplates	100
7704-0005	96	Round Format EVA	750 µL and 800 µL Microplates	100
7704-0006	48	Rectangular Format EVA	5 mL Microplates	100
7704-0007	24	Square Format Santoprene	10 mL Microplates	100
7704-0015	384	Square Format Santoprene	400 µL Microplates	100
Pierceable Capmats				
7704-0104	96	Square Format Silicone	2 mL Microplates	50
7704-0105	96	Round Format Silicone	300 µL, 750 µL and 800 µL Microplates	50
7704-0115	384	Square Format Silicone	100 µL and 400 µL Microplates	50
Venting Capmats (autoclavable)				
7704-0014	24	BugStopper Venting	10 mL Microplates	5

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Lids

Lids are suitable for using as dust covers and to prevent splashing or contamination when plates are being moved around the laboratory.

Polystyrene Microplate Lids

Ordering Information - Lids

Catalog Number	Lid Material	Quantity/Case
7704-1001	Clear Polystyrene Universal Lid	100
7704-1002	Natural Polypropylene Lid	100

Seals

Seals are used to control humidity and reduce evaporation of samples. They prevent spills and contamination. Cold seals are self-sticking with inert adhesive. Heat seals are available in a clear polypropylene or aluminum foil. Heat seals are for polypropylene microplates only and are applied with heat and pressure.

Microplate Seals

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Ordering Information - Seals

Catalog Number	Description	Quantity/Case
7704-0001	Clear Polyester Thin Cold Sealing Film, Adhesive Backing, 0.05 mm thick	100
7704-0009	Clear Polypropylene Cold Sealing Film, Adhesive Backing, 0.05 mm thick	100
7704-0002	Aluminum Foil, Applied with Heat and Pressure	100
7704-0003	Clear Polypropylene Film, Applied with Heat and Pressure	100

UniVac™ Vacuum Manifolds

UniVac 1 Vacuum to Waste Manifold

The Whatman UniVac 1 is a single station unit that can be used for evacuating all liquid from a filter plate to waste, when the filtrate is not required for further analysis.

UniVac 3 Vacuum to Collect Manifold

The Whatman UniVac 3 is a universal filter/collection manifold designed to hold all the UNIPLATE formats from 100 µL to 10 mL.

The specially designed drip directors beneath the UNIFILTER plate ensure that the filtrate is directed into the corresponding well of the receiving UNIPLATE. The UniVac 3 comes complete with vacuum gauge, regulator and two-way control valve.

UniVac 1 Vacuum to Waste Manifold

UniVac 3 Vacuum to Collect Manifold

Ordering Information - UniVac Vacuum Manifolds

Catalog Number	Description	Quantity/Case
UniVac 1 Vacuum to Waste Manifold		
7705-0101	Polyurethane Vacuum Manifold for Filtering to Waste	1
UniVac 3 Vacuum to Collect Manifold		
7705-0102	Teflon Coated Aluminum Filter/Collect Vacuum Manifold for Volumes from 100 µL to 10 mL	1
7705-0106	Solid Teflon Filter/Collect Vacuum Manifold for Volumes from 100 µL to 10 mL	1
7705-0107	Acrylic Filter/Collect Vacuum Manifold for Volumes from 100 µL to 10 mL	1
7705-0108	Replacement Viton gaskets for Filter/Collect Manifold	5
7705-0109	Replacement Viton o-rings for Filter/Collect Manifold	5

VacAssist™ Vacuum Assist Frame

The Whatman VacAssist is a thin, transparent Teflon membrane stretched inside a light metal frame that fits on top of the UNIFILTER during the vacuuming process. If one well empties before the others, this patented device automatically seals the mouth of the empty well, allowing the other wells to evacuate. One VacAssist is supplied with each UniVac 3.

VacAssist Vacuum Assist Frame

Ordering Information - VacAssist Vacuum Assist Frame

Catalog Number	Description	Quantity/Case
7705-0112	Vacuum Assist Frame	1

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LabSciences Products

To find out more about the LabSciences products on the next few pages, as well as many others, please refer to our new Whatman LabSciences Product Guide - # 12006L.

Filter Papers and Membranes

Qualitative Filter Papers

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

Qualitative Filter Papers

Glass Microfiber Filters

Whatman offers two types of glass microfiber filters manufactured from 100% borosilicate glass: binder-free glass microfiber that is chemically inert and binder glass microfiber.

Glass Microfiber Filters

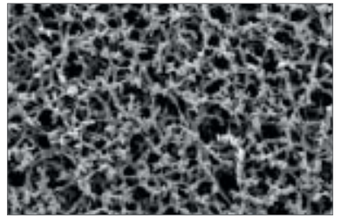
Track-Etched Membranes

Whatman offers a complete range of track-etched membranes manufactured using proprietary Whatman technology to produce a precision membrane filter with a closely controlled pore size distribution. These membranes include Cyclopore® polycarbonate and polyester, Nuclepore® polycarbonate, chemotaxis membranes, black polycarbonate and polycarbonate membranes for cell culture.

Track-Etched Membranes

Cellulose Nitrate Membranes

Recommended for the majority of routine applications, this membrane type is manufactured under strictly controlled cleanroom conditions. Usually, it can directly replace the general purpose membrane filters of other manufacturers without requiring any significant change of technique.



Cellulose Nitrate Membranes

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Filtration Devices

Polycap™ AS

Polycap AS is a unique product 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.

Polycap AS

GD/X®

Whatman GD/X disposable syringe filters are the ideal choice for the preparation of hard-to-filter samples. Compared to an unprotected membrane, GD/X syringe filters can process three to seven times more sample volume.

GD/X

Mini-UniPrep™

Simple, Innovative, Convenient. The Whatman Mini-UniPrep syringeless filters, now with a new durable plastic cap, provide a faster, easier way to remove particulates from samples being prepared for High Performance Liquid Chromatography (HPLC) analysis. In fact, Mini-UniPrep lets you prepare samples in one third the time required by other methods.

Mini-UniPrep

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Microbiology

Membrane Butler

The Membrane Butler offers optimal handling for all MicroPlus and ME membrane filters with the type name ‘STL’. The dispenser box is placed in the Membrane Butler, the sterile packing is inserted into the roller system and the system is ready.

Membrane Butler

Monitors

Microbiological monitors are ideal for monitoring contaminants in liquid samples from raw materials to finished products.

Monitors

NutriDisk®

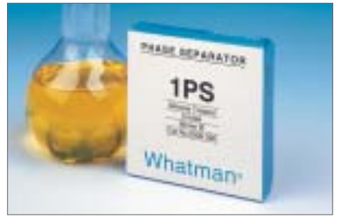
NutriDisk is an alternative to traditional agar plates. Colony counting identifications and selective microbial determinations can be carried out particularly easily with NutriDisk.

Extraction Products

1PS Separator Paper

The 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.

NutriDisk



1PS Separator Paper

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Specialty Products

Benchkote®

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.

Benchkote

Weighing Papers – Kjeldahl

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. The fastest, safest and most comfortable way to transfer Kjeldahl samples.

Weighing Papers – Kjeldahl

Chromatography

Advanced Ion Exchange Cellulose

Whatman Advanced Ion Exchange Cellulose (AIEC) products are ideal for the separation of biopolymers and are suitable for a wide variety of applications.

Advanced Ion Exchange Cellulose

Purasil™

Whatman Purasil high purity silica gel provides an excellent separation medium for flash chromatography purification of target molecules. Narrow particle size distribution and minimal fines enable fast separations with no loss of chromatographic performance.

UniSep

The UniSep HPLC column is the newest C-8 reverse phase HPLC column from Whatman. Using state-of-the-art technology, UniSep was developed for conditions that call for a highly aqueous mobile phase.

Purasil

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HEPA-VENT™
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Micro Punch™
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Multi-Chem™
NC™
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PlantSaver™
Polycap™
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VectaSpin™ 20
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