Whatman®

Leaders in Separations Technology

Product Guide 2004–2005

How to Find the Products You Need

Using this Product Guide

This new Whatman Product Guide provides a wealth of product and general reference information, all presented in a way that simplifies your selection process.

Choose from the three paths below to find the Whatman product to meet your specific needs.

1. Know the Product Type?

If you know the type of product you're looking for, such as Filter Paper or Membranes, you can quickly find it through the table of contents on page 1.

2. Know the Product Name or Catalog Number?

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

3. Know the Industry Application?

Our new Application Finder (following pages) allows you to easily locate Whatman products by industry or application.

For additional assistance, contact Whatman:

North America
Customer Service:
1.800.631.7290
Technical Support:
1.800.922.0361

Europe
+44 (0) 1662 676670

Japan
+81 (0)3 3832 6707

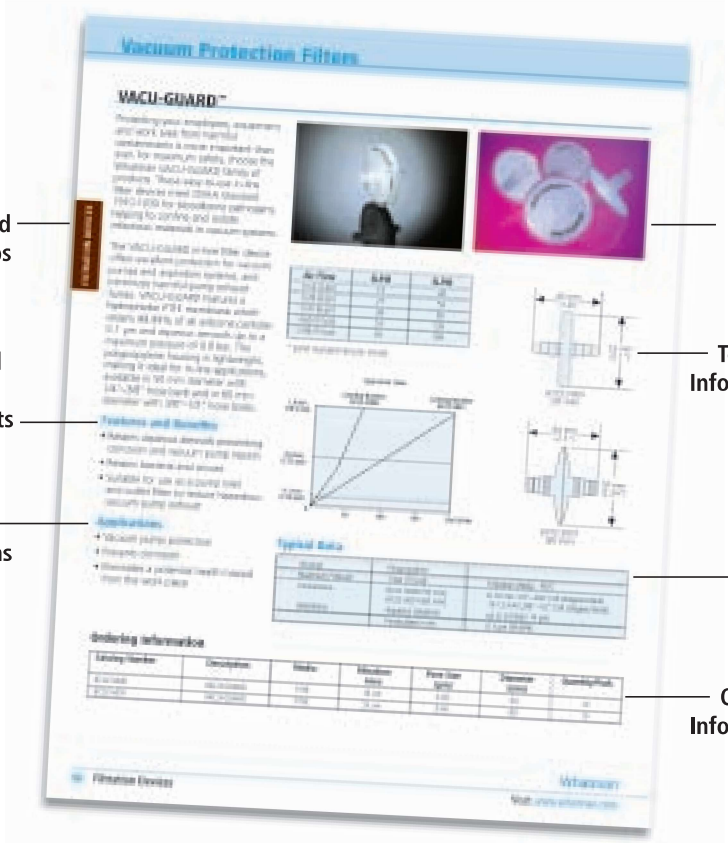
Asia Pacific
+65 6534 0138

China
86 21 6443 7176

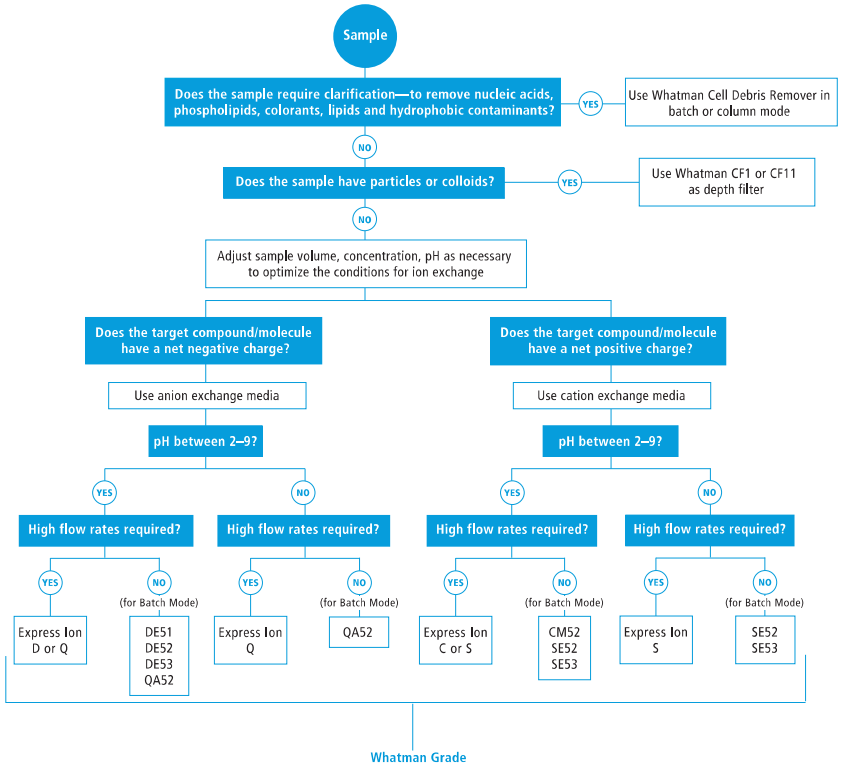
India
91 22 529 7035

Whatman®
www.whatman.com

Individual product pages provide in-depth information.



Quick Pick Reference Charts help you determine the right products to meet your needs.



How to Find the Products You Need

Whatman Products Make Solutions Possible

Whatman filters are world-renowned. For example, Whatman cellulose filter paper Grade No. 1 is the world standard for general use. Whatman high efficiency glass microfiber GF/D filters faster than competitive filter papers, while Anopore® membrane filters retain the finest particle size, down to 0.02 µm.

Whatman is not just a filter paper company, but a world leader in separations technologies. Our full line of high quality products ranges from cellulose and glass microfiber for general filtration, to Mini-UniPrep™ Syringeless Filters that simplify HPLC sample preparation, to unique FTA® products for collecting, archiving and purifying DNA.

Combining reliability with ease-of-use, Whatman products enable companies in many industries to innovate, streamline their processes and speed up time-to-market.

On this page, you'll find specific examples of unique ways Whatman products are helping companies achieve competitive advantage. ■

Genomics

Whatman products 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.

Basic Analytical Lab Processes

Ranging from simple clarification with Whatman filter papers, to pH papers, to thimbles for solvent extraction, Whatman products are considered the standard for basic laboratory processes.

Environmental Monitoring

Whatman products are widely used in EPA and ASTM protocols for environmental monitoring. For example, total suspended solids analysis methods for wastewater require Whatman 934-AH glass microfiber papers. Asbestos analysis is accomplished with Whatman Nuclepore® track-etched membranes.

Pharmaceutical

Whatman helps pharmaceutical companies increase productivity. Mini-UniPrep Syringless Filters reduce HPLC sample preparation time and consumables usage. Whatman DE52 ion-exchange resins are used for purification of critical therapeutics. Whatman track-etched membranes are used for liposome extrusion. Whatman FTA Cards provide pharmaceutical companies with the fastest, easiest, least expensive way to collect, archive and purify human DNA samples for drug trial testing.

Food & Beverage

Whatman Partisil HPLC columns are used in QA/QC steps for analysis of caffeine by a major beverage manufacturer. Whatman GD/X syringe filters are used to clarify orange juice prior to QC analysis.

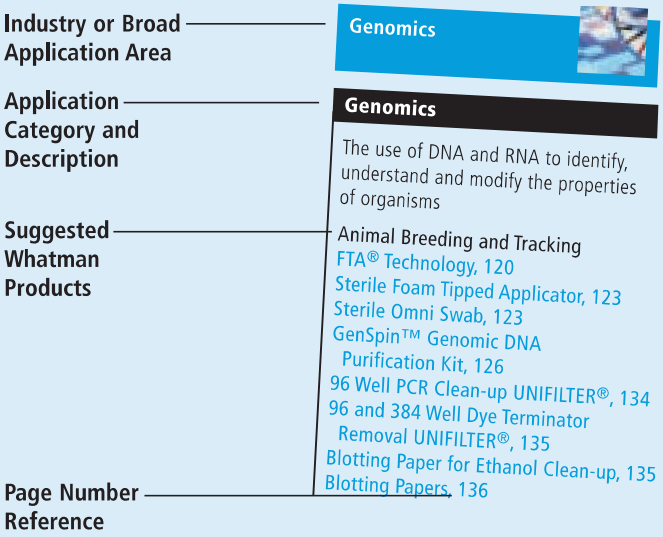
Find the Products You Need by Industry and Application

Customer Service: **1.800.631.7290**
Technical Support: **1.800.922.0361**
Web Site: **www.whatman.com**

How to Use This Chart

This chart is designed to allow you to quickly locate a Whatman product by industry and application. The industry or broad application area, such as Food and Beverage, is shown within the blue bar. The black bar highlights an application, such as QA/QC, with very specific applications listed below. The most appropriate Whatman products suggested for each specific application are shown in blue with the corresponding catalog page number.

For technical assistance in finding the Whatman product that meets your needs, please contact Whatman Technical Support at 1.800.922.0361.



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Genomics

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Pharmaceutical, Biotechnology, Medical Research, Life Science Research, Speciality Chemicals

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The discovery of new pharmaceutical, therapeutic and biotech products for human and animal uses

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Welcome

Dear Valued Whatman Customer,

Since our founding in 1740, Whatman has been committed to providing product excellence and unparalleled customer service. Although our technologies have evolved infinitely over the years, we remain a customer-focused business with a passion for delivering the highest quality solutions.

In laboratories across the globe, the Whatman name is synonymous with quality, reliability and ease-of-use. From filter papers and membranes, to disposable filtration devices, to groundbreaking technology for capturing and archiving DNA at room temperature, Whatman products have a reputation for working right the first time—and every time. Which is why Whatman products are specified for the most exacting applications across a whole range of industries.

Whatman can meet the filtration and separations needs of virtually any lab with the right product at the right time. Our experts play a consultative role with customers, helping to provide the best solutions to meet specific requirements. Our innovative technology simplifies complex processes, accelerating the rate of discovery. Whatman service representatives are knowledgeable and responsive, offering timely support and in-depth technical information. Through partnerships with the world's leading laboratory supply distribution companies, we ensure speedy delivery of products to your lab.

In short, no matter what industry you are in, or what type of research you are conducting, Whatman will help you achieve your goals.

Sincerely,

Howard Kelly
Chief Executive Officer

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New Products. New Solutions.

Whatman has developed a whole range of new and improved products to enhance lab productivity and make your job easier. Here are some brief highlights of the new products featured in this catalog. For more details, please see the individual page listings referenced below. Or feel free to contact a Whatman Technical Support representative at 1.800.922.0361 or visit our Web site, www.whatman.com.

NEW Mini-UniPrep™

PAGES 76-79

The new and improved family of Mini-UniPrep Syringeless Filters.

THEY'RE HUGE!

Our family of Mini-UniPrep Syringeless Filters provides a faster, easier way to remove particulates from samples being prepared for High Performance Liquid Chromatography (HPLC). New for 2004, the Mini-UniPrep is manufactured with a durable plastic cap for consistent superior performance, a Slit Septa cap option for high throughput automation and an amber colorant version to protect samples from UV degradation.

Prepare HPLC samples three times faster

Choose the Mini-UniPrep that meets your specific needs:

Mini-UniPrep™ P. 76

Why do anything in eight steps you can do in three? Mini-UniPrep cuts time-consuming steps out of the HPLC sample preparation process, greatly enhancing your productivity. With fewer steps in the process, you'll also dramatically reduce your expenditure for consumables.

The Mini-UniPrep Syringeless Filter on the left is shown with fluid in the chamber. On the right, the filter plunger is shown compressed with the sample ready for analysis

Slit Septa Mini-UniPrep™ P. 77

What could be more huge than Mini-UniPrep? Automated Mini-UniPrep! Our new Slit Septa cap enables use with current robotics on HPLC instruments, greatly enhancing lab efficiency and lowering costs.

Maximize lab productivity with automated sample prep

Amber Mini-UniPrep™ P. 77

Amber colorant prevents photo degradation of light-sensitive samples.

Amber Mini-UniPrep incorporates the same amber colorant used to protect pharmaceuticals from UV degradation

Whatman®

NEW Polycap™ GW

P. 96

The new Whatman Polycap GW Capsule makes ground water analysis fast and easy. Ideal for organizations that must meet strict environmental protocol standards.

PolyCap GW is trusted by the word's leading environmental monitoring organizations

NEW Polycap™ TC

P. 94

The new Whatman Polycap TC 0.8/0.2 µm High-Capacity Sterilizing Grade Capsule provides unsurpassed performance for sterile filtration of biological and tissue culture solutions.

Polycap TC capsules make sterile filtration easy

NEW EasyDisc™ 25 mm

P. 71

New EasyDisc lets you reduce preparation time and costs for customers that test large numbers of samples—without compromising quality.

EasyDisc is the newest addition to the complete family of quality Whatman syringe filters

NEW Purasil™ 60Å Silica Gel

P. 163

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.

Purasil 60Å Silica Gel features high resolution and excellent flow rates

NEW UniSep HPLC Column

P. 159

The UniSep 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 UniSep HPLC Column allows for greater flexibility when developing methods for highly water soluble components

NEW Dye Terminator Removal UNIFILTER®

PAGES 111 & 135

Add your own gel filtration media for quick, inexpensive cleanup of 96 or 384 sequencing reactions.

This UNIFILTER is ideal for high throughput sequencing reaction clean up

NEW Protein Precipitation UNIFILTER® FF

P. 112

Simplify your drug metabolism studies with this filter plate. Add plasma or serum, then acetonitrile or isopropanol. The oleophobic filter holds the mixture while protein precipitates and removes the precipitate when vacuum is applied.

This UNIFILTER is available in two models—fast flow and standard

NEW 384 Well PCR Cleanup UNIFILTER®

PAGES 110 & 134

Process 384 samples quickly with greater than 85% recovery. The Whatman PCR Cleanup UNIFILTER eliminates time-consuming precipitations and labor-intensive resin purifications.

Purify 384 PCR reaction products quickly and easily

Whatman®

NEW BugStopper™ Microplate Capmat

P. 114

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.

Test results prove these capmats improve cell growth

NEW FTA® Technology

PAGES 120-122

BloodSaver FTA® Card

Archive your blood samples and process for DNA and RNA analysis on FTA in this 96 well format.

PlantSaver FTA® Card

Collect plant DNA in the field on this customized FTA format.

FTA® Kit

Consists of 25 FTA Micro Cards, FTA purification reagent and UniCore Punches.

Kit includes cards, punches, reagent and a cutting mat

NEW Clone Archiving

P. 125

SPOT CloneSaver/BloodSaver Holder

This rigid frame holds CloneSaver and BloodSaver cards firmly in position for automated application of samples.

Ordering Information

Convenient Ordering from Your Local Laboratory Supply Distributor

Whatman has partnered with the leading laboratory supply distributors to provide you with convenient and cost-effective ordering and shipping. Please contact our Customer Service Department for the distributor nearest you at 1.800.631.7290 or visit our Web site at www.whatman.com.

When ordering, please specify the following:

- Catalog Number
- Brief Description
- Quantity

Quick Ship Delivery

The Whatman Quick Ship Program is specifically designed to provide responsive shipping of Whatman products to your lab. Our distributors maintain stock of a wide range of Whatman products. Whatman products not stocked by our distribution partners can be drop-shipped directly to you from our warehouse.

Satisfaction Guaranteed

Purchase any Whatman Laboratory products from an authorized Whatman distributor and evaluate it in your own application within 45 days of purchase. If the product does not satisfactorily meet your needs, Whatman will exchange it for any other Whatman product of equal value, or arrange for full credit through the delivering authorized distributor.

Limits of Liability

Products described are intended for laboratory use only.

Technical Information

For detailed technical information please contact our Technical Support Department at 1.800.922.0361

To Contact Whatman Inc.

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- For product availability and delivery information, contact Customer Service at:
  1.800.631.7290
  Or by Fax: 1.973.773.3991

Terms and Conditions of Sale

Sale of any material or performance of any work hereunder is expressly subject to the terms and conditions hereof, and placement of an order for the purchase of any material or performance of any work shall constitute assent to said terms and conditions. Any additional or different terms or conditions set forth in any such order or other communication from Buyer shall not be effective or binding unless assented to in writing by Whatman Inc.

Any tax or other Governmental charge on the performance, production, sale, and/or shipment of the subject matter hereof now imposed by Federal, State, or Municipal authorities, or hereafter becoming effective for or during the period hereafter, shall be added to the price herein provided.

Whatman warrants to Buyer that any material furnished and delivered by Whatman hereunder shall be free from defects in material or workmanship and shall be of the kind and quality specified herein. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, IMPLIED, OR STATUTORY. NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.

Any and all claims with respect to any materials or workmanship are waived unless written notice of defects is given to Whatman within thirty (30) days from the date of delivery hereunder. Whatman's sole liability on any claim of any kind, including, without limitation, breach of warranty or negligence, for any loss or damage arising hereunder, shall be limited to repayment to Buyer for the purchase price of the material in respect of which such claim is made. In no event, whether as a result of breach of contract or warranty, express or implied, or alleged negligence, shall Whatman be liable for special, indirect, punitive, or consequential damages.

Whatman shall not be liable for failure to perform in whole or in part if occasioned by: acts of God or the public enemy, fires, explosions, floods, war, riot, sabotage, accidents, labor disputes (from whatever cause arising), Government action or interruption, shortage or failure of normal sources of supply of materials, power or equipment, or any other circumstances whether of like or different character beyond the reasonable control of Whatman.

Whatman MAKES NO WARRANTY THAT ANY MATERIAL DELIVERED HEREUNDER WILL NOT INFRINGE THE CLAIMS OF ANY PATENT, by reason of the use or sale of the material itself or by reason of the use thereof in combination with other material or in the operation of any process, art or manufacture. Buyer assumes sole responsibility for results (including damages) occasioned by the use of such material by itself or in combination with other materials. The Whatman range of laboratory filters is specifically designed to adhere to critical standards for performance, purity and reproducibility.

Filter Papers and Membranes

Qualitative Filters

These 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. Whatman provides a wide range of Qualitative Filters to meet your specific needs.

Grade 1

11 µm—a medium retention and flow rate filter for routine applications, including soil analysis and seed testing procedures, food industry testing, air pollution monitoring and gas detection.

Grade 2

8 µm—more absorbent and slightly more retentive with a slower filtration speed than Grade 1. Available prepleated as Grade 2V. Used for monitoring specific contaminants in the atmosphere and in soil testing.

Grade 3

6 µm—a thick filter with good loading capacity, fine particle retention and increased strength. The extra thickness gives increased wet strength and makes the filter suitable for use in Büchner funnels. The high absorbency is particularly valuable when the filter is used as a sample carrier.

Grade 4

20–25 µm—offers high flow rate with good retention of larger particles and gelatinous precipitates such as ferric hydroxide and aluminum hydroxide. Also used as a rapid filter for routine cleanup of biological fluids or organic extracts and for rapid air pollution monitoring where collection of fine particles is not critical.

Grade 5

2.5 µm—the most efficient qualitative filter. Used for collecting small particles and has a slow flow rate. Suitable for chemical analysis clarifying cloudy suspensions, and for water and soil analysis.

Grade 6

3 µm—twice as fast as Grade 5 with similar particle retention. Often specified for boiler water analysis.

Wet Strengthened Filters

Wet strengthened qualitative filters contain a small quantity of a chemically stable resin to give improved wet strength. This does not introduce any significant impurities into the filtrate but because the resins contain nitrogen, these grades should not be used in Kjeldahl estimations.

Grade 91

>10 µm—a general-purpose crêped filter for less critical routine analysis. Widely used to assay sucrose in cane sugar and within pharmaceutical laboratories for routine filtration.

Student Grade/Grade 93

>10 µm—widely used in universities, colleges and schools for general laboratory filtration and coarse sample preparation. Available in a dispenser pack, which can be attached to the wall, placed on a shelf either upright or flat and used as a normal carton. Each dispenser pack contains 50 envelopes of 25 circles each.

Grade 113

30 µm—a crêped filter with high-loading capacity and the fastest flow rate of any qualitative grade. This is the thickest filter in the range and is extremely strong. Grade 113 is ideal for use with coarse or gelatinous precipitates. It is available prepleated as Grade 113V.

Grade 114

20–25 µm—half the thickness of Grade 113, this is a very strong filter with a smooth surface for easy recovery of precipitates. It is suitable for coarse or gelatinous precipitates. Also available prepleated as Grade 114V.

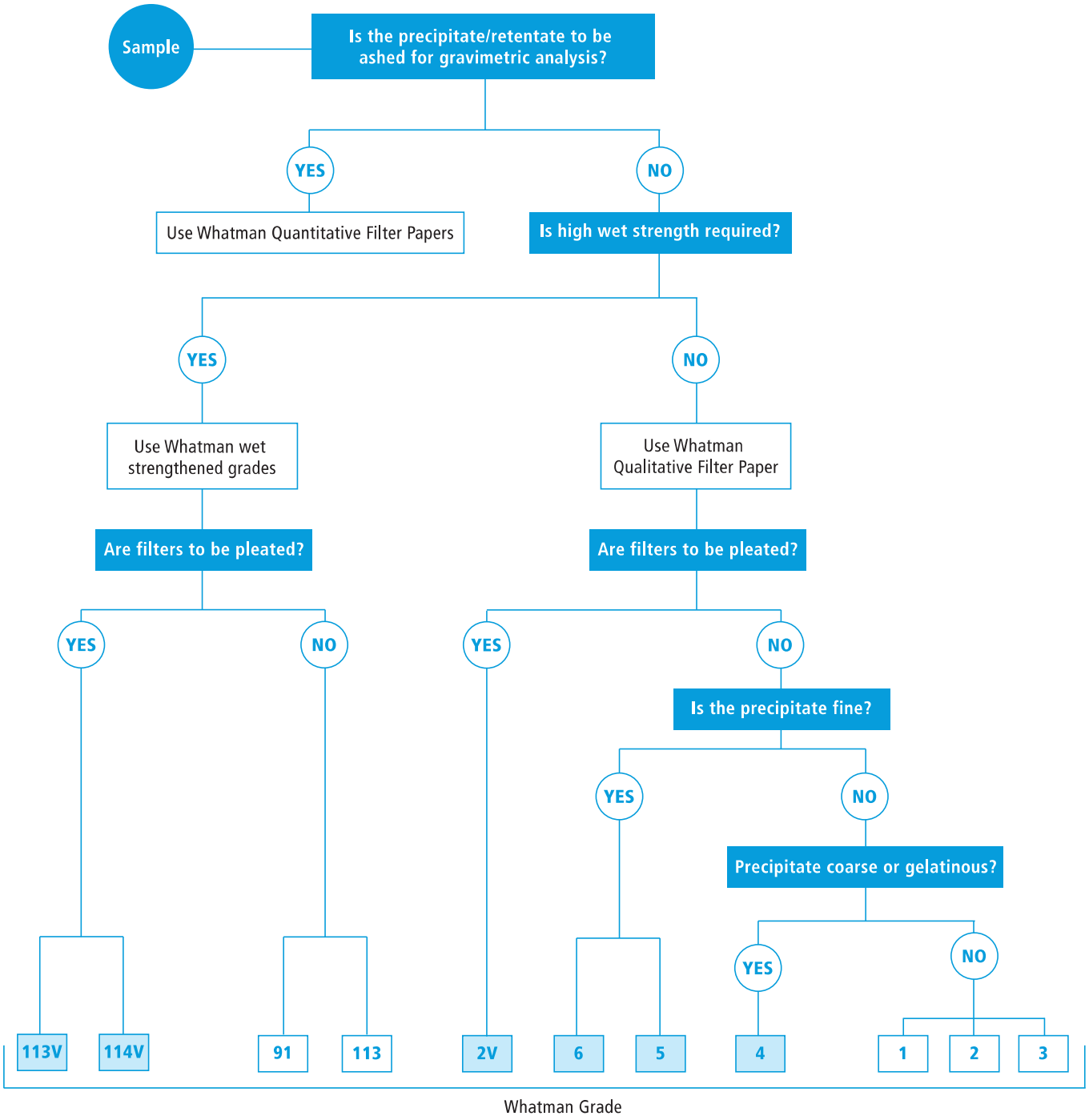
Note: For Disposable Filter Funnels, see page 54.

Cellulose filters are selected according to the required particle retention efficiency, fluid flow rate and loading capacity. Wet strength, chemical resistance, purity and ash levels are further considerations. The filter diameter selected will depend on the volume of liquid to be filtered. The maximum practical volume of the most popular disc sizes (quadrant folded) are:

Diameter (mm)	Volume (mL)
125	35
150	75
185	135
240	300

See Technical Appendices Page 177 for selection of Filter Funnels for use with filter papers.

Qualitative Filter Paper Quick Pick Reference Chart



Quantitative Filters

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, for routine quantitative techniques
- Hardened low ash: 0.015% ash maximum, very high wet strength
- Hardened ashless: 0.006% ash maximum, very high wet strength

Ashless Filters

Whatman ashless filters are produced from high quality cotton linters under carefully controlled conditions. These very pure filters are ideal for a wide range of critical analytical filtration procedures.

Grade 40

8 µm—general purpose ashless filter with medium speed and particle retention. Applications include gravimetric analysis, the filtration of solutions prior to atomic absorption spectrophotometry and in air pollution monitoring.

Grade 41

20–25 µm—the fastest ashless filter is recommended for analytical procedures involving large particles or gelatinous precipitates such as iron or aluminum hydroxides. Also used in quantitative air pollution analysis for determining gaseous compounds at high flow rates.

Grade 42

2.5 µm—filter with the finest particle retention of all Whatman cellulose filters. Typical analytical precipitates include barium sulfate, metastannic acid and finely precipitated calcium carbonate.

Grade 43

16 µm—a moderately fast filter used for foodstuff analysis, soil analysis, particle collection in air pollution monitoring and inorganic analysis in the construction, mining and steel industries.

Grade 44

3.0 µm—gives the lowest ash weight for any given disc size. Slightly less efficient for collecting small particles than Grade 42 but has a higher flow rate.

Hardened Low Ash Filters

Hardened low ash filters are treated with a strong acid to 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.

Grade 50

2.7 µm—the thinnest filter with a slow flow rate and good particle retention characteristics. The hardened surface is virtually free from loose fibers. In the electronics industry, the virtual absence of fiber shedding is utilized in carriers for integrated circuits.

Grade 52

7 µm—a general purpose filter with medium retention and flow rate. Ideal for use with Büchner funnels or Whatman 3-piece filter funnels.

Grade 54

20–25 µm—very fast filtration for use with coarse and gelatinous precipitates. High wet strength is suitable for vacuum-assisted fast filtration of difficult materials.

Hardened Ashless Filters

Hardened ashless filters are acid hardened to give high wet strength and chemical resistance with extremely low ash content. The tough surface makes these filters suitable for a wide range of critical filtration procedures.

Grade 540

8 µm—a general purpose filter with medium retention and flow rate. Frequently used in gravimetric analysis of metals in acid/alkali solutions.

Grade 541

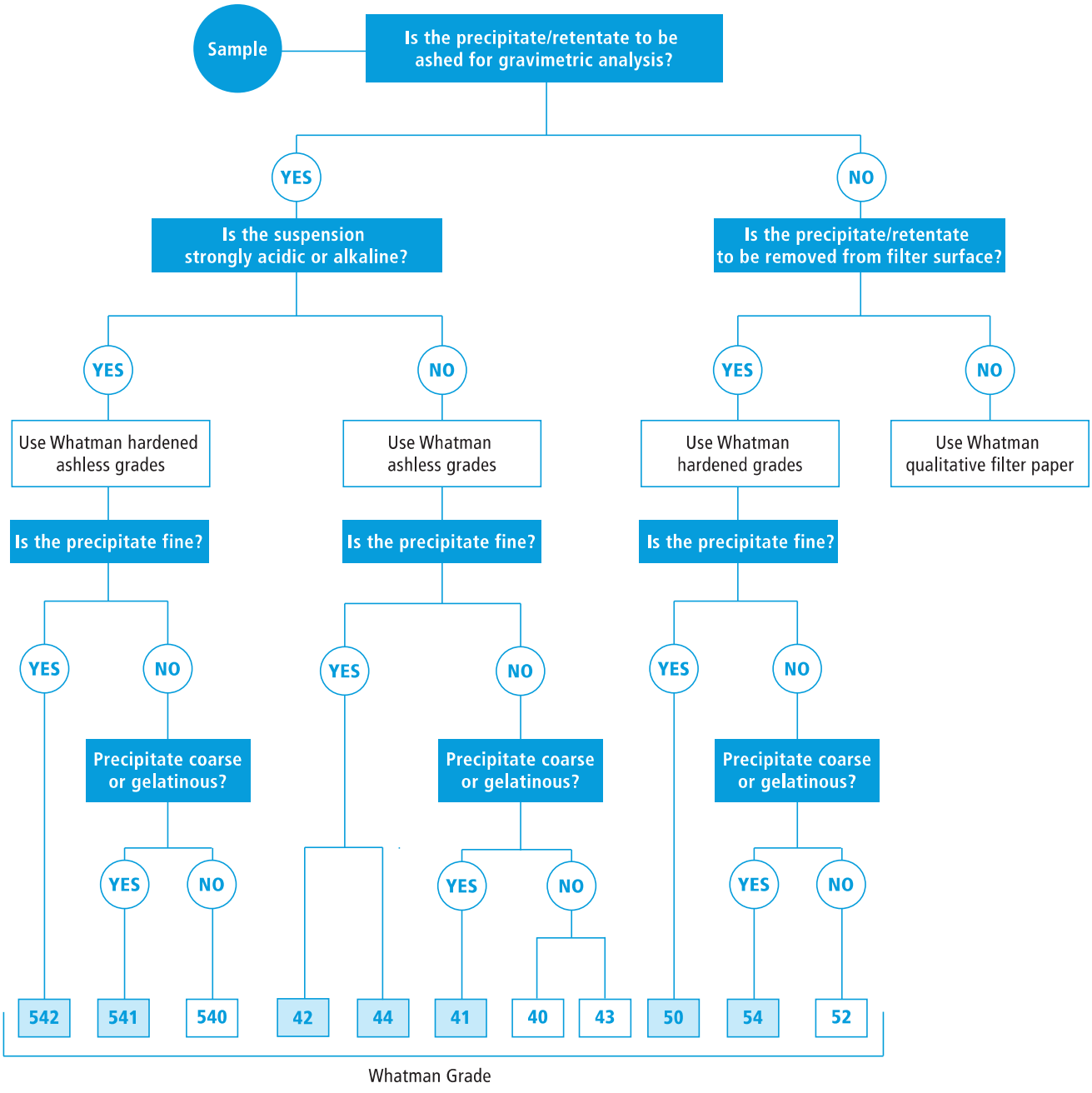
20–25 µm—offers high filtration speed for the retention of large particles and gelatinous precipitates in acid or alkaline solutions. Typical applications include protein determinations, cement analysis and the determination of fiber in animal food.

Grade 542

2.7 µm—gives efficient retention of small particles in solutions that would weaken conventional filters. Slow flow rate. Very hard and strong with excellent chemical resistance. Often used in gravimetric metal determinations.

Note: For Disposable Filter Funnels, see page 56.

Quantitative Filter Paper Quick Pick Reference Chart



Typical Properties of 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
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

Grade	1	42	542
Aluminum	<0.5	2	1
Antimony	<0.02	<0.02	<0.02
Arsenic	<0.02	<0.02	<0.02
Barium	<1	<1	<1
Boron	1	1	2
Bromine	1	1	1
Calcium	185	13	8
Chlorine	130	80	55
Chromium	0.3	0.3	0.7
Copper	1.2	0.3	0.2
Fluorine	0.1	0.2	0.3

Grade	1	42	542
Iron	5	6	3
Lead	0.3	0.2	0.1
Magnesium	7	1.8	0.7
Manganese	0.06	0.05	<0.05
Mercury	<0.005	<0.005	<0.005
Nitrogen	23	12	260
Potassium	3	1.5	0.6
Silicon	20	<2	<2
Sodium	160	33	8
Sulfur	15	<5	<2
Zinc	2.4	0.6	0.3

* All results expressed as µg/g.

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
110	1001-110	1002-110	1003-110	1004-110	1005-110	1006-110	100
125	1001-125	1002-125	1003-125	1004-125	1005-125	1006-125	100
150	1001-150	1002-150	1003-150	1004-150	1005-150	1006-150	100
185	1001-185	1002-185	1003-185	1004-185	1006-185	1006-185	100
240	1001-240	1002-240	1003-240	1004-240	1006-240	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

Ordering Information

Qualitative Wet Strengthened Filter Circles					
	Catalog Number				
Diameter (mm)	Grade 91	Student Grade/Grade 93	Grade 113	Grade 114	Quantity/Pack
90	—	1093-110	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

* Packed in 4000 subdivided into 100.

** Packed in 50 envelopes of 25 circles each.

*** Packed in 1000 subdivided into 100.

Ordering Information

Qualitative Filter Circles Folded (pleated)				
	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

Ordering Information

Qualitative Standard Filter Sheets		
Dimensions (mm)	Catalog Number	Quantity/Pack
Grade 1		
460 x 570	1001-917	100
460 x 570	1001-918	500
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

Ordering Information

Quantitative Ashless Filter Circles						
	Catalog Number					
Diameter (mm)	Grade 40	Grade 41	Grade 42	Grade 43	Grade 44	Quantity/Pack
Filter Circles						
30	1440-329	—	—	—	—	100
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
400	—	—	1442-400	—	—	100
Filter Sheets						
8" x 10"	—	1441-866	—	—	—	100
460 mm x 570 mm	1440-917	1441-917	—	—	—	100

Ordering Information

Quantitative Hardened Low Ash Filter Circles				Quantitative Hardened Ashless Filter Circles			
Catalog Number				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

Reeve Angel® Brand Filter Papers

Reeve Angel brand filter papers are manufactured primarily for non-critical industrial laboratory filtration applications requiring inexpensive filters of consistent performance. Some are wet strengthened by the addition of small amounts of wet strengthening resins. Such applications usually involve qualitative analysis and are characteristically routine and often repetitive. The filter papers used should, therefore, provide known and dependable performance with minimum variability.

In the applications for which they are intended, Reeve Angel brand filters offer uniformity and consistent performance at moderate cost. The student laboratory will also find Reeve Angel brand filter papers widely useful. These papers should not be used for Kjeldahl nitrogen analysis.

Grade 200

This is the most retentive of the Reeve Angel Filters with a slow flow rate and fine particle retention.

Grade 201

This is a thin retentive paper, smooth surfaced with close texture. It is excellent for general purpose use where retention of medium-fine precipitates is needed and relatively low filtration speed is unimportant; a particularly useful student grade. The paper structure is designed for retentivity and thus filtration speed and loading capacity are comparatively low.

Grade 202

Provides medium filtration speed of coarse particles. The surface is crêped, hence has a greater effective filtration area than smooth surfaced filter papers of the same diameter.

Grade 211

A retentive, relatively slow filter paper. Highly absorbent. A standard paper in cottonseed oil and other oil laboratories. Retains fine particles. Surface is smooth and white.

Grade 226

A unique Reeve Angel brand filter paper with a crêped, grey surface providing optical contrast for white or dark filtrates. Retains coarse or gelatinous precipitates. Filtration speed is high. Grade 226 is used extensively in sugar laboratories for routine and/or repetitive filtration.

Grade 230

A strong, thick crêped paper widely used in oil chemistry. American Oil Chemist's Society (AOCS) recommends Grade 230 for many oil test methods. Retains coarse particles. High speed and loading capacity.

Grade 801

Prepleated, thin, retentive, general purpose paper. Will retain medium-fine precipitates with relatively slow filtration rate and low to normal loading capacity.

Grade 802

Prepleated, crêped surface provides relatively higher filtration area than in a smooth paper of the same diameter. Retains coarse crystalline and gelatinous precipitates with fast flow rate.

Grade 830

Prepleated, strong and thick paper with crêped surface. Fast filtration speed and high loading capacity. Retains coarse particles.

TCLP Glass Fiber Filters

Pure borosilicate glass fiber filter with particle retention of 0.6 µm–0.8 µm to conform to EPA method 1311, 5W-846; toxicity characteristic leaching procedure.

Typical Grade Characteristics

Grade	Retentivity	Filtration Speed	Loading Capacity	Thickness (mm)	Basis Weight (g/m²)	Surface	Color
200	Fine (1–5 µm)	Slow	Low-Normal	0.19	100	Smooth	White
201	Medium-Fine (7–14 µm)	Slow-Medium	Low-Normal	0.15	75	Smooth	White
202	Large crystalline coarse particles (15–19 µm)	Medium	Normal	0.29	82	Crêped	White
211	Medium (9–14 µm)	Medium	Low-Normal	0.15	68	Smooth	White
226	Coarse particles gelatinous precipitates (20–25 µm)	Fast	High-Normal	0.28	87	Crêped	Grey
230	Coarse particles (25–30 µm)	Fast	High	0.40	123	Crêped	White
801*	Medium-Fine (9–14 µm)	Slow-Medium	Low-Normal	0.15	68	Smooth	White
802*	Coarse & crystalline gelatinous precipitates (30–35 µm)	Fast	Normal	0.26	73	Crêped	White
830*	Coarse particles (25–30 µm)	Fast	High	0.40	123	Crêped	White

* The 800 grade filters are prepleated.

Ordering Information

Reeve Angel Filter Papers		
Diameter (cm)	Catalog Number	Quantity/Pack
Grade 200		
9.0	5200-090	100
Grade 201		
4.25	5201-042	100
9.0	5201-090	100
11.0	5201-110	100
12.5	5201-125	100
15.0	5201-150	100
18.5	5201-185	100
24.0	5201-240	100
32.0	5201-320	100
33.0	5201-330	100
Grade 202		
9.0	5202-090	100
11.0	5202-110	100
12.5	5202-125	100
15.0	5202-150	100
18.5	5202-185	100
20.0	5202-200	100
24.0	5202-240	100
25.0	5202-250	100
32.0	5202-320	100
33.0	5202-330	100
40.0	5202-400	100

Ordering Information continued

Reeve Angel Filter Papers		
Diameter (cm)	Catalog Number	Quantity/Pack
Grade 211		
15.0	5211-150	100
Grade 226		
12.5	5226-125	100
19.0	5226-190	100
20.0	5226-200	100
33.0	5226-330	100
8" x 8"	5226-848	1000
Grade 230		
9.0	5230-090	50
11.0	5230-110	50
12.5	5230-125	50
15.0	5230-150	50
18.5	5230-185	50
20.0	5230-200	50
24.0	5230-240	50
25.0	5230-250	50
33.0	5230-330	50
40.0	5230-400	50
50.0	5230-500	50
Grade 801		
15.0	5801-150	100
24.0	5801-240	100
32.0	5801-320	100
Grade 802		
12.5	5802-125	100
15.0	5802-150	100
18.5	5802-185	100
24.0	5802-240	100
32.0	5802-320	100
38.5	5802-385	100
Grade 830		
12.5	5830-125	50
18.5	5830-185	50
24.0	5830-240	50
RA TCLP		
4.7	5925-047	100
9.0	5925-090	100
11.0	5925-110	100
14.2	5925-142	100
15.0	5925-150	100

Ashless Powder Paper Pulp 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

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

Glass Microfiber Filters

Whatman glass microfiber filters are manufactured from 100% borosilicate glass and are chemically inert and completely binder free. These depth filters combine fast flow rates with high loading capacity and the retention of very fine particles, extending into the sub-micron range.

Glass microfiber filters can be used at temperatures up to 500°C and are ideal for use in applications involving air filtration and for gravimetric analysis of volatile materials where ignition is involved.

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.

General Filtration/Prefiltration

The particle loading capacity of a filtration system can be greatly increased by using a prefilter. Glass microfiber filters such as GF/B or GF/D are 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.

GF/A

1.6 µm—highly efficient general filter. Suitable for suspended solids in all types of water and effluent and filtration of particulates in water, algae and bacterial cultures. Also widely used for air pollution monitoring.

GF/B

1.0 µm—thicker than GF/A with higher wet strength and increased loading capacity. Recommended for concentrated suspensions and retention of small particles. Suitable for suspended solids in industrial effluents, especially at high loading.

GF/C

1.2 µm—combines fine particle retention with good flow rate. Used in many parts of the world for collection of suspended solids in potable water and natural and industrial waste. Widely used in biochemistry for cell harvesting, liquid scintillation counting and binding assays.

GF/D

2.7 µm—general purpose membrane prefilter with high loading capacity.

GF/F

0.7 µm—very high retention for filtering fine particles. Suitable for critical applications including enumeration of *Salmonella* and *Pseudomonas Aeroginosa*, clarification of protein solutions and filtering samples and solvents prior to HPLC. EPA Standard for Toxicity Characteristic Leaching Procedure, Method 1311. Recommended for DNA binding and purification.

QM-A

Ultrapure quartz (SiO_2) microfiber filter for critical work in air pollution monitoring in stacks, flues and aerosols up to 500°C. The filter is heat-treated, contains 5% borosilicate glass as a binder and is extremely low in heavy metals and alkaline earth metals.

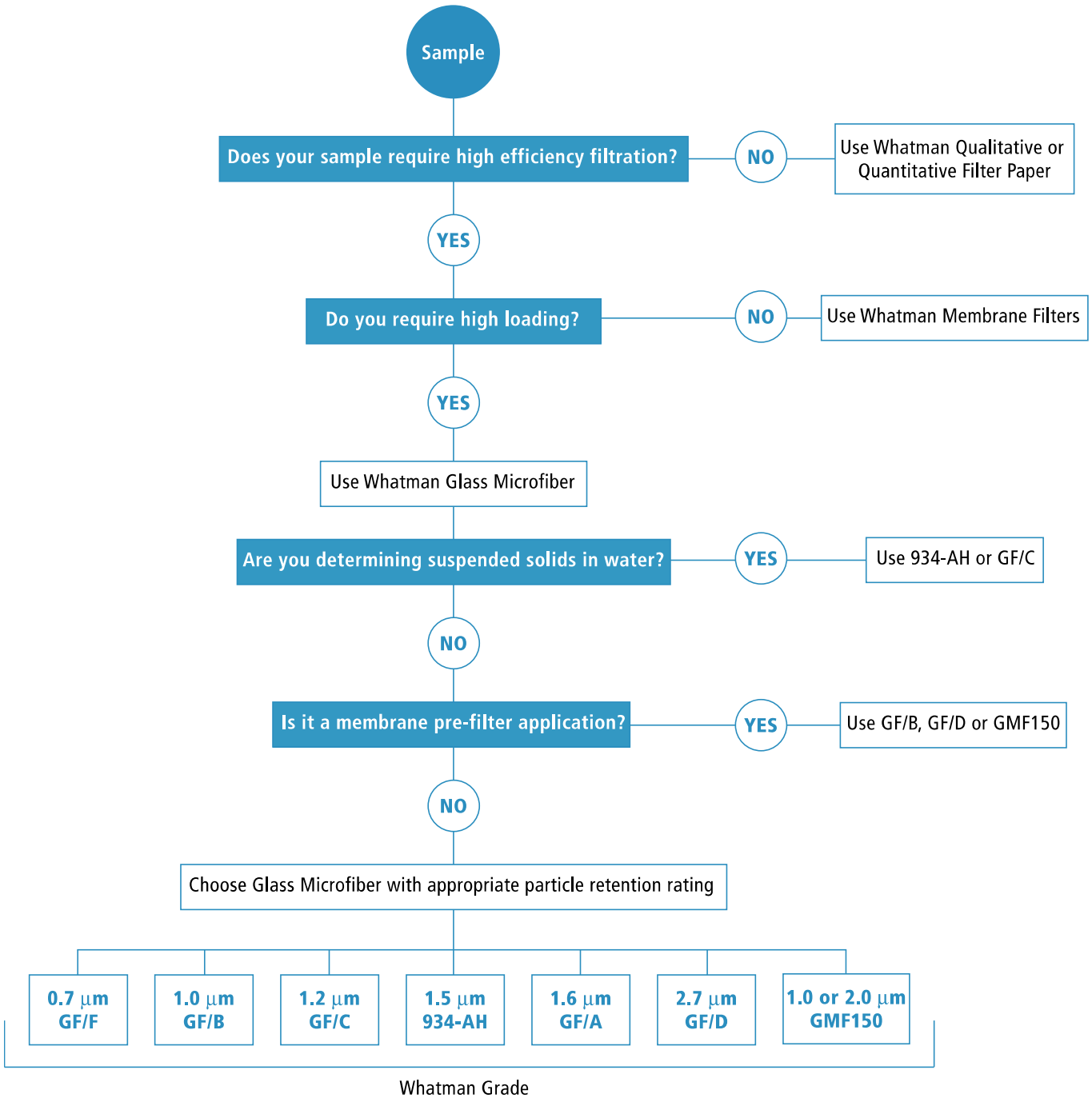
934-AH

1.5 µm—smooth surface, high retention borosilicate glass microfiber filter which withstands temperatures over 500°C. Specified in standard methods for determining total suspended solids in water, removal of turbidity and filtration of bacterial cultures. Particularly recommended for water pollution monitoring, cell harvesting, liquid scintillation counting and air pollution monitoring.

GMF150

Unique multilayer glass microfiber filter, with a coarse top layer (10 µm) and meshed with a finer layer of 1 µm or 2 µm. The ideal prefilter for higher particulate loading capacity with faster flow rates.

Glass Microfiber Filter Quick Pick Reference Chart



Typical Applications

Air Pollution Monitoring

Whatman glass microfiber filters are widely used for routine monitoring of air pollution and for specialized monitoring of solid pollutants, micro-organisms, oil and acid smokes in air. They are particularly recommended for high efficiency collection of fine particles.

These filters have lower resistance to air flow and higher particle loading capacity which, combined with excellent optical characteristics, make glass microfiber filters ideal for sensitive and accurate measurement of collected smoke particles.

Most methods rely on measuring the optical density of a smoke stain on a filter by reflectance or transmittance. Alternatively, the collected material can be washed from the filter and specialized tests applied. Continuous air sampling methods often use glass microfiber in reel form, which is automatically pulled through the apparatus to monitor pollution levels.

Air Sampling Filters EPM 2000

EPM 2000 has been developed and produced 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 with the minimum of interference or background.

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

Water Pollution Analysis

Whatman 934-AH, GF/C and GF/A are often specified to meet worldwide standards for water pollution monitoring.

Total suspended solids are determined by filtering a measured volume of water through a filter disc that has been pre-dried and weighed. In the U.S., Grade 934-AH is specified by Standard Methods (2540D) for this analysis. The organic content can be determined by igniting the residue from the total suspended solids determination at 500°C. Because Whatman glass microfiber filters are binder free, they retain their weight during ignition.

Chlorophyll, associated with algae, can be extracted from solids collected on a 7 cm disc of Whatman GF/C. Either acetone or methanol is used and the pigment concentration is measured spectrophotometrically.

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.

In addition, technical data sheets on EPM 2000 and Quartz filters are available upon request.

Applications

General Laboratory Filtration	Grade
Clarification of buffer and reagent solutions, especially in techniques involving spectrophotometry	GF/A
Removal of finely suspended carbonaceous material from test liquids	GF/A, GF/F
Carbohydrates analysis where cellulose fibers would interfere after hydrolysis	GF/C
Filtration of electrolyte used for particle size analysis	GF/F
Removal of precipitates in ion-pair reagents	GF/A
Gravimetric analysis of filters and pigments	GF/F
Clarification of protein solutions prior to freeze drying	GF/C, GF/F
Determination of sediment in petroleum products	GF/A
Estimation of oils and fats in foodstuffs by dripping solvent onto samples supported on the filter	GF/A
Biochemical Precipitates and Cells	
Collection of protein precipitates, especially in end-group analysis, followed by scintillation counting on the filter	GF/C
Cell harvesting, for example during incorporation studies	GF/C
Collection of tissue membrane fragments in receptor binding analysis	GF/C
Process Control	
Assessment of cleanliness of machined parts by washing in hydrocarbon solvent, filtering and viewing stain on filter	GF/A, GF/F
As a control test for industrial filters — downstream samples are filtered through a 15 cm glass microfiber disc which is examined for particulate	GF/A

Typical Properties of Glass Microfiber Filters

Grade	Particle Retention* Liquid (µm)	Air Flow Rate (s/100 mL/in²)	Basis Weight (g/m²)	Typical 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	12.0	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	19.0	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.

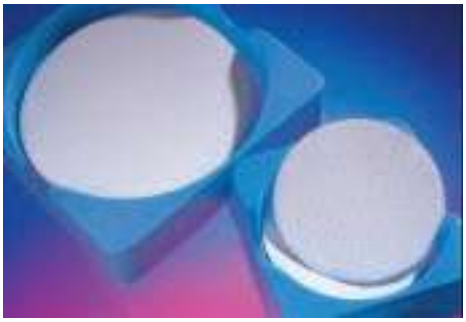
TCLP Filters Acid Treated Low Metal

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 filter with a particle retention rating of 0.6 µm to 0.8 µm, as specified by EPA Method 1311.

These acid treated low metal filters are available in 47, 90, 110, 125, 142 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 nonvolatile samples in an approved jar.



Ordering Information

TCLP Filters Acid Treated Low Metal		
Catalog Number	Size (mm)	Quantity/Box
1810-047	47	100
1810-090	90	50
1810-110	110	50
1810-125	125	50
1810-142	142	50
1810-150	150	50

Ordering Information

Filter Circles						
	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
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
Filter Sheets						
460 x 570†	—	1821-914	1822-914	—	—	100
460 x 570	1820-915*	1821-915*	1822-915*	1823-915*	—	25

† 5 per Box
* 25 per Box

Filter Circles							
	Catalog Number						
Diameter (mm)	Grade GMF 150 (1 µm)	Grade GMF 150 (2 µm)	Grade EPM 2000	Grade QM-A	Grade 934-AH	Acid Treated Low Metal TCLP	Quantity/Pack
21	—	—	—	—	1827-021	—	100
24	—	—	—	—	1827-024	—	100
25	—	—	—	1851-025	1827-025	—	100
32	—	—	—	—	1827-032	—	100
35	—	—	—	—	1827-035	—	100
37	—	—	—	1851-037	1827-037	—	100
42.5	—	—	—	—	1827-042	—	100
47	1841-047ᵖ	1842-047	1882-047	1851-047	1827-047	1810-047	100
55	—	—	—	1851-055	1827-055	—	100
70	—	—	—	—	1827-070	—	100
90	1841-090†	1842-090	—	1851-090	1827-090	1810-090**	100
110	—	—	—	—	1827-110	1810-110**	100
125	—	—	—	—	1827-125	1810-125**	100
142	—	—	—	—	—	1810-142**	50
150	—	—	—	—	1827-150	1810-150**	100
Filter Sheets							
8" x 10"	—	—	1882-866	1851-8866	—	—	100
(Pre-Numbered)							
8" x 10"	—	—	—	1851-865*	—	—	25
2" x 12"	—	—	—	—	1827-808	—	100
8" x 10"	—	—	—	—	1827-866	—	100
12" x 15"	—	—	—	—	1827-889	—	100

† 20 per Box
* 25 per Box
ᵖ 40 per Box
** 50 per Box

Whatman®

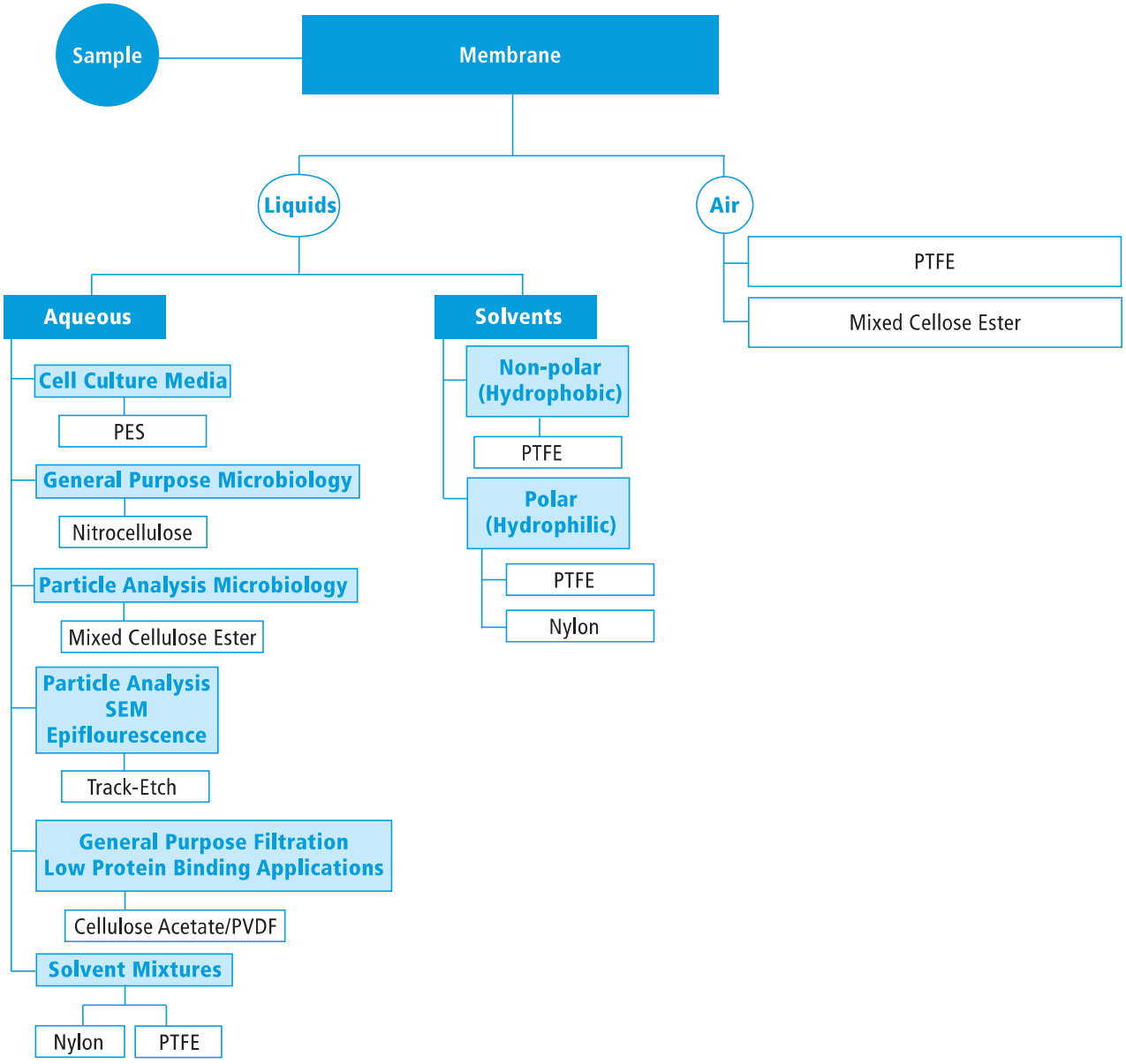
Membrane Filters

Whatman membranes are renowned for their consistent high quality and superior performance. There is a wide range of Whatman membrane products in various micron ratings and sizes* to meet your specific needs. This table will help you pick the appropriate product by type of membrane, pore size and diameter.

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

* Not all combinations may be offered

Membrane Filter Quick Pick Reference Chart



Anodisc® 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 that filters at precisely the stated cutoff, allowing no larger sized particles to pass through the membrane.

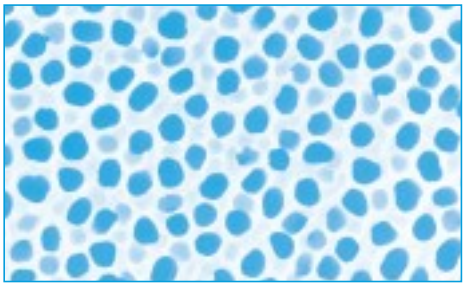
The precise pore structure and narrow pore size distribution of the Anopore membrane ensure a high level of particle removal efficiency. Micro-organisms and particulate material are captured on the surface of the membrane for subsequent analysis by light or electron microscopy. When wet, the membrane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

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.

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

Typical Data

	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	Anopore	Anopore
	aluminum oxide	aluminum oxide	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 Temperature	400°C	40°C	40°C
Porosity	25-50%	25–50%	25–50%
Autoclavable	No	No	No
Refractive Index	1.60	1.60	1.60

Ordering Information

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

Cyclopore® Track-Etched Membranes

Whatman Cyclopore membranes are true pore size microporous membranes featuring sharp cut off and reproducible microfiltration performance characteristic 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.

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

Typical Data

	Polycarbonate	Polyester	Black Polycarbonate
Thickness	7–20 µm	9–23 µm	7–20 µm
Burst Strength	>10 psi	>10 psi	>10 psi
Weight	0.7–2.0 mg/cm^2	0.9–2.3 mg/cm^2	0.7–2.0 mg/cm^2
Maximum Service Temperature	140°C	150°C	140°C
Porosity (Void Vol.)	4–20%	4–20%	4–20%
Ash Weight	0.6 µg/cm^2	2.3 µg/cm	20.6 µg/cm^2
Pore Density	10^5 - 6x10^8 pores/cm^2	10^5 - 6x10^8 pores/cm^2	10^5 - 6x10^8 pores/cm^2
Opacity	Translucent or transparent	N/A	N/A
Autoclavable	30 minutes at 121°C	30 minutes at 121°C	30 minutes at 121°C
Specific Gravity	1.21 g/cm^2	1.39 g/cm^2	—
Flammability	Slow burn	Slow burn	Slow burn
Fiber Releasing	No	No	No
Leachables	Negligible	Negligible	Negligible
Biological Compatibility	Inert	Inert	Inert

Applications

- Air monitoring
- Sample preparation
- Water analysis
- Blood cell analysis
- Electron, epifluorescence and optical microscopy
- Nucleic acid studies
- Analysis of microorganisms
- Tissue culture
- Oceanographic plankton analysis

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

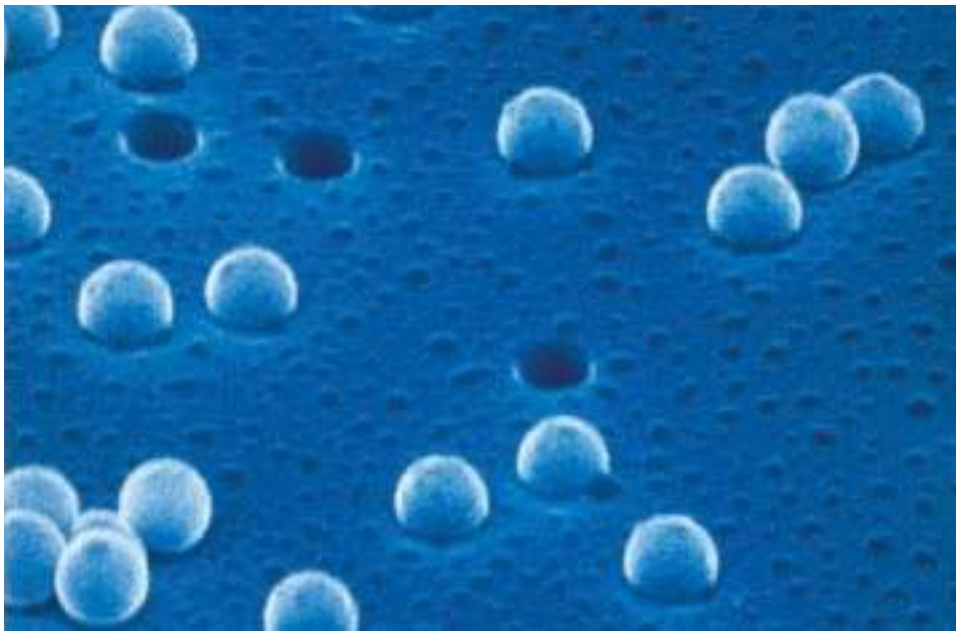
RBC deformability, leukocytes removal, RBC filtration and plasmaphoresis, chemotaxis, cytology and cell culture

General filtration

Particulate and bacteria removal, cross-flow filtration, HPLC sample preparation and solution filtration

Microscopy

Electron microscopy, epifluorescence microscopy and direct optical microscopy



Electron micrograph of a 0.4 µm Cyclopore membrane showing the retention of 0.42 µm latex spheres.

Microorganisms analysis

Direct total microbial count, harvesting, concentration, fractionation, yeast, molds, giardia, legionella, coliform and canine microfilaria

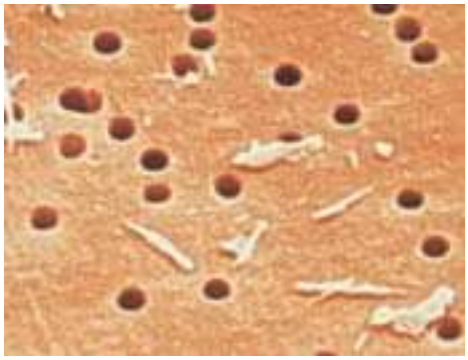
Nucleic acid studies

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.

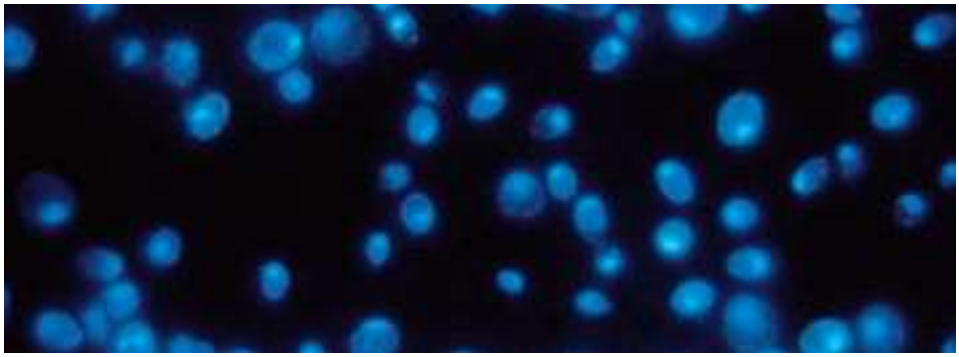
(Ref: Hewes et al. 1998; Graham & Mitchell 1999; Graham 1999.)



Asbestos fibers on a Cyclopore polycarbonate membrane.

Black Cyclopore® Track-Etched 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 Properties

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	6×10^8	4	>6.9	>1.4
0.2	20	5×10^8	13	4	>1
0.4	20	1.5×10^8	15	2.2	>1
0.8	20	4×10^7	16	0.7	>1.4
1.0	19	2.2×10^7	14	0.95	>3.4
3.0	17	3×10^6	17	0.15	>3.4
5.0	15	4×10^5	6	>0.15	>3.4
8.0	12	10^5	4	>0.15	>3.4
10.0	10	10^5	6	<0.07	>3.4
12.0	8	10^5	5	<0.07	>3.4
Polycarbonate Transparent					
3.0	17	4×10^5	2.83	N/A	>4.1
Polyester Microporous					
1.0	22	2.2×10^7	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
25	0.1	Polycarbonate	7060-2501	Yes	Low	Medium	100
25	0.2	Polyester	7061-2502	Yes	Low	Medium	100
25	0.2	Polycarbonate (black)	7063-2502	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

Ordering Information continued

Special Clear							
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
47	0.2	Polyester	7061-4702	Yes	Low	Medium	100
47	1.0	Polycarbonate	7091-4710	Yes	Low	Medium	100

Nuclepore® Track-Etched Membranes

Polycarbonate Membranes

Nuclepore polycarbonate track-etched 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

	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	230°C–275°C
Maximum Service Temperature	140°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 & smooth
Optical	Translucent
Refractive Index	1.584–1.625 (birefringent)
Hydrophobic	No
Fiber Releasing	No
Autoclavable	121°C

Ordering Information

Nuclepore Track-Etched Membranes				
Diameter (mm)	Membrane	Pore Size (µm)	Catalog Number	Quantity/ Box
13				
	Polycarbonate	0.015	110401	100
	Polycarbonate	0.1	110405	100
	Polycarbonate	0.2	110406	100
	Polycarbonate	0.4	110407	100
	Polycarbonate	0.8	110409	100
	Polycarbonate	1.0	110410	100
	Polycarbonate	3.0	110412	100
	Polycarbonate	5.0	110413	100
	Polycarbonate	8.0	110414	100
	Polycarbonate	10.0	110415	100
	Polycarbonate PVP-free	8.0	150446	100
	Gold Coated PC	0.8	800195	10
25				
	Polycarbonate	0.015	110601	100
	Polycarbonate	0.03	110602	100
	Polycarbonate	0.05	110603	100
	Polycarbonate	0.08	110604	100
	Polycarbonate	0.1	110605	100
	Polycarbonate	0.2	110606	100
	Polycarbonate	0.4	110607	100
	Polycarbonate	0.6	110608	100
	Polycarbonate	0.8	110609	100
	Polycarbonate	1.0	110610	100
	Polycarbonate	2.0	110611	100
	Polycarbonate	3.0	110612	100
	Polycarbonate	5.0	110613	100
	Polycarbonate	8.0	110614	100
	Polycarbonate	10.0	110615	100
	Polycarbonate	12.0	110616	100
	Polycarbonate AOX	0.4	110637	100
	Gold Coated PC	0.4	170607	50
	Gold Coated PC	0.8	117197	50
37				
	Polycarbonate	0.4	110807	100
	Polycarbonate	0.8	110809	100
47				
	Polycarbonate	0.015	111101	100
	Polycarbonate	0.05	111103	100
	Polycarbonate	0.08	111104	100
	Polycarbonate	0.1	111105	100
	Polycarbonate	0.2	111106	100
	Polycarbonate	0.4	111107	100

Diameter (mm)	Membrane	Pore Size (µm)	Catalog Number	Quantity/ Box
47 continued				
	Polycarbonate	0.6	111108	100
	Polycarbonate	0.8	111109	100
	Polycarbonate	1.0	111110	100
	Polycarbonate	2.0	111111	100
	Polycarbonate	3.0	111112	100
	Polycarbonate	5.0	111113	100
	Polycarbonate	8.0	111114	100
	Polycarbonate	10.0	111115	100
	Polycarbonate	12.0	111116	100
	Polycarbonate AOX	0.4	111137	100
	Polycarbonate AERO	0.4	111130	100
50				
	Polycarbonate	0.2	111206	100
	Polycarbonate	0.4	111207	100
	Polycarbonate	5.0	111213	100
	Polycarbonate	12.0	111216	100
76				
	Polycarbonate	0.1	111505	100
90				
	Polycarbonate	0.05	111703	25
	Polycarbonate	0.1	111705	25
	Polycarbonate	0.2	111706	25
	Polycarbonate	0.4	111707	25
	Polycarbonate	1.0	111710	25
	Polycarbonate	2.0	111711	25
142				
	Polycarbonate	0.08	112104	25
	Polycarbonate	0.1	112105	25
	Polycarbonate	0.2	112106	25
	Polycarbonate	0.4	112107	25
	Polycarbonate	0.6	112108	25
	Polycarbonate	1.0	112110	25
293				
	Polycarbonate	0.2	112806	25
	Polycarbonate	0.4	112807	25
	Polycarbonate	1.0	112810	25
	Polycarbonate	2.0	112811	25
8 x 10 inch				
	Polycarbonate	0.03	113502	25
19 x 42				
	Polycarbonate	5.0	113313	100
25 x 80				
	Polycarbonate PVP-free	8.0	155846	100

AOX–suitable for AOX analysis (Adsorbable Organic Halogens)

PVP-free–hydrophobic

Black Nuclepore® Polycarbonate Track-Etched Membranes for Use with Epifluorescence Microscopy

Nuclepore black dyed polycarbonate membranes are high performance membranes ideally suited for applications using Epiflourescence Microscopy. Black membranes greatly reduce background fluorescence, which results in improved micro-organism and particulate visibility.

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

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
- Ultrapure 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™ Polycarbonate Track-Etched 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™ Polycarbonate Track-Etched Membranes		
Diameter (mm)	**Catalog Number**	**Quantity/Pack**
13	110424	100

Polycarbonate Track-Etched Membranes for Cell Culture and Chemotaxis 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)

Ordering Information

Additional Polycarbonate Track-Etched Membranes for Cell Culture Applications				
Diameter (mm)	**Pore Size (µm)**	**Catalog Number**	**Surface**	**Quantity/Pack**
13	3.0	110412	Standard	100
13	5.0	110413	Standard	100
13	8.0	110414	Standard	100
13	5.0	150445	PVP-free	100
13	8.0	150446	PVP-free	100
25	2.0	110611	Standard	100
25	3.0	110612	Standard	100
25	5.0	110613	Standard	100
25	8.0	110614	Standard	100
25 x 80	8.0	155814	Standard	100
25 x 80	5.0	155845	PVP-free	100
25 x 80	8.0	155846	PVP-free	100

Cellulosic Membranes

Whatman offers cellulosic membranes in two formulations: (a) pure cellulose nitrate, and (b) mixed esters of cellulose nitrate and cellulose acetate.

Cellulose Nitrate

Whatman cellulose nitrate membranes are recommended for routine laboratory applications involving aqueous solutions. The membranes exhibit very narrow pore size distribution and have low levels of extractables.

The membranes are strong and flexible and can withstand handling and autoclaving procedures without loss of integrity. Cellulose nitrate membranes are supplied as circles, sheets or reels.

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

Whatman Brand Mixed Cellulose Ester Membranes

Whatman mixed cellulose ester membranes are suitable for routine applications involving aqueous solutions. Compared to pure nitrocellulose filters, these membranes have a smoother and more uniform surface as well as offering excellent color contrast for particle detection.

The membranes are also available in black and are gridded to assist in manual counting procedures. The grids are printed using non-toxic ink and are completely free from bacterial growth inhibitors. The membranes provide excellent contrast between the residue or cell colonies and the filter, eliminating the need to counterstain the membrane.

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 CN:CA
- Gridded/Sterile Gridded/Autoclave Packs have 90:10 ratio of CN:CA

Applications

- Bacteriological studies
- Particle counting from liquids and aerosols

Typical Data

	Cellulose Nitrate	Mixed Cellulose Esters
Thickness	125 µm	140 µm
Burst Strength	>2 psi	>10 psi
Weight	3.6–5.5 mg/cm^2	4.3–5.0 mg/cm^2
Maximum Service Temperature	80°C	130°C
Porosity	66–84%	74–77%
Steam Autoclavable	Yes	Yes

Typical Applications

Field of Application	Type	Pore Size (µm)
General		
Microfiltration	WCN/WCA	0.1
Ultracleaning	WCN/WCA	0.1
Sterilizing	WCN/WCA	0.2
Bulk Bacterial Removal	WCN/WCA	0.45
Analytical Precipitates	WCN	0.65
Clarifying Filtration	WCN	1.0
Particle Removal	WCN	5.0
Aggressive Fluids Sterilization	WTP	0.2
Air and Gas Sterilization	WTP	0.2, 0.5
Water Microbiology and Analysis		
Bacterial Colony Count	WCN	0.45 (grid)
Sediment Analysis	WCN	0.45
Suspended Particles	WCN	5.0
Yeasts and Moulds	WME	0.45 (black)
Air Pollution Monitoring		
Particle Detection	WME	0.45 (green)
Asbestos Monitoring (NIOSH)	WCN	0.8
Food and Beverage QC		
E. coli and Coliforms	WCN	0.45 (grid)
Total Bacteria Count	WCN	0.2
Tissue Culture		
Mycoplasma Removal	WCN	0.1
Sterile Filtration	WCN/WCA	0.2

Ordering Information

Diameter (mm)	Pore Size (µm)	Membrane	Catalog Number	Type	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/ Pack
13	0.2	Cellulose Nitrate	7182-001	Plain	Yes	High	Medium	100
25	0.65	Cellulose Nitrate	7186-002	Plain	Yes	High	Medium	100
25	0.8	Cellulose Nitrate	7188-002	Plain	Yes	High	Medium	100
25	1.0	Cellulose Nitrate	7190-002	Plain	Yes	High	Medium	100
25	3.0	Cellulose Nitrate	7193-002	Plain	Yes	High	Medium	100
25	5.0	Cellulose Nitrate	7195-002	Plain	Yes	High	Medium	100
47	0.2	Mixed Esters	7187-114†	Gridded	Yes	High	Medium	100
47	0.45	Cellulose Nitrate	7141-004	Plain	Yes	High	Medium	100
47	0.45	Cellulose Nitrate	7141-104†	Gridded	Yes	High	Medium	100
47	0.45	Cellulose Nitrate	7141-114*†	Gridded	Yes	High	Medium	100
47	0.45	Cellulose Nitrate	7141-204**	Gridded	Yes	Medium	Medium	100
47	0.45	Mixed Esters	7153-004	Black Gridded	Yes	Medium	Medium	100
47	0.45	Mixed Esters	7153-104†	Black Gridded	Yes	Medium	Medium	100
47	0.45	Mixed Esters	7141-124†	Gridded	Yes	Medium	Medium	200
47	0.45	Cellulose Nitrate	7141-154***†	Gridded	Yes	High	Medium	1000
47	0.8	Cellulose Nitrate	7188-004	Plain	Yes	High	Medium	100
47	1.0	Cellulose Nitrate	7190-004	Plain	Yes	High	Medium	100
47	3.0	Cellulose Nitrate	7193-004	Plain	Yes	High	Medium	100
47	6.0	Cellulose Nitrate	7195-004	Plain	Yes	High	Medium	100
90	0.8	Cellulose Nitrate	7188-009	Plain	Yes	High	Medium	25
90	1.0	Cellulose Nitrate	7190-009	Plain	Yes	High	Medium	25
90	5.0	Cellulose Nitrate	7195-009	Plain	Yes	High	Medium	25
142	0.2	Cellulose Nitrate	7182-014	Plain	Yes	High	Medium	25

Sterile membranes are packed individually with an absorbent pad. Sterilized using ethylene oxide gas.

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.

* Packed without pad.

** Autoclave pack contains 10 sealed envelopes. Each envelope contains 10 filters with 10 pads.

*** 1000/box without absorbent pad.

† Sterile

Membra-Fil® Membranes (Mixed Cellulose Esters)

Features and Benefits

- Low protein binding
- Do not contain surfactants
- Uniform microporous structure of these membranes yields high flow rates
- Biologically inert
- Thermally stable
- Made with 80:20 ratio of cellulose nitrate to cellulose acetate

Applications

- Microbiological analysis
- Clarification or sterilization of aqueous solutions
- Cytology
- HPLC samples (aqueous)
- Particulate removal
- Air monitoring
- Biological assays

Ordering Information

Membra-Fil® Membranes (Mixed Cellulose Esters)			
Diameter (mm)	Pore Size (µm)	Catalog Number	Quantity/Pack
13	0.45	140418	100
13	5.0	140413	100
25	0.22	140628	100
25	0.45	140618	100
25	1.2	140627	100
25	5.0	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	3.0	141112	100
47	5.0	141113	100
90	0.45	141718	100
142	0.22	142128	25
142	0.45	142118	25
142	0.8	142109	25

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 121°C.

Typical Data

	Nylon		
	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

Applications

- Filtration of aqueous and organic mobile phases
- Vacuum degassing

Ordering Information

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

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 150°C.

Applications

- HPLC sample preparation
- HPLC mobile phase filtration
- Sample clarification
- Sterile venting of vacuum manifolds, fermentation vessels and sterile filtrate tanks and containers
- Air and gas sterilization

Typical Data

PTFE			
	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/cm^2	7.5 L/min/cm^2	17 L/min/cm^2
Bubble Point	13 psi	6 psi	3 psi
Maximum Temperature	150°C	150°C	150°C

Ordering Information

PTFE Membranes							
Diameter (mm)	Membrane	Pore Size (µm)	Catalog Number	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/Pack
25	PTFE	0.2	7582-002	No	Low	Very Good	100
47	PTFE	0.2	7582-004	No	Low	Very Good	100
47	PTFE	0.5	7585-004	No	Low	Very Good	100
47	PTFE	1.0	7590-004	No	Low	Very Good	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). These membranes are also conveniently packaged 50 or 100 filters per package.

Easy Handling

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

Versatility

These membranes 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. The membranes are also compatible with organic solvents, making them highly suitable for HPLC mobile phase filtering and degassing, especially acetonitrile.

Ordering Information

Polypropylene (Type WPP) Membranes			
Diameter (mm)	**Pore Size (µm)**	**Catalog Number**	**Quantity/Pack**
25	0.2	7002-0225	100
25	0.45	7002-0425	100
47	0.2	7002-0247	100
47	0.45	7002-0447	100
47	1.0	7002-1047	100
90	0.2	7002-0290	50

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

Environmental Monitoring

Whatman has been a leading supplier of filtration products for environmental monitoring applications for more than 40 years. Regulatory authorities worldwide demand the highest quality from filtration products to ensure accurate results. Whatman products are acknowledged as the standard to which other products are compared and have been used by the EPA.

Convenient

Each filter is individually numbered for easy sample tracking. EPM and QMA filters are individually numbered for easy control.

Precise

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.

Clean

Whatman 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.

Proven

Whatman has been supplying filters for air monitoring applications for years; EPM 2000 papers for High Volume PM 10 testing; QM-A quartz filters for high temperature/high SO_2/NO_2 applications and Grade 4 reels for smoke detection instruments.

EPM 2000

High purity borosilicate glass microfiber filter designed for high volume air sampling and detailed analysis of particulates and aerosols.

934-AH

1.5 µm—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. Particularly recommended for water pollution monitoring, cell harvesting, liquid scintillation counting and air pollution monitoring.

QM-A

Ultrapure quartz (SiO_2) microfiber filter for critical work in air pollution monitoring in stacks, flues and aerosols up to 500°C. The filter is heat-treated, contains 5% borosilicate glass as a binder and is extremely low in heavy metals and alkaline earth metals.

(See Glass Microfiber Filters on page 20 for more information).

PM 2.5 Air Monitoring Filters

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.

PTFE Filters for EPA PM 2.5 Reference Method

These filters are manufactured under the requirements of 40 CFR Part 50, Appendix L. Whatman certifies that the required number of filters (0.1 percent or 10, whichever is greater) from each lot of filters offered for sale have been tested as specified for the following tests and meet each of the design and performance specifications.

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 and any other obvious filter defect. Whatman hereby states that each manufacturing lot that is offered for sale, and is identified for use with the PM 2.5 or TSP reference methods, conforms to EPA acceptance criteria.

Ordering Information

PM 2.5 Air Monitoring Filters			
Diameter (mm)	**Product Description**	**Catalog Number**	**Quantity/Pack**
46.2	PTFE Membrane with Polypropylene Support Ring, Sequentially Numbered	7592-104	50

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	micrometer	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 liters/min.	ASTM D 2986-91	cm H_20	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

3MM Chr

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 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.

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.

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

3MM Chr Pure Cellulose Grade Sheets		
Size (cm)	**Catalog Number**	**Quantity/Packs**
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 5.25"	3030-6189	100
6" x 8"	3030-6187	100
8" x 10"	3030-866	100
Grade 3MM* Circles		
Diameter (mm)	**Catalog Number**	**Quantity/Pack**
23	1030-023	100
24	1030-024	100
25	1030-025	100

*3MM is the qualitative version of 3MM Chr. This is a listing of small circles.

Additional chromatography paper types available on page 146.

Ordering Information

Pure Cellulose Grade Rolls

Length (m)	Width (cm)	Catalog Number			
		1 Chr	3MM Chr	4 Chr	54 SFC
100	1.0	3001-604	—	—	—
100	2.0	3001-614	3030-614	3004-614	—
100	3.0	3001-640	—	—	—
100	4.0	3001-652	—	—	—
100	5.0	3001-653	—	—	—
100	7.5	—	3030-662	—	—
100	10.0	3001-672	3030-672	—	—
100	12.5	—	3030-675	—	—
100	15.0	3001-681	3030-681	—	—
100	19.0	—	3030-690	—	—
100	23.0	—	3030-700	—	—
100	27.0	—	3030-704	—	—
100 yards	0.5"	—	—	—	—
100 yards	1.0"	3001-633	—	—	—
100 yards	1.5"	3001-651	—	3004-651	3454-651

Pure Cellulose Grade Sheets*

Size (cm)	1 Chr	2 Chr	3 Chr	4 Chr	17 Chr	20 Chr	31ET Chr	Quantity/Box
46 x 57	3001-917	3002-917	3003-917	3004-917	3017-915*	3020-917	3031-915*	100
20 x 20	3001-861	—	—	—	—	—	—	100
58 x 68	3001-931	—	—	—	—	—	—	100
10 x 30	3001-845	—	—	—	—	—	—	100
25 x 25	3001-878	—	—	—	—	—	—	100

* 25/box

(See section of Chromatography Papers for additional information)

Pure Cellulose Grade Patterns and Strips

	Catalog Number	Grade	Quantity/Box
CRL–Sheets 11 x 21.3 cm, 12 strips, 15 mm	3001-964	1 Chr	100

Filtration Hardware/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

3-Piece Construction

The funnel is quickly dismantled and 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. The 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

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

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

Ordering Information

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	2.0	3.0	13.6
4.7	1950-004	36	3.2	8.0	4.7	12.1
7.0	1950-007	115	5.0	19.6	7.0	15.9
7.0*	1950-017	210	5.0	19.6	7.0	20.8
9.0	1950-009	200	7.0	38.5	9.0	17.9
12.5	1950-012	530	9.2	66.5	12.5	22.0

* Large reservoir.

Ordering Information continued

Filter Funnels			
	Catalog Number		
	Optional Plates		Replacement Parts
Dimensions (cm)	PTFE Plate	Polypropylene Plate	Reservoirs
4.7	1950-114	1950-104	—
7.0	1950-117	1950-107	1950-207*, 1950-217*
9.0	1950-119	1950-109	1950-209

* Large reservoir.

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.

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.

Polyester Drain Discs

The disc is binder-free and has a thickness of 100 µm. It is recommended for use between membrane layers in serial filtration applications and also for use as membrane support with Nuclepore polycarbonate membranes for improved flow rate and throughput.

Applications

- General laboratory microfiltration
- Quality control and sterility testing
- Removal of particulates from HPLC solvents
- Tissue culture media filtration

Typical Data

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

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
Nuclepore 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 No. 8 stoppers, fitting standard manifolds and 1 L flasks.

Syringe Type Holders S/S

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). PTFE gaskets and O-ring permit autoclaving of the membrane in place without the filter sticking to the holder.

Ordering Information

Syringe Type Holders S/S				
Filter Diameter (mm)	**Description**	**Catalog Number**	**Model**	**Prefilter Diameter (mm)**
13	S/S, female luer inlet; male luer nozzle outlet	1980-001	SH13	10
25	S/S, female luer inlet; male luer nozzle outlet	1980-002	SH25	22

Hardware/Replacement Parts

Whatman offers both stoppers and glass reservoirs.

Ordering Information

Hardware/Replacement Parts		
Catalog Number	**Description**	**Quantity/Pack**
1961-054	Glass reservoir for FG47 (300 mL)	1

Plastic Filtration Holders

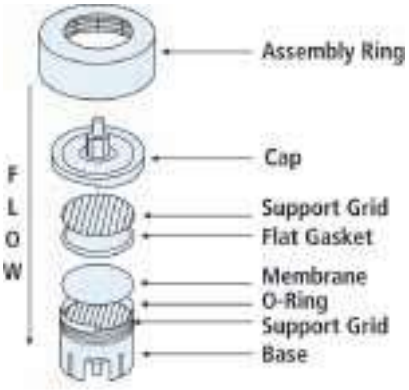
Pop-Top™ and Swin-Lok™ Plastic Filter Holders

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

Typical Data

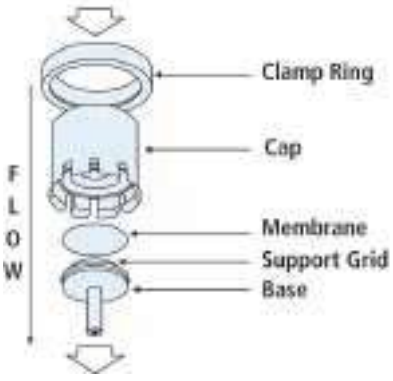
Materials	13 mm Pop-Top	25 mm Swin-Lok	47 mm Swin-Lok
Holder	Polycarbonate	Polypropylene	Polycarbonate
Maximum Operating Temperature and Pressure	38°C (100°F) at 50 psi (3.5 bar)		
Sterilization	121°C (250°F) for 15 minutes		
Size (cm)	2.7 OD x 2.7 H	3.5 OD x 3.7 H	6.0 OD x 6.5 H
Membrane Size (mm)	13	25	47
Prefilter Size (mm)	10	22	42
Filtration Area (cm^2)	0.8	3.9	11.3
Connection			
Cap	Male luer slip-fit	Female luer-lok	Female luer slip-fit with Male 1/4" NPT and 1/4" Tubing (multi purpose)
Base	Female luer slip-fit	Male luer slip-fit	



Plastic Filtration Holder, Swin-Lok
Catalog Number 420200/420400

Ordering Information

Plastic Filtration Holders			
Catalog Number	**Description**	**Diameter (mm)**	**Quantity/Pack**
420100	Pop-Top	13	10
420200	Swin-Lok Holder	25	10
420400	Swin-Lok Holder	47	10



Plastic Filtration Holder, 13 mm
Pop-Top, Catalog Number 420100

Polyester Drain Discs

For use with membrane hardware where extra support is needed. The Polyester Drain Disc provides a flat surface to eliminate filter tearing or rupturing. It is also used as a separator between filters when serial stacks are used. These chemically inert supports are available in a variety of diameters for use in a range of devices.

Features and Benefits

- Function as membrane supports
- Often used in serial filtration

Ordering Information

Polyester Drain Discs		
Diameter (mm)	Catalog Number	Quantity/ Pack
10	230300	100
22	230500	100
25	230600	100
37	230800	100
47	231100	100

Membrane Prefilters

The unique properties of borosilicate glass microfibers enable Whatman to manufacture filters with high loading capacity and retention of very fine particulates.

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.

Multigrade GMF 150

Used as a prefilter, the Multigrade GMF 150 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 as effectively as the Multigrade GMF 150, because prefilters of a uniform density do not have the loading capacity of the unique gradient density filter technology represented by the Multigrade GMF 150.

Ordering Information

Glass Microfiber				
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
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		Catalog Number 10 µm/1 µm	Catalog Number 10 µm/2 µm	
47	47	1841-047	1842-047	40
90	90	1841-090	1842-090	40

Filtration Devices

How to Select Your Sample Preparation Device

AQUEOUS SOLUTIONS

< 400 µL

VectaSpin Micro
Anopore
PP
PS
10 µm PP
12K CA
20K CA
30K PS
100K PS

Mini-UniPrep
PP
Nylon
PES

< 2 mL

Puradisc 4
Nylon
PS
PVDF

< 3 mL

VectaSpin 3
Anopore
PP
PVDF
10 µm PP
20K CA
10K PS
30K PS

< 5 mL

UniPrep
GMF
Nylon

< 10 mL

Puradisc 13
GMF
Nylon
PP
PS
PVDF

Puradisc 13 ZC
PVDF

Anotop 10
Anopore
Anopore Plus

Anotop 10 IC
Anopore

GD/X
13 mm CA
13 mm GMF
13 mm Nylon
13 mm PP
13 mm PS
13 mm PVDF

< 12 mL

Autovial
GMF
Nylon
PVDF

< 20 mL

VectaSpin 20
Anopore Plus
PP
10 µm PP

AutoCup
Nylon

< 100 mL

Puradisc 25
AS
GMF
Nylon
PP

Puradisc 25 ZC
PVDF

GD/X
25 mm CA
25 mm GMF
25 mm Nylon
25 mm PES
25 mm PP
25 mm PVDF

GD/XP
Nylon
PVDF
PP
DpPP
PES

EasyDisc
25 mm Nylon
25 mm PVDF
25 mm PP

< 100 mL

Anotop 25
Anopore
Anopore Plus

Anotop 25 IC
Anopore

2–5 L

Polydisc
AS
HD
SPF

AQUEOUS/ORGANIC SOLUTIONS

< 400 µL

VectaSpin Micro
Anopore
PP
PVDF
10 µm PP

Mini-UniPrep
PP
PTFE

< 2 mL

Puradisc 4
Nylon
PVDF

< 3 mL

VectaSpin 3
PP
PVDF
10 µm PP

< 5 mL

UniPrep
GMF
Nylon

< 10 mL

Puradisc 13
GMF
Nylon
PP
PVDF

Puradisc 13 ZC
PVDF

GD/X
13 mm GMF
13 mm Nylon
13 mm PP
13 mm PVDF

Anotop 10
Anopore
Anopore Plus

Anotop 10 IC
Anopore

Filter Tubes 6 mL
1PS

< 12 mL

Autovial
GMF
Nylon
PVDF

Filter Tubes 12 mL
1PS

< 20 mL

VectaSpin 20
Anopore Plus
PP
10 µm PP

AutoCup
Nylon

< 100 mL

Puradisc 25
GMF
Nylon
PP

Puradisc 25 ZC
PVDF

GD/X
25 mm GMF
25 mm Nylon
25 mm PP
25 mm PVDF

GD/XP
25 mm Nylon
25 mm PP
25 mm DpPP
25 mm PVDF

EasyDisc
25 mm Nylon
25 mm PVDF
25 mm PTFE
25 mm PP

< 100 mL

Anotop 25
Anopore
Anopore Plus

Anotop 25 IC
Anopore

Filter Tubes 60 mL
1PS

2–5 L

Polydisc
HD
TF

ORGANIC

< 400 µL

VectaSpin Micro
Anopore
10 µm PP

Mini-UniPrep
PP
PTFE

< 2 mL

Puradisc 4
Nylon
PTFE
PVDF

< 3 mL

VectaSpin 3
PP
PVDF
10 µm PP

< 5 mL

UniPrep
GMF
Nylon
PTFE

< 10 mL

Puradisc 13
GMF
Nylon
PP
PTFE
PVDF

Puradisc 13 ZC
PVDF
PTFE

GD/X
13 mm GMF
13 mm Nylon
13 mm PP
13 mm PTFE
13 mm PVDF

Anotop 10
Anopore
Anopore Plus

Anotop 10 IC
Anopore

Anotop 10 LC
Anopore

Filter Tubes 6 mL
PTFE

< 12 mL

Autovial
GMF
Nylon
PVDF
PTFE

Filter Tubes 12 mL
PTFE

< 20 mL

VectaSpin 20
Anopore
Anopore Plus
PP
10 µm PP

AutoCup
PTFE

< 100 mL

Puradisc 25
GMF
Nylon
PP
PTFE

Puradisc 25 ZC
PVDF
PTFE

GD/X
25 mm GMF
25 mm Nylon
25 mm PP
25 mm PTFE
25 mm PVDF

GD/XP
25 mm Nylon
25 mm PVDF
25 mm PTFE
25 mm PP
25 mm DpPP

EasyDisc
25 mm Nylon
25 mm PVDF
25 mm PTFE
25 mm PP

Anotop 25
Anopore
Anopore Plus

Anotop 25 IC
Anopore

Anotop 25 LC
Anopore

2–5 L

Polydisc
HD
TF

Key to Abbreviations

CA	Cellulose acetate
CTA	Cellulose triacetate
DpPP	Polypropylene Depth
GMF	Glass microfiber
PES	Polyethersulfone
Pptn	Protein precipitation
PP	Polypropylene
PS	Polysulfone
PTFE	Polytetrafluoroethylene
PVDF	Polyvinylidene fluoride

FilterCup™

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

Features and Benefits

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

Chemical Compatibility

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.

Ordering Information

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

Disposable Filter Funnel

Convenient to use. These disposable filter funnels contain Whatman brand filters. 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

Catalog Number	Filter Media	Quantity/Pack
1920-1441	Grade 41	5
1920-7001	WCN 0.45 µm grid sterile	5
1920-7113	WCN 0.45 µm grid sterile with pads	300

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 unit is composed of medical grade polypropylene, compatible with most solutions.

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

Ordering Information

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

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. Ensures sample purity
- Versatile and easy to use. Suitable for use under vacuum or in automated systems

Applications

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

Typical Data

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

Ordering Information

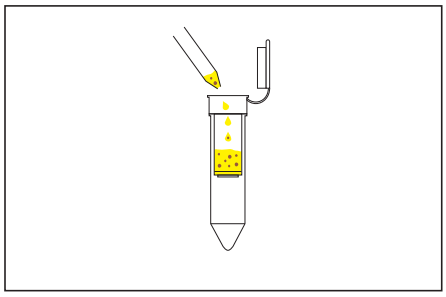
Catalog Number	Membrane	Pore Size (µm)	Quantity/Pack
1602-0465	Nylon	0.45	250
1602-0475	PTFE	0.45	250

VectaSpin™ Centrifuge Filter Tubes

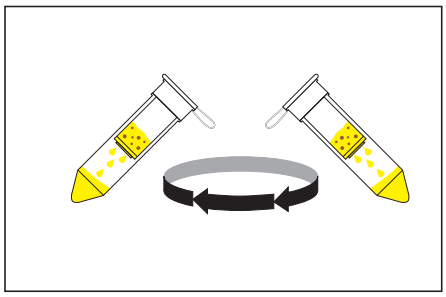
Whatman VectaSpin centrifuge filters are ideal for the quick and easy preparation of a wide range of laboratory samples by centrifugation. The centrifuge filters are available in 400 µL, 3 mL and 20 mL sizes and are produced from pigment free polypropylene to eliminate sample contamination.

VectaSpin centrifuge filters are supplied with a range of filtration and separation media. 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.

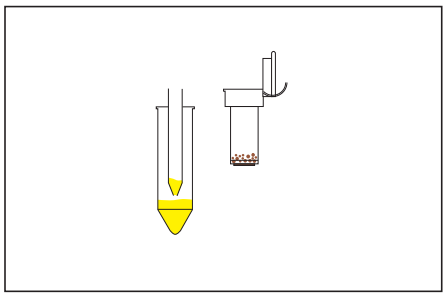
The centrifuge filters are compatible with all common centrifuge rotors and holders. Filtrate can be stored in the receiving tube after centrifugation eliminating the need for a separate storage tube.



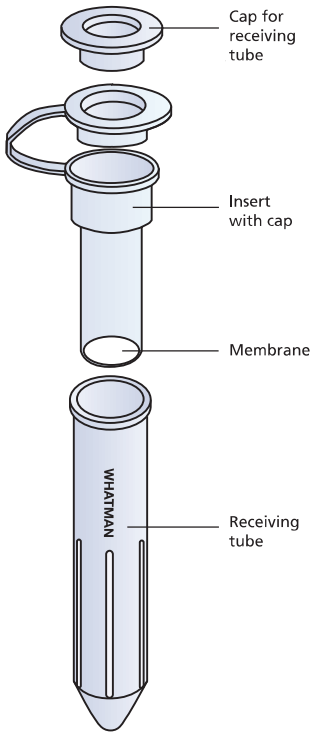
Step 1.
Place the filter insert in the outer tube, open the cap and add your sample material to the insert.



Step 2.
Seal the insert using the integral cap and place the whole tube in the centrifuge head. The tubes are designed to fit standard rotors. You can now spin your sample for an appropriate time.



Step 3.
Remove the filter insert. The filtrate can either be decanted from the outer tube or you can store it in the tube itself using the loose cap supplied.



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

Ordering Information

VectaSpin 3			
Catalog Number	**Membrane**	**Pore Size (µm)**	**Quantity/Pack**
Microfiltration			
6831-0405	PVDF	0.45	25
6832-0405	Polypropylene	0.45	25
Ultrafiltration		**(MWCO)**	
6835-3005	Polysulfone	30 K	25
6835-1005	Polysulfone	10 K	25
Coarse Filtration			
6838-0005	Polypropylene Mesh	10	25

VectaSpin™ Micro

Features and Benefits

- 400 µL sample capacity is ideal for small sample preparation
- 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

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

Ordering Information

VectaSpin Micro			
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		**(MWCO)**	
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

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
- Batch sample filtration
- Sample preparation and collection
- Ligand binding studies
- Buffer exchange

Ordering Information

VectaSpin 20			
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

Typical Data

	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
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	+4°C to +40°C	+4°C to +40°C	+4°C to +40°C
for sample storage (without filter insert)	–70°C to +50°C	–70°C to +50°C	–70°C to +50°C
Insert			
material	Polypropylene	Polypropylene	Polypropylene
overall height	N/A	N/A	61 mm

*Do not use at centrifugal forces above the recommended maximum.

**All other devices no minimum RCF.

Other Considerations: Ultrafiltration

The cellulose acetate and polysulfone membranes contain glycerin as a wetting agent. This may be removed if necessary by pre-rinsing 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.

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 clean-up
- Combinatorial chemistry
- Drug synthesis
- Sample and batch filtration
- Custom made SPE device

Typical Data

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

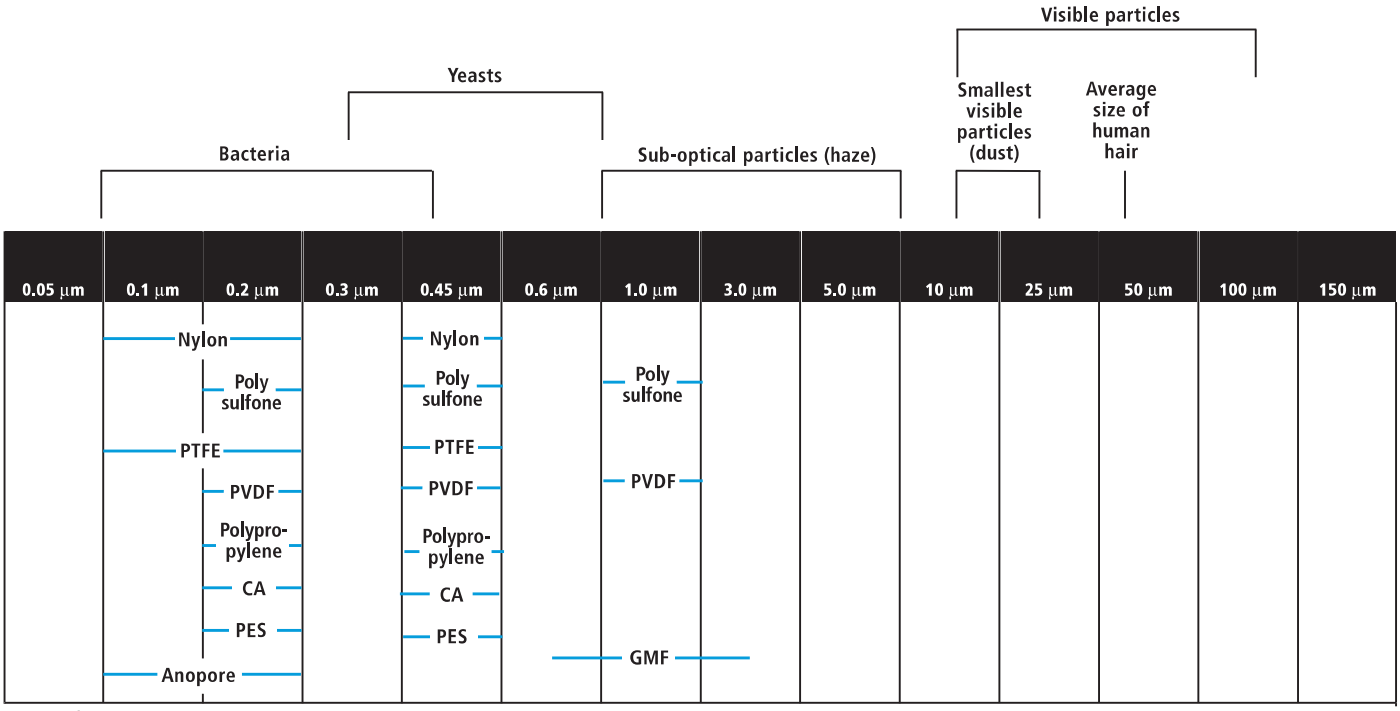
Ordering Information

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

Product Overview

Syringe Filters—Product Overview

Filters	Size	Features	Media
Anotop	10 mm, 25 mm	• Made of Anopore membrane	Anopore
Anotop Plus	10 mm, 25 mm	• Made with Glass Microfber Prefilter • For difficult-to-filter solutions	Anopore
Anotop IC/LC	10 mm, 25 mm	• Suitable for Ion Chromotography • Low levels of anion leaching	Anopore
ZC	13 mm, 25 mm	• Designed to be Zymark Compatible (ZC) Automated Robotic Systems	CA, GMF, Nylon, PTFE, PP, PS, 934-AH
Puradisc	4 mm, 13 mm, 25 mm	• Designed for manual operation	PTFE, Nylon, PP, PES, PS, PVDF, Glass Microfiber
GD/X	13 mm, 25 mm	• 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 mm	• Contains proprietary polypropylene prefiltration stack • Suitable for inorganic ion analysis	Nylon, PVDF, PP, PES, PTFE and Depth Polypropylene
EasyDisc	25 mm	• Designed for everyday use in large volume applications	Nylon, PVDF, PES, PTFE, Polypropylene



Syringe filters are available in 4, 10, 13, 25 mm sizes—not all combinations may be available

Puradisc™

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 and outlet luer 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 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 25™

Applications

- HPLC sample preparation
- Biological sample preparation

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

Typical Data

	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
Volume Throughput	up to 2 mL	up to10 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 121°C (131°C max) at 15 psi for 20 minutes†	Autoclave at 121°C (131°C max) at 15 psi for 20 minutes†	Autoclave at 121°C (131°C max) at 15 psi for 20 minutes†

† Not recommended for Nylon.

Ordering Information

4 mm Puradisc Syringe Filters (Non-Sterile)						4 mm Puradisc Syringe Filters (Sterile)			
		Without tube tip				Without tube tip			With tube tip
Pack Size	Pore Size (µm)	Membrane				Membrane			Membrane
		Nylon	PVDF	PTFE	PS	Nylon	PVDF	PS	PVDF
50 pack	0.1	—	—	—	—	—	—	—	—
	0.2	—	—	—	—	6786-0402	6791-0402	6780-0402	6777-0402
	0.45	—	—	—	—	—	—	6780-0404	6777-0404
100 pack	0.2	6789-0402	6779-0402	6784-0402	6782-0402	—	—	—	—
	0.45	6789-0404	6779-0404	6784-0404	6782-0404	—	—	—	—
500 pack	0.2	6790-0402	6792-0402	6783-0402	—	—	—	—	—
	0.45	6790-0404	6792-0404	6783-0404	—	—	—	—	—

Ordering Information

13 mm Puradisc Syringe Filters (Non-Sterile)											
		Without tube tip							With tube tip		
Pack Size	Pore Size (µm)	Membrane							Membrane		
		Nylon	PVDF	PTFE	PS	PP	GMF	CA	Nylon	PVDF	PTFE
50 pack	0.2	—	—	—	—	—	—	—	—	6777-1302	6775-1302
	0.45	—	—	—	—	—	—	—	—	6777-1304	6775-1304
100 pack	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 pack	0.2	—	6792-1302	6783-1302	—	6785-1302	—	—	6762-1302	6760-1302	6761-1302
	0.45	—	6792-1304	6783-1304	6781-1304	6785-1304	6818-1304	—	6762-1304	6760-1304	6761-1304
2000 pack	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

13 mm Puradisc Syringe Filters (Sterile)					
		Without tube tip			With Tube tip
Pack Size	Pore Size (µm)		Membrane		Membrane
		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

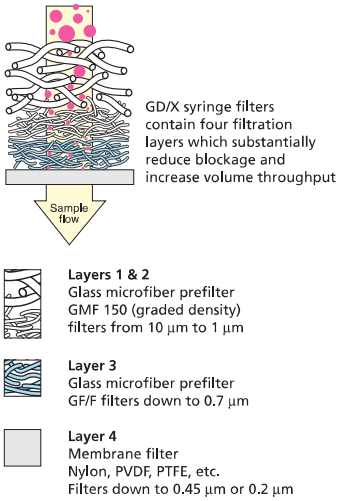
25 mm Puradisc Syringe Filters (Non-Sterile)									25 mm Syringe Filters (Sterile)
		Membrane							Membrane
Pack Size	Pore Size (µm)	Nylon	PVDF	TF	PP	AS (PES)	GF/F	GMF	PES
50 pack	0.1	—	—	6784-2501	—	—	—	—	—
	0.2	6750-2502	6746-2502	6784-2502	6786-2502	—	—	—	6780-2502
	0.45	6750-2504	6746-2504	6784-2504	6786-2504	—	—	—	6780-2504
	1.0	6750-2510	—	6784-2510	—	—	—	—	6780-2510
	GF/F 0.7 *	—	—	—	—	—	6825-2517	—	—
100 pack	GD-1 1.0	—	—	—	—	—	—	6783-2510	—
	GD-2 2.0 *	—	—	—	—	—	—	6783-2520	—
200 pack	0.2	6751-2502	6747-2502	6785-2502	6788-2502	6781-2502	—	—	—
	0.45	6751-2504	6747-2504	6785-2504	6788-2504	6781-2504	—	—	—
	1.0	6751-2510	—	—	—	6781-2510	—	—	—
	GF/F 0.7 *	—	—	—	—	—	6825-2527	—	—
300 pack	0.2	—	—	—	—	6759-2502	—	—	—
	0.45	—	—	—	—	6759-2504	—	—	—
500 pack	0.45	6752-2504	—	—	—	—	—	—	—
1000 pack	0.1	—	—	6798-2501	—	6794-2504	—	—	—
	0.2	6753-2502	6749-2502	6798-2502	—	6794-2502	—	—	6794-2512
	0.45	6753-2504	6749-2504	6798-2504	—	—	—	—	—
	GD-1 1.0	6753-2510		6798-2510	—	—	—	6792-2510	—
	GF/C 1.2 *	—	—	—	—	—	6758-2512	—	6794-2514

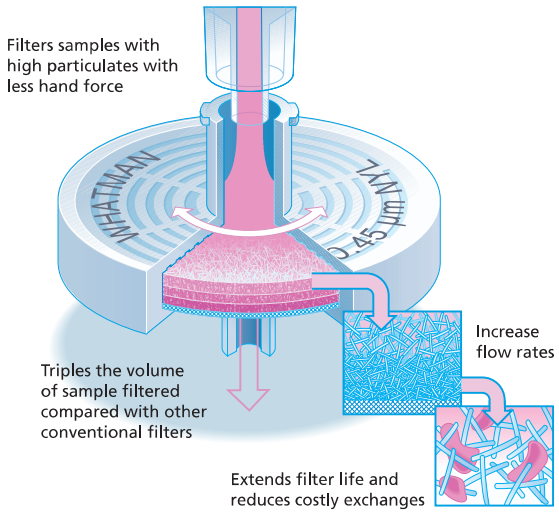
* Particle Retention Rating

GD/X

Whatman GD/X 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

Typical Data

	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 121°C (131°C max) at 15 psi for 20 minutes†	Autoclave at 121°C (131°C max) 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 GF/F 0.7 µm	GMF 150 10 µm : 1 µm GF/F 0.7 µm

† Not recommended for Nylon

Ordering Information

GD/X Syringe Filters									
		Membrane							
Quantity/ Pack	Pore Size (µm)	Nylon	PVDF	PTFE	Polysulfone	PES	Poly-propylene	Cellulose acetate	GMF
13 mm Syringe Filters Non-Sterile									
150	0.2	6870-1302	6872-1302	6874-1302[1]	6876-1302	—	6878-1302[1]	—	—
	0.45	6870-1304	6872-1304	6874-1304[1]	—	—	6878-1304[1]	6880-1304	—
	0.45*	—	—	—	—	—	—	—	6894-1304
25 mm Syringe Filters Non-Sterile									
150	0.2	6870-2502	6872-2502	6874-2502[1]	6876-2502	6904-2502	6878-2502[1]	6880-2502	—
	0.45	6870-2504	6872-2504	6874-2504[1]	6876-2504	6904-2504	6878-2504[1]	6880-2504	—
	0.45*	—	—	—	—	—	—	—	6894-2504
	0.7*	—	—	—	—	—	—	—	6890-2507[6]**
	1.0	—	—	—	—	—	—	—	6884-2510[3]**
	1.2	—	—	—	—	—	—	—	6886-2512[4]**
	1.5	—	—	—	—	—	—	—	6892-2515[7]**
	1.6	—	—	—	—	—	—	—	6882-2516[2]**
	2.7*	—	—	—	—	—	—	—	6888-2527[5]**
	5.0	6870-2550	—	—	—	—	—	—	—
1500	0.2	6871-2502	6873-2502	6875-2502	—	6905-2502	—	—	—
	0.45	6871-2504	6873-2504	6875-2504[1]	—	6905-2504	—	6881-2504	—
	0.45*	—	—	—	—	—	—	—	6895-2504
25 mm Syringe Filters Sterile									
50	0.2	—	6900-2502	—	—	6896-2502	—	6901-2502	—
	0.45	—	6900-2504	—	—	6896-2504	—	6901-2504	6902-2504
500	0.2	—	—	—	—	6897-2502	—	—	—
	0.45	—	—	—	—	6897-2504	—	—	—

* Particle Retention Rating.

** Contains GMF 150 but not GF/F prefilter.

[1] Not Hydrophilic

[2] GF/A

[3] GF/B

[4] GF/C

[5] GF/D

[6] GF/F

[7] 934-AH

GD/XP

Whatman GD/XP 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

Typical Data

	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 121°C (131°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
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

ZC

25 mm ZC Syringe Filter

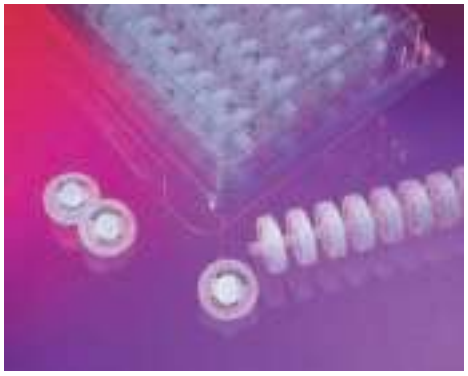
ZC robotic/syringe filters are designed to be fully compatible with the Zymark® Benchmate and other Zymark robotic systems. The ZC syringe filters feature a polypropylene housing and contain a prefilter stack of Whatman graded density Multigrade GMF 150 and GF/F glass microfiber, which increases loading 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.

Applications

- Automated sample filtration
- Tablet dissolution tests

Features and Benefits

- 13 mm and 25 mm diameter syringe filters
- Available in two sizes for sample volumes up to 10 mL and samples greater than 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



13 mm ZC Filter

25 mm ZC Filter

Typical Data

	13 mm ZC	25 mm ZC
Housing	Polypropylene	Polypropylene
Dimensions	21.7 mm x 29.7 mm	21.7 mm x 29.7 mm
Weight	3 g (approx)	3 g (approx)
Filtration Area	1.3 cm^2	4.6 cm^2
Glass Microfiber	100% borosilicate	100% borosilicate
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)
Inlet Connection	Female slip luer	Female slip luer
Outlet Connection	Male slip luer	Male slip luer
Prefiltration Media	GMF 150 10 µm : 1 µm and GF/F 0.7 µm	GMF 150 10 µm : 1 µm and GF/F 0.7 µm
Sterilization	Autoclave at 121°C (max 131°C) at 15 psi for 20 minutes	Autoclave at 121°C (max 131°C) at 15 psi for 20 minutes
Biosafe	All materials pass USP Class VI	All materials pass USP Class VI

Ordering Information

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
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
6847-1304	Polysulfone	0.45	Yes	Low	Poor	1000
6849-1302	Polypropylene	0.2	No	Low	Good	1000
6851-1302	Cellulose acetate	0.2	Yes	Low	Good	1000
6857-1312	Glass Microfiber (GF/C)	1.2*	Yes	Fair	Excellent	1000
6862-1315	Glass Microfiber (934-AH)	1.5*	Yes	Fair	Excellent	200
6853-1316	Glass Microfiber (GF/A)	1.6*	Yes	Fair	Excellent	1000
25 mm ZC Syringe Filters						
6840-2504	Nylon	0.45	Yes	High	Good	200
6841-2502	Nylon	0.2	Yes	High	Good	1000
6841-2504	Nylon	0.45	Yes	High	Good	1000
6843-2504	PVDF	0.45	Yes	Low	Good	1000
6844-2502	PTFE	0.2	No	Low	Excellent	200
6844-2504	PTFE with prefilter	0.45	No	N/A	Very Good	200
6846-2504	Polysulfone	0.45	Yes	Low	Poor	200
6847-2504	Polysulfone	0.45	Yes	Low	Poor	1000
6849-2504	Polypropylene	0.45	No	Low	Good	1000
6864-2504	Glass Microfiber (GMF)	0.45*	Yes	Fair	Excellent	200
6860-2507	Glass Microfiber (GF/F)	0.7*	Yes	Fair	Excellent	200
6854-2510	Glass Microfiber (GF/B)	1.0*	Yes	Fair	Excellent	200
6855-2510	Glass Microfiber (GF/B)	1.0*	Yes	Fair	Excellent	1000
6853-2516	Glass Microfiber (GF/A)	1.6*	Yes	Fair	Excellent	1000
6858-2527	Glass Microfiber (GF/D)	2.7*	Yes	Fair	Excellent	200

* Particle Retention Rating

Syrfil® MF

Syrfil® MF syringe filters are ideal for small sample filtration and sterile filtration of aqueous solvents. These filters feature high quality Membra-Fil cellulosic membranes in Cyrolite® housing and are manufactured with no toxic surfactants, making them ideal for life science applications. Syrfil filters allow minimal protein adsorption and feature superior flow characteristics, including a unique flow deflector that enhances flow and reduces back pressure.

Typical Data

Housing	Cyrolite® (acrylic-based co-polymer)
Filter Media	Mixed esters of cellulose
Filter Diameter	25 mm
Filter Area	3.9 cm^2
Inlet/Outlet	Luer-lok®/Luer-slip
Maximum Operating Temperature	45°C
Maximum Operating Pressure	75 psi (5.2 bar)
Fluid Retention	<0.1 mL
Sterilization	Presterilized, individually wrapped
Biosafety	Meets USP XXIII Class VI plastic tests

Ordering Information

Syrfil® MF Syringe Filters				
Diameter (mm)	**Pore Size (µm)**	**Catalog Number**	**Color**	**Quantity/Pack**
25	0.22	144666	Blue	50
25	0.45	144667	Grey	50
25	0.8	144668	Green	50
25	0.22	144661	Blue	200

NEW EasyDisc™ 25 mm

New EasyDisc is a high quality microfiltration solution for everyday use in large volume applications. These easy-to-use filters facilitate quick and convenient sample preparation and allow greater throughput without the need for syringe filter replacement in mid-operation. Available in a 0.45 µm pore size, EasyDisc Syringe Filters also provide enhanced versatility through a wide array of filtration media.

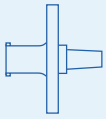
Features and Benefits

- Innovative design reduces physical exertion and operator fatigue
- Affordable price helps minimize sample preparation costs without jeopardizing operation integrity
- Advanced technology increases filtering volume as much as 300%
- Rigorous testing of each lot ensures product reliability
- ISO-driven manufacturing processes assure consistent quality
- Range of filtration media meets diverse application needs

Applications

- HPLC sample preparation
- Routine QC analysis
- Content uniformity
- Removal of protein precipitates
- Dissolution testing

Technical Specifications

Dimensions	 Diameter: 29.7 mm Length: 21.7 mm
Weight	Approximately 3 grams/unit
Filtration Area	4.6 cm^2
Maximum Pressure	75 psi (5.2 bar) at 20°C
Biosafety	All materials pass USP Class VI test for plastics
Materials of Construction	
Housing	Polypropylene
Filtration Media	As specified
Hold up Volume	
Full Housing	~1.0 mL
With Purge	~120 µL
Connectors	
Inlet	Female Luer Lock (FLL)
Outlet	Male Slip Luer (MSL)
Flow Direction	Flow from inlet to outlet (FLL side to MSL)
Sterilization	Can be autoclaved at 121°C once for 20 minutes

Technical Specifications

	Proteinaceous/Biological Samples	General Aqueous	Non-Aggressive/Organic (e.g., Alcohols)	Aggressive Organic (e.g., DMF)
Nylon (NYL)	—	++	+	—
Polyvinylidene fluoride (PVDF)	++	++	+	—
Polytetrafluoroethylene (PTFE)	—	—	++	++
Polyethersulfone (PES)	++	++	+	—
Polypropylene (PP)	—	—	++	++

++ Compatible + Limited compatibility — Not compatible

Ordering Information

		Filtration Media				
Pore Size	Pack Size	Nylon	PVDF	PTFE	PES	PP
0.45 µm	150	6710-2504	6712-2504	6714-2504	6716-2504	6718-2504
0.45 µm	1500	6711-2504	6713-2504	6715-2504	6717-2504	6719-2504

Anotop®

Anotop 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_20_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 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 clean up or expensive and time-consuming sequential filtration.

Anotop 25

Features and Benefits

- 25 mm diameter syringe filter
- Sample volume up to 100 mL
- Contains a glass microfiber prefilter

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 Plus

Applications

- Filtration of tissue culture media
- Clean-up of difficult samples
- Filtration of colloidal material
- Removal of mycoplasma

Applications

- HPLC sample preparation
- Biological sample preparation

Typical Data

	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

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.

Applications

- Ion chromatography sample preparation
- HPLC sample preparation

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

Typical Data

	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

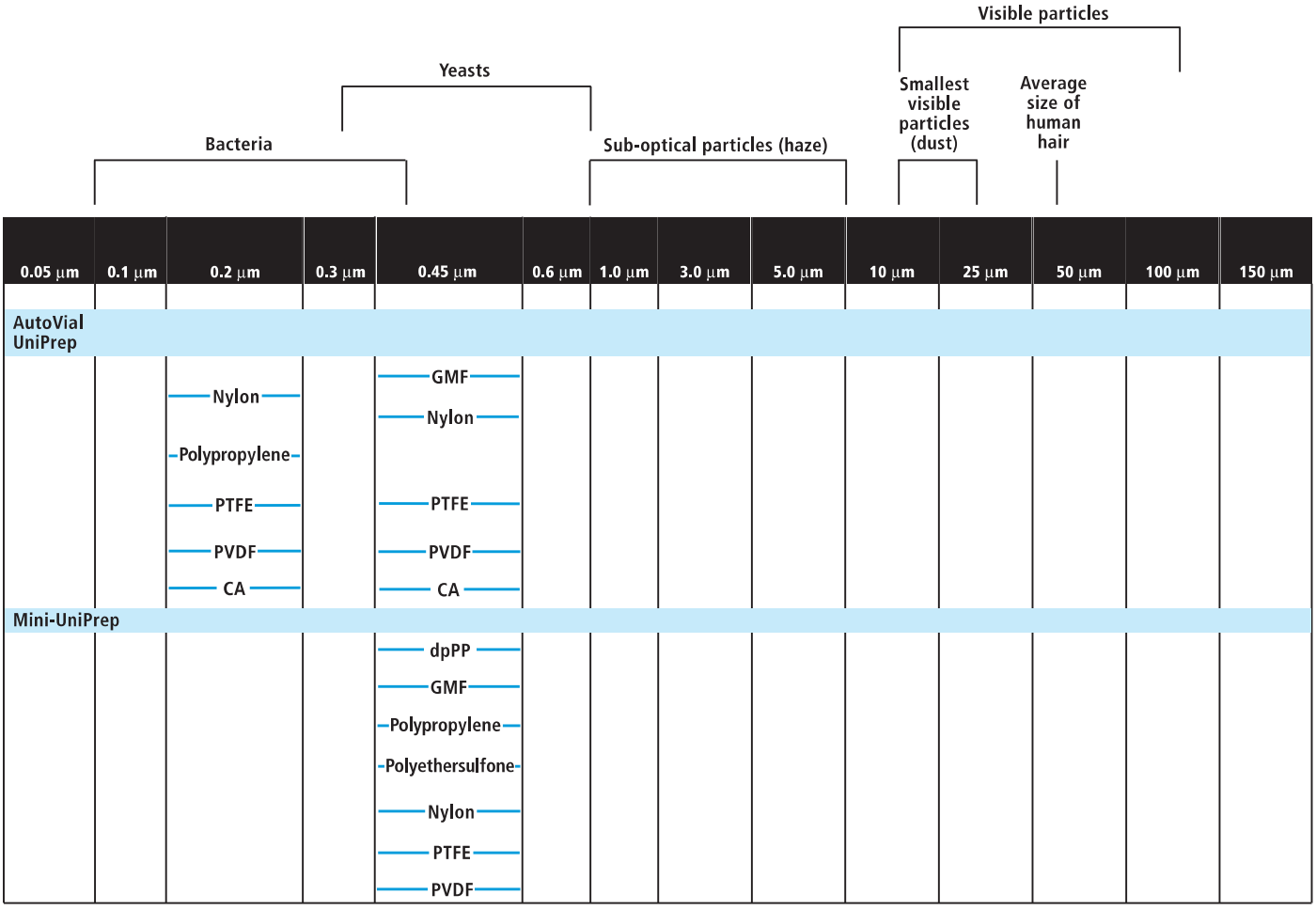
Anion	Level (ppb)
Fluoride	<10
Chloride	<15
Bromide	<20
Sulfate	<30
Phosphate	<75
Nitrite	<30
Nitrate	<30

Typical Average Anion Leaching Levels in 18 M W-cm (Meg Ohm-cm). Water at 20°C.

Ordering Information

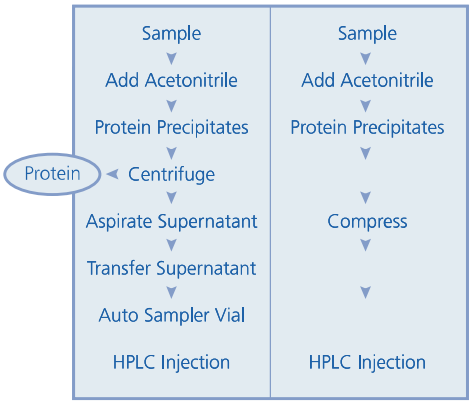
Catalog Number	Membrane	Pore Size (µm)	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/ Pack
Anotop 10						
6809-1002	Anopore	0.02	Yes	Low	Very Good	50
6809-1012	Anopore	0.1	Yes	Low	Very Good	50
6809-1022	Anopore	0.2	Yes	Low	Very Good	50
6809-1102	Anopore sterile	0.02	Yes	Low	Very Good	50
6809-1112	Anopore sterile	0.1	Yes	Low	Very Good	50
6809-1122	Anopore sterile	0.2	Yes	Low	Very Good	50
Anotop 10 Plus						
6809-3002	Anopore with prefilter	0.02	Yes	Low	Very Good	50
6809-3012	Anopore with prefilter	0.1	Yes	Low	Very Good	50
6809-3022	Anopore with prefilter	0.2	Yes	Low	Very Good	50
6809-3102	Anopore with prefilter sterile	0.02	Yes	Low	Very Good	50
6809-3112	Anopore with prefilter sterile	0.1	Yes	Low	Very Good	50
6809-3122	Anopore with prefilter sterile	0.2	Yes	Low	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	Low	Very Good	50
6809-4012	Anopore with prefilter	0.1	Yes	Low	Very Good	50
6809-4022	Anopore with prefilter	0.2	Yes	Low	Very Good	50
6809-4024	Anopore with prefilter	0.2	Yes	Low	Very Good	200
6809-4102	Anopore with prefilter sterile	0.02	Yes	Low	Very Good	50
6809-4112	Anopore with prefilter sterile	0.1	Yes	Low	Very Good	50
6809-4122	Anopore with prefilter sterile	0.2	Yes	Low	Very Good	50
Anotop 10 IC						
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

Product Overview



NEW Mini-UniPrep™

'Spin' Method vs. Mini-UniPrep Method Protein Removal



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 lab.

Features and Benefits

- All-in-one filtration process allows you to process sample loads in one-third the time
- Wide range of membranes to choose from. 0.2 and 0.45 µm pore sizes to meet specific sample application requirements
- Compatible with most major autosamplers. Allows you to speed processes
- Fewer consumables required. Lower costs by up to 40 percent

Applications:

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

Simple by design.

A filter membrane is housed at one end of a plunger, with a cap/septum on the other. By pressing the plunger through a liquid placed into the chamber, positive pressure forces the filtrate into the reservoir of the plunger. Air escapes through vent holes until the evaporation seal is engaged, providing an airtight seal. Within seconds the Mini-UniPrep can be placed into any approved autosampler for injection into your instrument.

Simple

Place unfiltered sample in chamber.

Innovative

Compress filter plunger into sample chamber. Clean filtrate fills reservoir from bottom up.

Convenient

The Mini-UniPrep vial shape fits easily in autosamplers.

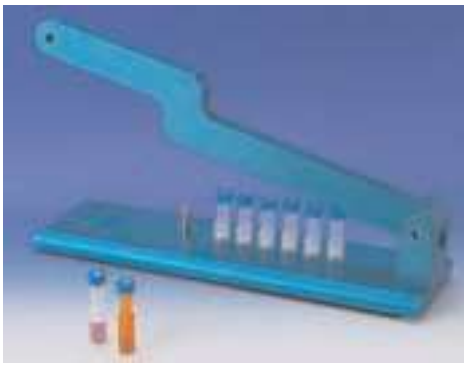
A Variety of Mini-UniPrep Filters to Meet Your Needs

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.

The Mini-UniPrep filter on the left is shown with fluid in the chamber. On the right, the filter plunger is shown compressed with the sample ready for analysis.

Six Position Compressor Makes Your Job Even Easier

The optional compressor allows you to process up to six Mini-UniPrep filters at the same time, further speeding your workflow and reducing the risk of hand stress.



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

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

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	Polytertrafluoroethylene (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

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	0.5 mL
Nominal Force Needed to Compress	Approximately 8 psi (0.6 bar)
Maximum Operating Temperature	120°F (50°C)

Ordering Information

Mini-UniPrep Syringeless Filtration System Standard Cap—Translucent Housing			
Catalog Number	**Pore Size (µm)**	**Media**	**Quantity/Pack**
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	DpPP	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
UN503NPEPP	0.2	PP	1000
UN503NPUAQU	0.45	PVDF	1000
UN503NPUDPP	0.45	DpPP	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

Ordering Information

Catalog Number	Pore Size (µm)	Media	Quantity/Pack
Mini-UniPrep with Slit Septa for Automated Samples Slit Septa Cap—Translucent Housing			
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	DpPP	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	DpPP	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
Amber Mini-UniPrep for Light Sensitive Samples Standard Cap—Amber Housing			
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	DpPP	100
UN203APUGMF	0.45	GMF	100
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	N/A	N/A	1

Autovial®

Autovial Syringeless Filters–For Quick Sample Preparation

Whatman Autovial syringeless filters replace syringe-coupled filtration devices with a single, convenient disposable unit. Available in your choice of filtration media and consisting of a graduated filter barrel and plunger, Autovial speeds sample preparation—so you can get more work done in less time. Simply pour the sample directly into the filter barrel, insert the plunger and compress the unit. The filter barrel has a support stand to protect the slip luer outlet. Autovial syringeless filters are ideal for filtration into an autosampler vial or direct instrument injection, by connecting a needle to the 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

UniPrep®

UniPrep is a preassembled device for the filtration and storage of laboratory samples. The device is quick and easy to use and features a plunger, filter and vial in one unit.

UniPrep consists of a 5 mL outer test tube and a filter plunger with cap. The sample is placed in the outer tube and the plunger is pressed through the liquid. Positive pressure forces the filtrate up into the reservoir of the filter plunger, which can then be capped for sample storage. Filtered samples can be decanted into an autosampler vial or can be removed by drawing into a syringe for manual injection.

Features and Benefits

- Integral storage vial saves time and minimizes laboratory waste
- Built-in prefilter 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

Typical Data

	Autovial 5	Autovial 12	UniPrep
Housing	Polypropylene	Polypropylene	Polypropylene
Filtration Area	1.7 cm^2	3.0 cm^2	0.3 cm^2
Capacity	5 mL	12 mL	1–5 mL
Volume 'Hold Up'	30 µL	140 µL	50 µL
Outlet Connection	Male slip luer	Male slip luer	—
Autoclavable	121°C for 20 minutes	121°C for 20 minutes	121°C for 20 minutes

Ordering Information

	Catalog Number	Membrane	Pore Size (µm)	Sterile	Quantity/Pack
Autovial 5	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
UniPrep					
	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
Autovial/UniPrep Accessories					
UniPrep Stand	UN0000001	N/A	—	—	1

*Particle Retention Rating

** No prefilter

Polydisc™ 50 mm Disc 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 (6–10 mm ID hose) 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, radiation 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

Technical Specifications

Description	Pore Size (µm)	Air Flow Rate (SLPM) 1.0 bar (14.5 psi)	Water Flow Rate[1] mL/minute @ 0.7 bar (10 psi)
Polydisc AS	0.2	—	150
Polydisc AS	0.45	—	225
Polydisc AS	1.0 (GMF/Nylon)	—	625

[1]Liquid rating. Retention efficiency in gas streams is significantly higher.

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

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

Technical Specifications

Product	Pore Size (µm)	Integrity Test Data[1]				Flow Rates[1]	
		Methanol		Water		Methanol	Air
		Bubble Point		Breakthrough		mL/min at	SLPM at
		bar	psi	bar	psi	0.7 bar (10 psi)	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

[1] 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

Technical Specifications

Description	Pore Size (µm)	Air Flow Rate (SLPM) 1.0 bar (14.5 psi)	Water Flow Rate[1] mL/minute 1.0 bar (14.5 psi)
Polydisc HD	5.0	110	1500
Polydisc HD	10.0	140	2200
Polydisc SPF	1.0	—	500

[1]Liquid rating. Retention efficiency in gas streams is significantly higher.

Typical Data

Housing	Polypropylene (pigment free)
Filtration Area	16 cm^2
Maximum Pressure	60 psi
Volume 'Hold Up' with Air Purge	<0.1 mL
Connectors	Stepped hose barbs for 6–10 mm ID tubing
Membrane Types	
SPF	Glass microfiber/polysulfone
TF	PTFE and polypropylene/PTFE
HD	Polypropylene
AS 0.2 and 0.45 µm	Glass microfiber/ polyethersulfone
AS 1.0 µm	Glass microfiber/ Nylon
Dimensions	46 mm x 56 mm
Weight	11.5 g

Ordering Information

Catalog Number	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	PTFE	0.1	10
6720-5002	PTFE	0.2	10
6720-5045	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	Polypropylene	5.0	10
6728-5100	Polypropylene	10.0	10

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. Solvent IFD has a 0.2 µm high flow polypropylene membrane for mobile phases containing organic solvents. Aqueous IFD has a 0.2 µm hydrophilic nylon membrane for use with aqueous-based mobile phases. Both devices have a polypropylene housing, fittings to accommodate 1/16"–1/8" tubing and an air vent on the inlet with luer lock cap to enable priming.

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

Applications

- HPLC analysis
- Pharmaceutical research
- Analytical chemistry

Typical Data

	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

Catalog Number	Description	Pore Size (µm)	Diameter (mm)	Filter Media	Quantity/Pack
6726-5002	Aqueous IFD	0.2	—	Nylon	10
6725-5002	Solvent IFD	0.2	—	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

* Non o-ring style—accepts 1/8" tubing only.

*Poly*VENT™

The *Poly*VENT range of products has been developed for venting and isolation applications to protect vessel contents from external contaminants and also to protect the environment from contaminants within the vessel. Each product features a polypropylene housing and a 0.2 µm PTFE membrane allowing easy scale up within the range based on vessel capacity and air flow rate required.

Features and Benefits

- Manufactured under strict clean-room conditions and totally biosafe
- Compact design provides a large effective filtration area in a small size
- Bi-directional and autoclavable

Applications

- Venting and isolation applications, especially in biotechnology, pharmaceutical, food and beverage industries
- Sterile vent and exhaust for growth environments
- Pharmaceutical analysis
- Food and beverage analysis, for holding, shipping and dispensing vessels
- Isolation of incubators, autoclaves, EtO sterilizers and fermentors

Typical Data

Air Flow Rate	*Poly*VENT 4	*Poly*VENT 16	*Poly*VENT 500	*Poly*VENT 1000
	SLPM*	SLPM*	SLPM*	SLPM*
0.1 bar (1.45 psi)	3	13	67	217
0.2 bar (3 psi)	5	25	101	335
0.5 bar (7.25 psi)	8	39	138	450
1 bar (14.5 psi)	10	50	163	540

*SLPM: Standard liters per minute.

Ordering Information

Catalog Number	Description	Media	Housing Type	Connections	Filtration Area (cm^2)	Pore Size (µm)	Quantity/ Pack
6713-0425	*Poly*VENT 4	PTFE	25 mm disc	Female luer lock, male slip luer	4	0.2	50
6713-1650	*Poly*VENT 16	PTFE	50 mm disc	Stepped hose barb for 6–10 mm ID tubing	16	0.2	10
6713-1651	*Poly*VENT 16	PTFE	50 mm disc	Stepped hose barb for 6–10 mm ID tubing	16	0.2	100
6713-5036	*Poly*VENT 500	PTFE	Capsule	Stepped hose barb for 6–10 mm ID tubing	500	0.2	1
6713-1075	*Poly*VENT 1000	PTFE	Capsule	Stepped hose barb for 10–13 mm tubing	1000	0.2	1

HEPA-VENT™ and HEPA-CAP™

HEPA-VENT and HEPA-CAP in-line devices are particularly suitable for the sterile venting of fermentors or reaction vessels to prevent airborne particles from entering or exiting the vessel. These lightweight filters have a polypropylene housing and are available in disc and capsule formats. The devices contain glass microfiber filtration media, which is mildly hydrophobic for resistance to bacterial growth and has been laminated on both sides to prevent fiber release.

Features and Benefits

- Retains 99.97% of airborne particles ≥0.3 µm. Ideal for clean air applications
- Suitable for in-line air and gas filtration
- High flow rates with low pressure drop across the filter media
- Allows bi-directional flow
- Repeatedly autoclavable for assured sterility
- Depth filter design allows for high loading capacity

Applications

- Preventing bacterial, algal or fungal contamination in fermentors or incubators
- Tissue culture applications
- In-line filtration
- Removal of particulates from gas/air stream

Typical Data

Air Flow Rate	HEPA-VENT	HEPA-CAP 36	HEPA-CAP 75
	SLPM*	SLPM*	SLPM*
0.07 bar (1 psi)	—	57	175
0.14 bar (2 psi)	30	—	—
0.28 bar (4 psi)	50	—	—
0.35 bar (5 psi)	—	225	700
0.69 bar (10 psi)	90	—	—

* SLPM: Standard liters per minute

Ordering Information

Catalog Number	Description	Housing Type	Connections	Filtration Area (cm²)	Quantity/Pack
6723-5000	HEPA-VENT	50 mm disc	Stepped hose barb for 6–10 mm ID hose	16	10
6702-3600	HEPA-CAP 36	Capsule	Stepped hose barb for 6–10 mm ID hose	625	1
6702-7500	HEPA-CAP 75	Capsule	Barb for 12 mm ID hose	1300	1

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).

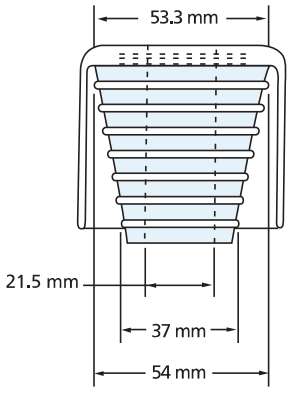
BugStopper is available in two sizes and simply pushes onto a variety of culture vessels. The device fits inside typical 250 mL to 2500 mL flasks and on the outside of typical 125 mL flasks. The silicone portion of the smaller BugStopper device can be penetrated with needles for use as a sample port or for gas infusion. BugStopper 10 fits flasks which accept size 8-1/2" to 10-1/2" stoppers.

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



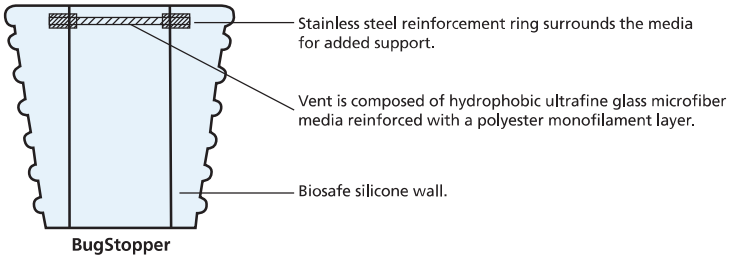
BugStopper 10

Typical Data

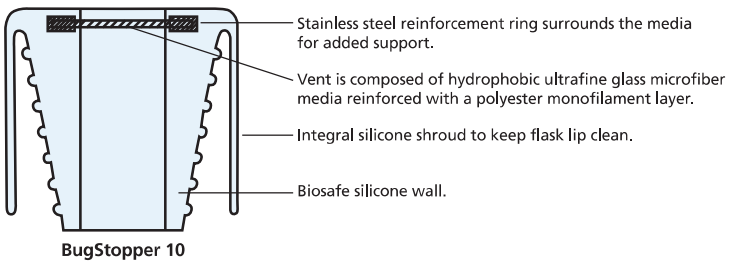
	BugStopper	BugStopper 10
Device	Biosafe silicone	Biosafe silicone
Vent Material	Hydrophobic ultrafine glass microfiber	Hydrophobic ultrafine glass microfiber
Support Ring	Stainless steel	Stainless steel
Top Diameter	43 mm	54 mm
Bottom Diameter		
Internal	21 mm	22 mm
External	28 mm	37 mm

Ordering Information

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



BugStopper



BugStopper 10

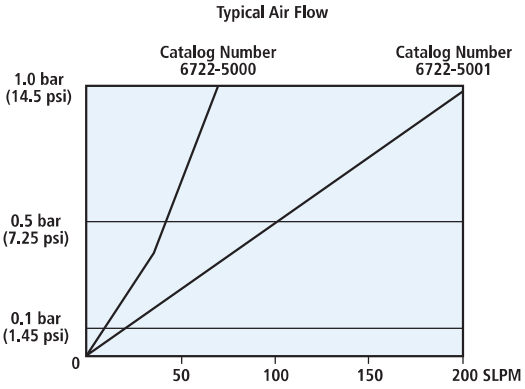
VACU-GUARD™

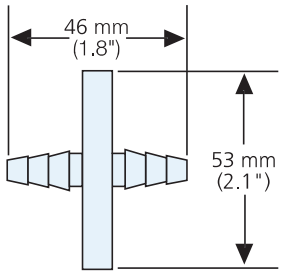
Protecting your employees, equipment and work area from harmful contaminants is more important than ever. For maximum safety, choose the Whatman VACU-GUARD family of products. These easy-to-use, in-line filter devices meet OSHA Standard 1910.1030 for bloodborne pathogens, helping to confine and isolate infectious materials in vacuum systems.

The VACU-GUARD in-line filter device offers excellent protection for vacuum pumps and aspiration systems and minimizes harmful pump exhaust fumes. VACU-GUARD features a hydrophobic PTFE membrane which retains 99.99% of all airborne particles ≥0.1 µm and aqueous aerosols up to a maximum pressure of 0.9 bar. The polypropylene housing is lightweight, making it ideal for in-line applications. It is available in 50 mm diameter with 1/4"–3/8" hose barb and in 60 mm diameter with 3/8"–1/2" hose barbs.

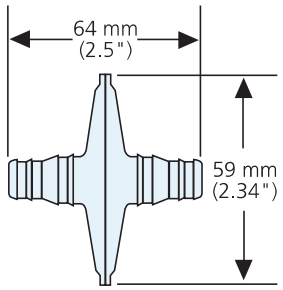
Air Flow Rate	SLPM*	SLPM*
0.14 bar (2 psi)	15	28
0.28 bar (4 psi)	27	54
0.41 bar (6 psi)	38	83
0.69 bar (10 psi)	53	139
0.96 bar (14 psi)	65	194

* SLPM: Standard liters per minute.





6722-5000 (50 mm)



6722-5001 (60 mm)

Features and Benefits

- Retains aqueous aerosols preventing corrosion and vacuum pump repairs
- Retains bacteria and viruses
- Suitable for use as a pump inlet and outlet filter to reduce hazardous vacuum pump exhaust

Applications

- Vacuum pump protection
- Prevents corrosion
- Eliminates a potential health hazard from the work place

Typical Data

Housing	Polypropylene	
Maximum Pressure	1 bar (15 psi)	
Filtration Media	PTFE	
Connections	6722-5000 (50 mm) 6722-5001 (60 mm)	6–10 mm (1/4"–3/8") SB (Stepped Barb) 10–12 mm (3/8"–1/2") SB (Stepped Barb)
Retentions	Aqueous Solutions: Particulates in Air:	up to 0.9 bar (14 psi) 0.1 µm 99.99%

Ordering Information

Catalog Number	Description	Media	Filtration Area	Pore Size (µm)	Diameter (mm)	Quantity/Pack
6722-5000	VACU-GUARD	PTFE	16 cm²	0.45	50	10
6722-5001	VACU-GUARD	PTFE	25 cm²	0.45	60	10

VACU-GUARD 150™

VACU-GUARD 150 is an in-line capsule device designed to protect vacuum pumps and minimize harmful pump exhaust fumes. The devices contain a choice of chemical trap with the additional feature of a hydrophobic PTFE membrane which retains 99.99% of airborne particles ≥0.1 µm and aqueous aerosols. Solvent solutions with low surface tension will pass through this filter. Chemical trap options include the following:

Activated Carbon

Produced from lignite coal and acid washed after steam activation, creates pores of molecular dimensions within the carbon particle and produces a material with extremely high internal porosity and surface area. Activated carbon is a powerful absorbent ideally suited to remove impurities and odors from gases. Mesh size is 12–20.

Molecular Sieve

A crystalline alkali metal aluminosilicate with a three-dimensional interconnecting network structure of silica and alumina tetrahedral, it is widely used for the removal of water from gases and will absorb molecules with a size of less than 4Å. Mesh size is 8–12.

Desiccant

Anhydrous calcium sulfate is prepared from natural gypsum and impregnated with calcium chloride. The desiccant is neutral, stable and chemically inactive towards reagents other than water. It can dry gases flowing at high speed because of its superior absorption of water and does not shrink, expand or disintegrate in use. With the addition of calcium chloride the desiccant changes from blue to pink as the limit of absorption is reached. Mesh size is 8.

Features and Benefits

- Designed for in-line use with stepped barb connections for 10–12 mm ID hose. Generally installed on pump inlet
- Use as a back up between a cold trap and the pump to protect against vapors if the cold trap fails

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

Typical Data

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	PTFE	PTFE	PTFE
Surface Area or Weight	82000 m^2	318 g	363 g
Flow Rates (SLPM)*			
0.1 bar (1.45 psi)	210	280	250
0.5 bar (7.25 psi)	450	600	570
Maximum Operating Pressure			
dry gas	60 psi	60 psi	60 psi
wet gas	14 psi	14 psi	14 psi

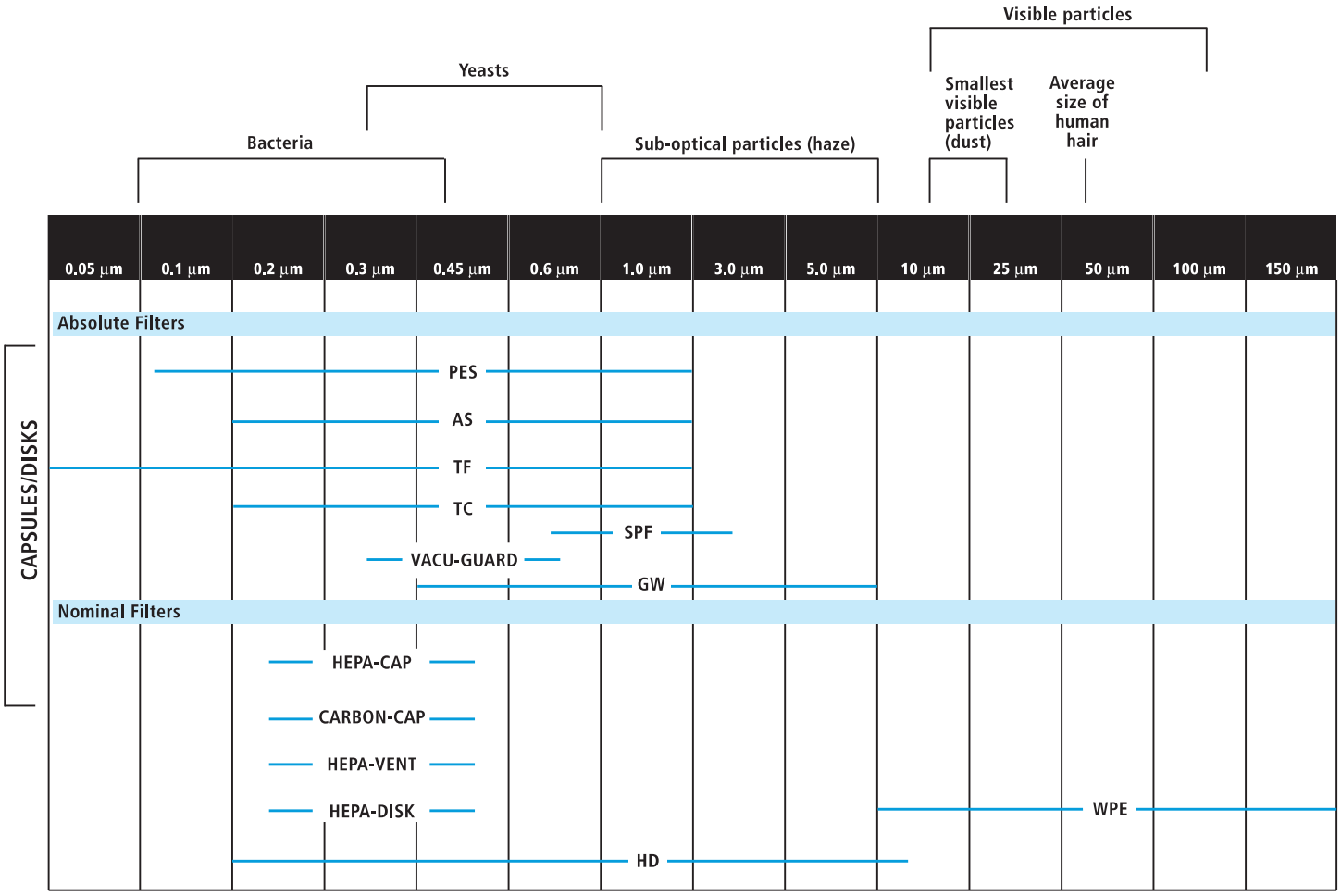
* SLPM=Standard liters per minute. Differential pressure.

Note: As with any chemical reaction, care should be used to determine the safety and usefulness of VACU-GUARD 150 products prior to routine use. For example, the molecular sieve rapidly heats up when exposed to water.

Ordering Information

Catalog Number	Description	Media	Quantity/Pack
6722-1001	VACU-GUARD 150	Activated Carbon/PTFE	1
6722-1002	VACU-GUARD 150	Desiccant/PTFE	1
6722-1003	VACU-GUARD 150	Molecular Sieve/PTFE	1

Product Overview



Polycap™

Whatman Polycap capsule filters are high surface area in-line devices for applications involving larger volumes of solution. The devices feature a high purity polypropylene housing which is free of adhesives or chemicals to ensure sample purity. They are available with a choice of pore sizes and are autoclavable (excluding products with a filling bell). Whatman offers a wide variety of Polycap filters to meet your specific needs.

Features and Benefits

- High surface area capsule filters
- Stepped hose barbs connect simply and quickly into tubing lines for immediate use
- Do not require expensive hardware
- Lower risk of spillage and leaks compared with traditional methods
- One capsule can act as a prefilter to another
- Can be used to dispense filtrate directly into unpressurized containers

Polycap™ AS

Suitable for use with large volume aqueous samples, these capsules are pre-sterilized and are available with a filling bell to protect the outlet from contamination. The hose barb connections connect quickly and easily to 6–10 mm or 10–12 mm ID hoses. Also available with 1/4" MNPT inlets.

The devices contain a nylon membrane, which gives excellent flow rates and is very low in extractables. The capsules also contain a glass microfiber prefilter to prolong the life of the final filter and allow larger volumes and difficult samples to be filtered more easily.

Applications

- Salt solutions
- Cleaning/rinsing solutions
- Immunologicals
- Virus suspensions
- Buffers
- Nutrients
- Irrigation solutions

Ordering Information

Catalog Number	Membrane	Prefilter	Pore Size (µm)	Filtration Area (cm^2)	Connections*		Flow Rate[1] liters/min @ 1.0 bar (14.5 psi)	Vent	Sterile	Quantity/ Pack
					Inlet	Outlet				
Polycap 36 AS										
6705-3602	Nylon	Glass microfiber	0.2	400	SB	SB	3.1	Yes	Yes	1
6705-3604	Nylon	Glass microfiber	0.45	400	SB	SB	3.7	Yes	Yes	1
6705-3610	Nylon	Glass microfiber	1.0	400	SB	SB	5.0	Yes	Yes	1
6708-3602	Nylon	Glass microfiber	0.2	400	1/2" SB	1/2" SB	—	Yes	Yes	1
6708-3604	Nylon	Glass microfiber	0.45	400	1/2" SB	1/2" SB	6.8	Yes	Yes	1
6709-3602	Nylon	Glass microfiber	0.2	400	MNPT	SB	—	Yes	Yes	1
6709-3604	Nylon	Glass microfiber	0.45	400	MNPT	SB	—	Yes	Yes	1
Polycap 36 AS with Filling Bell										
6706-3602	Nylon	Glass microfiber	0.2	400	SB	SB	3.0	Yes	Yes	1
Polycap 75 AS										
6705-7502	Nylon	Glass microfiber	0.2	820	SB	SB	4.0	Yes	Yes	1
6705-7504	Nylon	Glass microfiber	0.45	820	SB	SB	4.5	Yes	Yes	1
6705-7510	Nylon	Glass microfiber	1.0	820	1/2" SB	1/2" SB	18.2	Yes	Yes	1
6708-7502	Nylon	Glass microfiber	0.2	820	1/2" SB	1/2" SB	6.8	Yes	Yes	1
6708-7504	Nylon	Glass microfiber	0.45	820	1/2" SB	1/2" SB	11.0	Yes	Yes	1
6709-7502	Nylon	Glass microfiber	0.2	820	MNPT	1/2" SB	—	Yes	Yes	1
6709-7504	Nylon	Glass microfiber	0.45	820	MNPT	1/2" SB	—	Yes	Yes	1
Polycap 75 AS with Filling Bell										
6706-7502	Nylon	Glass microfiber	0.2	1000	SB	SB	4.0	Yes	Yes	1

[1] Typical values

* SB: Stepped barb for 6–10 mm 1/4"–3/8" tubing
1/2 SB: Stepped barb for 10–12 mm 3/8"–1/2" tubing
MNPT: Male National Pipe Thread

Polycap™ TF

Designed for use with organic solvents and chemically aggressive solutions. The devices contain a PTFE membrane. Polycap TF is available with standard hose barb and 1/4" MNPT connections.

Applications

- Biotechnology: sterile vents and exhausts for growth environments, in-line sterilization
- Laboratory: clean or sterile gases, solvents, reagents, drying gases
- Electronic: photoresists, solvents and gases for research
- Pharmaceutical: vents and in-line for laboratory systems

Ordering Information

Catalog Number	Membrane	Prefilter	Pore Size (µm)	Filtration Area (cm^2)	Connections*		Flow Rate[1] liters/min @ 1.0 bar (14.5 psi)	Vent	Sterile	Quantity/ Pack
					Inlet	Outlet				
Polycap 36 TF										
6700-3602	PTFE	—	0.2	500	SB	SB	3.5	Yes	No	1
6700-3610	PTFE	Polypropylene	1.0	500	SB	SB	4.3	Yes	No	1
6710-3602	PTFE	—	0.2	500	1/2"SB	1/2" SB	4.7	Yes	No	1
6710-3604	PTFE	—	0.45	500	3/8"–1/2" SB	1/2" SB	—	Yes	No	1
6711-3601	PTFE	—	0.1	500	1/4" MNPT	SB	4.0	Yes	No	1
6711-3602	PTFE	—	0.2	500	1/4" MNPT	SB	4.5	Yes	No	1
6711-3604	PTFE	—	0.45	500	1/4" MNPT	SB	5.8	Yes	No	1
Polycap 75 TF										
6700-7501	PTFE	—	0.1	1000	SB	SB	4.6	Yes	No	1
6700-7502	PTFE	—	0.2	1000	SB	SB	4.1	Yes	No	1
6700-7504	PTFE	—	0.45	1000	SB	SB	7.8	Yes	No	1
6701-7510	PTFE	Polypropylene	1.0	1000	1/2" SB	1/2" SB	13.0	Yes	No	1
6710-7502	PTFE	—	0.2	1000	1/2" SB	1/2" SB	6.4	Yes	No	1
6710-7504	PTFE	—	0.45	1000	1/2" SB	1/2" SB	7.5	Yes	No	1
6711-7502	PTFE	—	0.2	1000	1/4" MNPT	SB	6.6	Yes	No	1
6711-7504	PTFE	—	0.45	1000	1/4" MNPT	SB	7.2	Yes	No	1
6711-7505	PTFE	—	0.05	1000	1/4" MNPT	SB	3.7	Yes	No	1

[1] Typical values

* SB: Stepped barb for 6–10 mm 1/4"–3/8" tubing
1/2" SB: Stepped barb for 10–12 mm 3/8"–1/2" tubing
MNPT: Male National Pipe Thread

NEW Polycap™ TC

Developed for the safe and efficient filtration of critical biological and tissue culture solutions. The capsule contains two layers of polyethersulfone membrane, which is inherently hydrophilic, low in extractables and has excellent flow rates. The membrane also exhibits low protein binding characteristics making it ideal for use with biologically sensitive solutions.

The device is supplied pre-sterilized and has a vent to evacuate any air to allow fast filtration. The outlet of the capsule is protected to prevent touch contamination during set-up and has standard hose barb connections. Some capsules available with MNPT inlet fittings. Also available with filling bell for cleanliness assurance during filling.

Applications

- Pharmaceutical aqueous solutions
- Tissue culture media
- Reagent preparation
- Virus suspensions
- Particle counting solutions
- Cleaning, rinsing solutions

Ordering Information

Catalog Number	Membrane/ Media	Pore Size (µm)	Filtration Area (cm^2)	Connections*		Water Flow Rate[1] liters/min @ 1.0 bar (14.5 psi)	Vent	Sterile	Quantity/ Pack
				Inlet	Outlet				
Polycap 36 TC									
6714-3601	PES	0.2/0.1	550	SB	SB	3.5	Yes	Yes	1
6714-3602	PES	0.2/0.2	550	SB	SB	5.3	Yes	Yes	1
6714-3604	PES	0.65/0.45	550	SB	SB	9.0	Yes	Yes	1
6714-3610	PES	1.0/1.0	550	SB	SB	12.0	Yes	Yes	1
Polycap 36 TC with Bell									
6715-3601	PES	0.2/0.1	550	SB	SB	3.5	Yes	Yes	1
6715-3602	PES	0.2/0.2	550	SB	SB	5.3	Yes	Yes	1
6715-3682	PES	0.8/0.2	380	SB	SB	7.6	Yes	Yes	1
6716-3602	PES	0.2/0.2	550	MNPT	SB	—	Yes	Yes	1
6715-3604	PES	0.65/0.45	550	SB	SB	9.0	Yes	Yes	1
Polycap 75 TC									
6714-7501	PES	0.2/0.1	1100	SB	SB	7.0	Yes	Yes	1
6714-7502	PES	0.2/0.2	1100	SB	SB	11.5	Yes	Yes	1
6717-7504	PES	0.65/0.45	1100	1/2" SB	1/2" SB	17	Yes	Yes	1
6714-7504	PES	0.65/0.45	1100	SB	SB	26	Yes	Yes	1
6717-7510	PES	1.0/1.0	1100	1/2" SB	1/2" SB	—	Yes	Yes	1
Polycap 75 TC with Bell									
6715-7501	PES	0.2/0.1	1100	SB	SB	7.0	Yes	Yes	1
6715-7502	PES	0.2/0.2	1100	SB	SB	11.5	Yes	Yes	1
6715-7582	PES	0.8/0.2	760	SB	SB	15.2	Yes	Yes	1
6716-7502	PES	0.2/0.2	1100	MNPT	SB	—	Yes	Yes	1
6718-7504	PES	0.65/0.45	1100	1/2" SB	SB	17	Yes	Yes	1

[1] Typical values

*SB: Stepped barb for 6–10 mm 1/4"–3/8" tubing
1/2" SB: Stepped barb for 10–12 mm 3/8"–1/2" tubing
MNPT: Male National Pipe Thread

Ordering Information continued

Catalog Number	Membrane/ Media	Pore Size (µm)	Filtration Area (cm²)	Connections*		Water Flow Rate[1] liters/min @ 1.0 bar (14.5 psi)	Vent	Sterile	Quantity/ Pack
				Inlet	Outlet				
Polycap 150 TC									
6717-9501	PES	0.2/0.1	2200	1/2" SB	1/2" SB	17	Yes	Yes	1
6717-9502	PES	0.2/0.2	2200	1/2" SB	1/2" SB	26	Yes	Yes	1
6717-9504	PES	0.65/0.45	2200	1/2" SB	1/2" SB	37	Yes	Yes	1
6717-9510	PES	1.0/1.0	2200	1/2" SB	1/2" SB	40	Yes	Yes	1
Polycap 150 TC with Bell									
6718-9502	PES	0.2/0.2	2200	1/2" SB	SB	26	Yes	Yes	1
6718-9582	PES	0.8/0.2	1140	1/2" SB	SB	—	Yes	Yes	1

[1] Typical values

*SB: Stepped barb for 6–10 mm 1/4"–3/8" tubing

1/2" SB: Stepped barb for 10–12 mm 3/8"–1/2" tubing

Polycap™ HD

Ideal for the filtration of aqueous and solvent samples at a range of pore sizes from 1 µm to 20 µm. The high loading depth filter design allows for clean-up of solution with high debris content. The capsules are available in two sizes and have standard hose barb connections for use with 6–10 mm or 10–12 mm ID hoses.

Applications

- Fine filtration
- Prefiltration
- Sample preparation
- Solvents
- Buffers
- Reagents

Ordering Information

Catalog Number	Membrane	Prefilter	Pore Size (µm)	Filtration Area (cm²)	Connections*		Flow Rate[1] liters/min @ 1.0 bar (14.5 psi)	Vent	Sterile	Quantity/ Pack
					Inlet	Outlet				
Polycap 36 HD										
6703-3610	PP	No	1.0	400	SB	SB	4.0	No	No	1
6703-3650	PP	No	5.0	400	SB	SB	5.5	No	No	1
6703-3611	PP	No	10.0	400	SB	SB	6.5	No	No	1
6703-3621	PP	No	20.0	400	SB	SB	9.0	No	No	1
Polycap 75 HD										
6703-7510	PP	No	1.0	820	1/2" SB	1/2" SB	8.0	No	No	1
6703-7550	PP	No	5.0	820	1/2" SB	1/2" SB	14.0	No	No	1
6703-7511	PP	No	10.0	820	1/2" SB	1/2" SB	21.0	No	No	1
6703-7521	PP	No	20.0	820	1/2" SB	1/2" SB	>30.0	No	No	1

[1] Typical values

*SB: Stepped barb for 6–10 mm 1/4"–3/8" tubing

1/2" SB: Stepped barb for 10–12 mm 3/8"–1/2" tubing

Polycap™ SPF

Specifically designed to prefilter serum in preparation for final filtration or sterilization. The capsule contains layers of glass microfiber, ultrafine glass microfiber and a final 1.0 µm polyethersulfone membrane for the easy filtration of heavily loaded samples. Polycap SPF is available in two sizes and has hose barb connections for use with 6–10 mm ID hoses.

Applications

- Serum prefiltration
- Tissue culture
- Immunoassay methods
- Diagnostic standards/controls

Ordering Information

Catalog Number	Membrane	Prefilter	Pore Size (µm)	Filtration Area (cm^2)	Connections*		Flow Rate[1] liters/min @ 1.0 bar (14.5 psi)	Vent	Sterile	Quantity/ Pack
					Inlet	Outlet				
Polycap 36 SPF										
6705-3600	PES	Glass microfiber	1.0	260	SB	SB	4.0	Yes	No	1
Polycap 75 SPF										
6705-7500	PES	Glass microfiber	1.0	535	SB	SB	13	Yes	No	1

[1] Typical values

*SB: Stepped barb for 6–10 mm 1/4"–3/8" tubing.

NEW Polycap™ GW

The new Whatman Polycap GW high-capacity capsule is the perfect choice for sample filtration for ground water analysis. Widely used by organizations who must meet strict environmental protocol standards, Polycap GW capsules combine consistent high quality, durability and ease-of-use. Polycap GW capsules are certified for low metal extractables and suitable for the EPA Method 3005 filtration procedure.

Applications

- Filter ground water samples before dissolved metal analysis

Ordering Information

Catalog Number	Membrane/ Media	Pore Size (µm)	Filtration Area (cm^2)	Connections*		Water Flow Rate[1] liters/min @ 1.0 bar (14.5 psi)	Vent	Sterile	Quantity/ Pack
				Inlet	Outlet				
Polycap GW									
6714-6004	PES	0.45	600	SB	SB	60	Inlet	Yes	1
6703-6010	PP	1.0	600	SB	SB	60	Inlet	Yes	1
6703-6050	PP	5.0	600	SB	SB	60	Inlet	Yes	1
6724-6004	PES	0.45	600	SB	SB	60	Inlet	Yes	100
6723-6010	PP	1.0	600	SB	SB	60	Inlet	Yes	100
6723-6050	PP	5.0	600	SB	SB	60	Inlet	Yes	100

[1] Typical values

*SB: Stepped barb for 6–10 mm 1/4"–3/8" tubing.

Carbon Cap™

The Whatman Carbon Cap in-line capsule device is ideal for applications involving compressed air lines, vacuum pumps or instrument exhaust emissions. Carbon Cap features a high purity polypropylene housing with hose barb connections to connect to a 12 mm ID hose.

The capsule contains a high purity granular activated carbon and has a pleated glass microfiber HEPA filter at the base of the unit which retains 99.97% of all particles greater than 0.3 µm.

Features and Benefits

- Large surface area of activated carbon for effective operation
- Two sizes of capsule available to suit your specific application

Applications

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

Typical Data

	Carbon Cap 75	Carbon Cap 150
Media	Activated carbon + HEPA	Activated carbon + HEPA
Surface Area	26000 m^2	82000 m^2
Dimensions	96 mm x 66 mm (overall length 166 mm)	183 mm x 66 mm (overall length 252 mm)
Connectors	12 mm OD 1/2" hose barb	10–12 mm OD 3/8"–1/2" SB
Air Flow Rate (SLPM) 0.02 bar (0.3 psi)	72.0	57.5
0.11 bar (1.6 psi)	212.0	150.0
Water Flow Rate (LPM) 0.35 bar (5 psi)	8.8	4.5

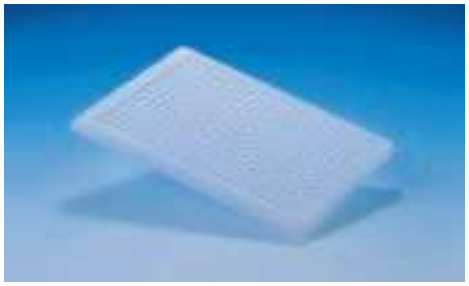
Ordering Information

Catalog Number	Description	Quantity/Pack
6704-7500	Carbon Cap 75	1
6704-1500	Carbon Cap 150	1

Multiwell Plates

UniPCR™* Microplates

Compatible with most thermocyclers, UniPCR microplates are designed to meet the demanding needs of high throughput genomic laboratories. These microplates are produced with a special polymer for good thermal conductivity.



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

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 crosstalk are needed. Glass Bottom microplates are designed to provide optically clear as well as optically flat surfaces. This ensures confluence and planarity for confocal imaging and detection techniques. They are suitable for FRET and GFP.

Ordering Information

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

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
Tissue Culture Treated, Irradiated with Lid				
7716-2380	96	300	Black Polystyrene	50
7716-3380	96	300	White Polystyrene	50

UniCell™

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 0.4 µm
- 24 well feeder tray with round wells which have a volume of 3.5 mL
- Polystyrene lid cover

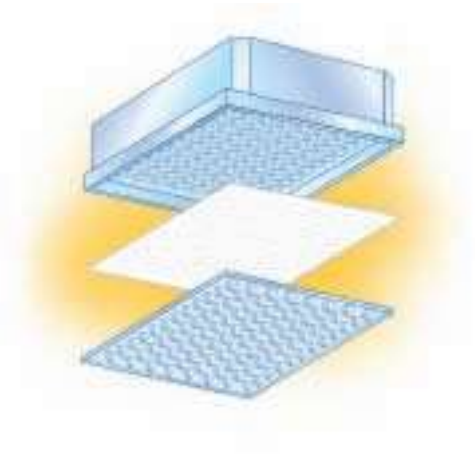
The polycarbonate membrane is ideal for cell culture because it is not toxic to cells and will not inhibit cell growth. It is the ideal material to allow formation of a confluent monolayer of mammalian cells.

The membrane retains its strength when wet, 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.

Ordering Information

UniCell™					
Catalog Number	**Well Format**	**Plate Material**	**Filter Media**	**TC Treated/Irradiated**	**Quantity/Case**
7703-1400	24	Polystyrene	0.4 µm polycarbonate membrane	Yes	5

UNIFILTER® Filtration Microplates



The patented 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 crosstalk. 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

Typical Data

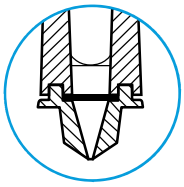
Filter Media	Flow Rate*	Protein Binding	Hydrophilic	Solvent Resistance	Physical Strength	Thermal Resistance °C	General Comments
Cellulose Nitrate (CN)	4	High	Yes	Poor	Brittle	<125	Highly adsorptive membrane (CN) typically used for DNA/RNA/ protein hybridization, also for ELISA and RIA-based assays.
Cellulose 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.
Polyvinylidene fluoride (PVDF) Hydrophilic**	4	Low	Yes	Good	Good	<135	Low protein binding, good chemical resistance.
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 available for high protein binding.

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.

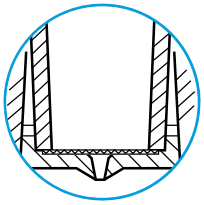


Ordering Information

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

96 Well 350 µL UNIFILTER® Microplate

The 350 µL UNIFILTER is the plate of choice for filter-based HTS assays. It is available in opaque white polystyrene for efficient use with liquid scintillation and chemiluminescence detection. The dimensions are compatible with most microplate readers for screening procedures. Also available in clear polystyrene.



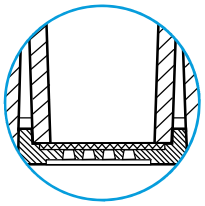
Ordering Information

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
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 P81	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 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.



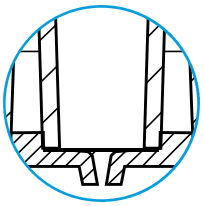
Ordering Information

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 P81	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 P81	50
7700-4313	96	350	White Polystyrene	Mesh	Whatman DE81	50

96 Well 800 µL UNIFILTER® Microplate

The 800 µL UNIFILTER is the microplate most typically used in purification, isolation 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.

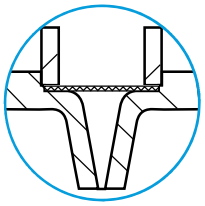


Ordering Information

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
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 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. 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 crosstalk.

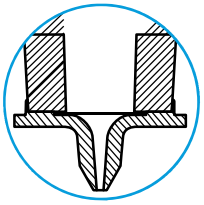


Ordering Information

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
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

24 Well 10 mL UNIFILTER® Microplate

The sample volume advantages of the 2 mL UNIFILTER Microplates are carried to a still higher level by these 24 well 10 mL UNIFILTERs.



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
7700-9917	24	10	Natural Polypropylene	Long	10–12 µm melt blown polypropylene	25

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 proposed 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.

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 crosstalk in light emitting assays
- Conforms to proposed SBS microplate standard. Guaranteed for use with robotic handlers and centrifuge carriers




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
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.

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 channeled into the well base. The "V" bottom ensures maximum sample recovery—typically ≥99% liquid sample recovery is attained.

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.

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. Nonbinding properties of Multi-Chem microplates also make them ideal for storage of biological materials.

Ordering Information

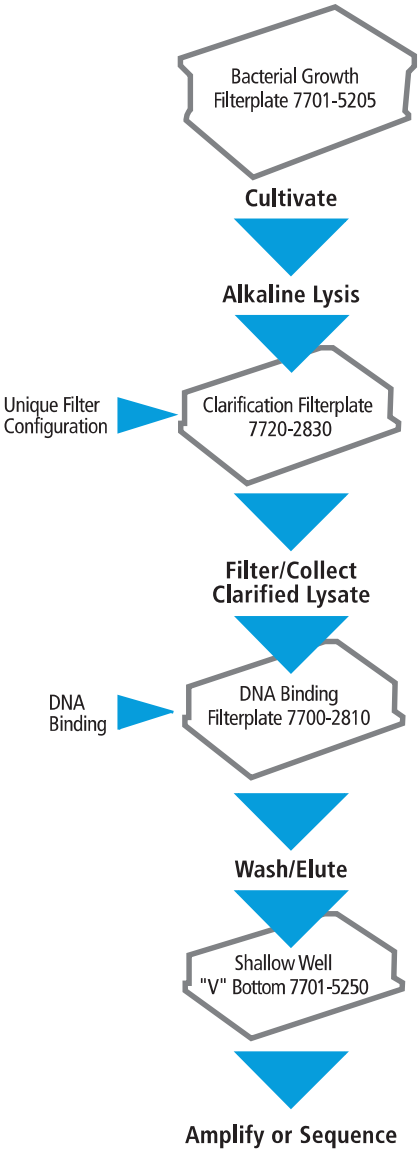
Multi-Chem™ Microplates					
Catalog Number	Well Format	Well Volume	Plate Material	Well Bottom	Quantity/Case
7701-6102	24	10 mL	Multi-Chem	Round	10
7701-6250	96	250 µL	Multi-Chem	"V"	10
7701-6750	96	750 µL	Multi-Chem	Round	10
7701-6200	96	2 mL	Multi-Chem	Round	10
7701-6101	384	80 µL	Multi-Chem	"V"	10

Plasmid Miniprep

The preparation of plasmid DNA from bacterial culture is an extremely common procedure. The Whatman Plasmid Miniprep System simplifies the process, increases the throughput and improves the purity of plasmid DNA. The Whatman Plasmid Miniprep System consists of a few basic steps, each with an optimized microplate. Sample results of the Plasmid Miniprep process are shown at right.

Average Yield Per Well	6.0 µg
A260/A280	1.94
EcoR1 Digest	Yes
Sequencing Accuracy (BLAST)	97% over 600 bp

Full protocol available on request.



Ordering Information

Plasmid Miniprep							
Catalog Number	**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

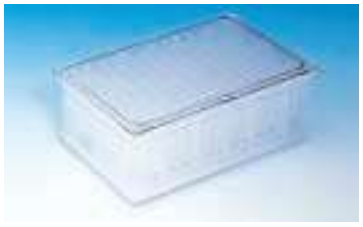
Plasmid Miniprep		
Catalog Number	**Description**	**Quantity/Case**
7705-0102	UniVac™ 3 vacuum/collect manifold	1

* Does not comply with SBS Standards.

† LDD = Long Drip Director

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.



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)

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 to 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.

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

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 nonbinding 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 to 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 available on request.

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.

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

384 Well DNA Binding UNIFILTER®

The 384 Well DNA Binding UNIFILTER provides highly reproducible results with yields exceeding 2 µg/well, from bind-wash-elute processing with collection by filtration. Minimal liquid hangup 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.

Ordering Information

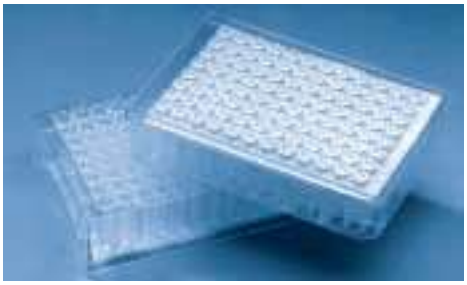
384 Well DNA Binding UNIFILTER®					
Catalog Number	**Well Format**	**Well Volume (µL)**	**Plate Material**	**Filter Media**	**Quantity/Case**
7700-2110	384	100	Clear Polystyrene	DNA Binding	50
7701-1100	384	100	Clear Polystyrene	N/A	50

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.

This microplate has a Cellulose Acetate membrane with a special support, which clears nonchaotropic 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

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 Cellulose Acetate	N/A	25
7701-5200	96	2 mL	Natural Polypropylene	N/A	Round	25

NEW 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 UNIFILTERs 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.

NEW 96 Well Dye Terminator Removal UNIFILTER®

This UNIFILTER can be used with gel filtration media for high throughput sequencing reaction cleanup, including removal of dye blobs. It is 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

NEW 384 Well Dye Terminator Removal UNFILTER®

A 384 well version is also available for Dye Terminator Removal.

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

*Long drip director

NEW Protein Precipitation UNIFILTER® FF

The Whatman Protein Precipitation UNIFILTER is optimized for removing acetonitrile-precipitated proteins from plasma or serum samples. Made with 2 mL, 96 well, rigid glass-filled polypropylene microplates, the Whatman Protein Precipitation UNIFILTER 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. Now available in two models: Fast Flow (7720-7236) and Standard (7720-7235).

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
7701-5250*	96	250 µL	Natural Polypropylene	"V" Bottom	50

* Does not comply with SBS Standards. Full protocol available on request.

Protein Kinase Assay UNIFILTER®

The Whatman 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 nonspecific 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 crosstalk problems during Liquid Scintillation Counting. The 150 µL UNIFILTER has shallow wells enabling higher detection sensitivity.

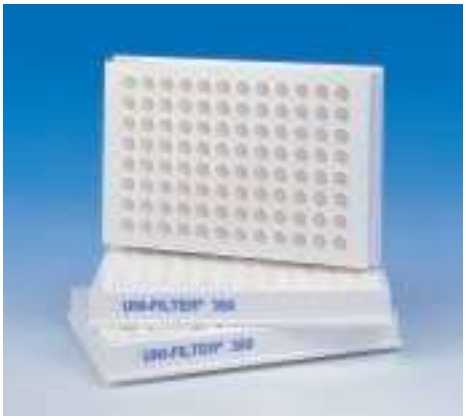
Ordering Information

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

ELISA UNIFILTER®

The Whatman ELISA plate allows researchers to use the binding characteristics of nitrocellulose in the standard SBS 8 x 12 multiwell format. It is also suitable for other types of ligand binding applications such as hybridoma supernatant screening.

Solutions are easily vacuumed to waste using a vacuum manifold. Chemiluminscent assays can be read in the plate. If the ELISA product is eluted then centrifugation is preferred. This microplate is compatible with automated systems.



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	0.45 µm Cellulose Nitrate	Filter	50
7701-1250	96	250 µL	Clear Polystyrene	N/A	"V"	50
7701-5200	96	2 mL	Natural Polypropylene	N/A	Round	25

Phase Separation UNIFILTER®

The Whatman 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 remove this layer.

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

NEW 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.

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 re-use.** 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 H_2O and CO_2 to pass through the membrane
- **Prevents aerosol formation.** Suitable for growth of infectious microorganisms.

Ordering Information

BugStopper™ Microplate Capmats				
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

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.

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

Lids

The lids are suitable for using as dust covers and to prevent splashing or contamination when plates are being moved around the laboratory.

Ordering Information

Lids		
Catalog Number	**Lid Material**	**Quantity/Case**
7704-1001	Clear Polystyrene Universal Lid	100
7704-1002	Natural Polypropylene Lid	100

Capmats

Whatman Flexible Capmats individually seal the top of each well. Capmats may be used on either filter or collection microplates.

Ordering Information

Capmats				
Catalog Number	**Well Format**	**Capmat Material**	**Microplate Compatibility**	**Quantity/Case**
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 microplate	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

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.

Ordering Information

UniVac™ 1 Vacuum to Waste Manifold		
Catalog Number	**Description**	**Quantity/Case**
7705-0101	Polyurethane vacuum manifold for filtering to waste	1

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.

Ordering Information

UniVac™ 3 Vacuum to Collect Manifold		
Catalog Number	**Description**	**Quantity/Case**
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.

Ordering Information

VacAssist™ Vacuum Assist Frame		
Catalog Number	**Description**	**Quantity/Case**
7705-0112	Vacuum assist frame	1

Biomek® 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.

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 CD	1
Protocol*	Plasmid Miniprep 96-Biomek Protocol CD	1

* Note: Downloadable protocols are available at www. whatman.com (click on Technical Support and on Protocols). CD-ROMs may be obtained from Technical Support (1-800-922-0361).

Nucleic Acid Sample Preparation and Analysis Products

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

Applications

- Forensics
- Transgenics
- Transfusion Medicine
- Plasmid Screening
- Food & Agriculture Testing
- Drug Discovery
- Genomics
- STR Analysis
- Animal Identification
- Diagnostics
- Pharmacogenomics
- Molecular Biology

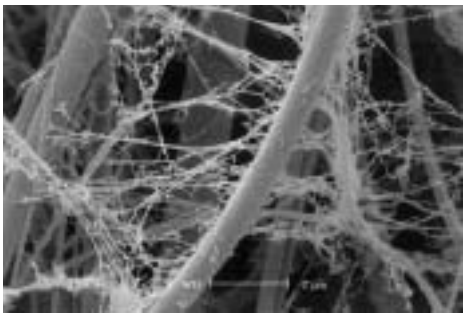
Capture Nucleic Acids in One Easy Step

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.

FTA Cards are available in a variety of sizes and formats.



Electron micrograph showing DNA entrapped within the FTA matrix (magnification x 10,000).

FTA Cards can be 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, RFLP 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. In contrast, genomic DNA stored at room temperature on non-FTA Cards for over six months did not amplify.

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 culture cells.

FTA Micro Card

FTA Classic Card

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 culture cells.

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 culture 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).

BloodSaver™ Card

FTA Card in a 96 well format for 5 µL blood samples. Used with the SPOT card holder (p. 125) in automated liquid handlers.

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 vials purification reagent (25 mL), 2 Harris Uni-Core Punches with cutting mat, instructions.

FTA Kit

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 and desiccant, 1 vial purification reagent (25 mL), 2 Harris Uni-Core Punches with cutting mat, instructions.

Blood Stain Card

Blood Stain Card

Contains non-FTA absorbent filter paper for the collection and transport of blood and body fluids. Intended for short-term handling of specimens and for protein or metabolite studies. For long-term storage of nucleic acids, Whatman FTA Cards are recommended. There are four sample areas for application of up to 500 µL whole blood per card. Convenient for multiple applications of the same specimens or collection of multiple specimens on one card. Different samples can be processed independently.

Ordering Information

FTA Technology					
Catalog Number	Description	Cards/ Pack	Sample Areas/ Card	Maximum Volume/ Sample Area (µL)	Maximum Total Volume/Card (µL)
WB120067	FTA Kit	25	N/A	N/A	N/A
WB120061	FTA Starter Pack	N/A	N/A	N/A	N/A
WB120205	FTA Classic Card	100	4	125	500
WB120206	Indicating FTA Classic Card	100	4	125	500
WB120055	FTA Mini Card	100	2	125	250
WB120056	Indicating FTA Mini Card	100	2	125	250
WB120210	FTA Micro Card	100	1	125	125
WB120211	Indicating FTA Micro Card	100	1	125	125
WB120208	FTA Gene Card	100	3	75	225
WB120065	PlantSaver FTA Card	100	4	N/A	N/A
WB100014	Blood Stain Card, non-FTA	100	4	125	500
WB120217	FTA Card/Pouch/Desicant	1000	N/A	N/A	N/A
WB120216	FTA Gene Card/Pouch/Desiccant	1000	N/A	N/A	N/A

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 RFLP 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 or 2.0 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

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

Sterile Foam tipped applicator

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. (Not for use with FTA Cards.)

Sterile Omni Swab

Multi-Barrier Pouches

Large

- For transporting or storing FTA Classic Cards
- Seven laminated layers that 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

FTA Card Mailer

- For use with the Multi-Barrier Pouches to transport FTA Cards in accordance with US Postal Service requirements

Storage Desiccant Packets

- Ensure that FTA Cards remain dry during transport or storage
- Changes from blue to pink to indicate absorption of moisture

Multi-Barrier Pouches

Ordering Information

FTA Reagent and Accessories		
Catalog Number	**Description**	**Quantity/Case**
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 Mat)	1
WB100006	Replacement Tip 1.2 mm	1
WB100007	Harris Micro Punch 2.0 mm (with Mat)	1
WB100008	Replacement Tip 2.0 mm	1
WB100020	Replacement Cutting Mat	1
WB100010	Multi-Barrier Pouch, Large (9 x 15 cm)	500
WB100011	Multi-Barrier Pouch, Small (8 x 7 cm)	500
WB100016	FTA Card Mailer	50
WB100003	Desiccant Packets (1 gm)	1000
WB100021	Bloodstain Card/Pouch/Desiccant	500
WB100025	Harris Micro Punch 1.2 mm replacement plunger	1
WB100026	Harris Micro Punch 2.0 mm replacement plunger	1
WB100028	Harris Uni-Core 1.2 mm punch	4
WB100029	Harris Uni-Core 2.0 mm punch	4
WB100035	Sterile Omni Swab	100

Clone Archiving

FTA Technology in 96 Well Format For High Throughput Applications

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 4 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 Amersham Bioscience's TempliPhi™, and then sequenced without the need for culture re-growth and plasmid purification.

For information regarding automation options contact Whatman technical services.

CloneSaver™ Card in a 96 Well Format

Designed for the collection, long-term storage and purification of plasmid and BAC DNA from bacterial clones.

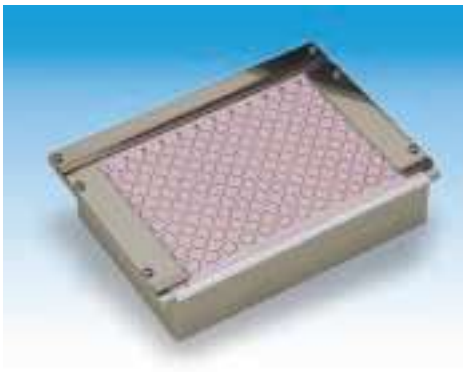
CloneSaver Card

CloneSaver™ Resealable Multi-Barrier Pouches

Same construction as FTA Multi-Barrier Pouches plus a zip-lock resealable closure for easy access to CloneSaver Cards.

SPOT CloneSaver/BloodSaver Holder

SPOT is a rigid frame that allows automated spotting to standard CloneSaver and BloodSaver cards. It keeps the card flat for uniform and precise spotting of your biological samples. A 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. The SPOT holder is compatible with standard liquid handlers manufactured by companies such as Beckman Coulter and Tecan Instruments.



SPOT Holder

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	N/A	N/A	N/A
WB120028	CloneSaver Card	5	96 well format	5	480
WB100024	CloneSaver Resealable Multi-Barrier Pouch	50	N/A	N/A	N/A
WB100034	SPOT Holder for Semi-Automated Spotting	1	N/A	N/A	N/A

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 microcentrifuge 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.

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 sufficient DNA for up to 80 amplification reactions from a 50 µL blood sample
- No precipitation steps. DNA is ready for immediate analysis

GenSpin Genomic Kit Contents

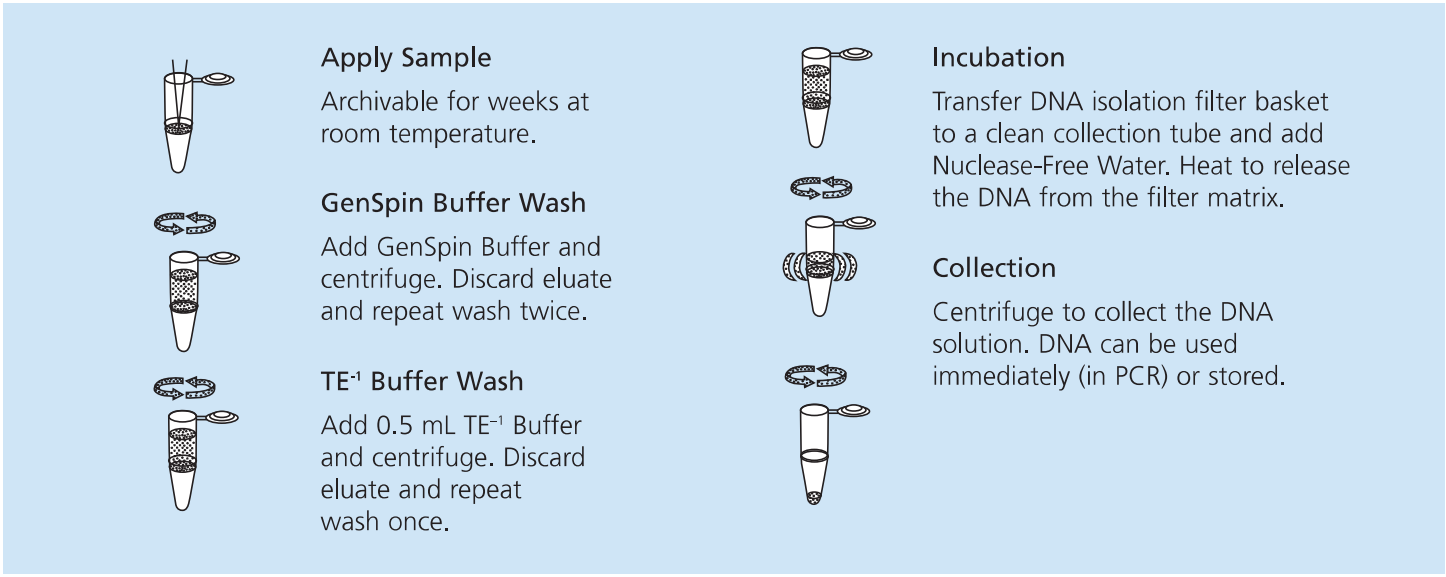
Quantity	Item
50	DNA Isolation Filter Baskets in 2 mL microcentrifuge tubes
50	2 mL microcentrifuge tubes
1	GenSpin Buffer 110 mL
1	Nuclease Free Water 25 mL
1	User Manual

Ordering Information

GenSpin Genomic Kits		
Catalog Number	**Description**	**Size**
WB120005	GenSpin DNA Purification Kit	50 purifications
WB120111	GenSpin Sample Kit	5 purifications

GenSpin Genomic DNA Purification Kit Performance Characteristics

Fig. 1 Overview of Protocol



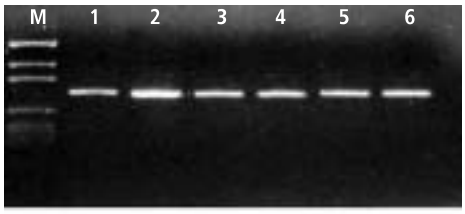


Fig. 2 PCR Using GenSpin Purified DNA.

Amplification of HLA-B using 10 µL GenSpin purified DNA per reaction. DNA was prepared using 25 µL of 6 whole blood samples. Products visualized on 1.5% agarose gel.

M: pGEM markers; Lane 1–6: GenSpin purified DNA

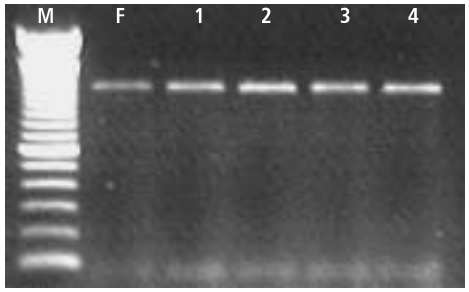


Fig. 3 PCR from Human Blood Archived on GenSpin.

5 µL of human blood was applied to Whatman GenSpin. The DNA was isolated after 1, 2, 3 and 4 weeks of storage at room temperature. 10 µL of eluted DNA was used to amplify HLA group loci. Products were separated on a 1.5% agarose gel.

M: Markers; F: Fresh blood; 1–4: Weeks of storage at room temperature

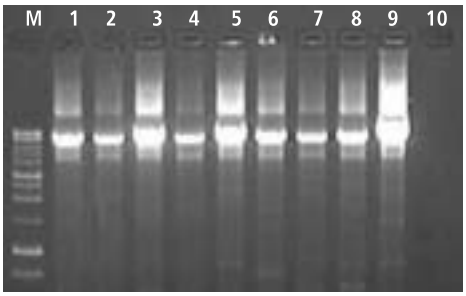


Fig. 4 7.5 kb PCR of the Human Beta-Globin Gene.

GenSpin purified DNA from fresh and frozen blood was used to amplify a 7.5 kb amplicon, demonstrating DNA purity and integrity.

M: Marker DNA Ladder; Lanes 1 and 2: Amplicons of DNA from fresh blood; Lanes 3–8: Amplicons of DNA from frozen blood; Lane 9: Positive control (human K562 DNA; Roche Diagnostics); Lane 10: Negative control

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 microcentrifuge 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 4 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.

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 ID of genetically modified plants
- FTA technology protects DNA from degradation. Enables room temperature storage for weeks

GenSpin Plant Kit Contents

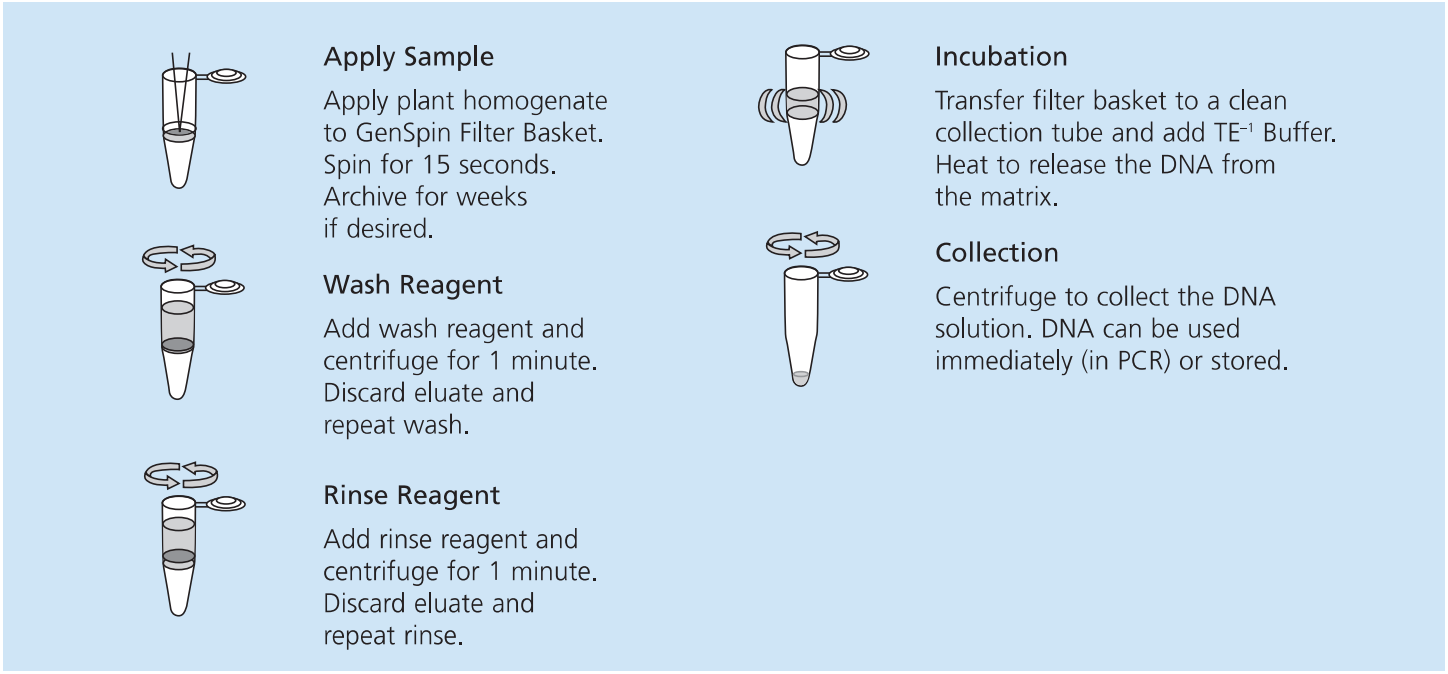
Quantity	Item
50	GenSpin Purification Tube with Filter Basket
50	GenSpin Collection Tube
1 bottle	Homogenization Buffer 25 mL
1 bottle	Wash Reagent 60 mL
1 bottle	Rinse Reagent 60 mL
1	Instruction Booklet

Ordering Information

GenSpin Plant Kits		
Catalog Number	**Description**	**Size**
WB120046	GenSpin Plant Kit	50 Purifications
SWB120046	GenSpin Plant Sample Kit	5 Purifications

GenSpin Plant DNA Purification Kit Performance Characteristics

Fig. 1 Overview of Protocol



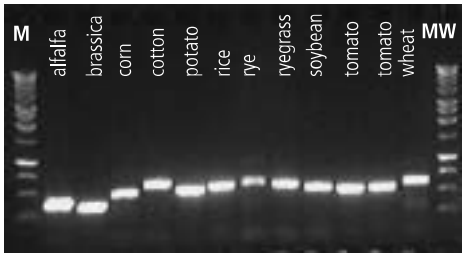


Fig. 2 Amplification of GenSpin Plant Purified DNA with Universal Primers for a Variety of Plant Species.

5 µL of GenSpin Plant DNA used per 25 µL PCR reaction for amplification of a noncoding chloroplast region trnL (UAA) exon.

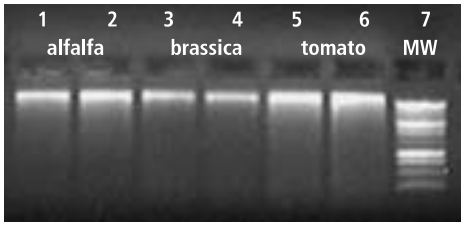


Fig. 3 GenSpin Plant Purified DNA.

Genomic DNA purified using GenSpin Plant Kit from 3 plant species. DNA from duplicate purifications were run on a 0.8% agarose gel.

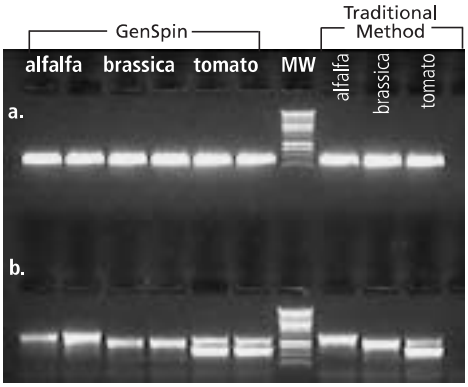


Fig. 4 Comparison of DNA Amplification Using DNA from GenSpin and a Traditional Extraction Method.

a. 18S rDNA PCR from three plant species, a 500 bp fragment is amplified

b. Rubisco activase (Rca) PCR from three plant species, fragments of 0.7–1.5 kb are amplified

Duplicate GenSpin purifications were run for each species. Results for GenSpin DNA are shown on the left and manually purified DNA shown on the right.

GenSpin Plant DNA Purification Kit Performance Characteristics continued

Table 1. 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

* 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.

Table 2. Comparison of GenSpin Plant and a common manual DNA isolation method

	GenSpin Plant	Manual Method*
Extraction Time	25 minutes	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.

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.

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)

96 Well Lysate Clarification UNIFILTER®

The Whatman Lysate Clarification UNIFILTER can utilize either a vacuum or centrifuge. The vacuum process is significantly easier to automate with consistency across all wells. It also has an average DNA recovery rate 10 to 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.

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

96 Well DNA Binding UNIFILTER®

The 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 dry on a vacuum manifold. The plasmid DNA is eluted by vacuum in a final volume of 100 µL into a nonbinding 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 to 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 available on request.

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.

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

384 Well DNA Binding UNIFILTER®

The 384 Well DNA Binding UNIFILTER provides highly reproducible results with yields exceeding 2 µg/well, from bind-wash-elute processing with collection by filtration. Minimal liquid hangup allows for reduced elution volume, enabling DNA concentration as high as 150 ng/µL. The DNA is ready to use and further ethanol precipitation is unnecessary.

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

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.

This microplate has a Cellulose Acetate membrane with a special support, which clears nonchaotropic 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

High Throughput Genomics UNIFILTER®					
Catalog Number	**Well Format**	**Well Volume**	**Plate Material**	**Filter Media**	**Quantity/Case**
7700-2808	96	800 µL	Clear Polystyrene	0.45 µm Cellulose Acetate	25
7701-5200	96	2 mL	Natural Polypropylene	N/A	25

NEW 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. PCR Cleanup UNIFILTERs 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.

NEW 96 Well Dye Terminator Removal UNFILTER®

This UNIFILTER can be used with gel filtration media for high throughput sequencing reaction cleanup, including removal of dye blobs. It is 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 UNFILTER®					
Catalog Number	**Well Format**	**Well Volume (µL)**	**Plate Material**	**Well Bottom**	**Quantity/Case**
7700-2801	96	800	Polystyrene	Filter, LLD*	25
7701-5750	96	750	Natural Polypropylene	Round	25

*Long drip director

NEW 384 Well Dye Terminator Removal UNFILTER®

A 384 well version is also available for Dye Terminator Removal.

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, LLD*	50

*Long drip director

Blotting Papers

3MM Chr

Whatman 3MM Chr paper is the 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), it is used extensively for general chromatography and electrophoresis.

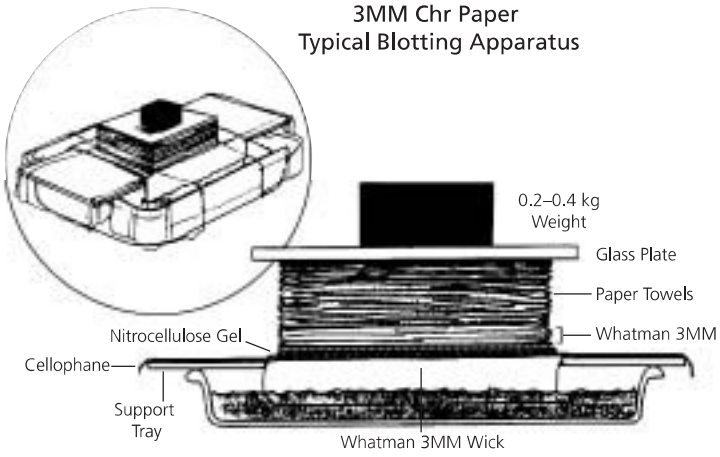
17 Chr

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.

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

3MM Chr Paper
Typical Blotting Apparatus



NUCLEIC ACID

Ordering Information

3MM Chr Pure Cellulose Grade Sheets		
Catalog Number	**Size**	**Quantity/Pack**
3030-6185	11 x 14 cm	100
3030-6132	12 x 14 cm	100
3030-153	15 x 17.5 cm	100
3030-6188	15 x 20 cm	100
3030-221	18 x 34 cm	100
3030-861	20 x 20 cm	100
3030-6461	26 x 41 cm	100
3030-347	35 x 43 cm	100
3030-392	35 x 45 cm	100
3030-335	31.5 x 35.5 cm	100
3030-917	46 x 57 cm	100
3030-931	58 x 68 cm	100
3030-6189	4" x 5.25"	100
3030-6187	6" x 8"	100
3030-866	8" x 10"	100
17 Chr Pure Cellulose Grade Sheets		
3017-915	46 x 57 cm	25

Extraction Products

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 analysis of fat content of food materials and many analytical procedures that involve a solid-liquid extraction.

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 (approximately 2 mm) are also available for applications where higher retention and increased wet or dry strength or rigidity is required (6 µm nominal particle retention).

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

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

Typical Data

	Cellulose	Glass Microfiber
Maximum Operating Temperature	120°C	500°C

Ordering Information

Single Thickness Catalog Number	Double Thickness 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
2800-307	—	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
2800-331	2810-331	33 x 118	25
2800-432	2810-432	43 x 123	25
2800-608	2810-608	60 x 180	25
2800-900	—	90 x 200	25
Glass Microfiber Thimbles–Grade HP-GF			
2814-199	—	19 x 90	25
2814-300	—	30 x 100	25
2814-432	—	43 x 123	25

*Internal diameter and external lengths.
**Fits Soxtec™ extractor.

EXTRACTION

Reeve Angel® Thimbles

1.5 mm thickness for mid-range particle retention.

Ordering Information

Reeve Angel® Thimbles		
Catalog Number	**Dimensions (mm)***	**Quantity/Box**
5128-6520	22 x 80	50
5128-6521	25 x 80	50
5128-6522	25 x 100	50
5128-6523	26 x 60	50
5128-6524	33 x 80	50
5128-6525	33 x 94	50
5128-6526	43 x 123	50

*Internal diameter and external lengths.

Cartridges and Columns

Whatman SPE devices are designed to concentrate or isolate analytes from complex sample matrices. Available with a variety of packings, these devices offer the advantage of working with different types of interactions between the sample components, sorbent and suitable eluent. The polarity (polar, nonpolar) 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 size columns. 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.

Features and Benefits

- Available in a range of packings
- 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

Typical Data

Key to Sorbent Abbreviations		Features
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®	—
SCX	Strong cation exchanger–aromatic benzene sulfonic acid functional groups	—
SAX	Strong anion exchanger–quaternary amino groups (-NR_3+)	—

Ordering Information

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.

Solid Phase Extraction (SPE) Disks

The Whatman SPE disk 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

Applications

- Oil and grease analysis, EPA Method 1664A

Ordering Information

Solid Phase Extraction (SPE) Disks					
Catalog Number	Description	Filter Media	Diameter (mm)	Pore Size (µm)	Quantity/ Box
6805-3043	SPE disk for oil and grease	—	47	—	80
6805-3048	SPE disk for oil and grease	—	90	—	20
6805-8034	DFP prefilter	—	42.5	5	48
6805-8035	DFP prefilter for 47 mm disk	PP	47	5	48
6805-8037	DFP prefilter for 90 mm disk	PP	90	5	16

Sample Drying Device

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

Ordering Information

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

1PS Phase 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.

Automatic Cut-off, Separatory Funnel Replacement

After being shaken, the mixed organic and aqueous phase is poured directly into the quadrant-folded 1PS circle 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, providing 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.

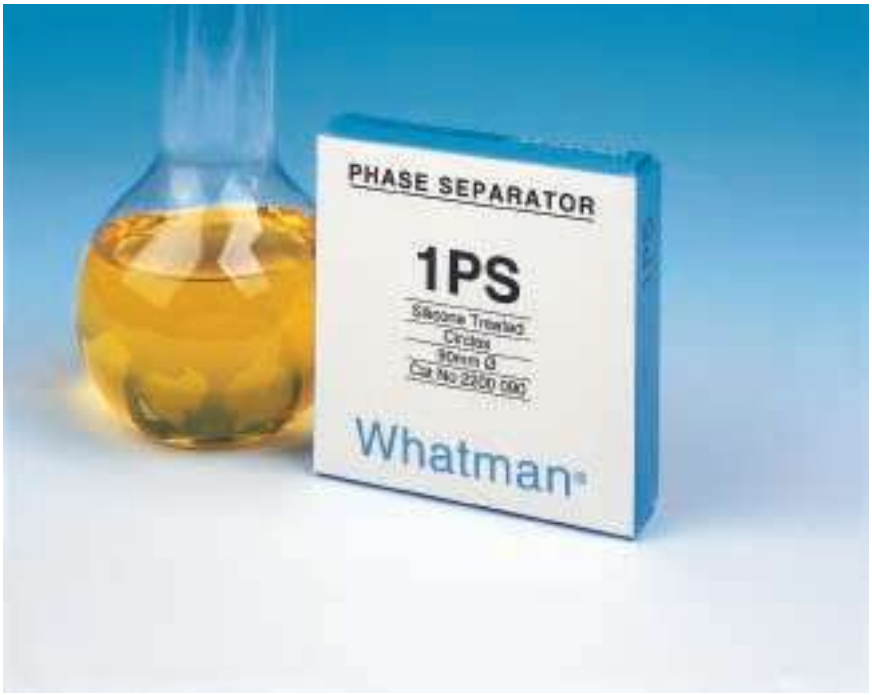
Unsupervised Separation

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.*

Features and Benefits

- Ease of use. No special training required
- Any number of separations can proceed together
- Staff involvement in routine separation is minimized

* Water may break through upon prolonged standing



Ordering Information

1PS Phase Separators (Circles)		
Catalog Number	**Diameter**	**Quantity/Pack**
2200-070	7.0	100
2200-090	9.0	100
2200-110	11.0	100
2200-125	12.5	100
2200-150	15.0	100
2200-185	18.5	100
2200-240	24.0	100
2200-270	27.0	100

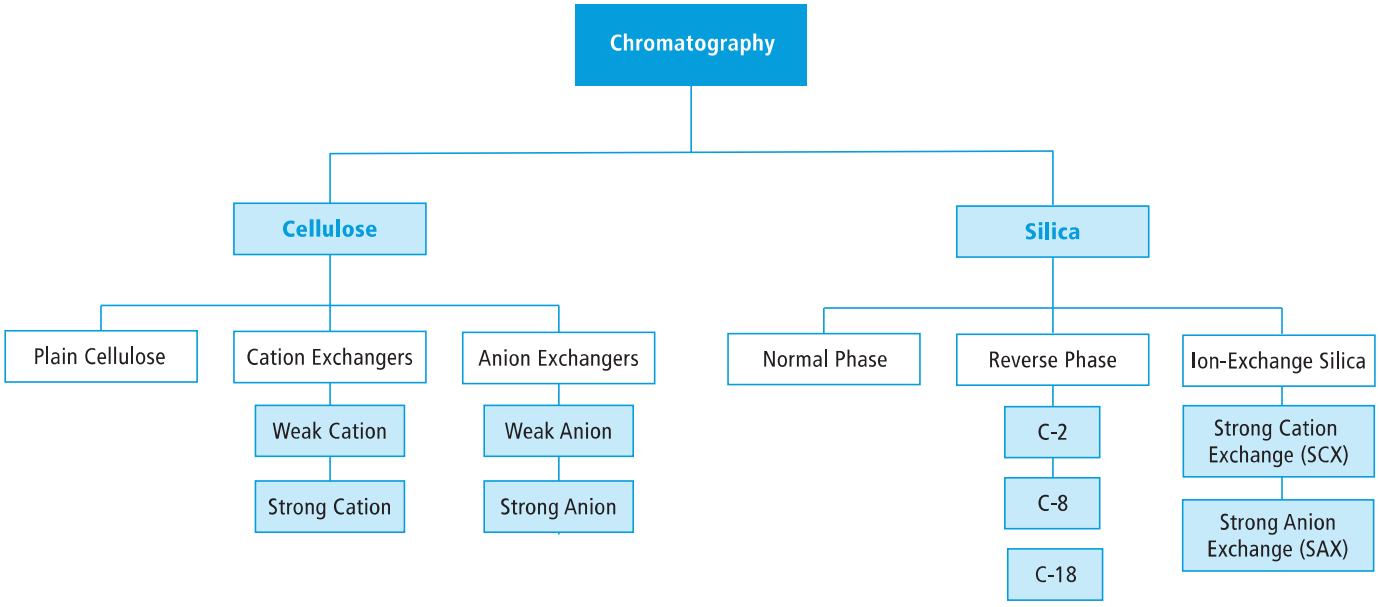
Chromatography Products

Overview of Chromatography Products

		Process/Sample Preparation Scale	Thin Layer Chromatography (TLC)	High Performance Liquid Chromatography (HPLC)
Silica				
Normal Phase	Silica Gel		Yes	Yes
	Low Pressure Silica Gel–LPS 1 13–24 µm	Yes		
	Low Pressure Silica Gel–LPS 2 37–53 µm	Yes		
	Diamond		Yes	
	HPTLC		Yes	
	Partisil 5 µm			Yes
	Partisil 10 µm			Yes
	PartiSphere 5 µm			Yes
	Silica 60Å–38 to 63 µm	Yes		
	Silica 60Å–63 to 212 µm	Yes		
Reversed Phase	Bonded Silica Gel–LPS 2 37–53 µm	Yes		
	C-18		Yes	
	C-8		Yes	
	C-2		Yes	
	Di-phenyl		Yes	
	Dual Phase		Yes	
	Partisil ODS-3 10.5% Carbon 5 µm			Yes
	Partisil ODS-3 10.5% Carbon 10 µm			Yes
	Partisil ODS 5% Carbon 10 µm			Yes
	Partisil ODS-2 16% Carbon 10 µm			Yes
	Partisil C-8 8.5% Carbon 5 µm			Yes
	Partisil C-8 8.5% Carbon 10 µm			Yes
	PartiSphere C-18 10.5% Carbon 5 µm			Yes
	PartiSphere C-18 16% Carbon 5 µm			Yes
	PartiSphere C-8 8.5% Carbon 5 µm			Yes
	PartiSphere RTF C-18 22% Carbon 5 µm			Yes
	PartiSphere RTF C-8 16 % Carbon 5 µm			Yes
	PartiSphere RTF Phenyl 22% Carbon 5 µm			Yes
	PartiSphere RTF Cyano 16% Carbon 5 µm			Yes
Ion-Exchange—Flexible			Yes	Yes
	Partisil/Polar Amino-Cyano (PAC)/5 µm			Yes
	Partisil/PAC/10 µm			Yes
	Partisil/Strong Anion-Exch (SAX)/10 µm			Yes
	Partisil/Strong Cation-Exch (SCX)/10 µm			Yes
	PartiSphere/PAC/5 µm			Yes
	PartiSphere/SAX			Yes
	PartiSphere/SCX			Yes
	PartiSphere/Weak Anion-Exch (WAX)			Yes
	PartiSphere/Weak Cation-Exch (WCX)			Yes

		Process/Sample Preparation Scale	Thin Layer Chromatography (TLC)	High Performance Liquid Chromatography (HPLC)
Cellulose	Plain Microcrystalline	Yes	Yes	No
	Plain Fibrous	Yes		
	Plain Cell Debris Remover	Yes		
	Anion Exchange/Weak Anion/Pre-Swollen/ Microgranular–Diethyl Amino Ethyl (DEAE)	Yes		No
	Anion Exchange/Weak Anion/Dry/Microgranular–DEAE	Yes		
	Anion Exchange/Weak Anion/Dry/Fibrous–DEAE	Yes		
	Anion Exchange/Weak Anion/Express Ion–DEAE	Yes		
	Anion Exchange/Strong Anion/Pre-Swollen/Microgranular/ Quart. Amine (QA)	Yes		
	Anion Exchange/Strong Anion/Express Ion/QA	Yes		
	Cation Exchange/Weak Cation/Pre-swollen/ Microgranular/Carboxyl Methyl (CM)	Yes		No
	Cation Exchange/Weak Cation/Dry/Microgranular/CM	Yes		
	Cation Exchange/Weak Cation/Dry/Fibrous/CM	Yes		
	Cation Exchange/Weak Cation/Express Ion/CM	Yes		
	Cation Exchange/Strong Anion/Pre-Swollen/Microgranular/ Sulfoxy Ethyl (SE)	Yes		
	Cation Exchange/Strong Anion/Express Ion/SE	Yes		
	Cation Exchange/Strong/Weak Cation/Dry/Fibrous/ Orthophosphate (P)	Yes		

Chromatography Quick Pick Reference Chart



Made into
- Packed columns—for HPLC
- Encapsulated into: 96 well plates, encapsulated devices
- TLC plates and flexible sheets
- Fibrous and granular powder media—in small and bulk packages

Applications
- Process/preparation scale: process purification applications into pharmaceutical production, e.g., protein purification–separation and purification of enzymes, fractionation of proteins
- High performance liquid chromatography (HPLC) qualitative and quantitative constituent chemical analysis in various lab applications
- Thin Layer Chromatography lab tool for analytical work for chemical, pharmaceutical, and environmental R&D and QC/QA labs

Chromatography Paper

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.

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.

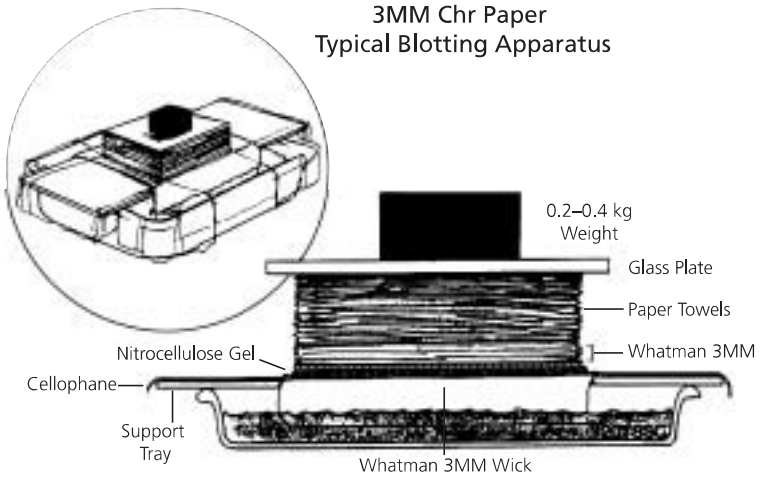
3 Chr

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.

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

3MM Chr Paper
Typical Blotting Apparatus



Ordering Information

3MM Chr Precut Sheets		
Catalog Number	**Size (cm)**	**Quantity/Pack**
3030-6185	11 x 14	100
3030-6132	12 x 14	100
3030-153	15 x 17.5	100
3030-6188	15 x 20	100
3030-221	18 x 34	100
3030-861	20 x 20	100
3030-6461	26 x 41	100
3030-347	35 x 43	100
3030-392	35 x 45	100
3030-335	31.5 x 35.5	100

Pure Cellulose Grade Rolls					
Catalog Number				**Length**	**Width**
1 Chr	**3MM Chr**	**4 Chr**	**54 SFC**		
3001-604	—	—	—	100 meters	1.0 cm
3001-614	3030-614	3004-614	—	100 meters	2.0 cm
3001-640	—	—	—	100 meters	3.0 cm
3001-652	—	—	—	100 meters	4.0 cm
3001-653	—	—	—	100 meters	5.0 cm
—	3030-662	—	—	100 meters	7.5 cm
3001-672	3030-672	—	—	100 meters	10.0 cm
—	3030-675	—	—	100 meters	12.5 cm
3001-681	3030-681	—	—	100 meters	15.0 cm
—	3030-690	—	—	100 meters	19.0 cm
—	3030-700	—	—	100 meters	23.0 cm
—	3030-704	—	—	100 meters	27.0 cm
3001-633	—	—	—	100 yards	1.0"
3001-651	—	3004-651	3454-651	100 yards	1.5"

Pure Cellulose Grade Sheets							
1 Chr	**2 Chr**	**3 Chr**	**4 Chr**	**17 Chr**	**20 Chr**	**31ET Chr**	**Size (cm)**
3001-917	3002-917	3003-917	3004-917	3017-915*	3020-917	3031-915*	46 x 57
3001-861	—	—	—	—	—	—	20 x 20
3001-931	—	—	—	—	—	—	58 x 68
3001-845	—	—	—	—	—	—	10 x 30
3001-878	—	—	—	—	—	—	25 x 25

*25/box

Pure Cellulose Grade Patterns and Strips		
Catalog Number	**Grade**	**Quantity/Pack**
CRL-Sheets 11 x 21.3 cm, 12 strips, 15 mm		
3001-964	1 Chr	100

Ion Exchange Paper

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

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/cm^2 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/cm^2 and the flow rate is 125 mm/30 min. For use with protein kinase assay with peptide substrates.

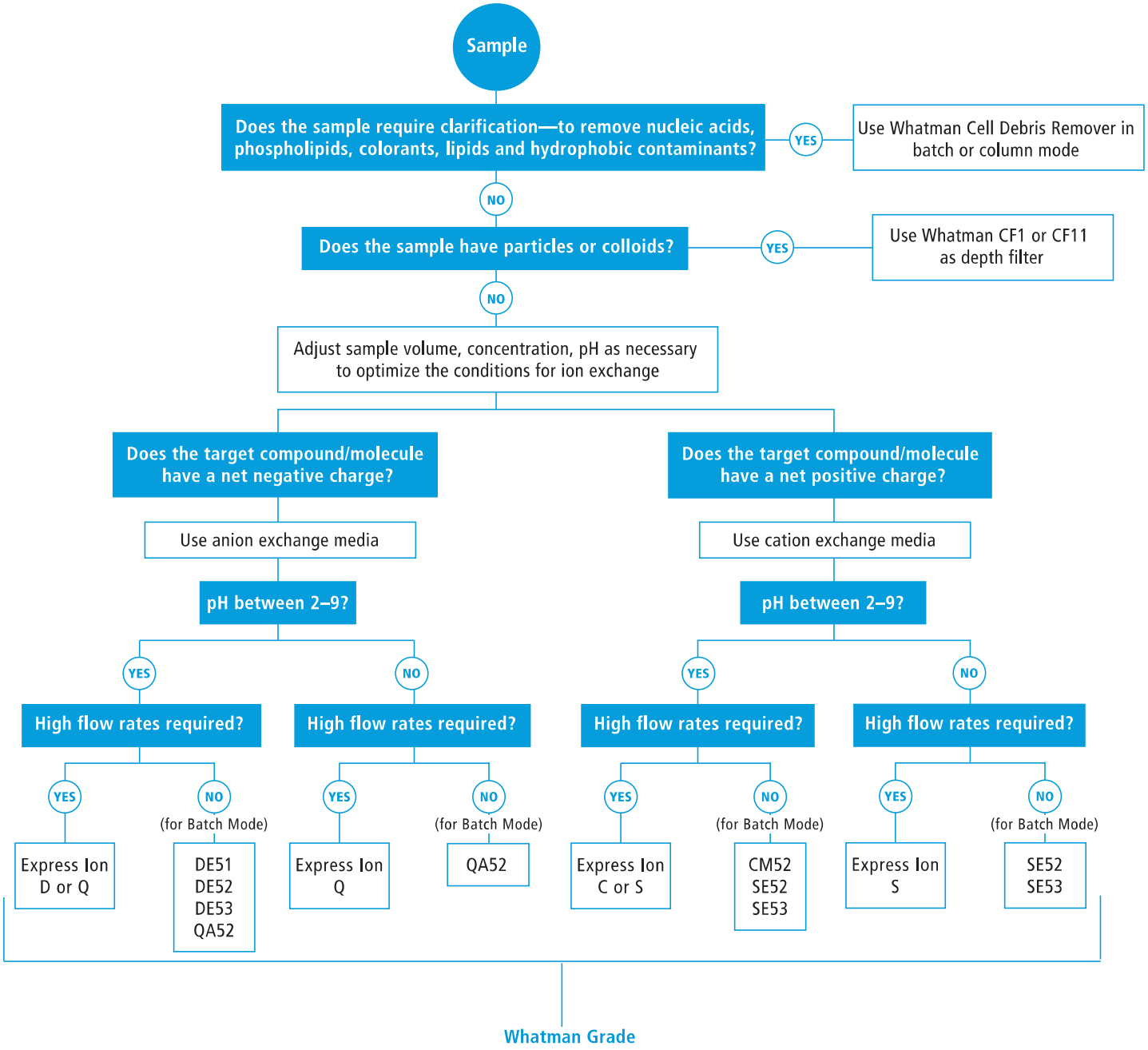
SG81

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.

Ordering Information

Catalog Number	Description	Diameter (cm)	Quantity/Box
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

Chromatography Media Quick Pick Reference Chart



Advanced Ion Exchange Cellulose

Whatman Advanced Ion Exchange Cellulose (AIEC) and Column Chromatography (CC) products, ideal for separation of biopolymers, are also 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

Cellulose Powders

For Column and Thin Layer Chromatography (TLC).

Four high-purity cellulose powders are available 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

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 clean-up of cell lysates; removes unwanted suspended, colloidal and soluble matter, leaving target proteins in solutions.

Ordering Information

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

Anion Exchangers

Anion Exchange Chromatography

The 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 (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	Protein Capacity[1]	
			meq/dg	mg/dg	mg/mL Bed Volume
Dry Fibrous					
DE23	Diethylaminoethyl	2–9.5	0.88–1.08	425[b]	60
Dry Microgranular					
DE32	Diethylaminoethyl	2–9.5	0.88–1.08	700[b]	140
Preswollen Microgranular					
DE51	Diethylaminoethyl	2.9	0.20–0.25	175[a]	30
DE52	Diethylaminoethyl	2–9.5	0.88–1.08	700[b]	130
DE53	Diethylaminoethyl	2–12	1.8–2.2	750[b]	150
QA52	Quaternary Ammonium	2–12	1.10	750[b]	150

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
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

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.

P1 Cellulose Phosphate
Dry fiber. Recommended for batch separations.

P11 Cellulose Phosphate
Dry fiber. Recommended for column separations.

Typical Data

Cation Exchange Media						
	Physical Form	Functional Group	Normal pH Range	Small Ion Capacity	Protein Capacity[1]	
				meq/dg	mg/dg	mg/mL Bed Volume
Preswollen Microgranular						
	CM52	Carboxymethyl	3–10	0.90–1.15	1180[a]	210
Dry Microgranular						
	CM32	Carboxymethyl	3–10	2.1–2.8	1180[b]	200
Dry Fibrous						
	P1	Orthophosphate	2–10	7.4	—	—
	P11	Orthophosphate	2–10	3.2–5.3	—	—

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 carboxymethyl	100 g
4035-050	CM32	Dry microgranular carboxymethyl	500 g
4037-050	CM52	Preswollen microgranular CM cellulose	500 g
4037-200	CM52	Preswollen microgranular CM cellulose	2 kg
4070-050	P1	Dry bifunctional cation exchange cellulose	500 g
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.

EXPRESS-ION D

A weak anion exchange cellulose substituted with diethylaminoethyl (DEAE) groups and recommended for separations between pH 2 and pH 9.

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.

Properties

Type	EXPRESS-ION D Weak Anion	EXPRESS-ION Q Strong Anion	EXPRESS-ION C Weak Cation	EXPRESS-ION S Strong Cation
Working pH range	2–9	2–12	4.5–10	2–12
Typical Protein	—	—	—	—
Capacity mg/mL: BSA Lysozyme	 60 —	 55 —	 — 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	—	—

Typical Data

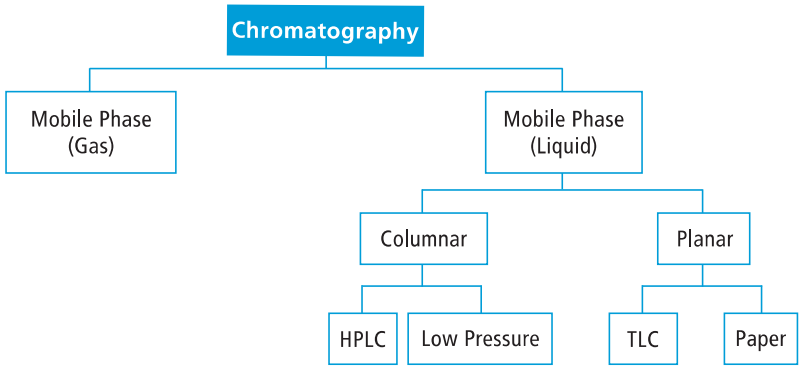
Flow Rate (cm/h)	Pressure (psi)		
	5.0	7.5	10.0
EXPRESS-ION D	171.6	213.6	238.5
EXPRESS-ION Q	134.7	173.6	212.4
EXPRESS-ION C	94.0	127.2	165.3
EXPRESS-ION S	94.0	127.2	160.8

Column dimensions 45 cm ID x 15 cm.

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

HPLC Quick Pick Reference Chart



Characteristics of HPLC Methods	
Method/Description/Column	**When is Method Preferred**
Reversed Phase Uses water/organic mobile phase Columns: C-18, C-8	First choice for non-ionized compounds that dissolve in water or organic mixtures
Ion Pair Uses water/organic mobile phase, a buffer to control pH and an ion pair reagent Columns: C-18, C-8	Good choice for ionic or ionizable compounds
Normal Phase Uses a mixture of organic solvents as mobile phase Columns: PAC, Silica	Good choice when reversed phase or ion pair are ineffective. First choice for lipophilic samples that do not dissolve well in water/organic mixtures, first choice for mixtures of isomers and preparative scale
Ion Exchange Uses aqueous mobile phase plus buffer for pH control Columns: Anion or Cation Exchange	First choice for separating mixtures of inorganic ions, good choice for separating proteins, nucleic acid samples and related compounds

Columns and Media

Partisil® HPLC Column Configurations

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.

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 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 end fittings.

Magnum 9 (50 cm)

9.4 mm ID x 50 cm long. Semipreparative 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 (with WCS Standard End-Fittings)

Catalog Number	Particle Size (µm)	Dimensions
Bonded Phase		
Partisil Silica		
4222-220	5	4.6 x 100 mm
4215-001	5	4.6 x 250 mm
4216-001	10	4.6 x 250 mm
4230-120	10	9.4 x 250 mm
4230-220	10	9.4 x 500 mm
4232-220	10	22 x 500 mm
Partisil ODS-3		
4222-225	5	4.6 x 100 mm
4238-001	5	4.6 x 250 mm
4228-001	10	4.6 x 250 mm
4230-125	10	9.4 x 250 mm
4232-125	10	22 x 250 mm
Partisil C-8		
4222-232	5	4.6 x 100 mm
4239-001	5	4.6 x 250 mm
4229-001	10	4.6 x 250 mm
Partisil SAX		
4222-227	5	4.6 x 100 mm
4226-001	10	4.6 x 250 mm
4250-001	10	4.6 x 250 mm (with Solvecon)
4232-128	10	22 x 250 mm
Partisil SCX		
4222-228	5	4.6 x 100 mm
4227-001	10	4.6 x 250 mm
4251-001	10	4.6 x 250 mm
4232-230	10	22 x 500 mm
Partisil PAC		
4235-001	5	4.6 x 250 mm
4225-001	10	4.6 x 250 mm
Partisil 10 ODS		
4223-001	10	4.6 x 250 mm
Partisil 10 ODS-2		
4224-001	10	4.6 x 250 mm
4230-124	10	9.4 x 250 mm
Accessories		
4334-225	Frits, 1/4" diameter, 2 µm porosity	(10/pack)

Whatman Void Sealing (WVS) Columns and Media Characteristics

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

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, phenyl 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

Typical Data

Partisil Bonded Phase	Other Specifications
Silica (85Å)	Irregular
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% $-NR_{3+}$
SCX	0.40% S
PartiSphere Bonded Phase	
Silica (120Å)	Spherical
C-18	10% carbon load; end capped; brush
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
C-8	17% carbon load; monomeric brush
Phenyl	16% carbon load; monomeric brush
Cyano	7.5% carbon load; monomeric brush

Ordering Information

WVS Columns			
Catalog Number	Particle Size (µm)	Column Type	Column Size (mm)
Partisil[1] 5 µm & 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
PartiSphere RTF Phenyl			
4522-0114	5	Standard Analytical	4.6 x 250

* Requires one-time purchase of 4.6 mm ID WVS end fittings, catalog number 4631-1001.

[1] Irregular Media

[2] Spherical Media

CHROMATOGRAPHY

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

Catalog Number	Product	Quantity/Pack
Guard Cartridge Holders (For use with WVS Analytical Column)		
4631-1003	Integral Guard Cartridge Holder	WVS Small 1
4631-1004	Universal Guard Cartridge Holder	WCS Small 1
Guard Cartridge System Replacement Cartridges		
4641-0001	SIL Cartridge	5
4641-0002	RP Cartridge	5
4641-0005	AX Cartridge	5
4641-0007	CX 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

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

Ordering Information

Catalog Number	Product	Size (mm)	Quantity/Pack
4601-1001	TAC 1	4.6 x 250	1

NEW UniSep HPLC Column

The UniSep 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
- 5 µm
- 100Å pore size
- 16% carbon load
- Easy scale up

Applications

- Life science
- Food and beverage
- Pharmaceutical

Ordering Information

Catalog Number	Dimensions	Quantity/Pack
UniSep HPLC Column		
4550-4605	4.6 mm x 50 mm	1
4550-4610	4.6 mm x 100 mm	1
4550-4615	4.6 mm x 150 mm	1
4550-4625	4.6 mm x 250 mm	1

Media for High Performance Liquid Chromatography (HPLC)

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 (5 µm and 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 (5 µm and 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 a pure silica, in normal phase mode. Check prepacked column ordering information for availability of specific columns.

Partisil ODS-2 (5 µm and 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. Check prepacked column ordering information for availability of specific columns.

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, biologicals 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.

Ordering Information

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

Bulk Silica Media for Column Chromatography

Media 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.

Features and Benefits

- High resolution
- Good flow characteristics
- High surface area

Ordering Information

Catalog Number	Product	Particle Size (µm)	Mode of Separation	Other Specifications	Weight
Bulk Silica Media for Low Pressure Column Chromatography					
4770-010	LPS-1 low pressure silica gel	13–24	Adsorption	250 m^2/g high purity; totally porous; slurry pack for best results	1 kg
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

All-purpose media for general column chromatography. Applicable for preparative low pressure column separations scaled up from Partisil analytical HPLC columns.

Ordering Information

Catalog Number	Product	Particle Size (µm)	Mode of Separation	Other Specifications	Weight
Bulk Silica Media for General Column Chromatography					
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

NEW 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

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

Catalog Number	Product	Dimensions
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

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 pre-concentrate the sample before it interacts with the silica layer. In order to facilitate sample application and the pre-concentrating power of the pre-adsorbent 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.

TLC Plates: Designations/Formats

Whatman has designed nomenclature as a simple and convenient way of distinguishing between 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 spot into a narrow horizontal band. Hence, it is known as Linear-K; prefix L.

D Channeled 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

Type	Separation Mode	Application	Layer Thickness (µm)	Plate Size (cm)	Fluorescent Linear-K	Channeled	Indicator
C-18	Reversed Phase	General	200 1000	1" x 3", 10 x 10, 5 x 20, 20 x 20	Available	—	Available
C-8	Reversed Phase	General	200	5 x 20, 20 x 20	—	—	Available
C-2	Reversed Phase	Small polar molecules	200	5 x 20, 20 x 20	—	—	Available
Diphenyl	Reversed Phase	Biological samples and aromatics	250	20 x 20	—	—	Available
Diamond	Adsorption	General	250	2.5" x 7.5", 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
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 Ion exchange	General anionic Anionic biopolymers	250 100	20 x 20 20 x 20	—	—	Available

Partisil K6 60Å and K5 150Å Adsorption TLC Plates

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.

Ordering Information

Catalog Number	Product Code	Plate Size (cm)	Linear-K Preadsorbent	Channeled	Fluorescent Indicator	Quantity/Pack
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	—	—	—	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
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	—	—	—	50
4850-820	K5	20 x 20	—	—	—	25
4851-820	K5F	20 x 20	—	—	Yes	25
4850-830	PK5*	20 x 20	—	—	—	22
4850-840	PK5**	20 x 20	—	—	—	22
4851-830	PK5F*	20 x 20	—	—	Yes	22
4851-840	PK5F**	20 x 20	—	—	Yes	22
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
4856-821	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.

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. The EH6 series comes in a variety of sizes to conveniently suit most applications.

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 adds to efficiency by reducing band spreading
- Available in bulk quantities

Applications

- The 60 Angstrom 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
- The EH6 Series comes in a variety of sizes to suit most applications including the analysis of microsamples
- Ultra low noise backgrounds allow you to perform scanning densitometry with maximum detection range

Ordering Information

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
4840-725	EH6	10 x 20	250	No	250

Diamond Series TLC Plates

Whatman Diamond Series TLC plates exhibit gem-like qualities for resolution and speed. 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 minimizes light scattering which interferes with densitometric scanning.

Ordering Information

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

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).

Ordering Information

Catalog Number	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	PE SIL G	Aluminum	250	20 x 20	—	25
4420-222	Silica Gel 60Å	PE 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 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 for reproducible results
- Compatible with highly aqueous solvent systems, for greater flexibility
- Ready correlation with HPLC columns provides convenient starting point for methods development

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 utilizing two different separation mechanisms. Additionally they offer single step sample clean-up.

Ordering Information

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

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
- Microsamples (nano 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

Catalog Number	Product Code	Plate Size (cm)	Linear-K	Channeled Indicator	Fluorescent	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

Specialty Products

pH Indicator 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.

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.

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

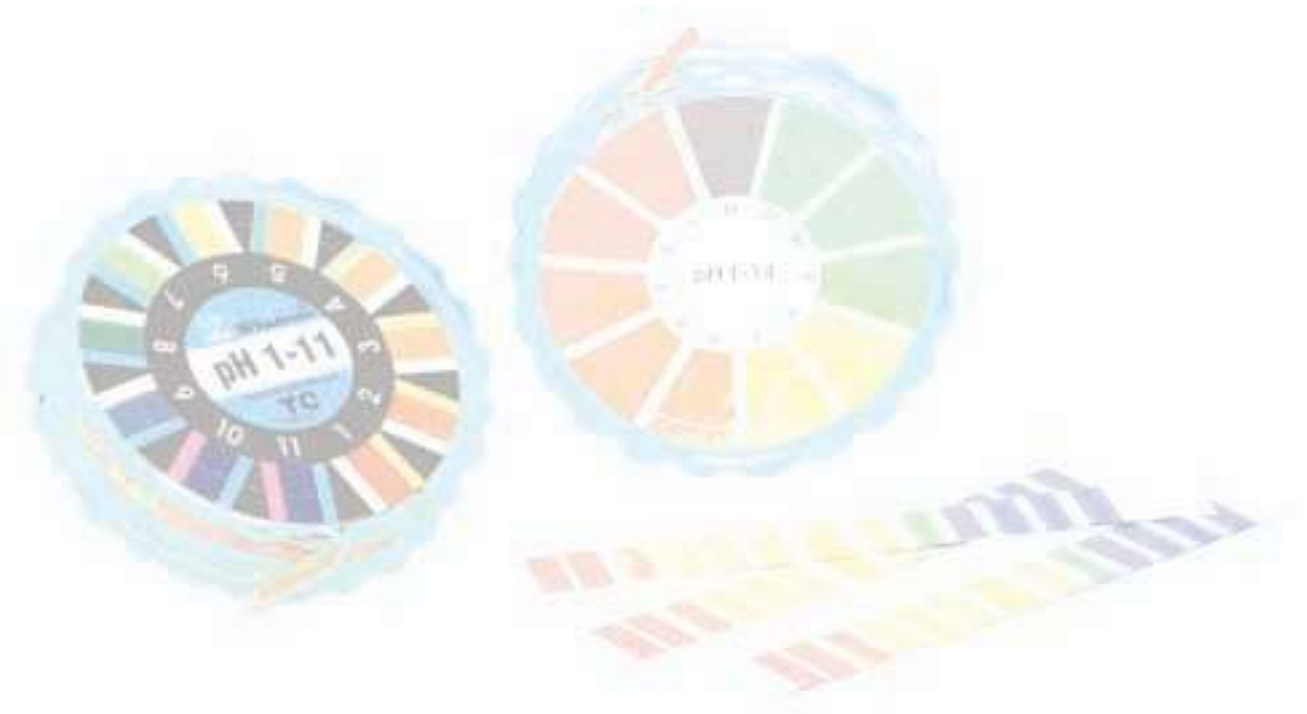
Used for detecting chlorine and other oxidizing agents. In acid solution, oxidizing agents react with the iodide in the test paper to liberate iodine. The paper will turn blue in the presence of an oxidizing agent (e.g., Cl_2, Br_2, H_2O_2, HNO_2, etc.).

Ordering Information

Catalog Number	Type	Description	pH Range	pH Unit Graduation	Dimensions	Packaging
pH Indicator Papers						
Strips						
2613-991	CF	Color Bonded	0–14	1.0	6 mm x 80 mm	Pack of 100 Strips
2614-991	CF	Color Bonded	4.5–10.0	0.5	6 mm x 80 mm	Pack of 100 Strips
2612-990	CS	Integral Comparison Strip	1.0–12.0	1.0	11 mm x 100 mm	Pack of 200 Strips
2626-990	CS	Integral Comparison Strip	1.8–3.8	0.2–0.3	11 mm x 100 mm	Pack of 200 Strips
2627-990	CS	Integral Comparison Strip	3.8–5.5	0.2–0.3	11 mm x 100 mm	Pack of 200 Strips
2628-990	CS	Integral Comparison Strip	5.2–6.8	0.2–0.3	11 mm x 100 mm	Pack of 200 Strips
2629-990	CS	Integral Comparison Strip	6.0–8.1	0.3	11 mm x 100 mm	Pack of 200 Strips
2630-990	CS	Integral Comparison Strip	8.0–9.7	0.2–0.3	11 mm x 100 mm	Pack of 200 Strips
2631-990	CS	Integral Comparison Strip	9.5–12.0	0.5	11 mm x 100 mm	Pack of 200 Strips
Dispensers						
2611-628	TC	Three Colors	1.0–11.0	1.0	7 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	6.0–8.0	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

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



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

Ordering Information

Catalog Number	Dimensions	Quantity/Box
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

Acid Treated Low Metal TCLP Filters

See also the Filter Papers and Membranes section of this catalog.

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.

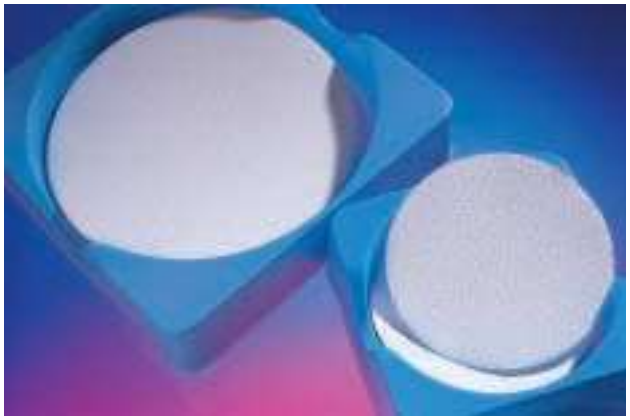
Used for EPA Method 1311

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 EPA Method 1311.

These acid treated low metal filters are available in a range of 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

Catalog Number	Size (mm)	Quantity/Box
Acid Treated Low Metal TCLP Filters		
1810-047	47	100
1810-090	90	50
1810-110	110	50
1810-125	125	50
1810-142	142	50
1810-150	150	50



SPECIALTY

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
- Suitable for saturation with disinfectant to protect benches where pathogens and other bacteria are present
- Use polyethylene side up to collect deposits without absorption

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

Catalog Number	Description	Dimensions	Quantity
Benchkote			
2300-916	Sheets	460 mm x 570 mm	50
2300-594	Pads	460 mm x 570 mm	50
2300-731	Reel	46 cm x 50 m	1
2300-772	Reel	92 cm x 50 m	1
Benchkote Plus			
2301-6150	Sheets	500 mm x 600 mm	50
2301-6160	Reel	60 cm x 50 m	1

Appendices

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 181).

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.

Herzberg Method

Whatman quantifies liquid flow rate for its range of filters by using a Herzberg flow rate tester. 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

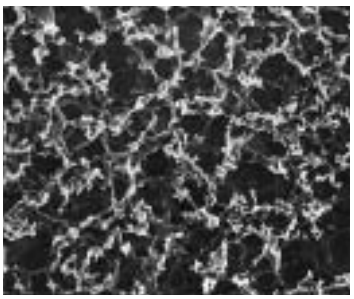
These types of filters repel water, and are thus best suited for venting or gas filtration applications.

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 system 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.

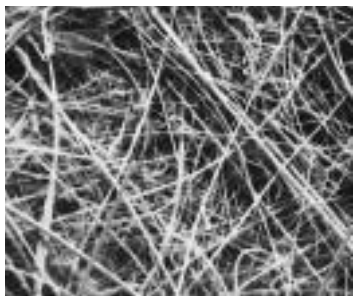
Loading Capacity

This relates to the ability of a filter to load particulates into the fibrous matrix while maintaining a practical filtration

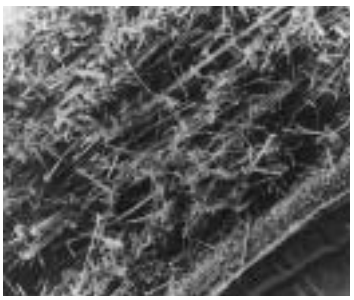


Membrane filters allow the efficient retention of submicron particulates and organisms.

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.

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 (mm), 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 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 submicron 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

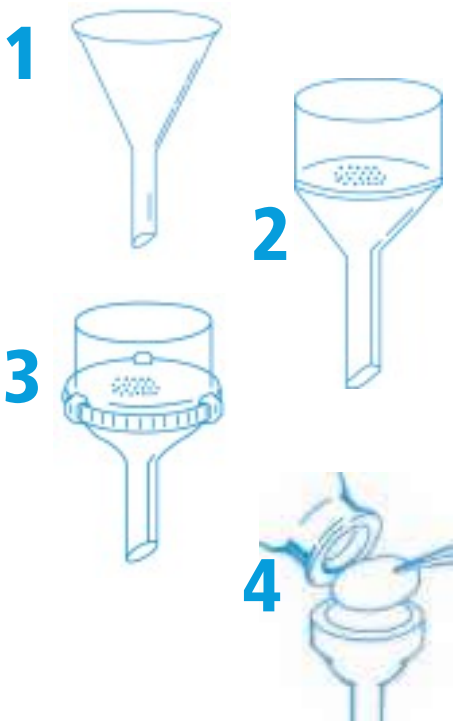
The maximum practical volume of the most popular circle sizes (quadrant folded) is given in the following charts. Membrane and glass microfiber filters are used flat.

Diameter (cm)	Volume (mL)
9	15
11	20
12.5	35
15	75
18.5	135
24	300

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, see next page). 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 Buchner 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.



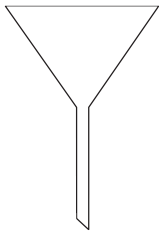
Selecting the Right Filter

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:

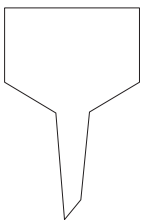
- Particle retention efficiency
- Fluid flow rate through the filter
- Loading capacity

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.

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



Buchner Funnel Filter Selection Table			
Coors Catalog Number	**Diameter (mm)**	**Perforated Area (mm)**	**Filter Paper Size (mm)**
60239	43	32	42.5
60240	63	42	55
60242	83	60	75
60243	100	77	90
60244	114	95	110
60245	126	105	125
60246	151	135	150
60247	186	160	185
60248	253	213	240



Typical Particle Sizes	
Gelatinous Precipitates	**µm**
Metal hydroxides	25–40
Precipitated silica	25–40
Crystalline Precipitates	
Ammonium phosphomolybdate	20
Calcium oxatate	15
Lead sulphate	10
Barium sulphate (hot ppt.)	8
Barium sulphate (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
Bacillius 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.

Product Selection

Chemical 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
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, Cone	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.

Alphabetical Index

Numerical Index

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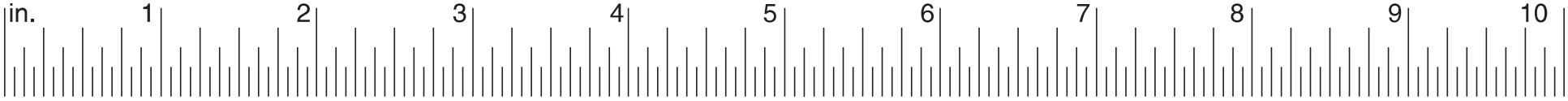
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