

Whatman

Part of GE Healthcare

# Touching lives

Product Guide 2009-2010



# Welcome to Whatman,

the world's leading developer of high-end laboratory separation products. As a part of GE Healthcare, Whatman is creating a center of excellence in separations technology for the scientific community. Whether its a simple paper filter or technologies that help us understand the role of genes and proteins in disease treatments, our solutions enable scientists, engineers and medical staff to impact human lives every day – from the child who needs clean drinking water to the elderly woman who needs precisely the right amount of medication to the man undergoing cancer treatment. With this, we can promote Early Health to aid earlier diagnosis and treatment of diseases. No matter what industry you are in, or what type of research you are conducting, Whatman will help you achieve your goals and touch lives.



# One clear united vision

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Our reputation, based on a solid foundation of expertise, enables us to touch lives and change how healthcare is researched and delivered. In laboratories across the globe, the Whatman name is synonymous with quality, reliability and ease of use. Our instinct for simplification accelerates the rate of discovery, reduces costs and saves time. Whatman products have a reputation for working right the first time – every time. Which is why Whatman products are specified for the most exacting applications across a wide range of industries for humans around the globe.



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### **Genomics and Proteomics**

Whatman products facilitate genomic studies of humans, animals, plants and microorganisms. Cancer research is aided by our protein microarrays, which help to screen and profile samples. Our FTA™ range of products and CloneSaver™ Cards can assist with collection, storage and analysis of DNA, while our blotting membranes are used for protein analysis. UNIFILTER™ is our market-leading multiwell filtration plate for high-throughput nucleic acid sample preparation. We also offer 903™ Specimen Collection Paper, the international standard for body fluid sample collection and analysis.

### **Basic Analytical Testing**

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

### **Food and Beverage**

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

### **Pharmaceutical**

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

### **Environmental Monitoring**

Whatman solutions are used extensively in EPA, ASTM and ISO protocols for environmental monitoring. Total suspended solids analysis methods for waste water, for example, require Whatman 934-AH™ glass microfiber papers. Asbestos analysis is accomplished with Whatman Nuclepore™ track-etched membranes. Our innovative products, such as the FTA Concentrator-PS™, are also used to purify nucleic acids to identify organisms in diverse samples.

### **FTA/Neonatal Screening**

Our 903 Specimen Collection Paper is globally known for its high quality for collecting blood samples for neonatal screening, and has an international reputation as the market-leading paper for purity and reproducibility. Whether collecting a blood sample or a noninvasive buccal cell sample, our FTA technology is the right choice for genetic population screening. For straightforward amplification analyses, FTA Cards provide rapid DNA preparation for PCR amplifications. For more flexibility and real-time PCR analysis, FTA Elute offers the choice of DNA in solution for a wide variety of assays.

# Two easy ways to contact your local distributor

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**Call us now, or email your customer service team.** Whatman can meet the filtration and separations needs of virtually any laboratory with the right product at the right time. Through partnerships with the world's leading laboratory supply distribution companies, we ensure speedy delivery of products to your lab. Details of your nearest distributor can be found at [www.whatman.com](http://www.whatman.com).

# Three ways to use this guide

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

## Industry Application

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

## Product Type

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

## Product/Catalog Number

Look up Whatman products by name or catalog number through the indices at the back of this catalog (p. 342).

**North America**

1-800-WHATMAN or  
whatmaninfo@ge.com

**EU** (except countries  
listed below), **Europe,**  
**Eastern Europe, Africa**  
**and Middle East**

+44 (0) 1622 676670 or  
information@whatman.com

**Belgium, Netherlands**  
**and Luxembourg**

+31 (0) 73631 3100 or  
information@whatman.com

**Germany**

+49 (0) 5564 204 100 or  
information@whatman.com

**France**

+33 (0)1 39 29 29 39 or  
information@whatman.com

**Japan**

+81 (0) 3-6864-1240 or  
japaninfo@whatman.com

**Asia Pacific**

+65 6534 0138 or  
wap@whatman.com



# Application Finder

## Agricultural Identification

### Animal Identification

*Genetic analysis, purifying DNA for microsatellite and SNP typing to identify individual animals and important genetic traits in research and livestock production settings*

FTA Products	222
Multiwell Plates	300

### Animal Disease Diagnostics

*Nucleic acid based molecular diagnostic testing and analysis in R&D, protein based disease diagnostics via immunoassay and Western blot analysis*

FTA Products	222
Protein Microarrays	254
Blotting Products	278
Multiwell Plates	300

### Animal Genotyping and Tracking

*Purifying DNA for genetic analysis of economically important traits, meat and meat products traceability*

FTA Products	222
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### Animal Research

*Nucleic acid and protein based analysis in basic research, molecular biology and immunological assays*

FTA Products	222
Protein Microarrays	254
Blotting Products	278
Multiwell Plates	300

### Plant Research and Breeding

*Molecular biology analysis, nucleic acids isolation and gene detection*

FTA Products	222
Multiwell Plates	300

### Plant Genotyping

*Analysis of advantageous growth genes, screening transgenic plants, germplasm identification and identity preservation*

FTA Products	222
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## GMO Analysis

*Detection of genetically modified organisms via DNA based or immunological methods, R&D, basic research*

FTA Products	222
Protein Microarrays	254
Blotting Products	278
Multiwell Plates	300

## Basic Lab

### Education, Commercial Labs

*Basic laboratory filtration for educational purposes, quality control, analysis and R&D*

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## Environmental Monitoring

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*Analysis of air for biological and particulate contaminants*

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### Trace Organics

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Glass Microfiber Filters	26

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## Food and Beverage

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*Microbial and contaminant detection in food and beverage products*

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FTA Products	222

## Genomics

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<i>Child and adult identification, genetic identification</i>	

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<b>Paternity</b>	
<i>Parent/child relationships, family relationships, ancestry tracing</i>	

FTA Products	222
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# Application Finder continued

## Microbial Genomics

### Microbial Identification

*Identification of bacterial species by DNA based and immunological methods, basic research, R&D*

FTA Products	222
Protein Microarrays	254
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Multiwell Plates	300

### Water Analysis

*Detecting microorganisms in water samples, molecular identification, basic research, R&D, monitoring*

Microbiology	142
FTA Products	222
Protein Microarrays	254
Blotting Products	278
Multiwell Plates	300

### Air Analysis

*Detecting microorganisms in air samples, molecular identification, basic research, R&D, monitoring*

FTA Products	222
Protein Microarrays	254
Blotting Products	278
Multiwell Plates	300

### Food Safety and Analysis

*Detecting microorganisms in food samples, molecular identification, basic research, R&D*

FTA Products	222
Protein Microarrays	254
Blotting Products	278
Multiwell Plates	300

### Homeland Security

*Identification of bioterrorism agents, toxicology, molecular and protein analysis*

FTA Products	222
Protein Microarrays	254
Blotting Products	278
Multiwell Plates	300

## Molecular Diagnostics

### Disease Identification

*Molecular diagnostics, oncology, disease tracking, basic research, clinical research, R&D*

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### Genetic Markers

*Identification of genetic disease markers, screening, basic research, clinical research, R&D*

FTA Products	222
Protein Microarrays	254
Multiwell Products	300

## Non-life Sciences

### Micro-Electronics

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### Chemical Process Industries

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### Population Screening

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## Pharmaceutical, Biotechnology, Medical Research, Specialty Chemicals, Life Science Research

### R&D

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

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## Manufacturing Operations

*Full scale production of pharmaceuticals and other products*

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### Prefiltration

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## Product Development

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

### Bio-Separation and Purification

VectaSpin Centrifuge Filter Tubes 123

### Prefiltration

Cellulose Filters 4

Glass Microfiber Filters 26

Syringe Filters 80

Capsule Filters 106

## Pharmacogenomics

### Clinical Trials

*Sample collection, analysis and archiving, genetic analysis, genotyping, basic research, clinical research, pharmaceutical R&D*

FTA Products 222

Protein Microarrays 254

Blotting Products 278

### BioBanking/DNA Repositories

*Sample collection, analysis and long term archiving, genetic analysis, genotyping, basic research, clinical research, pharmaceutical R&D*

FTA Products 222



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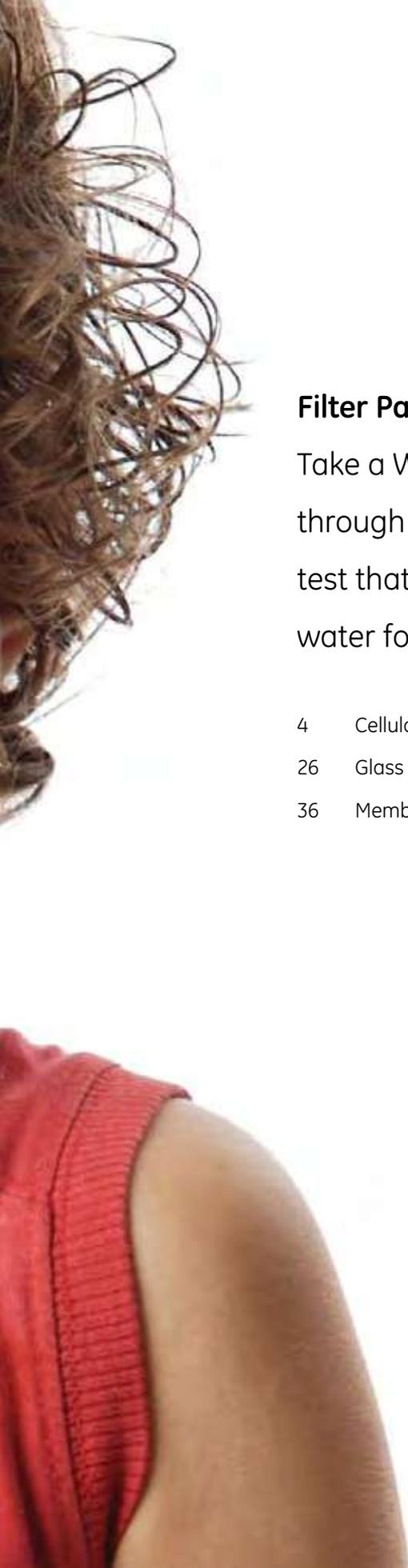
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## Filter Paper and Membranes

Take a Whatman microfiber filter paper, run a water sample through it and test for suspended solids. A simple but essential test that protects the environment and the quality of drinking water for millions of people throughout the world.

- 4 Cellulose Filters
- 26 Glass Microfiber Filters
- 36 Membrane Filters

# Filter Papers and Membranes

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

Whatman offers an extensive line of filter papers. The innovative features of these filters make them the optimum choice for many filtering techniques. Whatman maintains a guaranteed quality, reproducibility, and uniformity for all its filters by using only the highest quality raw materials.

The filters are tested for grammage, thickness, air flow, and mechanical strength. In addition, special parameters such as particle retention, wicking rate, filtration performance, and surface characteristics can be measured as needed.

## Cellulose Filters

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

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



### Selection – Cellulose Filters: Trace Elements – Typical Values (µg/g Paper)

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

## Qualitative Filter Papers

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

### *Qualitative Filter Papers – Standard Grades*

#### **Grade 1: 11 $\mu\text{m}$**

The most widely used filter paper for routine applications with medium retention and flow rate. Extended range of sizes includes 10 to 500 mm diameter circles and 460  $\times$  570 mm sheets. This filter is also available in the FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 ml capacity molded from polypropylene with an integral, heat bonded filter (catalog number 1600-001).

This grade covers a wide range of laboratory applications and is frequently used for clarifying liquids. Traditionally, the grade is used in qualitative analytical separations for precipitates such as lead sulfate, calcium oxalate (hot), and calcium carbonate.

In agriculture, it is used for soil analysis and seed testing procedures. In the food industry, Grade 1 is used for numerous routine techniques to separate solid foodstuffs from associated liquid or extracting liquid and is widely used in education for teaching simple qualitative analytical separations.

In air pollution monitoring, using circles or rolls, atmospheric dust is collected from airflow and the stain intensity measured photometrically. For gas detection, the paper is impregnated with a chromogenic reagent and color formation quantified by optical reflectance.

#### **Grade 2: 8 $\mu\text{m}$**

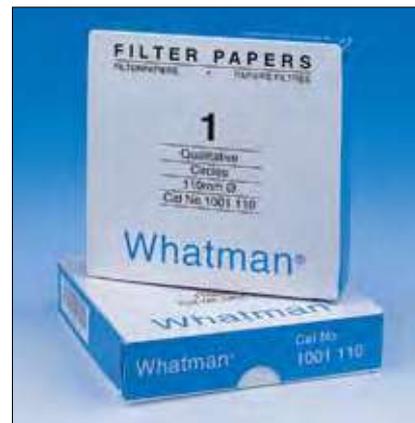
Slightly more retentive than Grade 1 with a corresponding increase in filtration time (i.e., slightly slower filtration speed). More absorbent than Grade 1. In addition to general filtration in the 8  $\mu\text{m}$  particle size range, the extra absorbency is utilized, for example, to hold soil nutrient in plant growth trials. Also used for monitoring specific contaminants in the atmosphere and in soil testing. Also available prepleated as Grade 2V.

#### **Grade 3: 6 $\mu\text{m}$**

Double the thickness of Grade 1 with still finer particle retention and excellent loading capacity; more precipitate can be held without clogging. The extra thickness gives increased wet strength and makes this grade highly suitable for use in Büchner funnels. The high absorbency is particularly valuable when the paper is used as a sample carrier. This filter is also available in the FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 ml capacity, molded from polypropylene with an integral, heat bonded filter (catalog number 1600-003).

#### **Grade 4: 20–25 $\mu\text{m}$**

Extremely fast filtering with excellent retention of coarse particles and gelatinous precipitates such as ferric hydroxide and aluminum hydroxide. Very useful as a rapid filter for routine clean-up of biological fluids or organic extracts during analysis. Used when high flow rates in air pollution monitoring are required and the collection of fine particles is not critical.



**Grade 5: 2.5 µm**

The maximum degree of fine particle filtration in the qualitative range. Capable of retaining the fine precipitates encountered in chemical analysis. Slow flow rate. Excellent clarifying filter for cloudy suspensions and for water and soil analysis. Also available prepleated as Grade 5V.

**Grade 6: 3 µm**

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

**Grade 591: 7-12 µm**

A thick filter paper with very high loading capacity for fast filtration of medium to coarse precipitates. Offers high absorbency and increased wet strength. Also available prepleated as Grade 591 ½.

**Grade 595: 4-7 µm**

Very popular, thin filter paper, medium-fast with medium to fine particle retention. Used for many routine analytical applications in different industries (e.g., particle separation from food extracts or filtration of solids from digested environmental samples for ICP/AAS analysis). Also available prepleated as Grade 595 ½.

**Grade 597: 4-7 µm**

A medium fast filter paper with medium to fine particle retention. Used for a wide variety of analytical routine applications in different industries like food testing (e.g., determination of fat content or removal of carbon dioxide and turbidity from beverages (as in beer analysis). Available prepleated as Grade 597 ½.

**Grade 598: 8-10 µm**

A thick filter paper with high loading capacity. Combines medium retention with medium-fast to fast filtration speed. Also available prepleated as Grade 598 ½.

**Grade 602 h: < 2 µm**

A dense filter paper for collecting very small particles and removing fine precipitates. Used in sample preparation (e.g., in the beverage industry for residual sugar determination, acidic spectra, refractometric analysis, and HPLC). Available prepleated as Grade 602 h ½.

*For qualitative wet strengthened papers see Qualitative Filter Papers – Wet Strengthened Grades*

**Typical Properties – Qualitative Standard Filter Grades**

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed (approx) Herzberg (s)	Air Flow (s/100 ml/in <sup>2</sup> )	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
1	Medium flow	11*	150	10.5	180	88
2	Medium flow	8*	240	21	190	103
3	Medium flow, thick	6*	325	26	390	187
4	Very fast	20-25*	37	3.7	205	96
5	Slow	2.5*	1420	94	200	98
6	Medium to slow	3*	715	35	180	105
591	Medium fast, thick	7-12**	45	5.9	350	161
595	Medium fast, thin	4-7**	80	-	150	68
597	Medium fast	4-7**	140	-	180	85
598	Medium fast, thick	8-10**	50	-	320	140
602 h	Slow, dense	< 2**	375	-	160	84

\* Particle retention rating at 98% efficiency

\*\* Approximate values

## Ordering Information – Qualitative Filter Circles – Standard Grades

Diameter (mm)	Catalog Number						Quantity/Pack
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	
10	1001-6508	-	-	-	-	-	500
15	1001-0155	-	-	-	-	-	500
18	1001-018	-	-	-	-	-	400
20	1001-020	-	-	-	-	-	400
23	-	-	1003-323	-	-	-	100
25	1001-325	1002-325	-	1004-325	1005-325	-	100
25	1001-025	-	-	-	-	-	400
27	-	-	-	1004-027	-	-	400
30	1001-329	-	-	-	-	-	100
30	1001-030	-	-	-	-	-	400
32	1001-032	-	-	-	-	-	100
42.5	1001-042	1002-042	1003-042	1004-042	1005-042	1006-042	100
47	1001-047	1002-047	-	1004-047	1005-047	-	100
50	-	-	-	1004-050	-	-	-
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
94	-	1002-094	-	-	-	-	1000
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		1002-147	-	-	-	-	100
150	1001-150	1002-150	1003-150	1004-150	1005-150	1006-150	100
185	1001-185	1002-185	1003-185	1004-185	1005-185	1006-185	100
240	1001-240	1002-240	1003-240	1004-240	1005-240	1006-240	100
270	1001-270	1002-270	1003-270	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	-	1005-550	-	100
FilterCup 70*	1600-001	-	1600-003	-	-	-	25

\* Requires FilterCup stem, catalog number 1600-900

### Ordering Information – Qualitative Filter Circles – Standard Grades

Diameter (mm)	Catalog Number Grade 595	Grade 597	Grade 598	Grade 602 h	Quantity/Pack
12.7	-	10311862	-	-	1000
42.5	-	10312040	-	-	100
45	-	10311804	-	-	100
55	-	10311807	-	-	100
70	-	10311808	-	-	100
90	-	10311809	10312209	10312609	100
110	10311610	10311810	-	-	100
125	10311611	10311811	-	10312611	100
150	10311612	10311812	-	10312612	100
185	-	10311814	-	10312614	100
240	-	10311820	-	10312620	100
320	-	10311822	-	-	100

### Ordering Information – Qualitative Filter Sheets – Standard Grades

Dimensions (mm)	Catalog Number	Quantity/Pack	Dimensions (mm)	Catalog Number	Quantity/Pack
<b>Grade 1</b>			<b>Grade 4</b>		
26 × 31	1001-813	1000	130 × 190	1004-912	500
75 × 100	1001-824	500	140 × 190	1004-911	500
460 × 570	1001-917	100	250 × 355	1004-922	100
460 × 570	1001-918	500	460 × 570	1004-917	100
580 × 680	1001-931	100	580 × 580	1004-930	100
580 × 680	1001-932	500	<b>Grade 591</b>		
600 × 600	1001-929	100	580 × 580	10311387	250
<b>Grade 2</b>			<b>Grade 595</b>		
430 × 680	1002-6691	500	580 × 580	10311687	500
460 × 570	1002-917	100	<b>Grade 597</b>		
580 × 680	1002-931	100	580 × 580	10311887	500
600 × 600	1002-929	100	580 × 580	10311897	100
<b>Grade 3</b>			<b>Grade 598</b>		
305 × 457	1003-433	100	580 × 580	10312287	250
460 × 570	1003-917	100			
580 × 580	1003-930	100			

## Qualitative Filter Papers – Wet Strengthened Grades

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

### Grade 91: 10 $\mu\text{m}$

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

### Grade 93: 10 $\mu\text{m}$

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

### Grade 113: 30 $\mu\text{m}$

Ultra high loading capacity with a particle retention — making it ideal for use with coarse or gelatinous precipitates. Fastest flow rate of the qualitative grades. Creped surface. Thickest filter paper in the qualitative range. This filter is also available in the FilterCup, a convenient, disposable 70 mm filter funnel with a 250 ml capacity, molded from polypropylene with an integral, heat bonded filter (catalog number 1600-113). Also available as Grade 113V.

### Grade 114: 25 $\mu\text{m}$

Only half the thickness of Grade 113 and suitable for coarse or gelatinous precipitates. Smooth surface for easy recovery of precipitates. Also available prepleated as Grade 114V.

### Grade 588

Fast filter paper. Stated in a number of standards and methods, e.g., Aflatoxin determination in animal feed (BS 5766-7) and Mercury determination in sludge (EPA method 105). Also available prepleated as Grade 588  $\frac{1}{2}$ .

### Grade 1573: 12-25 $\mu\text{m}$

A fast filter paper with high wet strength. It has a very smooth surface, making it easy to scrape or wash off precipitate. Resistant against: sulfuric and nitric acid solutions (up to 40% at 50°C), hydrochloric (up to 10% at 100°C, 20% at 60°C, 25% at 20°C) and alkalis (up to 10% at 20°C). Also available prepleated as Grade 1573  $\frac{1}{2}$ .

### Grade 1575: < 2 $\mu\text{m}$

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

*See Filter Papers for Technical Use section, for additional wet strengthened filter papers.*



## Typical Properties – Qualitative Wet Strengthened Grades

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed (approx) Herzberg (s)	Air Flow (s/100 ml/in <sup>2</sup> )	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
91	Creped	10*	70	6.2	205	71
93	Medium	10*	80	7	145	67
113	Fast, creped	30*	28	1.3	420	125
114	Fast, smooth	25*	38	5.3	190	77
588	Fast	-	-	-	205	80
1573	Fast, smooth	12-25**	25	-	170	88
1575	Slow	< 2**	700	-	140	92

\* Particle retention rating at 98% efficiency

\*\* Approximate values

## Ordering Information – Qualitative Filter Papers – Wet Strengthened Grades

Diameter (mm)	Catalog Number							Quantity/Pack
	Grade 91	Grade 93	Grade 113	Grade 114	Grade 588	Grade 1573	Grade 1575	
90	-	-	1113-090	1114-090	-	-	-	100
110	1091-110	-	-	-	-	-	-	4000‡
110	-	1093-110	1113-110	-	-	-	-	100
110	-	1093-111*	-	-	-	-	-	1250
125	1091-125	-	-	-	-	-	-	4000‡
125	-	1093-125	1113-125	1114-125	-	10314711	10314911	100
125	-	1093-126*	-	-	-	-	-	1250
125	-	1093-6212**	-	-	-	-	-	4000‡
150	1091-150	1093-6215**	-	-	-	-	-	1000‡
150	-	-	1113-150	1114-150	-	10314712	10314912	100
165	1091-165	-	-	-	-	-	-	1000‡
185	1091-185	-	-	-	-	-	-	1000‡
185	-	-	1113-185	1114-185	-	10314714	10314914	100
190	1091-190	-	-	-	-	-	-	1000‡
200	-	-	-	-	-	-	10314916	100
240	1091-240	-	-	-	-	-	-	1000‡
240	-	-	1113-240	1114-240	10318220	10314720	-	100
270	-	-	-	1114-270	-	-	-	100
290	-	-	-	-	-	10314726	-	100
320	-	-	1113-320	-	-	-	-	100
400	-	-	-	1114-400	-	-	-	100
500	1091-500	-	1113-500	-	-	-	-	100
400 x 400	-	-	-	-	-	-	10314984	500
1100 x 1100	-	-	-	-	-	-	10314991	100
FilterCup†	-	-	1600-113	-	-	-	-	25

\* Packed 50 envelopes of 25 circles

\*\* Packed 10 bags of 100 circles

† Requires FilterCup stem, catalog number 1600-900

‡ Subdivided into 100

## Qualitative Filter Papers – Folded Prepleated Grades

Time-saving Whatman qualitative grades are offered in this convenient form, which have major advantages over flat circles:

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



### Grade 2V: 8 µm

Widely used for general purpose filtration. Has excellent particle retention and a good filtration speed and loading capacity. Also available in flat stock form as Grade 2.

### Grade 5V: 2.5 µm

The maximum degree of fine particle filtration in the qualitative range. Capable of retaining the fine precipitates encountered in chemical analysis. Slow flow rate. Excellent clarifying filter for cloudy suspensions and for water and soil analysis. Also available in flat stock form as Grade 5.

### Grade 113V: 30 µm

Very thick and strong filter with creped surface for extremely high loading capacity, particularly in folded form. Fastest flow rate of any qualitative grade. Ideal for coarse particles and gelatinous precipitates. Also available in flat stock form as Grade 113.

### Grade 114V: 25 µm

Strong filter with very fast flow rate. Ideal for coarse particles and gelatinous precipitates. Smooth surface. Also available in flat stock form as Grade 114.

### Grade 287 ½

Kieselguhr paper with a medium to slow flow rate. Additional adsorption effect, e.g., for the separation of very fine semi-colloidal turbidity, for clarifying milk serum, starch solutions, soil suspensions, or sugar-containing solutions prior to polarimetry or refractometry. Also available in flat stock form as Grade 287.

### Grade 520 a ½: 15-18 µm

A thin paper with great wet strength and a very high flow rate. Frequently used in technical applications such as the filtration of viscous liquids and emulsions (e.g., sweetened juices, spirits and syrups, resin solutions, oils or plant extracts). Also available in flat stock form as Grade 520 a.

### Grade 520 bII ½: 15-19 µm

A thick paper with high wet strength offering a very high flow rate. Also available in flat stock form as Grade 520 bII.

**Grade 588 ½**

Fast filter paper. Stated in a number of standards and methods, e.g., Aflatoxin determination in animal feed (BS 5766-7) and Mercury determination in sludge (EPA method 105). Also available in flat stock form as Grade 588.

**Grade 591 ½: 7-12 µm**

A thick filter paper with very high loading capacity for fast filtration of medium to coarse precipitates. Offers high absorbency and increased wet strength. Also available in flat stock form as Grade 591.

**Grade 595 ½: 4-7 µm**

Very popular, thin filter paper, medium-fast with medium to fine particle retention. Used for many routine analytical applications in different industries (e.g., particle separation from food extracts or filtration of solids from digested environmental samples, e.g., for ICP/AAS analysis). Also available in flat stock form as Grade 595.

**Grade 597 ½: 4-7 µm**

A medium fast filter paper with medium to fine particle retention. Used for a wide variety of analytical routine applications in different industries like food testing (e.g., determination of fat content or removal of carbon dioxide and turbidity from beverages (e.g., beer analysis). Also available in flat stock form as Grade 597.

**Grade 598 ½: 8-10 µm**

A thick filter paper with high loading capacity. Combines medium retention with medium-fast to quick filtration speed. Also available in flat stock form as Grade 598.

**Grade 602 h ½: < 2 µm**

A dense filter paper for collecting very small particles and removing fine precipitates. Used in sample preparation, e.g., in the beverage industry for residual sugar determination, acidic spectra, refractometric analysis, and HPLC. Also available in flat stock form as Grade 602 h.

**Grade 0858 ½: 7-12 µm**

Grained, with medium fast flow rate and medium retention. A universal filter paper used for the filtration of extracts, oils, beer, syrups, etc., also applied in filter presses or for the aspiration of liquids. Available in flat stock form as Grade 0858.

**Grade 0860 ½: 12 µm**

Comparable to Grade 0858 but with a smooth surface, slightly thinner and faster. Also available in flat stock form as Grade 0860.

**Grade 0905 ½: 12-25 µm**

A creped paper for coarse particles, offers a very high filtration speed. Available in flat stock form as Grade 0905.

**Grade 1573 ½: 12-25 µm**

A fast filter paper with high wet strength. It has a very smooth surface, making it easy to scrape or wash off precipitate. Resistant against: sulfuric and nitric acid solutions (up to 40% at 50°C), hydrochloric (up to 10% at 100°C, 20% at 60°C, 25% at 20°C), alkalis (up to 10% at 20°C). Also available in flat stock form as Grade 1573.

**Grade 1574 ½: 7-12 µm**

A medium fast filter paper with high wet strength. This paper has the same chemical resistance characteristics as Grade 1573 (see under Grade 1573 above). Also available in flat stock form as Grade 1574.

**Grade 2555 ½**

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

## Typical Properties – Qualitative Folded Grades

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed (approx) Herzberg (s)	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
2V	Medium flow	8*	240	190	103
5V	Slow	2.5*	1420	200	98
113V	Fast, creped	30*	28	420	125
114V	Fast, smooth	25*	38	190	77
287 ½	Kieselguhr	-	330	360	154
520 a ½	Very fast, creped, high wet strength	15-18**	17.5	300	90
520 bli ½	Very fast, creped, wet strength, thick	15-19**	15	500	135
588 ½	Fast	-	-	205	80
591 ½	Medium fast, thick	7-12**	45	350	161
595 ½	Medium fast, thin	4-7**	80	150	68
597 ½	Medium fast	4-7**	70	180	85
598 ½	Medium fast, thick	8-10**	50	320	140
602 h ½	Slow, dense	< 2**	375	160	84
0858 ½	Medium fast, grained	7-12**	55	170	75
0860 ½	Medium fast, smooth	7-12**	60	170	75
0905 ½	Very fast, creped	12-25**	40	270	75
1573 ½	Fast, smooth	12-25**	25	170	88
1574 ½	Medium fast, very low fiber release	7-12**	85	160	90
2555 ½	Medium fast	7-12**	55	170	75

\* Particle retention rating at 98% efficiency

\*\* Approximate values

## Ordering Information – Qualitative Filter Papers – Folded (Prepleated Grades)

Diameter (mm)	Catalog Number							Quantity/ Pack
	Grade 2V	Grade 5V	Grade 113V	Grade 114V	Grade 287 ½	Grade 520 a ½	Grade 520 bli ½	
125	-	-	-	-	10310244	-	-	50
125	1202-125	-	1213-125	1214-125	-	-	-	100
150	-	-	-	-	10310245	-	-	50
150	1202-150	-	1213-150	1214-150	-	-	-	100
185	-	-	-	-	10310247	-	-	50
185	1202-185	1205-185	1213-185	1214-185	-	-	-	100
240	-	-	-	-	10310251	-	-	50
240	1202-240	-	1213-240	1214-240	-	10331451	-	100
270	1202-270	-	1213-270	-	-	-	-	100
320	-	-	-	-	10310253	-	10331653	50
320	1202-320	-	1213-320	1214-320	-	-	-	100
385	1202-385	-	-	-	-	-	-	100
400	1202-400	-	-	-	-	-	-	100
500	1202-500	-	1213-500	-	-	10331456	-	100
700	-	-	-	-	-	10331459	-	100

cont.

FILTER PAPERS AND MEMBRANES | CELLULOSE FILTERS

Diameter (mm)	Catalog Number						Quantity/Pack
	Grade 588 ½	Grade 591 ½	Grade 595 ½	Grade 597 ½	Grade 598 ½	Grade 602 h ½	
70	-	-	10311641	10311841	-	-	100
90	-	-	10311642	10311842	-	10312642	100
110	-	-	10311643	10311843	-	-	100
125	-	-	-	-	10312244	-	50
125	-	-	10311644	10311844	-	10312644	100
150	-	-	10311645	10311845	-	10312645	100
185	-	10311347	-	-	10312247	-	50
185	-	-	10311647	10311847	-	10312647	100
210	-	-	10311649	-	-	-	100
240	-	10311351	-	-	10312251	-	50
240	-	-	10311651	10311851	-	10312651	100
270	10319352*	-	10311652	10311852	-	-	100
320	-	-	-	-	-	-	50
320	-	-	10311653	10311853	-	-	100
385	-	-	10311654	10311854	-	-	100
400	-	-	-	-	-	-	100
500	-	-	-	-	10312256	-	50
500	-	-	10311656	10311856	-	-	100
700	-	-	-	-	-	-	100

\* Product is only available in the Americas

Diameter (mm)	Catalog Number						Quantity/Pack
	Grade 0858 ½	Grade 0860 ½	Grade 0905 ½	Grade 1573 ½	Grade 1574 ½	Grade 2555 ½	
125	-	-	-	10314744	10314844	-	100
150	10334345	-	-	10314745	-	-	100
185	10334347	10334547	-	10314747	10314847	10313947	100
240	10334351	10334551	-	10314751	-	10313951	100
270	10334352	-	-	10314752	-	-	100
320	10334353	10334553	10334953	10314753	-	10313953	100
500	-	-	-	10314756	-	-	100

## Quantitative Filter Papers

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

- **Ashless:** 0.007% ash maximum for Grades 40 to 44 and a maximum of 0.01% for the 589 Grades – very pure filters suitable for a wide range of critical analytical filtration procedures.
- **Hardened low ash:** 0.015% ash maximum – treated with a strong acid to remove trace metals and produce high wet strength and chemical resistance. These filters are particularly suitable for Büchner filtration where the tough smooth surface of the filter makes it easy to recover precipitates.
- **Hardened ashless:** 0.006% ash maximum – acid hardened to give high wet strength and chemical resistance with extremely low ash content. The tough surface makes these filters suitable for a wide range of critical filtration procedures.



### *Quantitative Filter Paper – Ashless Grades*

#### **Grade 40: 8 µm**

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

#### **Grade 41: 20 µm**

The fastest ashless filter paper, recommended for analytical procedures involving coarse particles or gelatinous precipitates (e.g., iron or aluminum hydroxides). Also used in quantitative air pollution analysis as a paper tape for impregnation when determining gaseous compounds at high flow rates. This filter is also available in the Disposable Filter Funnel. This is a convenient, disposable 47 mm filter funnel with a 250 ml capacity (catalog number 1920-1441). The 47 mm Grade 41 filter can be easily removed for further analysis or culturing.

#### **Grade 42: 2.5 µm**

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

#### **Grade 43: 16 µm**

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

#### **Grade 44: 3 µm**

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

**Grade 589/1: 12-25 µm**

“Black Ribbon Filter” – the established standard in quantitative analysis for the filtration of coarse precipitates (class 2a acc. to DIN 53 135). Ashless filter paper with very high flow rate. Used for many quantitative standard methods, especially for gravimetric applications (e.g., determination of the ash content in foodstuffs or for the Blaine test in the cement industry). Also available prepleated as Grade 589/1 ½.

**Grade 589/2: 4-12 µm**

“White Ribbon Filter” – ashless standard filter paper for medium fine precipitates (class 2b acc. to DIN 53 135) offering medium filtration speed. Applied in a variety of routine methods in quantitative analysis, e.g., determination of the

sand content in foodstuffs, determination of the grade of flour or analysis of aqueous suspensions in the paper industry. Also available prepleated as Grade 589/2 ½.

**Grade 589/3: 2 µm**

“Blue Ribbon Filter” – ashless standard filter paper for very fine precipitates (class 2d acc. to DIN 53 135). Slow filter paper with highest efficiency for collecting very small particles. Also used for many analytical routine methods in different industries, e.g., determination of the amount of insoluble contaminants in animal and vegetable fats and oils. Also available prepleated as Grade 589/3 ½.

### Typical Properties – Ashless Quantitative Papers

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed Herzberg (s)	Ash Content† (%)	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
40	Medium flow	8*	340	0.007	210	95
41	Fast	20*	54	0.007	220	85
42	Slow	2.5*	1870	0.007	200	100
43	Medium to fast	16*	155	0.007	220	95
44	Slow to medium	3*	995	0.007	180	80
589/1	Fast	12-25**	25	0.01	190	80
589/2	Medium fast	4-12**	70	0.01	180	85
589/3	Slow	< 2**	375	0.01	160	84

\* Particle retention rating at 98% efficiency

\*\* Approximate values

† Ash is determined by ignition of the cellulose filter at 900°C in air

### Ordering Information – Quantitative Filter Papers – Ashless Grades

Dimensions (mm)	Catalog Number								Quantity/ Pack	
	Grade 40	Grade 41	Grade 42	Grade 43	Grade 44	Grade 589/1	Grade 589/2	Grade 589/3		
<b>Filter Circles</b>										
12.7	1440-012	-	-	-	-	-	10300102	10300263	400	
25	-	1441-325	-	-	-	-	-	-	100	
25	-	1441-025	-	-	-	-	-	-	400	
25	-	1441-6309	-	-	-	-	-	-	1000	
30	1440-329	-	-	-	-	-	-	-	100	

cont.

Dimensions (mm)	Catalog Number								Quantity/Pack
	Grade 40	Grade 41	Grade 42	Grade 43	Grade 44	Grade 589/1	Grade 589/2	Grade 589/3	
32	1440-032	-	-	-	-	-	-	-	100
40.5	-	1441-040	-	-	-	-	10300103	-	100
42.5	1440-042	1441-042	1442-042	-	-	-	-	-	100
47	1440-047	1441-047	1442-047*	-	-	-	-	-	100
50	-	1441-050	-	-	-	-	10300106	-	100
55	1440-055	1441-055	1442-055	-	-	-	10300107	-	100
60	-	1441-060	-	-	-	-	-	-	100
70	1440-070	1441-070	1442-070	-	1444-070	-	10300108	-	100
90	1440-090	1441-090	1442-090	1443-090	1444-090	10300009	10300109	-	100
105	-	1441-105	-	-	-	-	-	-	100
110	1440-110	1441-110	1442-110	1443-110	1444-110	10300010	10300110	10300210	100
125	1440-125	1441-125	1442-125	1443-125	1444-125	10300011	10300111	10300211	100
150	1440-150	1441-150	1442-150	1443-150	1444-150	10300012	10300112	10300212	100
185	1440-185	1441-185	1442-185	1443-185	1444-185	10300014	10300114	10300214	100
200	-	-	1442-200	-	-	-	-	-	100
240	1440-240	1441-240	1442-240	-	1444-240	-	10300120	-	100
320	1440-320	1441-320	1442-320	-	-	-	-	-	100
450	1440-6168	-	-	-	-	-	-	-	100
500	-	-	-	-	-	-	-	-	100
700	-	-	-	-	-	-	-	-	100
<b>Disposable Filter Funnel</b>									
47	-	1920-1441	-	-	-	-	-	-	5
<b>Filter Sheets</b>									
25.4 × 90	-	-	1442-6551	-	-	-	-	-	100
203 × 254	-	1441-866	-	-	-	-	-	-	100
460 × 570	1440-917	1441-917	1442-917	-	1444-917	-	-	-	100
580 × 580	-	-	1442-930	-	-	-	-	-	500

\* Product is only available in Europe

## Ordering Information – Quantitative Ashless Filter Papers – Folded (Prepleated Grades)

Diameter (mm)	Catalog Number Grade 589/1 ½	Grade 589/2 ½	Grade 589/3 ½	Quantity/Pack
110	-	10300143	-	100
150	10300045	10300145	-	100
240	-	-	10300251*	100

\* Product is only available in the Americas

### Quantitative Filter Papers – Hardened Low Ash Grades

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

#### Grade 50: 2.7 µm

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

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

#### Grade 52: 7 µm

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

#### Grade 54: 22 µm

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



Hardened Low Ash Grades



Surface Wipes – Smear Tab

### Typical Properties – Quantitative Hardened Low Ash Grades

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed Herzberg (s)	Ash Content* (%)	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
50	Slow	2.7**	2685	0.015	115	97
52	Medium	7**	235	0.015	175	101
54	Very fast	22**	39	0.015	185	92

\* Ash is determined by ignition of the cellulose filter at 900°C in air

\*\* Particle retention rating at 98% efficiency

## Ordering Information – Quantitative Filter Papers – Hardened Low Ash Grades

Dimensions (mm)	Catalog Number			Quantity/Pack
	Grade 50	Grade 52	Grade 54	
<b>Filter Circles</b>				
42.5	1450-042	-	-	100
50	1450-050	-	-	100
55	1450-055	-	1454-055	100
70	1450-070	1452-070	1454-070	100
90	1450-090	1452-090	1454-090	100
110	1450-110	1452-110	1454-110	100
125	1450-125	1452-125	1454-125	100
150	1450-150	1452-150	1454-150	100
185	1450-185	-	1454-185	100
240	1450-240	1452-240	1454-240	100
320	1450-320	-	1454-320	100
400	1450-400	-	-	100
500	1450-500	-	1454-500	100
609.6	1450-561	-	-	100
Smear Tab	1450-993	-	-	100
<b>Filter Sheets</b>				
150 × 230	1450-916	-	-	100
400 × 400	1450-925*	-	-	100
400 × 450	-	1452-923	-	500
410 × 400	1450-900	-	-	100
460 × 570	1450-917	-	1454-917	100
10 × 10"	1450-880	-	-	100

\* Product is only available in the Americas

## Quantitative Filter Papers – Hardened Ashless Grades

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

### Grade 540: 8 µm

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

### Grade 541: 22 µm

Fast filtration of coarse particles and gelatinous precipitates in acid/alkali solutions during gravimetric analysis. Typical applications include fiber in animal foodstuffs, gelatin in milk and cream, chloride in cement, and chloride and phosphorus in coal and coke.

### Grade 542: 2.7 µm

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

## Typical Properties – Quantitative Hardened Ashless Grades

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed Herzberg (s)	Ash Content* (%)	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
540	Medium	8**	200	< 0.006	160	88
541	Fast	22**	34	< 0.006	155	82
542	Slow	2.7**	2510	< 0.006	150	93

\* Ash is determined by ignition of the cellulose filter at 900°C in air

\*\* Particle retention rating at 98% efficiency

## Ordering Information - Quantitative Filter Papers – Hardened Ashless Grades

Dimensions (mm)	Catalog Number			Quantity/Pack
	Grade 540	Grade 541	Grade 542	
<b>Filter Circles</b>				
21	1540-321	-	-	100
24	1540-324	-	-	100
42.5	1540-042	1541-042	-	100
47	-	1541-047	-	100
55	1540-055	1541-055	1542-055	100
70	1540-070	1541-070	1542-070	100
85		1541-085	-	
90	1540-090	1541-090	1542-090	100
110	1540-110	1541-110	1542-110	100
125	1540-125	1541-125	1542-125	100
150	1540-150	1541-150	1542-150	100
185	1540-185	1541-185	1542-185	100
240	1540-240	1541-240	1542-240	100
270	1540-270	1541-270	-	100
320	1540-320	1541-320	-	100
400	-	1541-400	1542-400	100
<b>Filter Sheets</b>				
460 × 570	-	1541-917	-	100

## *Filter Papers for Technical Use*

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

### **Grade 520 a: 15-18 µm**

A thin paper with great wet strength and a very high flow rate. Frequently used in technical applications such as the filtration of viscous liquids and emulsions (e.g., sweetened juices, spirits and syrups, resin solutions, oils, or plant extracts). Available prepleated as Grade 520 a ½.

### **Grade 520 bII: 15-19 µm**

A thick paper with high wet strength offering a very high flow rate. Also available prepleated as Grade 520 bII ½.

### **Grade 0858: 7-12 µm**

Grained, with medium fast flow rate and medium retention. A universal filter paper used for the filtration of extracts, oils, beer, syrups, etc., also applied in filter presses or for the aspiration of liquids. Available prepleated as Grade 0858 ½.

### **Grade 0860: 12 µm**

Comparable to 0858 but with a smooth surface, slightly thinner and faster. Also available prepleated as Grade 0860 ½.

### **Grade 0903: 4-7 µm**

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

### **Grade 0905: 12-25 µm**

A creped paper for coarse particles, offers a very high filtration speed. Available prepleated as Grade 0905 ½.

### **Grade 1574: 7-12 µm**

A medium fast filter paper with high wet strength. This paper has the same chemical resistance characteristics as Grade 1573. Also available prepleated as Grade 1574 ½.

### **Grade 1575: < 2 µm**

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

### **Grade 2294: 8-15 µm**

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

### **Grade 2411: 9-11 µm**

A fast filter paper with high wet strength and medium retention. Frequently used as a protective paper in filter presses.

### **Grade 2589 a: 6-12 µm**

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

### **Grade 2589 c: 4-8 µm**

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

### **Grade 2589 d: 2-6 µm**

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

### **Grade Shark Skin: 8-12 µm**

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

## Typical Properties – Qualitative Standard Filter Grades

Grade	Description	Particle Retention in Liquid (µm) (approx)	Filtration Speed Herzberg (s)	Air Flow (s/100 ml/in <sup>2</sup> )	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
520 a	Very fast, creped, high wet strength	15-18	17.5	–	300	90
520 b II	Very fast, creped, wet strength, thick	15-19	15	–	500	135
0858	Medium fast, grained	7-12	55	4.9	170	75
0860	Medium fast, smooth	7-12	60	4.8	170	75
0903	Medium to slow, smooth	4-7	175	–	140	65
0905	Very fast, creped	12-25	20	–	270	75
1574	Medium fast, very low fiber release	7-12	85	–	160	90
1575	Slow, very low fiber release	< 2	700	–	140	92
2294	Fast, wet strength, thick	8-15	27.5	4.4	1500	556
2411	Fast, creped, wet strength	9-11	35	–	350	85
2589 a	Medium fast, wet strength	6-12	60	–	430	200
2589 c	Medium to slow, wet strength	4-8	160	–	750	400
2589 d	Medium to slow, wet strength, thick	2-6	235	–	1000	500
Shark Skin	Medium to slow, wet strength, thin, creped	8-12	77.5	–	170	44

## Ordering Information – Filter Papers for Technical Use

Dimensions (mm)	Catalog Number					Shark Skin Filter Sheets	Quantity/Pack
	Grade 0858	Grade 0903	Grade 0905	Grade 520 a	Grade 520 bII		
<b>Filter Sheets</b>							
110 × 580	10334365	–	–	–	–	–	500
390 × 390	10334383	–	–	–	–	–	500
450 × 450	10334385	10334885	10334985	–	–	–	500
580 × 580	–	10334887	10334987	–	–	–	500
580 × 580	–	–	–	10331487	10331687	–	250
8 × 10"	–	–	–	–	–	10538877†	100
26 × 53"	–	–	–	–	–	10347588	500
32 × 64"	–	–	–	–	–	10347585	500
37 × 37"	–	–	–	–	–	10538873†	500
21" × 750 ft.	–	–	–	–	–	10537138†	1

† Product is only available in the Americas

cont.

Dimensions (mm)	Catalog Number						Quantity/Pack
	Grade 1574	Grade 1575	Grade 2411	Grade 2589 a	Grade 2589 c	Grade 2589 d	
<b>Filter Circles</b>							
150	10314812	-	-	-	-	-	100
<b>Filter Sheets</b>							
25 × 75	-	-	-	-	10343876	10343976	100
300 × 309	-	10314983**	-	-	-	-	500
400 × 400	10314889*	-	-	-	-	-	500
580 × 580	-	-	10343287	-	-	-	250
580 × 580	-	-	-	10343687	-	-	100
Diameter (mm)	Catalog Number					Quantity/Pack	
	Grade 0860	520 a	Grade 2294	Grade 2589 a	Shark Skin Filter Circles		
<b>Filter Circles</b>							
90	-	-	-	-	10347509	100	
110	-	-	10342810	-	10347510	100	
125	-	-	-	-	10347511	100	
140	-	-	-	10343630	-	500	
150	10334512†	-	-	-	10347513	100	
180 / 33 ZL1	-	-	10342860	-	-	100	
185	-	-	-	-	10347512	100	
210 / 60 ZL1	-	-	10342862	-	-	100	
240	-	-	-	-	10347519	100	
270	-	10331421	-	-	10347521	100	
290	-	-	-	-	10347577	100	
320	-	-	-	-	10347530	100	
340	-	-	-	-	10347522	100	
385	-	-	-	-	10347523	100	
500	-	-	-	-	10347525	100	
812.8	-	-	-	-	10347576	100	

\* With 4 holes each 28 mm

\*\* With 4 holes each 20 mm

## Application Specific Filters

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

### Grade 2 (IS Certified)

Certified for use in measuring the ignition strength of cigarettes according to ASTM standard E2187-04.

### Grade 0048

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

### Grade 72

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

### Grade 287 ½

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

### Grade 551

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

### Grade 2555 ½

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

## Soil Analysis Filter Papers

### Grade 0790 ½

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

### Grade 512 ½

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

## Sugar/Food Industry Filter Papers

### Grade 3000, 3002 and 3459

Creped or smooth filter papers, Grades 3000, 3002, and 3459 have good retentivity at a relatively high filtration speed. They are used for the clarifying filtration of:

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

## Typical Properties – Application Specific Filters

Grade	Properties	Filtration Speed in Herzberg (s)	Thickness (mm)	Weight (g/m <sup>2</sup> )
<b>Soil Analysis Filter Papers</b>				
0790 ½	Low Mg and P	225	0.17	84
512 ½	Low phosphate	375	0.16	84
<b>Sugar Industry Filter Papers</b>				
3000	Fast, smooth	47.5	0.16	68
3002	Medium fast, smooth	75	0.14	60
<b>Specially for the Venema Unit</b>				
3459	Fast, creped	55	0.30	75
<b>Malt and Beer Filter</b>				
2555 ½	-	55	0.17	75
<b>Food Industry Mat (Cellulose/Polyester)</b>				
0048	-	-	0.86	130
<b>Detection of Contaminants</b>				
551	Colored black	425	0.2	95
<b>Activated Carbon Loaded Paper</b>				
72	-	-	0.80	195
<b>Kieselguhr Paper</b>				
287 ½	-	330	0.36	161

## Ordering Information – Application Specific Filters

Diameter (mm)	Catalog Number						Quantity/Pack
	Grade 0048	Grade 72	Grade 551	Grade 3000	Grade 3002	Grade 3459	
<b>Filter Circles</b>							
12.7	-	1872-012	-	-	-	-	1000
32	10348903	-	-	-	-	-	1000
42.5	-	-	10310802	-	-	-	100
47	-	1872-047	-	-	-	-	100
55	-	-	10310807	-	-	-	100
60	-	1872-060	-	-	-	-	100
70	-	-	10310808	-	-	-	100
90	-	-	10310809	-	-	-	100
110	-	-	10310810	-	-	-	100
125	-	-	10310811	-	-	-	100
185	-	-	-	10316114	-	-	1000
200	-	-	-	10316116*	10316316	-	1000
230	-	-	-	-	-	10316619	1000
240	-	-	-	-	10316320	-	1000

\* Product is only available in the Americas

cont.

Diameter (mm)	Catalog Number				Quantity/Pack
	Grade 287 ½	Grade 512 ½	Grade 0790 ½	Grade 2555 ½	
<b>Folded Filters</b>					
110	-	10310643	-	-	100
125	10310244	-	-	-	50
150	10310245	-	-	-	50
150	-	10310645	10301645	-	100
185	10310247	-	-	-	50
185	-	10310647	10301647	10313947	100
240	10310251	-	-	-	50
240	-	-	-	10313951	100
320	10310253	-	-	-	50
320	-	-	-	10313953	100

\* Product is only available in the Americas

### Paper for Ignition Strength (IS) Measurement of Cigarettes

Specifically developed for use in measuring the Ignition Strength of Cigarettes according to ASTM standard E 2187-04, this certified Grade 2 is tested according to the procedure detailed in ASTM E 2187-04 Sections 9.3.1 and 9.3.2. The paper meets both the conditioned (26.1 ± 0.5 g, SD ≤ 0.3 g) and dried (24.7 ± 0.5 g, SD ≤ 0.3 g) weight requirements.

#### Features and Benefits

- Each lot is guaranteed to meet the ASTM E 2187-04 specifications
- Simplifies testing process by eliminating lot suitability testing
- Lot specific certificate is downloadable from the web
- Just condition and use

The lot specific certificate can be downloaded from <http://www.whatman.com/customerCertificates.aspx>.

### Ordering Information – Paper for Ignition Strength (IS) Measurement of Cigarettes

Diameter (mm)	Catalog Number	Grade	Quantity/Pack
150	1002-147	Grade 2 (for IS testing)	100

## Glass Microfiber Filters

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

These depth filters combine fast flow rates with high loading capacity and the retention of very fine particles, extending into the sub-micron range. Glass microfiber filters can be used at temperatures up to 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.

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

## Glass Microfiber GF Series

### *Binder Free Glass Microfiber Filters*

#### **Grade GF/A: 1.6 $\mu\text{m}$**

Offers fine particle retention and high flow rate, as well as good loading capacity. Used for high-efficiency general purpose laboratory filtration, including water pollution monitoring of effluents, for filtration of water, algae and bacteria cultures, foodstuff analyses, protein filtration, and radioimmunoassay of weak  $\beta$  emitters. Recommended for gravimetric determination of airborne particulates, stack sampling, and absorption methods of air pollution monitoring.

*This filter is also available in the FilterCup and Disposable Filter Funnel formats.*

#### **Grade GF/B: 1.0 $\mu\text{m}$**

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

#### **Grade GF/C: 1.2 $\mu\text{m}$**

Combines fine particle retention with good flow rate. The standard filter in many parts of the world for the collection of suspended solids in potable water and natural and industrial wastes.

Fast and efficient clarification of aqueous liquids containing low to medium levels of fine particulates. Widely used for cell harvesting, liquid scintillation counting, and binding assays where more loading capacity is required.

*This filter is available in the FilterCup format.*



Glass Microfiber GF Series

#### **Grade GF/D: 2.7 $\mu\text{m}$**

Considerably faster in flow rate and overall filtration speed than cellulose filter papers of similar particle retention. The filter is thick and consequently exhibits a high loading capacity. Designed as a membrane prefilter and available in sizes to fit most holders. GF/D will provide good protection for finely retentive membranes. Can be used in combination with GF/B to provide very efficient graded prefilter protection for membranes.

#### **Grade GF/F: 0.7 $\mu\text{m}$**

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

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

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

*This filter is available in the FilterCup and Disposable Filter Funnel format.*

**Grade 934-AH: 1.5 µm**

The fine particle retention of this popular grade is superior for its high retention efficiency at high flow rates and its high loading capacity. This is a smooth surface, high-retention borosilicate glass microfiber filter, which withstands temperatures over 500°C. Used for determining total suspended solids in water, removal of turbidity, and filtration of bacterial cultures. Grade 934-AH is used for a wide range of laboratory applications. It is recommended for water pollution monitoring, cell harvesting, liquid scintillation counting, and air pollution monitoring.

**Quartz Filter – Grade QM-A: 2.2 µm**

High-purity quartz (SiO<sub>2</sub>) microfiber filters are used for air sampling in acidic gases, stacks, flues, and aerosols, particularly at high temperatures up to 500°C and in PM-10 testing. Due to the low level of alkaline earth metals, “artifact” products of sulfates and nitrates (from SO<sub>2</sub> and NO<sub>2</sub>) are virtually eliminated. QM-A, sequentially numbered according to EPA standards, is suitable for most applications. Please refer to the Air Sampling Filter/Quartz Filters section for ordering information.

**Grade EPM 2000: 2.0 µm**

EPM 2000 has been developed especially for use in high volume air sampling equipment that collects atmospheric particulates and aerosols. It is manufactured from 100% pure borosilicate glass of special purity, enabling detailed chemical analysis of trace pollutants to take place with the minimum of interference or background. See Air Sampling Filter/Quartz Filters section for ordering details.

**Grade GMF 150: 1 µm or 2 µm**

The Whatman GMF 150 is a multilayer glass microfiber filter with a coarse top layer (10 µm) and meshed with a finer layer of 1 µm or 2 µm. Manufactured from 100% borosilicate glass microfiber, the filter is binder free. It is an excellent prefilter for higher particulate loading capacity with faster flow rates. See GMF 150 section for ordering information.

**Typical Properties – Binder Free Glass Microfiber Grades**

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed Herzberg (s)	Air Flow (s/100 ml/in <sup>2</sup> )	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
GF/A	Fast, high loading	1.6*	62	4.3	260	53
GF/B	Medium to fast, very high loading	1.0*	195	12	675	143
GF/C	Medium to fast, high loading	1.2*	100	6.7	260	53
GF/D	Fast, very high loading	2.7	41	2.2	675	121
GF/F	Medium, high loading	0.7*	325	19	420	75
934-AH	Fast, high loading	1.5*	47	3.7	435	64
QM-A	Quartz	2.2*	–	6.4	450	85
EPM 2000	Used u/c PM-10 air monitoring	2.0*	–	4.7	450	85
GMF 150 1 µm	Multilayer	1.2*	–	3.1	730	139
GMF 150 2 µm	Multilayer	2.4*	–	1.5	750	149

\* Particle retention rating at 98% efficiency

## Ordering Information – Binder Free Glass Microfiber

Dimensions (mm)	Catalog Number						Quantity/Pack
	Grade GF/A	Grade GF/B	Grade GF/C	Grade GF/D	Grade GF/F	Grade 934-AH	
<b>Filter Circles</b>							
7	-	-	-	1823-007	-	-	100
10	-	-	-	1823-010	-	-	100
13	1820-8013	-	-	-	-	-	100
13	-	-	-	-	1825-0134	-	400
19.1	-	1821-019	-	-	-	-	50
21	1820-021	1821-021	1822-021	1823-021	1825-021	1827-021	100
24	1820-024	1821-024	1822-024	1823-024	1825-024	1827-024	100
25	1820-025	1821-025	1822-025	1823-025	1825-025	1827-025	100
25	-	-	1822-6580	-	-	-	400
27	-	-	-	-	-	1827-027	100
28	-	-	-	-	-	1827-028	100
30	1820-030	-	-	-	-	1827-030	100
32	-	-	-	-	-	1827-032	100
35	-	-	-	1823-035	-	1827-035	100
37	1820-037	1821-037	1822-037	-	1825-037	1827-037	100
42	-	-	-	1823-042	-	-	100
42.5	1820-042	1821-042	1822-042	-	1825-042	1827-042	100
47	1820-047	1821-047	1822-047	1823-047	1825-047	1827-047	100
50	1820-050	-	1822-050	-	-	-	100
55	1820-055	1821-055	1822-055	1823-055	1825-055	1827-055	100
60	1820-060	-	-	-	-	-	100
60	1820-061‡	-	-	-	-	-	50
70	1820-070	1821-070	1822-070	1823-070	1825-070	1827-070	100
81	1820-6537	-	-	-	-	1827-132	100
82	-	-	-	-	-	1827-082	100
85	-	-	-	-	-	1827-085	100
90	1820-090	1821-090*	1822-090	1823-090*	1825-090*	1827-090	100
100	-	-	1822-100	-	-	-	100
100	-	-	1822-9916**	-	-	-	100
105	-	-	-	-	-	1827-105	100
110	1820-110	1821-110*	1822-110#	1823-110*	1825-110*	1827-110	100
125	1820-125	1821-125*	1822-125	1823-125*	1825-125*	1827-125	100
142	-	-	1822-142	1823-142*	1825-142*	-	100
150	1820-150	1821-150*	1822-150	1823-150*	1825-150*	1827-150	100

\* 25 per box

\*\* Individually bagged

† Requires FilterCup stem, catalog number 1600-900

‡ With reinforced rim

# Product is only available in Europe

## Product is only available in the Americas

cont.

Dimensions (mm)	Catalog Number						Quantity/Pack
	Grade GF/A	Grade GF/B	Grade GF/C	Grade GF/D	Grade GF/F	Grade 934-AH	
155	-	1821-155 <sup>#</sup>					100
185	-	1821-185*	-	-	-	1827-185	100
240	1820-240	-	-	-	-	1827-240	100
257	-	-	-	1823-257	1825-257	-	25
293	-	1821-293	-	-	1825-293	1825-295 <sup>##</sup>	25
320	-	-	-	-	-	1827-320	100
FilterCup	1600-820 <sup>†</sup>	-	1600-822 <sup>†</sup>	-	1600-825 <sup>†</sup>	-	25
Disposable Filter Funnel 25 ml	1922-1820	-	1922-1822	-	-	-	50
<b>Filter Sheets</b>							
102 × 254	-	-	1822-849	-	-	-	50
203 × 254	-	-	-	-	-	-	100
460 × 570	-	1821-914	1822-914	-	-	-	5
460 × 570	1820-915	1821-915	1822-915	1823-915	1825-915	-	25
1/5 × 9.5"	-	-	-	-	-	1827-262 <sup>#</sup>	100
2 × 12"	-	-	-	-	-	1827-808	100
8 × 10"	1820-866	-	1822-866	-	-	1827-866	100
12 × 15"	-	-	-	-	-	1827-889	100
9 × 28"	-	-	-	-	-	1827-957	100
* 25 per box				‡ With reinforced rim			
** Individually bagged				# Product is only available in Europe			
† Requires FilterCup stem, catalog number 1600-900				## Product is only available in the Americas			

## Multigrade GMF 150

The Whatman GMF 150 is a multilayer glass microfiber filter with a coarse top layer (10 µm) meshed with a finer layer of 1 µm or 2 µm. Manufactured from 100% borosilicate glass microfiber, the filter is binder free. It is the ideal prefilter for higher particulate loading capacity with faster flow rates.

### The GMF 150 allows for:

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

### Multiple Porosities, Greater Filtration Efficiency

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





### Ordering Information – Glass Microfiber Filters with Binder

Dimensions (mm)	Catalog Number						Quantity/Pack
	Grade GF 6	Grade GF 8	Grade GF 9	Grade GF 10	Grade GF 92	Grade GF 3362	
<b>Filter Circles</b>							
25	10370018	-	-	-	-	-	200
42	-	-	-	-	10421019	-	200
44	-	-	-	-	10421022	-	200
47	10370019	10370119	-	10370319	10421026	-	200
50	10370002	-	10370202	10370302	10421030	-	200
55	10370003	-	-	-	-	-	100
70	10370004	-	-	-	-	-	100
90	10370005	10370105	10370205	10370305	-	-	100
100	10370020	-	-	10370320	10421043	-	100
110	10370006	-	10370206	-	10421048	-	100
125	10370007	-	-	-	-	-	100
130	-	-	-	-	10421055	-	100
135	-	-	-	-	10421057	-	100
142	-	-	-	-	10421060	-	100
150	10370008	-	10370208	10370308	-	-	100
185	10370010	-	-	-	-	-	100
200	10370011	-	-	-	-	-	100
240	10370012	-	-	-	-	10372112	50
<b>Roll</b>							
50 mm x 100 m	-	-	-	10370394	-	-	1

### Ordering Information – Glass Microfiber Filter Sheets with Binder

Dimensions (mm)	Catalog Number			Quantity/Pack
	Grade GF 6	Grade GF 8	Grade GF 3362	
60 x 90	-	10370172	-	100
610 x 620	10370050	-	10372150	100

## Whatman Acid Treated Low Metal TCLP Filters

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

#### Used for EPA Method 1311

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



These acid treated low metal filters are available in 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 – Acid Treated Low Metal TCLP Filters

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

## Air Sampling Filters

### EPM 2000

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

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

### Quartz Filters – QM-A

High-purity quartz (SiO<sub>2</sub>) 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. Due to the low level of alkaline earth metals, “artifact” products of sulfates and nitrates (from SO<sub>2</sub> and NO<sub>2</sub>) are virtually eliminated. QM-A, sequentially numbered according to EPA standards, is suitable for most applications.



### Quartz Filters – QM-H

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

**PM 2.5 Air Monitoring Membranes** – Please refer to the section on PM 2.5

## Typical Properties – Air Sampling Filters

Grade	Description	Particle Retention in Liquid (µm)	Air Flow (s/100ml/in <sup>2</sup> )	Typical Thickness (µm)	Basis Weight (g/m <sup>2</sup> )
QM-A	Quartz	2.2*	6.4	450	85
QM-H	Quartz	–	–	430	85
EPM 2000	Pure borosilicate glass	2.0*	4.7	450	85

\* Particle retention rating at 98% efficiency

### Ordering Information – EPM 2000

Diameter (mm)	Catalog Number EPM 2000	Quantity/Pack
<b>Filter Circles</b>		
47	1882-047	100
<b>Dimensions</b>		
<b>EPM 2000</b>		
<b>Filter Sheets</b>		
8 × 10" (prenumbered)	1882-866	100

### Ordering Information – Quartz Filters

Diameter (mm)	Catalog Number QM-A	QM-H	Quantity/Pack
<b>Filter Circles</b>			
25	1851-025		100
32	1851-032		25
37	1851-037	1853-037	25
47	1851-047	1853-047	25
50	1851-050	1853-050*	100
55	1851-055		100
70	1851-070		100
82	1851-082		100
85	1851-085		100
90	1851-090		100
101.6	1851-101		100
110	1851-110		100
118	1851-118		100
150	1851-150	1853-150*	100
<b>Dimensions</b>			
<b>Catalog Number</b>			
<b>QM-A</b>			
<b>Filter Sheets</b>			
8 × 10"	1851-8866 (prenumbered)		100
8 × 10"	1851-865		25

\* 25 pack

## Glass Microfiber Accessories

### 3-Piece Filter Funnel

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

#### Functional Design

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

#### Positive Filter Clamping

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

#### Simple to Clean

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

#### A Choice of Three Plates

For quick and easy filtration, Whatman 3-Piece Filter Funnels are available with a choice of three plates. They also come in several sizes to match your needs.



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

### Ordering Information – 3-Piece Filter Funnel Details

Filter Dimensions (cm)	Catalog Number	Reservoir Volume (ml)	Effective Filtration Diameter (cm)	Effective Filtration Area (cm <sup>2</sup> )	Filter Support Plate Diameter (cm)	Filter Funnel Height (cm)
2.5	1950-002	16	1.6	2	3	13.6
4.7	1950-004	36	3.2	8	4.7	12.1
7	1950-007	115	5	19.6	7	15.9
7	1950-017	210	5	19.6	7	20.8
7	1950-027	400	5	19.6	7	-
9	1950-009	200	7	38.5	9	17.9
12.5	1950-012	530	9.2	66.5	12.5	22

### Ordering Information – Glass Microfiber Accessories

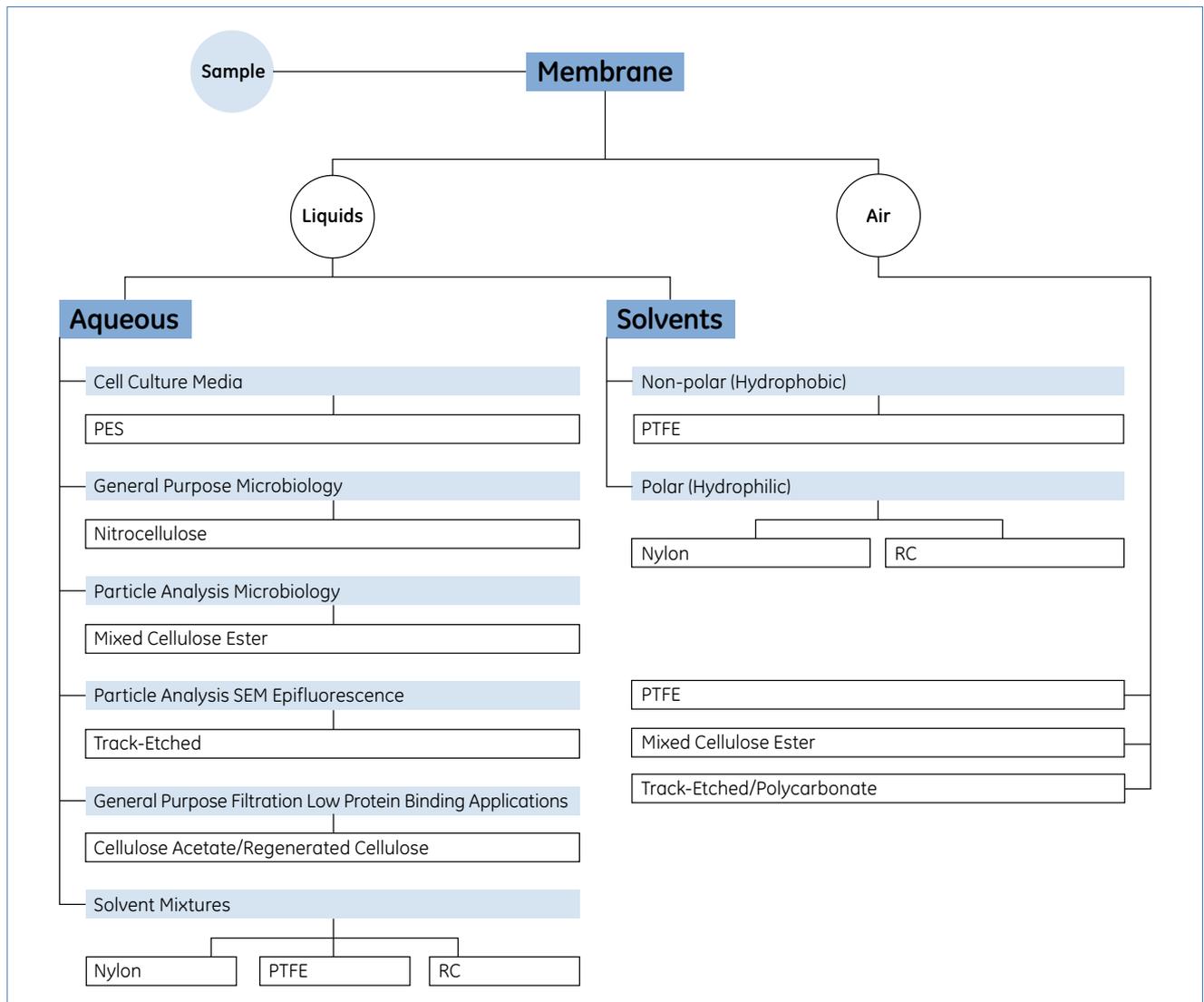
Type	Catalog Number	Optional Plates	Filter Funnel Plates – PTFE	Replacement Reservoirs
47	1950-104	PTFE Plates	1950-114	-
70	1950-107		1950-117	1950-207 1950-217*
90	1950-109		1950-119	1950-209

\* Large reservoir

# Membrane Filters

Whatman brings to the laboratory user a range of membrane filters whose advanced technical specifications make them today's preferred choice for a wide range of applications. The membrane filters offer accurately controlled pore size distribution and higher strength and flexibility, which ensure reproducibility and consistency. The Whatman membrane filter range includes pore sizes from 0.015 to 12 µm with a wide selection of membrane filters. Sterile and autoclave packs are available for specialized applications. Colored and gridded types are also available.

## Quick Pick Reference Chart



## Membranes

Membrane Type	Material	Pore Size* (µm)	Diameter (mm)	Rectangular	Brand Name
Track-Etched	Polyester (Polyethylene Terephthalate)	0.1, 0.2, 0.4, 1.0, 5.0	13, 25, 47	-	Cyclopore Nuclepore
-	Polycarbonate (4, 4-hydroxy-diphenyl-2, 2'-propane)	0.015, 0.03, 0.05, 0.08, 0.1, 0.2, 0.4, 0.6, 0.8, 1.0, 2.0, 3.0, 5.0, 8.0, 10.0, 12.0	13, 19, 25, 37, 47, 50, 76, 90, 142, 293	19 × 42 mm, 25 × 80 mm, 8 × 10 inches	-
Anopore	Aluminum Oxide	0.02, 0.1, 0.2	13, 25, 47	-	Anodisc
Cellulose based	Regenerated Cellulose	0.2, 0.45, 1.0	25, 47, 50, 100, 110, 142	300 × 600 mm	-
-	Cellulose Acetate	0.2, 0.45, 0.8, 1.2	13, 25, 47, 50, 85, 100, 110, 142, 293	300 × 600 mm	-
-	Cellulose Nitrate	0.025, 0.1, 0.2, 0.45, 0.65, 0.8, 1.0, 1.2, 3.0, 5.0, 8.0, 12.0	13, 25, 30, 37, 47, 50, 82, 90, 100, 110, 142, 150, 293	300 × 600 mm	-
-	Mixed Cellulose Ester (mixture of cellulose acetate and cellulose nitrate)	0.2, 0.45, 0.6, 0.8, 1.2, 3.0	25, 37, 47, 50, 90, 100, 110, 142	-	-
Polytetrafluoroethylene (PTFE)	Polytetrafluoroethylene	0.2, 0.45, 0.5, 1.0, 5.0	25, 37, 47, 50, 90, 150	-	-
Nylon (Polyamide)	Hexamethylenediamine; Nylon 66	0.2, 0.45, 0.8, 1.0	13, 25, 47, 50, 90, 142	-	-
Polyethersulfone (PES)	Polyethersulfone	0.8	47	-	-
Polypropylene	Polypropylene	0.2, 0.45	25, 47, 90	-	-
MembraClear	-	-	25, 37, 47	-	-

\* Not all pore sizes are available in all diameters

## Track-Etched Polycarbonate and Polyester Membranes

Whatman offers a complete range of track-etched membranes manufactured using proprietary Whatman technology to produce a precision membrane filter with a closely controlled pore size distribution.

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

## Cyclopore Polycarbonate and Polyester Membranes

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

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



Cyclopore track-etched membranes

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

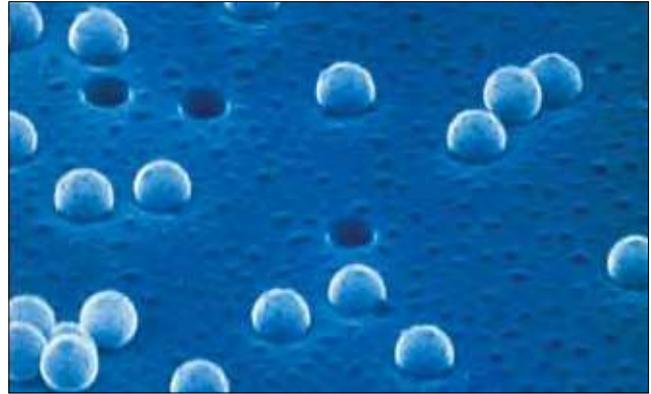
The polycarbonate membranes are hydrophilic and are available in a choice of diameters and pore sizes. The polyester membranes are resistant to most organic solvents, amides, and halogenated hydrocarbons. This broad chemical compatibility makes them suitable for the detection of particles in many corrosive 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; nonhygroscopic
- Low tare weights
- No particle shedding provides ultra clean filtrate
- Biologically inert

*Typical Applications*

- **Air Monitoring**  
Trace elements (chemicals, radioactivity) and particulate analysis (dust, pollens, and airborne particles)
- **Analytical Methods**  
Gravimetric analysis, densitometry, emission spectroscopy, X-ray fluorescence, and infrared analysis
- **Water Analysis**  
Absorbable organic halides (AOX), direct count of microorganisms, marine biology and dissolved phosphates, nitrates, and ammonia analysis
- **Blood Filtration and Cell Analysis**  
RBC deformability, leukocyte removal, RBC filtration and plasmapheresis, chemotaxis, cytology, and cell culture
- **General Filtration**  
Particulate and bacteria removal, cross flow filtration, HPLC sample preparation, and solution filtration



Electron micrograph of Cyclopore membrane with latex beads on surface

- **Microscopy**  
Electron microscopy, epifluorescence microscopy, and direct optical microscopy
- **Microorganism Analysis**  
Direct total microbial count, harvesting, concentration, fractionation, yeast, molds, *Giardia*, *Legionella*, coliform, and canine microfilaria
- **Nucleic Acid Studies**  
Alkaline elution and DNA fragment fractionation
- **Oceanographic Studies**  
Transparent polycarbonate membrane filters provide a new tool for studying planktonic organisms. These ultra thin transparent membranes are strong yet flexible, allowing for planktonic samples to be filtered and the membranes to be mounted directly onto microscope slides. (Ref: Hewes et al. 1998; Graham and Mitchell 1999; Graham 1999.)
- **Healthcare**  
*Biosensors* – as a barrier offering controlled diffusion for biological reagents and electrochemical detectors.  
*Diagnostic assays* – for flow control, sample preparation, blood separation, and capture of latex microparticles.  
*Cell biology* – for cell culture, chemotaxis, and cytological analyses, e.g., direct staining, isotopic, and fluorescence based assays.  
*Transdermal drug delivery* – as an inert matrix for retention of therapeutics.

## Typical Data – Cyclopore Track-Etched Membranes

	Polycarbonate	Polyester
Thickness	7-20 µm	9-23 µm
Burst strength	> 10 psi	> 10 psi
Weight	0.7-2.0 mg/cm <sup>2</sup>	0.9-2.3 mg/cm <sup>2</sup>
Maximum service temperature	140°C	150°C
Porosity (void vol.)	4-20%	4-20%
Ash weight	0.6 µg/cm <sup>2</sup>	2.3 µg/cm <sup>2</sup>
Pore density	1 × 10 <sup>5</sup> – 6 × 10 <sup>8</sup> pores/cm <sup>2</sup>	1 × 10 <sup>5</sup> – 6 × 10 <sup>8</sup> pores/cm <sup>2</sup>
Opacity	Translucent*	Translucent
Autoclavable	30 minutes at 121°C	30 minutes at 121°C
Specific gravity	1.21 g/cm <sup>2</sup>	1.39 g/cm <sup>2</sup>
Flammability	Slow burn	Slow burn
Fiber releasing	No	No
Leachables	Negligible	Negligible
Biological compatibility	Inert	Inert

\* Transparent also available as Special Clear

## Ordering Information – Cyclopore Polycarbonate and Polyester Membrane Circles

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
<b>Standard Cyclopore</b>				
13	0.1	7060-1301	Polycarbonate	100
13	0.4	7060-1304	Polycarbonate	100
13	0.8	7060-1308	Polycarbonate	100
13	5.0	7061-1313	Polyester	100
25	0.1	7060-2501	Polycarbonate	100
25	0.2	7060-2502	Polycarbonate	100
25	0.2	7061-2502	Polyester	100
25	0.4	7060-2504	Polycarbonate	100
25	0.4	7061-2504	Polyester	100
25	0.6	7060-2506	Polycarbonate	100
25	0.8	7060-2508	Polycarbonate	100
25	1.0	7060-2510	Polycarbonate	100
25	1.0	7061-2510	Polyester	100
25	1.0	7091-2510	Polycarbonate, thin clear circles	100
25	2.0	7060-2511	Polycarbonate	100
25	5.0	7060-2513	Polycarbonate	100
25	5.0	7062-2513	Polycarbonate, clear circles	100
25	8.0	7060-2514	Polycarbonate	100
25	10.0	7060-2515	Polycarbonate	100
25	12.0	7060-2516	Polycarbonate	100

cont.

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
<b>Standard Cyclopore</b>				
37	0.4	7060-3704	Polycarbonate	100
47	0.1	7060-4701	Polycarbonate	100
47	0.1	7061-4701	Polyester	100
47	0.2	7060-4702	Polycarbonate	100
47	0.2	7061-4702	Polyester	100
47	0.4	7060-4704	Polycarbonate	100
47	1.0	7060-4710	Polycarbonate*	100
47	1.0	7091-4710	Polycarbonate, thin clear circles	100
47	2.0	7060-4711	Polycarbonate	100
47	3.0	7060-4712	Polycarbonate	100
47	3.0	7062-4712	Polycarbonate, clear circles**	100
47	5.0	7060-4713	Polycarbonate	100
47	8.0	7060-4714	Polycarbonate	100
47	10.0	7060-4715	Polycarbonate	100
47	12.0	7060-4716	Polycarbonate	100
90	1.0	7060-9010	Polycarbonate	100

\* Special clear Cyclopore

\*\* Standard polycarbonate

## Nuclepore Track-Etched Membranes

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

### Features and Benefits

- Low protein binding and low extractables, ensuring no sample contamination
- High chemical resistance and good thermal stability for a wide range of samples
- Low, consistent ash and tare weights
- Smooth flat surface for good visibility of particles

### Applications

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



## Ordering Information – Nuclepore Track-Etched Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
<b>Circles</b>				
13	0.015	110401	Polycarbonate	100
13	0.1	110405	Polycarbonate	100
13	0.2	110406	Polycarbonate	100
13	0.4	110407	Polycarbonate	100
13	0.8	110409	Polycarbonate	100
13	1.0	110410	Polycarbonate	100
13	3.0	110412	Polycarbonate	100
13	5.0	110413	Polycarbonate	100
13	8.0	110414	Polycarbonate	100
13	10.0	110415	Polycarbonate	100
13	8.0	150446	Polycarbonate PVP-free*	100
13	0.8	800195	Gold Coated PC	10
19	0.03	800307	Polycarbonate	100
19	0.05	800308	Polycarbonate	100
19	0.08	800280	Polycarbonate	100
19	0.1	800309	Polycarbonate	100
19	0.2	800281	Polycarbonate	100
19	0.4	800282	Polycarbonate	100
19	0.8	800284	Polycarbonate	100
19	1.0	800319	Polycarbonate	100
25	0.015	110601	Polycarbonate	100
25	0.03	110602	Polycarbonate	100
25	0.05	110603	Polycarbonate	100
25	0.08	110604	Polycarbonate	100
25	0.1	110605	Polycarbonate	100
25	0.2	110606	Polycarbonate	100
25	0.4	110607	Polycarbonate	100
25	0.6	110608	Polycarbonate	100
25	0.8	110609	Polycarbonate	100
25	1.0	110610	Polycarbonate	100
25	2.0	110611	Polycarbonate	100
25	3.0	110612	Polycarbonate	100
25	5.0	110613	Polycarbonate	100
25	8.0	110614	Polycarbonate	100
25	10.0	110615	Polycarbonate	100
25	12.0	110616	Polycarbonate	100
25	0.4	110637	Polycarbonate AOX†	100
25	0.4	170607	Gold Coated PC	50
25	0.8	117197	Gold Coated PC	50

\* PVP-free – hydrophobic

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

cont.

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
<b>Circles</b>				
37	0.4	110807	Polycarbonate	100
37	0.8	110809	Polycarbonate	100
47	0.015	111101	Polycarbonate	100
47	0.05	111103	Polycarbonate	100
47	0.08	111104	Polycarbonate	100
47	0.1	111105	Polycarbonate	100
47	0.2	111106	Polycarbonate	100
47	0.4	111107	Polycarbonate	100
47	0.6	111108	Polycarbonate	100
47	0.8	111109	Polycarbonate	100
47	1.0	111110	Polycarbonate	100
47	2.0	111111	Polycarbonate	100
47	3.0	111112	Polycarbonate	100
47	5.0	111113	Polycarbonate	100
47	8.0	111114	Polycarbonate	100
47	10.0	111115	Polycarbonate	100
47	12.0	111116	Polycarbonate	100
47	0.4	111137	Polycarbonate AOX†	100
47	0.4	111130	Polycarbonate AERO**	100
50	0.2	111206	Polycarbonate	100
50	0.4	111207	Polycarbonate	100
50	5.0	111213	Polycarbonate	100
50	12.0	111216	Polycarbonate	100
76	0.05	111503	Polycarbonate	100
76	0.1	111505	Polycarbonate	100
90	0.015	111701‡	Polycarbonate	25
90	0.05	111703	Polycarbonate	25
90	0.1	111705	Polycarbonate	25
90	0.2	111706	Polycarbonate	25
90	0.4	111707	Polycarbonate	25
90	1.0	111710	Polycarbonate	25
90	2.0	111711	Polycarbonate	25
90	3.0	111712	Polycarbonate	25
142	0.08	112104	Polycarbonate	25
142	0.1	112105	Polycarbonate	25
142	0.2	112106	Polycarbonate	25
142	0.4	112107	Polycarbonate	25
142	0.6	112108	Polycarbonate	25
142	1.0	112110	Polycarbonate	25
142	2.0	112111	Polycarbonate	25

\* PVP-free – hydrophobic

\*\* AERO – suitable for aerosol testing

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

‡ Product is only available in the Americas

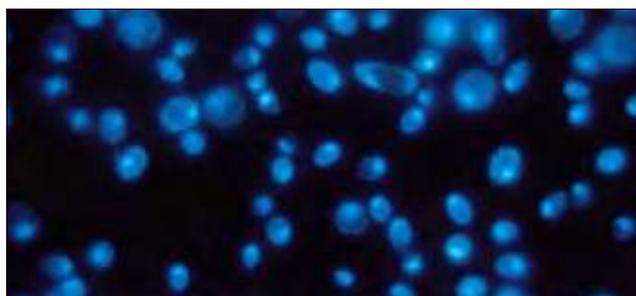
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Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
<b>Circles</b>				
293	0.2	112806	Polycarbonate	25
293	0.4	112807	Polycarbonate	25
293	1.0	112810	Polycarbonate	25
293	2.0	112811	Polycarbonate	25
<b>Sheets</b>				
8 × 10"	0.03	113502	Polycarbonate	25
8 × 10"	0.2	113506	Polycarbonate	25
8 × 10"	5.0	113513	Polycarbonate	25
8 × 10"	12.0	113516	Polycarbonate	25
19 × 42"	5.0	113313	Polycarbonate	100
19 × 42"	8.0	113314	Polycarbonate	100
25 × 80"	8.0	155846	Polycarbonate PVP-free*	100

\* PVP-free – hydrophobic

## Black Cyclopore Membranes

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



Yeast cells on Black Cyclopore with DAPI Stain

### Typical Data – Black Cyclopore Membranes

	Black Polycarbonate
Thickness	7-20 µm
Burst strength	> 10 psi
Weight	0.7-2.0 mg/cm <sup>2</sup>
Maximum service temperature	140°C
Porosity (Void Vol.)	4-20%
Ash weight	20.6 µg/cm <sup>2</sup>
Pore density	1 × 10 <sup>5</sup> - 6 × 10 <sup>8</sup> pores/cm <sup>2</sup>
Opacity	N/A
Autoclavable	30 minutes at 121°C
Flammability	Slow burn
Fiber releasing	No
Leachables	Negligible
Biological compatibility	Inert

## Typical Properties – Black Cyclopore Membranes

Pore Size (µm)	Nominal Thickness (µm)	Mean Porosity (%)	Bubble Point in Water (bar)*	Burst Strength (bar)*
<b>Polycarbonate Microporous</b>				
0.2	20	13	4	> 1
0.4	20	15	2.2	> 1

\* 1 bar = 14.7 psi

## Ordering Information – Black Cyclopore Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
25	0.2	7063-2502	Polycarbonate	100
25	0.4	7063-2504	Polycarbonate	100
47	0.2	7063-4702	Polycarbonate	100
47	0.4	7063-4704	Polycarbonate	100

## Black Nuclepore Membranes

### Membranes for use with Epifluorescence Microscopy

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

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

### Features and Benefits

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

### Applications

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

## Ordering Information – Black Nuclepore Membrane Circles

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

## Hemafil Track-Etched Polycarbonate Membranes

Whatman Hemafil™ track-etched polycarbonate membranes, part of the Whatman range 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 diameter due to their ability to deform.

### Ordering Information - Hemafil Track-Etched Polycarbonate Membranes

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

## Track-Etched Polycarbonate Membranes

### Cell Culture and Chemotaxis Applications

Whatman track-etched polycarbonate membranes for cell culture applications.

#### Features and Benefits

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



Chemotaxis membranes

### Ordering Information – Cell Culture Track-Etched Polycarbonate Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Surface	Quantity/Pack
13	3.0	110412	Standard	100
13	5.0	110413	Standard	100
13	5.0	150445	PVP-free	100
13	8.0	110414	Standard	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 × 80	5.0	155845	PVP-free	100
25 × 80	8.0	155814	Standard	100
25 × 80	8.0	155846	PVP-free	100

## Anopore Inorganic Membranes

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

The precise pore structure and narrow pore size distribution of the Anopore membrane ensure a high level of particle removal efficiency. Microorganisms and particulate material are captured on the surface of the membrane for subsequent analysis by light or electron microscopy. When wet, the membrane is virtually transparent, 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.

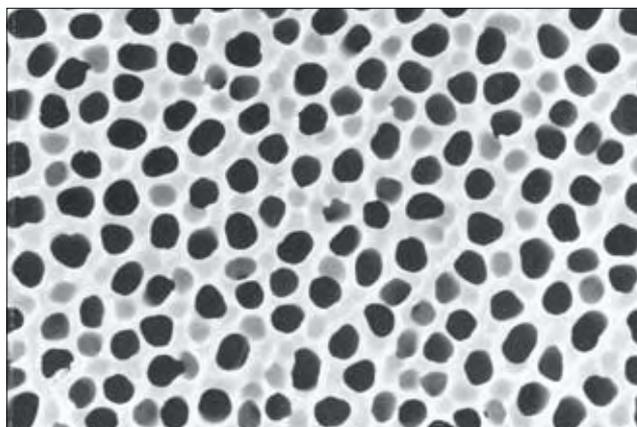
Anopore is available in three nominal pore sizes: 0.02  $\mu\text{m}$ , 0.1  $\mu\text{m}$  and 0.2  $\mu\text{m}$  and in three diameters: 13 mm, 25 mm and 47 mm.

### Features and Benefits

- High pore density and narrow pore size distribution make it an extremely precise membrane
- Wide solvent compatibility reduces the need to stock a variety of membranes in the laboratory
- 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



Anodisc 47



Anodisc pore structure

### 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 – Anopore Inorganic Membranes

	Anodisc 13	Anodisc 25	Anodisc 47
Average membrane thickness	60 µm	60 µm	60 µm
Membrane diameter	13 mm	21 mm	43 mm
Membrane type	Anopore aluminum oxide	Anopore aluminum oxide	Anopore aluminum oxide
Support ring material	None	Polypropylene	Polypropylene
Construction process	None	Thermal weld	Thermal weld
Protein adsorption	Low	Low	Low
Burst strength	65-110 psi	65-110 psi	65-110 psi
Maximum service temperature	400°C	40°C	40°C
Porosity	25-50%	25-50%	25-50%
Autoclavable	Yes	No	No
Refractive index	1.6	1.6	1.6

## Ordering Information – Anopore Inorganic Membranes (Anodisc)

Diameter (mm)	Membrane	Pore Size µm	Catalog Number	Hydrophilic	Protein Binding	Solvent Resistance	Quantity/Pack
13	Anodisc 13*	0.02	6809-7003	Yes	Low	Very good	100
13	Anodisc 13*	0.1	6809-7013	Yes	Low	Very good	100
13	Anodisc 13*	0.2	6809-7023	Yes	Low	Very good	100
25	Anodisc 25	0.02	6809-6002	Yes	Low	Very good	50
25	Anodisc 25	0.1	6809-6012	Yes	Low	Very good	50
25	Anodisc 25	0.2	6809-6022	Yes	Low	Very good	50
47	Anodisc 47*	0.02	6809-5502	Yes	Low	Very good	50
47	Anodisc 47	0.02	6809-5002	Yes	Low	Very good	50
47	Anodisc 47	0.1	6809-5012	Yes	Low	Very good	50
47	Anodisc 47*	0.2	6809-5522	Yes	Low	Very good	50

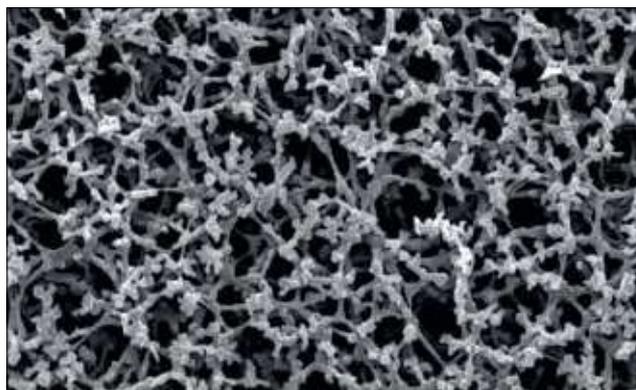
\* No support ring

## Regenerated Cellulose Membranes

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

### Features and Benefits

- Spontaneously wetting, very good wet strength
- Extremely chemically resistant; suitable for aqueous and organic media
- Hydrophilic
- Mechanically stable
- Sterilizable by all methods
- Pore sizes between 0.2 µm and 1 µm



Regenerated cellulose membrane (0.45 µm (RC 55)) electron micrograph (magnification 1000×)

## Typical Data – Regenerated Cellulose Membranes

Membrane Type	Pore Size (µm)	Thickness (µm)	Water Flow Rate Δp = 0.9 bar (s/100 ml/12.5 cm <sup>2</sup> )	Air Flow Rate Δp = 3 mbar (s/100 ml)	Bubble Point (bar)
RC 58	0.2	75	26	–	3.7
RC 55	0.45	75	14	–	3.5
RC 60	1.0	70	15	12.5	0.8

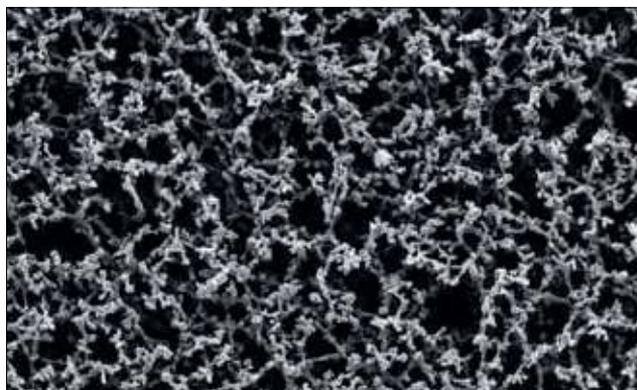
## Ordering Information – Regenerated Cellulose Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>RC 55</b>			
25	0.45	10410206	100
47	0.45	10410212	100
50	0.45	10410214	100
100	0.45	10410219	25
110	0.45	10410224	25
142	0.45	10410229	25
<b>RC 58</b>			
47	0.2	10410312	100
50	0.2	10410314	100
100	0.2	10410319	25
300 × 600	0.2	10410380	5
<b>RC 60</b>			
47	1	10410012	100
50	1	10410014	100

## Cellulose Acetate Membranes

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

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



Cellulose acetate membrane (Type ST 68, 0.8 µm)

## Typical Data – Cellulose Acetate Membranes

Membrane Type	Pore Size (µm)	Thickness (µm)	Water Flow Rate Δp = 0.9 bar (s/100 ml/12.5 cm <sup>2</sup> )	Bubble Point (psi)	Bubble Point (bar)
OE 66	0.2	115	26	58	4
OE 67	0.45	115	12	44.95	3.1
ST 68	0.8	140	16	21.75	1.5
ST 69	1.2	140	12	13.05	0.9

## Ordering Information – Cellulose Acetate Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>OE 66</b>			
25	0.2	10404106	100
47	0.2	10404112	100
47	0.2	10404170	100
50	0.2	10404114	100
110	0.2	10404126	50
142	0.2	10404131	25
293	0.2	10404139	25
300 × 600	0.2	10404180	5
<b>OE 67</b>			
13	0.45	10404001	100
25	0.45	10404006	100
47	0.45	10404012	100
50	0.45	10404014	100
85	0.45	10404044	50
100	0.45	10404021	50
110	0.45	10404026	50
142	0.45	10404031	25
<b>OE 67/A</b>			
142	0.45	10404331	25
<b>ST 68</b>			
47	0.8	10403112	100
50	0.8	10403114	100
<b>ST 69</b>			
47	1.2	10403012	100
50	1.2	10403014	100

## Cellulose Nitrate Membranes

Recommended for the majority of routine applications, this membrane is manufactured under strictly controlled conditions. The user will benefit from the performance improvements, which are now available in Whatman membrane filters, including very narrow pore size distribution and low levels of extractables.

### Higher Strength and Flexibility

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

### Low Extractable Levels

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

### Narrow Pore Size Distribution

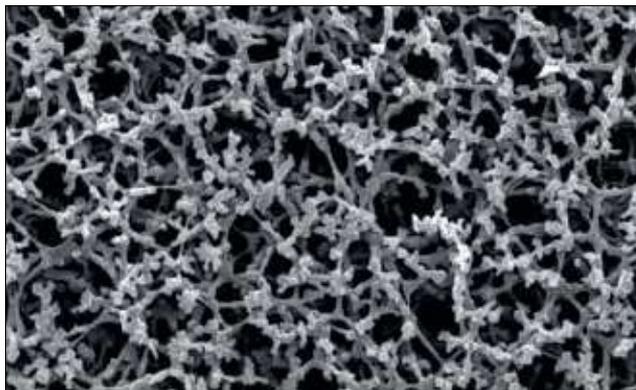
One of the major features of Whatman membrane filters is the narrow distribution of pore sizes. The rated pore size of these membranes is closely controlled due to the advanced manufacturing and control system. Additionally, the batch-to-batch variation is minimized, providing more consistent laboratory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

### Increased Temperature Stability

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

### Reduced Shrinkage

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



### Features and Benefits

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

### Applications

- Sample preparation
- Microbiological studies
- Filtration of aqueous solutions

### Filter Types

#### White Plain Filters

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

#### Gridded Filters

Gridded filters make it easier to count particles, microorganisms and colonies. If a gridded membrane is required, please see Mixed Cellulose Ester Membranes.

## Typical Data – Cellulose Nitrate Membranes

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

## Typical Applications – Cellulose Nitrate Membranes

Field of Application	Pore Size (µm)
<b>General</b>	
Microfiltration	0.1
Ultracleaning	0.1
Sterilizing	0.2
Bulk bacterial removal	0.45
Analytical precipitates	0.65
Clarifying filtration	1.0
Particle removal	5.0
<b>Water Microbiology and Analysis</b>	
Bacterial colony count	0.45 (gridded) – See Mixed Cellulose Ester Membranes
Sediment analysis	0.45
Suspended particles	5.0
<b>Air Pollution Monitoring</b>	
Asbestos Monitoring (NIOSH)	0.8
<b>Food and Beverage QC</b>	
<i>E. coli</i> and Coliforms	0.45 (gridded) – See Mixed Cellulose Ester Membranes
Total bacteria count	0.2
<b>Tissue Culture</b>	
Mycoplasma removal	0.1
Sterile filtration	0.2

### Ordering Information – Cellulose Nitrate Membrane Circles

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
13	0.2	7182-001	Plain (white)	100
13	0.45	7184-001	Plain (white)	100
25	0.025	10402206*	Plain (white)	100
25	0.1	7181-002	Plain (white)	100
25	0.2	7182-002	Plain (white)	100
25	0.2	10401306	Plain (white)	100
25	0.45	7184-002	Plain (white)	100
25	0.65	7186-002	Plain (white)	100
25	0.8	7188-002	Plain (white)	100
25	1.0	7190-002	Plain (white)	100
25	3.0	7193-002	Plain (white)	100
25	5.0	7195-002	Plain (white)	100
25	5.0	10400206	Plain (white)	100
25	8.0	10400106	Plain (white)	100
30	0.45	10401107	Plain (white)	100
37	0.45	7184-003	Plain (white)	100
37	0.8	7188-003	Plain (white)	100
37	8.0	10400109	Plain (white)	100
47	0.1	7181-004	Plain (white)	100
47	0.1	10402012	Plain (white)	100
47	0.2	7182-004	Plain (white)	100
47	0.2	10401312	Plain (white)	100
47	0.2	7187-114	Plain (white)	100
47	0.45	7184-004	Plain (white)	100
47	0.45	10401170	Plain (white), sterile	100
47	0.45	7153-004	Black gridded	100
47	0.45	7153-104	Black gridded, sterile	100
47	0.45	7155-004	Green gridded, sterile	100
47	0.65	7186-004	Plain (white)	100
47	0.8	7188-004	Plain (white)	100
47	1.0	7190-004	Plain (white)	100
47	3.0	7193-004	Plain (white)	100
47	5.0	7195-004	Plain (white)	100
47	5.0	10400212	Plain (white)	100
47	8.0	10400112	Plain (white)	100
47	12.0	10400012	Plain (white)	100
50	0.1	10402014	Plain (white)	100
50	0.2	10401314	Plain (white)	100
50	0.45	10401114	Plain (white)	100
50	0.45	7184-005	Plain (white)	100
50	1.2	7191-005	Plain (white)	100

\* Product is only available in the Americas

cont.

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
50	5.0	10400214	Plain (white)	100
50	8.0	10400114	Plain (white)	100
50	8.0	10405079	Plain (white), with hydrophobic rim	100
50	12.0	10400014	Plain (white)	100
82	0.45	7184-008	Plain (white)	25
90	0.2	7182-009	Plain (white)	25
90	0.45	10401118	Plain (white)	50
90	0.45	7184-009	Plain (white)	25
90	0.8	7188-009	Plain (white)	25
90	1.0	7190-009	Plain (white)	25
90	5.0	7195-009	Plain (white)	25
100	0.45	10401121	Plain (white)	50
100	8.0	10400121*	Plain (white)	50
110	0.45	10401126	Plain (white)	50
142	0.2	7182-014	Plain (white)	25
142	0.2	10401331	Plain (white)	25
142	0.45	7184-014	Plain (white)	25
142	0.45	10401131	Plain (white)	25
142	1.2	7191-014	Plain (white)	25
150	8.0	10400132	Plain (white)	25
293	0.45	7184-029	Plain (white)	25

\* Product is only available in the Americas

## Mixed Cellulose Ester Membranes

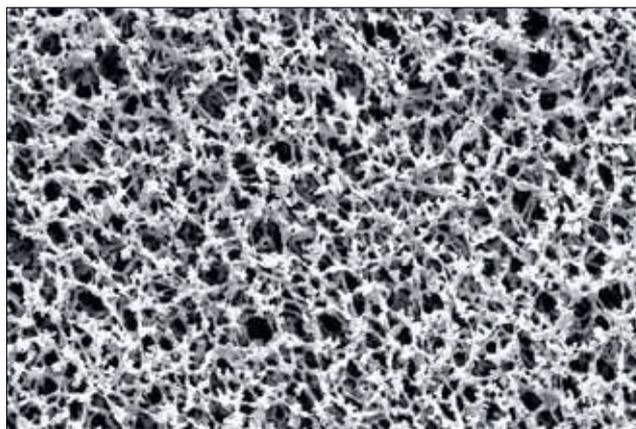
Whatman mixed cellulose ester membranes are composed of cellulose acetate and cellulose nitrate. These membranes are characterized by a smoother and more uniform surface than pure nitrocellulose filters. Also, the color contrast provided by the filter surface facilitates particle detection and minimizes eye fatigue. The ME range has a lower cellulose acetate content compared to the WME range of membranes.

### Eased Counting Process

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

### Plain or Gridded

Many microbiological techniques include colony counting after incubation as the standard method of quantification. Whatman gridded filters have clearly defined grid lines spaced at 3.1 or 5 mm intervals. The special ink used is nontoxic and completely free from bacterial growth inhibitors.



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

### Sterile Filters

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

### Features and Benefits

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

### Applications

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

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

## Typical Data – Mixed Cellulose Ester Membranes

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

## Product Selection – Mixed Cellulose Ester Membranes

Membrane Type	Pore Size (µm)	Thickness (µm)	Water Flow Rate Δp = 0.9 bar (s/100 ml/12.5 cm <sup>2</sup> )	Air Flow Rate Δp = 3 mbar (s/100 ml)	Bubble Point (psi)	Bubble Point (bar)
<b>WME Product Range</b>		140	–	–	–	–
<b>ME Product Range</b>						
ME 24	0.2	135	20	–	53.65	3.7
ME 25	0.45	145	12.5	–	40.6	2.8
ME 26	0.6	135	48	21	27.55	1.9
ME 27	0.8	140	2.8	11.6	18.85	1.3
ME 28	1.2	140	2	9.3	11.6	0.8
ME 29	3	150	1.2	6.7	10.15	0.7

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

## Ordering Information – Mixed Cellulose Ester Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
<b>ME Range – ME 24, Plain</b>				
25	0.2	10401706	Plain	100
47	0.2	10401712	Plain	100
47	0.2	10401770	Plain	100
50	0.2	10401714	Plain	100
50	0.2	10401772	Plain, sterile	100
100	0.2	10401721	Plain	50
110	0.2	10401726	Plain	50
142	0.2	10401731	Plain	25
<b>ME Range – ME 25, Plain</b>				
25	0.45	10401606	Plain	100
47	0.45	10401612	Plain	100
47	0.45	10401670	Plain	100
50	0.45	10401614	Plain	100
50	0.45	10401662	Without interleaving paper	100
50	0.45	10401672	Plain	100
90	0.45	10401618	Plain	50
100	0.45	10401621	Plain	50
110	0.45	10401626	Plain	50
142	0.45	10401631	Plain	25
<b>ME Range – ME 26, Plain</b>				
25	0.6	10401506	Plain	100
47	0.6	10401512	Plain	100
50	0.6	10401514	Plain	100
100	0.6	10401521	Plain	100
<b>ME Range – ME 27, Plain</b>				
25	0.8	10400906	Plain	100
37	0.8	10400909	Plain	100
47	0.8	10400912	Plain	100
47	0.8	10400970	Plain	100
50	0.8	10400914	Plain	100
100	0.8	10400921	Plain	50
<b>ME Range – ME 28, Plain</b>				
25	1.2	10400806	Plain	100
47	1.2	10400812	Plain	100
50	1.2	10400814	Plain	100
100	1.2	10400821	Plain	50

\* Product is only available in the Americas

cont.

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Quantity/Pack
<b>ME Range – ME 29</b>				
25	3	10400706	Plain	100
47	3	10400712	Plain	100
50	3	10400714	Plain	100
50	3	10400772	Plain, sterile	100
100	3	10400721*	Plain	50
<b>ME Range – ME 24, Gridded</b>				
47	0.2	10406970	White/black grid 3.1 mm, sterile	100
50	0.2	10406914	White/black grid 3.1 mm	100
50	0.2	10406972	White/black grid 3.1 mm, sterile	100
<b>ME Range – ME 25, Gridded</b>				
47	0.45	10406812	White/black grid 3.1 mm	100
47	0.45	10407970	White/black grid 3.1 mm, sterile	100
47	0.45	10406871	White/black grid 3.1 mm, sterile	1000
47	0.45	10406512	White/black grid 5 mm	100
47	0.45	10406570*	White/black grid 5 mm, sterile	100
47	0.45	10409712	Black/white grid 3.1 mm	100
47	0.45	10409770	Black/white grid 3.1 mm, sterile	100
47	0.45	10409771	Black/white grid 3.1 mm, sterile	1000
47	0.45	10409414	Green/black grid 3.1 mm	1000
47	0.45	10409471*	Green/black grid 3.1 mm, sterile	1000
50	0.45	10406814	White/black grid 3.1 mm	100
50	0.45	10406862	White/black grid 3.1 mm, without interleaving paper	100
50	0.45	10406873	White/black grid 3.1 mm, sterile	1000
50	0.45	10406514	White/black grid 5 mm	100
50	0.45	10406572	White/black grid 5 mm, sterile	100
50	0.45	10406562	White/black grid 5 mm, without interleaving paper	100
50	0.45	10409714	Black/white grid 3.1 mm	100
50	0.45	10409772	Black/white grid 3.1 mm, sterile	100
50	0.45	10409773*	Black/white grid 3.1 mm, sterile	1000
50	0.45	10409462	Green/black grid 3.1 mm, without interleaving paper, sterile	100
50	0.45	10409473	Green/black grid 3.1 mm, sterile	1000
<b>ME Range – ME 26, Gridded</b>				
50	0.6	10409814	Black/white grid 3.1 mm	100
<b>ME Range – ME 27, Gridded</b>				
47	0.8	10408970	White/black grid 3.1 mm, sterile	100
47	0.8	10409970	White/black grid 3.1 mm with pad, sterile	100
47	0.8	10409270	Black/white grid 3.1 mm, sterile	100
50	0.8	10405672	Green/black grid 3.1 mm, sterile	100
<b>ME Range – ME 28, Gridded</b>				
50	1.2	10408372	Black/white grid 3.1 mm, sterile	100
50	1.2	10408472	Green/black grid 3.1 mm, sterile	100

\* Product is only available in the Americas

cont.

Diameter (mm)	Pore Size $\mu\text{m}$	Catalog Number	Description	Quantity/Pack
<b>WME Range, Gridded</b>				
25	0.45	7141-002	White/black grid 3.1 mm	100
25	0.8	7148-002	White/black grid 3.1 mm	100
47	0.45	7140-104	Plain, sterile	100
47	0.2	7187-114	White/black grid 3.1 mm	100
47	0.45	7141-004	White/black grid 3.1 mm	100
47	0.45	7141-104	White/black grid 3.1 mm, sterile	100
47	0.45	7141-114	White/black grid 3.1 mm, sterile, without pad	100
47	0.45	7141-124	White/black grid 3.1 mm, sterile	200
47	0.45	7141-154	White/black grid 3.1 mm, sterile, without pad	1000
47	0.45	7141-204	White/black grid 3.1 mm, autoclave pack, sterile	100
47	0.45	7153-004	Black/white grid 3.1 mm	100
47	0.45	7153-104	Black/white grid 3.1 mm, sterile	100
47	0.45	7155-004	Green/black grid 3.1 mm, sterile	100

## Teflon® (PTFE) Membranes

Whatman PTFE membranes are chemically stable and inert. They are suitable for applications involving aggressive organic solvents, strong acids and alkalis. PTFE membranes are particularly suitable for preparing samples for HPLC analysis. The hydrophobic nature of the membrane also has applications for air and gas sterilization. The membrane is laminated onto a nonwoven polypropylene support web for improved strength and handling and can be used at temperatures up to 120°C.

### Chemically Stable and Inert

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

### Applications

One of the major applications for the PTFE membrane is the clarification of corrosives, solvents, and aggressive fluids. This includes the important requirement in HPLC analysis for sample filtration where any solid particles can cause permanent damage to the column. The 0.5  $\mu\text{m}$  pore size is normally used. Air and gas sterilization make use of the hydrophobic characteristics of PTFE membranes and their ability to stop aqueous aerosols. Usual pore sizes are 0.2  $\mu\text{m}$  and 0.5  $\mu\text{m}$ . Sterile venting of vacuum manifolds, fermentation vessels, and sterile filtrate tanks and containers utilize PTFE 0.2  $\mu\text{m}$  membranes.



PTFE membrane

### WTP and TE Membrane Ranges

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

## Typical Data – Teflon (PTFE) Membranes

Membrane Type	Thickness (µm)	Porosity (%)	Liquid Flow Rate Δp = 0.9 bar (s/100 ml/12.5 cm <sup>2</sup> )	Liquid Flow Rate @ 10 psi Vacuum (ml/min/cm <sup>2</sup> )	Air Flow Rate Δp = 3 mbar (s/100 ml)	Air Flow Rate @ 10 psi Vacuum (l/min/cm <sup>2</sup> )	Bubble Point (psi)	Bubble Point (bar †)	Max. Temp. (°C)
<b>TE Range</b>									
0.2 µm (TE 35)	240	–	24*	–	70	–	1.29	18.8	100
0.45 µm (TE 36)	220	–	12*	–	60	–	0.89	13	100
1.0 µm (TE 37)	275	–	5.4*	–	24	–	0.24	3.5	100
5.0 µm (TE 38)	265	–	2.2*	–	3.5	–	0.19	2.9	100
<b>WTP Range</b>									
0.2 µm	130	72	–	61.4**	–	4.5	0.89	13	120
0.5 µm	120	74	–	110**	–	7.5	0.41	6	120
1.0 µm	90	76	–	445**	–	17	0.21	3	120

\* Measured with ethanol

\*\* Measured with acetone

† Measured using 2-propanol

## Ordering Information – Teflon (PTFE) Membranes

Diameter (mm)	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>WTP Range</b>			
25	0.2	7582-002	100
25	1.0	7590-002	100
37	1.0	7590-003	100
47	0.2	7582-004	100
47	0.5	7585-004	100
47	1.0	7590-004	100
<b>TE Range – TE 35</b>			
25	0.2	10411405	50
47	0.2	10411411	50
50	0.2	10411413	50
<b>TE Range – TE 36</b>			
25	0.45	10411305	50
47	0.45	10411311	50
50	0.45	10411313	50
<b>TE Range – TE 37</b>			
25	1.0	10411205	50
47	1.0	10411211	50
50	1.0	10411213	50

cont.

Diameter (mm)	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>TE Range – TE 38</b>			
37	5.0	10411108	50
47	5.0	10411111	50
50	5.0	10411113	50
90	5.0	10411116	50
150	5.0	10411130	50

## PM 2.5 Air Monitoring Membrane

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

The PM 2.5 PTFE membranes are manufactured under clean room conditions. These chemically resistant, low chemical background filters permit sensitive, interference-free determinations. No glues or adhesives are used in making these 46.2 mm diameter products.

### Statement of Conformance

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

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

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

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

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



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

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

### Technical Specifications – PTFE Filters for use in US EPA PM 2.5 Ambient Air Monitoring

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

### Maximum Trace Element Concentration by X-Ray Fluorescence

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

### Ordering Information – PM 2.5 Air Monitoring Membrane

Diameter (mm)	Catalog Number	Description	Quantity/Pack
46.2	7592-104	With support ring, sequentially numbered	50

# Nylon Membranes

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

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

## Applications

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

## Typical Data – Nylon Membranes

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

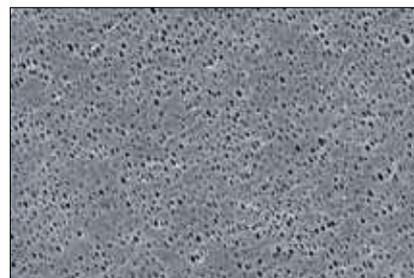
## Ordering Information - Nylon Membrane Circles

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

## Polyamide Membranes

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

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



Polyamide membrane (0.45 µm, Type NL 17) electronic micrograph (magnification 1000×)

### Typical Data – Polyamide Membranes

Pore Size (µm)	Thickness (µm)	Water Flow Rate Δp = 0.9 bar (ml/min/cm <sup>2</sup> )	Air Flow Rate Δp = 3 mbar (bar) (ml/min/cm <sup>2</sup> )	Bubble Point (bar)	Maximum Temperature (°C)
0.2 (NL 16)	110	0.2	10	4.2	135
0.45 (NL 17)	110	0.45	20	2.8	135

### Ordering Information – Polyamide Membrane Circles

Diameter (mm)	Pore Size (µm)	Catalog Number	Membrane Type	Quantity/Pack
25	0.2	10414006	NL 16	100
25	0.45	10414106	NL 17	100
47	0.2	10414012	NL 16	100
47	0.45	10414112	NL 17	100
50	0.2	10414014	NL 16	100
50	0.45	10414114	NL 17	100
142	0.45	10414131	NL 17	25

## Polyethersulfone (PES) Membranes

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

### Ordering Information – PES Membrane Circles

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

# Polypropylene Membranes

Whatman polypropylene membrane filters are ideal for numerous applications in chromatography and biotechnology laboratories. They are available in 0.2 µm and 0.45 µm pore sizes.

## Easy Handling

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

## Versatility

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

## Purity

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

## Ordering Information - Polypropylene (Type WPP) Membrane Circles

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

# MembraClear Membrane

This membrane is particularly suitable for the hot block method for Asbestos fiber analysis as it becomes crystal clear and stays clear without artifacts.

## Ordering Information - MembraClear Membrane

Diameter (mm)	Catalog Number	Quantity/Pack
25	7141-025	100
37	7141-037	100
47	7141-047	100

# Membrane Accessories

## Membrane Prefilters

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

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

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

### Ordering Information – Glass Microfiber Prefilter Circles

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

## Membrane Filter Holders

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.

### Polyester Drain Discs

For use with membrane hardware where extra support is needed for improved flow rate and throughput. The polyester drain disc is binder free and has a thickness of 100 µm. It provides a flat surface to eliminate filter tearing or rupturing. It is also used as a separator between membrane layers in serial stack filtration applications. This chemically inert support disc is available in a variety of diameters for use in a range of devices.



Membrane filter holders

### Applications

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

## Typical Data – Membrane Filter Holders

Filter Diameter (mm)	Membrane Holder Filter Systems – Glass	Reservoir Volume (ml)	Filter Surface Area (cm <sup>2</sup> )	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

*Additional types of membrane holders can be found in the Membrane Accessories section and Membrane Vacuum Filtration Equipment section.*

## Ordering Information – Membrane Filter Accessories

Diameter (mm)	Catalog Number	Description	Quantity/Pack
<b>Membrane Filter Holders</b>			
25	1960-032	Stainless steel support, 50 ml volume	1
25	1960-002	Glass support, 25 ml volume	1
25	1960-052	Stainless steel support, 25 ml volume	1
47	1960-004	Glass support, 300 ml volume	1
47	1960-054	Stainless steel support, 300 ml volume	1
47	1961-054	Glass reservoir, 300 ml volume	1
90	1960-009	Glass support, 1000 ml volume	1
<b>Drain Discs</b>			
10	230300	Polyester	100
22	230500	Polyester	100
25	230600	Polyester	100
37	230800	Polyester	100
47	231100	Polyester	100

## Glass Vacuum Filtration Devices

### Features and benefits

- Chemically resistant to most aqueous and organic solutions
- Acid and caustic solution resistant
- Autoclavable and can be sterilized in dry heat to 180°C
- Can be used up to 200°C

### Applications

- Foodstuffs (e.g., ice cream)
- Beverages (e.g., residues in beer)
- Pharmaceuticals and cosmetics
- Water and wastewater
- Residue analytics and precipitation analysis
- Contamination tests (e.g., in electroplating)
- Microbiological, biochemical, and hydrobiological detection
- Radiochemical tests
- Particle analysis in sensitive areas of electronics, aviation, and space travel



## Technical Information – Glass Vacuum Filtration Devices

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

Series	Funnel Volume (ml)	Filter Format (mm)	Filter Surface (cm <sup>2</sup> )	Prefilter (mm)	Height* × Diameter (mm)
GV 025	60	24/25	3.1	20	210/335 × 45
GV 050	250	47/50	12.5	40	225/450 × 80
GV 100	500	100	70	80	225 × 90

\* Height without/with Erlenmeyer flask, diameter without clamp and hose coupling

## Ordering Information – Glass Vacuum Filtration Devices

Code No	Description	Filter Support	Vacuum Connection	Quantity/Pack
<b>GV 025 Series</b>				
10441000	GV 025/0	Glass frit	Rubber stopper	1
10441100	GV 025/1	Sieve	Rubber stopper	1
10441200	GV 025/2	Glass frit	Hose coupling Erlenmeyer flask 250 ml (NS29)	1
<b>GV 050 Series*</b>				
10442000	GV 050/0	Glass frit	Rubber stopper	1
10442100	GV 050/1	Sieve	Rubber stopper	1
10442200	GV 050/2	Glass frit	Hose coupling Erlenmeyer flask 1000 ml (NS45)	1
10442300	GV 050/3	Sieve	Hose coupling Erlenmeyer flask 1000 ml (NS45)	1
<b>GV 100 Series</b>				
10443000	GV 100/0	Glass frit	Rubber stopper	1
10443100	GV 100/1	Sieve	Rubber stopper	1

\* Silicone cap and supplied with air inlet

## Syringe Type Holders S/S

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

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



Syringe type holder

### Ordering Information – Syringe Type Holders

Diameter (mm)	Catalog Number	Description	Quantity/Pack
<b>Membrane Holders</b>			
13	1980-001	Stainless steel	1
25	1980-002	Stainless steel	1

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

### Features and Benefits

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



Plastic filter holders

## Typical Data – Pop-Top and Swin-Lok Plastic Filter Holders

Materials	13 mm Pop-Top	25 mm Swin-Lok	47 mm Swin-Lok
Holder	Polycarbonate	Polypropylene	Polycarbonate
Maximum operating temperature and pressure	38°C (100°F) at 3.5 bar (50 psi)		
Sterilization	121°C (250°F) for 15 minutes		
Size (cm)	2.7 OD × 2.7 H	3.5 OD × 3.7 H	6.0 OD × 6.5 H
Membrane size (mm)	13	25	47
Prefilter size (mm)	10	22	42
Filtration area (cm <sup>2</sup> )	0.8	3.9	13.8
<b>Connection</b>			
Cap	Male luer slip-fit	Female luer-lok	Female luer slip-fit
Base	Female luer slip-fit	Male luer slip-fit	Male 1/4" NPT and 1/4" tubing (multipurpose)

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

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



## Filtration Devices

Every day, people put their trust in our solutions. From critical HPLC/UHPLC sample preparations, to automated sample preparations for dissolution testing, our products offer reliable quality. When the lives and health of many are at stake, you can count on us to deliver filtration devices that work.

- 72 Syringeless Filters
- 80 Syringe Filters (including syringe filters for automation)
- 100 Inline Filters
- 106 Capsule Filters
- 123 Centrifuge Filters
- 128 Venting Filters
- 133 Vacuum Protection Filters
- 134 Specialty Devices

# Filtration Devices

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

## Syringeless Filters

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

### Mini-UniPrep Syringeless Filters

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

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

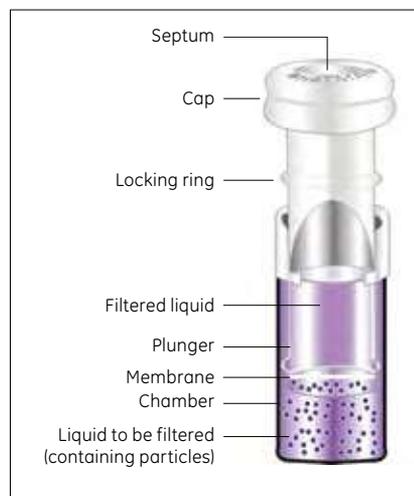
The device can be used either manually or with a compressor unit. The multi-compressor can process up to 6 samples at one time, further improving sample processing time and reducing the risk of hand stress. The Mini-UniPrep device is designed to fit into any autosampler accommodating 12 x 32 mm vials. Alternatively the septum can be pierced with a needle and the sample drawn off for manual injection into an analyzer.

#### Features and Benefits

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



Mini-UniPrep



Mini-UniPrep

### Applications HPLC/UHPLC

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

### A Variety of Mini-UniPrep Filters to Meet Your Needs

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 who need to filter light sensitive samples, there is Amber Mini-UniPrep. For customers using robotics to maximize throughput, Whatman offers Slit Septa Mini-UniPrep.

### Amber Mini-UniPrep Syringeless Filter

Protects samples from UV damage.

#### Features and Benefits

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



Mini-UniPrep automated



Six-position compressor



Mini-UniPrep in an HPLC autosampler

## Selection – Mini-UniPrep Filtering Media

Sample Type	Suitable Mini-UniPrep Media
High particulate laden liquids	Glass Microfiber (GMF)
Aqueous/organic samples in 3 to 10 pH range	Nylon (NYL)
General filtration media/solvent based samples	Polypropylene (PP)
Chemically aggressive solutions	Polytetrafluoroethylene (PTFE)
Biological samples requiring low protein binding media	Regenerated Cellulose (RC) or Polyethersulfone (PES)
Aqueous/organic solvents – low nonspecific protein binding media	Polyvinylidene Difluoride (PVDF) or Regenerated Cellulose (RC)
Aqueous/organic solvents – high flow and loading capacity	Polypropylene Depth Filter (Depth PP or DpPP)

## Technical Data – Mini-UniPrep Syringeless Filters

Dimensions	Equivalent in size to 12 × 32 mm vials
<b>Materials of Construction</b>	
Housing and cap	Polypropylene
Filter media	As specified
Septa	PTFE coated silicone rubber
Filtering capacity	0.4 ml
Nominal force needed to compress	Approximately 18 lbs/8.2 kg
Maximum operating temperature	120°F (50°C)

## Ordering Information – Mini-UniPrep Syringeless Filters

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
<b>Standard Cap – Translucent Housing</b>			
0.2	UN203NPENYL	Nylon	100
0.2	UN503NPENYL	Nylon	1000
0.45	UN203NPUNYL	Nylon	100
0.45	UN503NPUNYL	Nylon	1000
0.2	UN203NPEPES	PES	100
0.2	UN503NPEPES	PES	1000
0.45	UN203NPUPES	PES	100
0.45	UN503NPUPES	PES	1000
0.2	UN203NPEAQU	PVDF	100
0.2	UN503NPEAQU	PVDF	1000
0.45	UN203NPUAQU	PVDF	100
0.45	UN503NPUAQU	PVDF	1000
0.2	UN203NPERC	RC	100
0.2	UN503NPERC	RC	1000
0.45	UN203NPURC	RC	100
0.45	UN503NPURC	RC	1000
0.2	UN203NPEORG	PTFE	100
0.2	UN503NPEORG	PTFE	1000
0.45	UN203NPUORG	PTFE	100

PES – Polyethersulfone  
PTFE – Polytetrafluoroethylene

PVDF – Polyvinylidene Difluoride  
RC – Regenerated Cellulose

cont.

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
<b>Standard Cap – Translucent Housing</b>			
0.45	UN503NPUORG	PTFE	1000
0.2	UN203NPEPP	PP	100
0.2	UN503NPEPP	PP	1000
0.45	UN203NPUPP	PP	100
0.45	UN503NPUPP	PP	1000
0.45	UN203NPUDPP	DpPP	100
0.45	UN503NPUDPP	DpPP	1000
0.45	UN203NPUGMF	GMF	100
0.45	UN503NPUGMF	GMF	1000
<b>Slit Septum Cap – Translucent Housing</b>			
0.2	US203NPENYL	Nylon	100
0.2	US503NPENYL	Nylon	1000
0.45	US203NPUNYL	Nylon	100
0.45	US503NPUNYL	Nylon	1000
0.2	US203NPEPES	PES	100
0.2	US503NPEPES	PES	1000
0.45	US203NPUPES	PES	100
0.45	US503NPUPES	PES	1000
0.2	US203NPEAQU	PVDF	100
0.2	US503NPEAQU	PVDF	1000
0.45	US203NPUAQU	PVDF	100
0.45	US503NPUAQU	PVDF	1000
0.2	US203NPEORG	PTFE	100
0.2	US503NPEORG	PTFE	1000
0.45	US203NPUORG	PTFE	100
0.45	US503NPUORG	PTFE	1000
0.2	US203NPEPP	PP	100
0.2	US503NPEPP	PP	1000
0.45	US203NPUPP	PP	100
0.45	US503NPUPP	PP	1000
0.45	US203NPUDPP	DpPP	100
0.45	US503NPUDPP	DpPP	1000
0.45	US203NPUGMF	GMF	100
0.45	US503NPUGMF	GMF	1000
<b>Amber Housing (for Light Sensitive Samples) – Standard Cap</b>			
0.2	UN203APENYL	Nylon	100
0.45	UN203APUNYL	Nylon	100
0.2	UN203APEPES	PES	100
0.45	UN203APUPES	PES	100

DpPP – Polypropylene Depth Filter  
GMF – Glass Microfiber  
PES – Polyethersulfone

PP – Polypropylene  
PTFE – Polytetrafluoroethylene  
PVDF – Polyvinylidene Difluoride

cont.

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
<b>Amber Housing (for Light Sensitive Samples) – Standard Cap</b>			
0.2	UN203APEAQU	PVDF	100
0.45	UN203APUAQU	PVDF	100
0.2	UN203APEORG	PTFE	100
0.45	UN203APUORG	PTFE	100
0.2	UN203APEPP	PP	100
0.45	UN203APUPP	PP	100
0.45	UN203APUDPP	DpPP	100
0.45	UN203APUGMF	GMF	100
<b>Amber Housing (for Light Sensitive Samples) – Slit Septum Cap</b>			
0.45	US203APUNYL	Nylon	100
<b>Accessories – Six-Position Compressor</b>			
–	CR0000006	–	1
<b>Accessories – Adapter</b>			
–	UN2031545PP	–	150
<i>DpPP – Polypropylene Depth Filter</i>		<i>PTFE – Polytetrafluoroethylene</i>	
<i>GMF – Glass Microfiber</i>		<i>PVDF – Polyvinylidene Difluoride</i>	
<i>PP – Polypropylene</i>			

## UniPrep Syringeless Filters

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

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

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

### Features and Benefits

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



### Applications

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

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

**UniPrep Membranes are Available for Various Applications:**

- **GMF:** Layered glass microfiber depth filter for use with samples containing aqueous or organic solvents (indicated pore size is the particle retention rating)

- **NYL:** Naturally hydrophilic membrane for filtration of samples containing aqueous or organic solvents with a pH range of 3-10
- **PTFE:** Chemically inert Teflon membrane for filtration of samples containing > 50% organic solvent
- **PVDF:** Low protein binding membrane for filtration of samples with aqueous or aqueous/organic solvent composition

### Technical Data – UniPrep Syringeless Filters

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

### Ordering Information – UniPrep Syringeless Filters

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
0.2	UN113ENYL	Nylon	50
0.45	UN113UNYL	Nylon	50
0.45	UN513UNYL	Nylon	1000
0.2	UN113EAQU	PVDF	50
0.45	UN113UAQU	PVDF	50
0.45	UN513UAQU	PVDF	1000
0.2	UN113EORG	PTFE	50
0.2	UN513EORG	PTFE	1000
0.45	UN113UORG	PTFE	50
0.45	UN513UORG	PTFE	1000
0.45*	UN113UGMF	GMF	50

\* Particle retention rating

GMF – Glass Microfiber

PTFE – Polytetrafluoroethylene

PVDF – Polyvinylidene Difluoride

## Autovial Syringeless Filters

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

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

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



### Features and Benefits

- Single unit convenience saves time. No assembly required – easier to load
- Choice of filter media. Compatible with a wide range of sample types
- Excellent 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
- Prefilter design for difficult-to-filter samples (no prefilter in Autovial 5 and in selected Autovial 12)
- Choice of glass fiber or polypropylene prefilters

### Autovial Membranes are Available for Various Applications:

- CA: Cellulose Acetate – low nonspecific protein binding and high loading capacity membrane for biological solutions
- GMF: Glass microfiber depth filter for samples in aqueous or organic solutions
- NYL: Nylon membrane for aqueous and organic samples within a pH range of 3-10
- PES: Polyethersulfone – low nonspecific protein binding membrane for samples in aqueous solutions
- PP: Polypropylene – Hydrophobic membrane. Resistant to a wide range of organic solvents
- PTFE: Polytetrafluoroethylene – Teflon membrane for samples with > 50% organic solvent
- PVDF: Polyvinylidene Fluoride – low nonspecific protein binding membrane for samples in aqueous solutions and/or organic solvents

Patent # 4,859,336

## Typical Data – Autovial Syringeless Filters

	Autovial 5	Autovial 12
Housing	Polypropylene	Polypropylene
Filtration area	1.7 cm <sup>2</sup>	3.0 cm <sup>2</sup>
Capacity	5 ml	12 ml
Volume hold-up	30 µl	140 µl
Outlet connection	Male slip luer	Male slip luer
Autoclavable	121°C for 20 min.	121°C for 20 min.

## Ordering Information – Autovial Syringeless Filters

Pore Size (µm)	Catalog Number	Media	Sterile	Quantity/Pack
<b>Autovial 5</b>				
0.45	AV115NPUNYL**	Nylon	No	50
0.45	AV115NPUAQU**	PVDF	No	50
0.2	AV115NPEORG**	PTFE	No	50
0.45	AV115NPUORG**	PTFE	No	50
0.45*	AV115UGMF**	GMF	No	50
<b>Autovial 12 – with Glass Prefilter</b>				
0.45	AV125UCA	CA	No	50
0.2	AV125SNAO	Nylon	Yes	40
0.2	AV125ENAO	Nylon	No	50
0.45	AV125UNAO	Nylon	No	50
0.45	AV525UNAO	Nylon	No	1000
0.45	AV125NPUSU**	PES	No	50
0.2	AV125SAQU	PVDF	Yes	40
0.2	AV125EAQU	PVDF	No	50
0.45	AV125UAQU	PVDF	No	50
0.45	AV525UAQU	PVDF	No	1000
0.45	AV125NPUAQU**	PVDF	No	50
0.2	AV125SORG	PTFE	Yes	40
0.2	AV125EORG	PTFE	No	50
0.45	AV125UORG	PTFE	No	50
0.45	AV525UORG	PTFE	No	1000
0.45*	AV125UGMF	GMF	No	50
0.45	AV125URCT	GMF	No	75
1.0*	AV525BGMF	GF/B	No	1000
0.65	AV125PDCE	CE	No	40
<b>Autovial 12 – with Polypropylene Prefilter</b>				
0.2	AV125EPP	PP	No	50
0.45	AV125UPP	PP	No	50

\* Particle retention rating

\*\* No prefilters

CA – Cellulose Acetate

GF – Glass Fiber

GMF – Glass Microfiber

PTFE – Polytetrafluoroethylene

PVDF – Polyvinylidene Difluoride

CE – Cellulose Ester

# Syringe Filters

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

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

## Safety – Applicable to ALL Syringe Filters

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

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

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

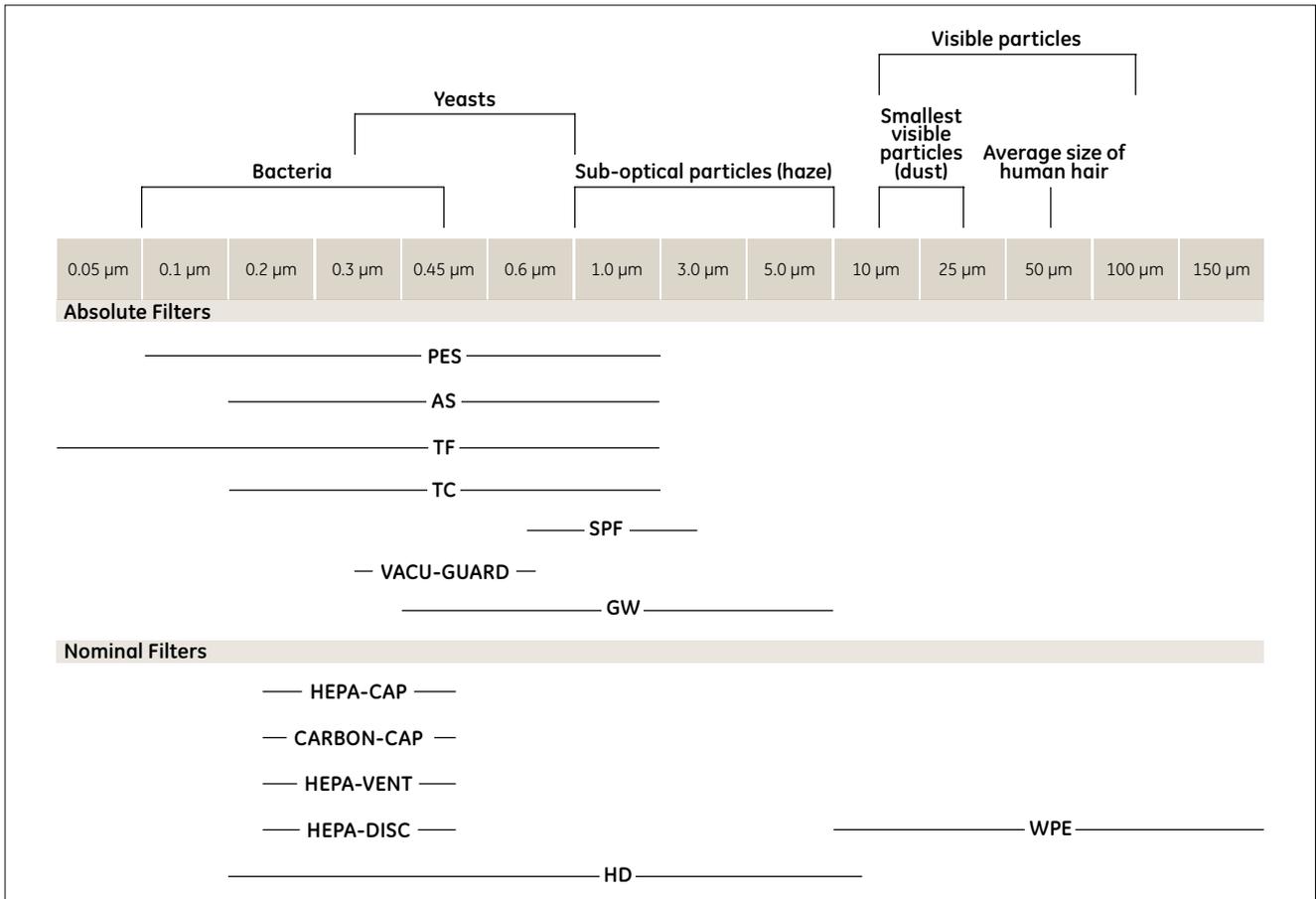
## Product Overview – Syringe Filters

Diameter (mm)	Filters	Features	Media
10, 25	Anotop	<ul style="list-style-type: none"> <li>Made of Anopore membrane</li> </ul>	Anopore
10, 25	Anotop Plus	<ul style="list-style-type: none"> <li>Suitable for ion chromatography</li> <li>Low levels of anion leaching</li> </ul>	Anopore
13, 25	GD/X	<ul style="list-style-type: none"> <li>Contains proprietary prefiltration stack of Whatman GMF 150 and Grade GF/F</li> <li>3x flow rates compared to unprotected membrane</li> </ul>	CA, PTFE, Nylon, PP, PES, PVDF, GMF, RC
25	GD/XP	<ul style="list-style-type: none"> <li>Contains proprietary polypropylene prefiltration stack</li> <li>Suitable for inorganic ion analysis</li> </ul>	Nylon, PVDF, PP, PES, PTFE, Depth Polypropylene
4, 13, 25	Puradisc	<ul style="list-style-type: none"> <li>Designed for manual operation</li> </ul>	PTFE, Nylon, PP, PES, CA PVDF, GMF
30	Puradisc FP	<ul style="list-style-type: none"> <li>Polycarbonate housing</li> </ul>	CA, CN
25	Roby 25	<ul style="list-style-type: none"> <li>Designed to be compatible with the major dissolution test systems</li> </ul>	CA, Nylon, RC, GMF
13, 30	ReZist	<ul style="list-style-type: none"> <li>PTFE for HPLC sample prep</li> </ul>	PTFE
13, 30	SPARTAN	<ul style="list-style-type: none"> <li>Optimized for HPLC sample prep, HPLC certified, batch certificate can be downloaded. Compatible with organic and aqueous solvents</li> </ul>	RC
13	ZC	<ul style="list-style-type: none"> <li>Designed to be Caliper (ZyMark) compatible (ZC) for automated robotic systems</li> </ul>	Nylon, PVDF, PTFE

CA – Cellulose Acetate  
 CN – Cellulose Nitrate  
 GMF – Glass Microfiber

PES – Polyethersulfone  
 PP – Polypropylene  
 PTFE – Polytetrafluoroethylene

PVDF – Polyvinylidene Difluoride  
 RC – Regenerated Cellulose



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

## GD/X Syringe Filters

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

GMF 150 and GF/F are produced from 100% borosilicate glass microfiber. The innovative, graded density GMF 150 medium has a coarse top layer meshed with a fine bottom layer that retains particles to 1.0  $\mu\text{m}$ . A GF/F filter then retains particles down to 0.7  $\mu\text{m}$ . The prefilter stack ends with a final membrane.



GD/X Syringe filter

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

**Features**

- 13 and 25 mm diameter syringe filters
- 13 mm devices for samples up to 10 ml and 25 mm devices for samples greater than 10 ml (however, the volume of sample that can be filtered through each filter depends on the characteristics of the sample)
- Sterile options
- Pigment-free polypropylene housing
- Prefiltration stack of Whatman GMF 150 (graded density) and GF/F glass microfiber media

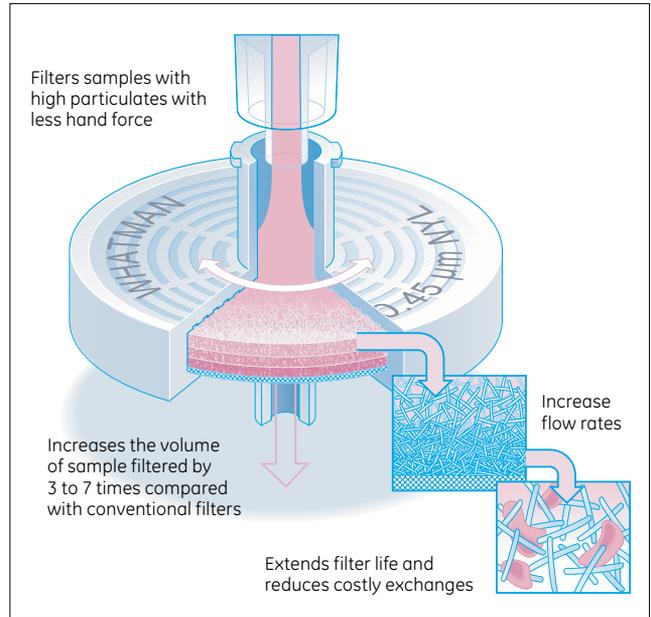
**Benefits**

- Eliminates sample contamination
- Requires less hand pressure, even with the most difficult samples
- Processes three to seven times more sample volume

**Applications**

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

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



## Typical Data – GD/X Syringe Filters

	GD/X 13 mm	GD/X 25 mm
Housing	Polypropylene (pigment free)	Polypropylene (pigment free)
Filtration area	1.3 cm <sup>2</sup>	4.6 cm <sup>2</sup>
Maximum pressure	100 psi (6.9 bar)	75 psi (5.2 bar)
Volume hold-up – full housing – with air purge	0.5 ml 50 µl (approx)	1.4 ml 250 µl (approx)
Dimensions	21.6 × 29.8 mm	20.8 × 29.8 mm
Weight	3 g (approx)	3 g (approx)
Flow direction	Flow should enter from the inlet	Flow should enter from the inlet
Inlet connection	Female luer lock	Female luer lock
Outlet connection	Male luer	Male luer
Sterilization	Autoclave at 121°C (131°C max) at 15 psi (1 bar) for 20 min.	Autoclave at 121°C (131°C max) at 15 psi (1 bar) for 20 min.
Biosafe	All materials pass USP Class VI	All materials pass USP Class VI
Glass microfiber prefiltration media	100% borosilicate glass fiber GMF 150 10 µm: 1 µm GF/F 0.7 µm	100% borosilicate glass fiber GMF 150 10 µm: 1 µm GF/F 0.7 µm

## Ordering Information – GD/X Syringe Filters

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
<b>GD/X 13 mm – Nonsterile</b>			
0.2	6880-1302	CA	150
0.45	6880-1304	CA	150
0.2	6870-1302	Nylon	150
0.2	6871-1302	Nylon	1500
0.45	6870-1304	Nylon	150
0.45	6871-1304	Nylon	1500
0.2	6876-1302	PES	150
0.45	6876-1304	PES	150
0.2	6872-1302	PVDF	150
0.45	6872-1304	PVDF	150
0.45	6873-1304	PVDF	1500
0.2	6878-1302	PP	150
0.45	6878-1304	PP	150
0.2	6874-1302	PTFE	150
0.2	6875-1302	PTFE	1500
0.45	6874-1304	PTFE	150
0.45	6875-1304	PTFE	1500
1.6*	6882-1316	GF/A**	150
1.0*	6884-1310	GF/B**	150
1.2*	6886-1312	GF/C**	150

\* Glass microfiber particle retention rating

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

cont.

CA – Cellulose Acetate  
GF – Glass Fiber

PES – Polyethersulfone  
PP – Polypropylene

PTFE – Polytetrafluoroethylene  
PVDF – Polyvinylidene Difluoride

FILTRATION DEVICES | SYRINGE FILTERS

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
<b>GD/X 13 mm – Nonsterile</b>			
2.7*	6888-1327	GF/D**	150
0.7*	6890-1307	GF/F**	150
0.45*	6894-1304	GMF	150
<b>GD/X 25 mm – Nonsterile</b>			
0.2	6880-2502	CA	150
0.2	6881-2502†	CA	1500
0.45	6880-2504	CA	150
0.45	6881-2504	CA	1500
0.2	6869-2502	Nylon high charge (positive)	150
0.45	6869-2504	Nylon high charge (positive)	150
0.2	6870-2502	Nylon	150
0.2	6871-2502	Nylon	1500
0.45	6870-2504	Nylon	150
0.45	6871-2504	Nylon	1500
5.0	6870-2550	Nylon	150
5.0	6871-2550	Nylon	1500
0.2	6876-2502	PES	150
0.2	6905-2502	PES	1500
0.45	6876-2504	PES	150
0.45	6905-2504	PES	1500
0.2	6872-2502	PVDF	150
0.2	6873-2502	PVDF	1500
0.45	6872-2504	PVDF	150
0.45	6873-2504	PVDF	1500
0.2	6878-2502	PP	150
0.45	6878-2504	PP	150
0.45	6879-2504	PP	1500
0.2	6874-2502	PTFE	150
0.2	6875-2502	PTFE	1500
0.45	6874-2504	PTFE	150
0.45	6875-2504	PTFE	1500
0.45	6882-2504	RC	150
0.45	6883-2504	RC	1500
1.6*	6882-2516	GF/A**	150
1.6*	6883-2516	GF/A**	1500
1.0*	6884-2510	GF/B**	150
1.2*	6886-2512	GF/C**	150
2.7*	6888-2527	GF/D**	150
0.7*	6890-2507	GF/F**	150
0.7*	6891-2507	GF/F**	1500
0.45*	6894-2504	GMF**	150
0.45*	6895-2504	GMF**	1500
1.5*	6892-2515	934-AH**	150
0.2	6901-2502	CA	50
0.45	6901-2504	CA	50
0.2	6896-2502	PES	50

cont.

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
<b>GD/X 25 mm – Sterile</b>			
0.45	6896-2504	PES	50
0.2	6897-2502	PES	500
0.45	6897-2504	PES	500
0.2	6900-2502	PVDF	50
0.45	6900-2504	PVDF	50
0.45*	6902-2504	GMF**	50

\* Glass microfiber particle retention rating

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

† Product is only available in the Americas

CA – Cellulose Acetate

GF – Glass Fiber

GMF – Glass Microfiber

PES – Polyethersulfone

PP – Polypropylene

PTFE – Polytetrafluoroethylene

PVDF – Polyvinylidene Difluoride

RC – Regenerated Cellulose

## GD/XP Syringe Filters

Whatman GD/XP™ disposable syringe filters are designed 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
- Sample preparation prior to determination of dissolved heavy metals



### Typical Data – GD/XP Syringe Filters

	<b>GD/XP 25 mm</b>
Housing	Polypropylene (pigment free)
Filtration area	4.6 cm <sup>2</sup>
Maximum pressure	75 psi (5.2 bar)
Volume hold-up full housing with air purge	1.4 ml 250 µl (approx)
Dimensions	20.8 × 30.0 mm
Weight	3 g (approx)
Flow direction	Flow should enter from the inlet
Inlet connection	Female luer lock
Outlet connection	Male luer
Sterilization	Autoclave at 121°C (131°C max) at 15 psi (1 bar) for 20 min.
Biosafe	All materials pass USP Class VI
Prefiltration media	PP 20 µm: 5 µm

## Ordering Information – GD/XP Syringe Filters

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

*DpPP – Polypropylene Depth Filter*  
*PES – Polyethersulfone*  
*PP – Polypropylene*

*PVDF – Polyvinylidene Difluoride*  
*PTFE – Polytetrafluoroethylene*

## Puradisc Syringe Filters

Puradisc™ syringe filters combine premium quality and economy. They are used for the quick, efficient filtration of samples up to 100 ml volume.

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

### Features and Benefits

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

### Puradisc 4

#### Features

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

#### Applications

- HPLC samples containing low solid content – filtration will improve column life
- CE (Capillary Electrophoresis) samples – filtration will eliminate spurious peaks
- Sterile filtration of low volume samples
- UV/Vis samples – filter directly into cuvette using tube tip
- Refractometry – filter samples to prevent damage to instrument optics and improve accuracy of results
- Minimizing nonspecific binding to membrane (due to small membrane size)

### *Puradisc 13*

#### **Features**

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

#### **Applications**

- Biological sample preparation
- HPLC sample preparation



Puradisc 4 syringe filters

### *Puradisc 25*

#### **Features**

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

#### **Applications**

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



Puradisc 13 syringe filters with tube tip

### *Puradisc 30*

#### **Features**

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

#### **Applications**

- Filtration of protein-containing solutions with minimal protein loss (CA membrane)
- Removal of cellular constituents from solution



Puradisc 25 syringe filters

*Puradisc Aqua 30*

Specifically designed for filtration of environmental samples prior to COD and DOC analysis. The membranes used in these devices are prewashed prior to assembly of the filters so as to reduce the organic carbon level.



Puradisc 30 syringe filter

**Typical Data – Puradisc Syringe Filters**

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

**Ordering Information – Puradisc 4 mm Syringe Filters**

Pore Size (µm)	Media			Quantity/Pack
	Nylon	PVDF	PTFE	
<b>Nonsterile with Tube Tip</b>				
0.2	-	6777-0402	-	50
0.45	-	6777-0404	-	50
<b>Sterile without Tube Tip</b>				
0.2	6786-0402	6791-0402	-	50
<b>Nonsterile without Tube Tip</b>				
0.2	6789-0402	6779-0402	6784-0402	100
0.2	6790-0402	6792-0402	6783-0402	500
0.45	6789-0404	6779-0404	6784-0404	100
0.45	6790-0404	6792-0404	6783-0404	500

PTFE – Polytetrafluoroethylene  
 PVDF – Polyvinylidene Difluoride

## Ordering Information – Puradisc 13 mm Syringe Filters (Nonsterile)

Pore Size (µm)	Media CA	Nylon	PES	PVDF	PP	PTFE	GMF	Quantity/Pack
<b>With Tube Tip</b>								
0.1	-	-	-	-	-	6784-1301	-	50
0.2	-	-	-	6777-1302	-	6775-1302	-	50
0.2	-	-	-	6778-1302	-	-	-	50
0.2	-	-	-	6760-1302	-	6761-1302	-	500
0.45	-	-	-	6777-1304	-	6775-1304	-	50
0.45	-	-	-	6796-1304	-	-	-	100
0.45	-	-	-	6760-1304	-	6761-1304	-	500
<b>Without Tube Tip</b>								
0.1	-	6789-1301	-	-	-	-	-	100
0.2	-	6789-1302	6782-1302	6779-1302	6788-1302	6784-1302	-	100
0.2	-	6790-1302	-	6792-1302	6785-1302	6783-1302	-	500
0.2	-	6768-1302	-	6765-1302	-	6766-1302	-	2000
0.45	6771-1304	6789-1304	6782-1304	6779-1304	6788-1304	6784-1304	-	100
0.45	-	6790-1304	6781-1304	6792-1304	6785-1304	6783-1304	6818-1304	500
0.45	6763-1304	6768-1304	-	6765-1304	-	6766-1304	-	2000
1.0	-	-	-	-	-	6784-1310	-	100
5.0	-	-	-	-	-	6784-1350	-	100
GF/F 0.7*	-	-	-	-	-	-	6825-1307	100
GF/B 1.0*	-	-	-	-	-	-	6821-1310	100
GF/C 1.2*	-	-	-	-	-	-	6822-1312	100
GF/A 1.6*	-	-	-	-	-	-	6820-1316	100
GF/A 1.6	-	-	-	-	-	-	6806-1316	500
GF/D 2.7*	-	-	-	-	-	-	6823-1327	100
934-AH 1.5*	-	-	-	-	-	-	6827-1315	100
934-AH 1.5*	-	-	-	-	-	-	6816-1315	2000

\* Particle retention rating

CA – Cellulose Acetate  
GMF – Glass Microfiber

PES – Polyethersulfone  
PP – Polypropylene

PTFE – Polytetrafluoroethylene  
PVDF – Polyvinylidene Difluoride

## Ordering Information – Puradisc 13 mm Syringe Filters (Sterile)

Pore Size (µm)	Media Nylon	PVDF	PES	Quantity/Pack
<b>Without Tube Tip</b>				
0.1	6786-1301	-	-	
0.2	6786-1302	6791-1302	6780-1302	50
0.45	-	6791-1304	6780-1304	50

PES – Polyethersulfone

PVDF – Polyvinylidene Difluoride

## Ordering Information – Puradisc FP 13 Syringe Filters (Sterile)

Pore Size (µm)	Media: RC (Regenerated Cellulose)	Quantity/Pack
<b>With Mini Tip</b>		
0.2	10462940	50
<b>Without Mini Tip</b>		
0.2	10462945	50

### Ordering Information – Puradisc 25 mm Syringe Filters

Pore Size (µm)	Media Nylon	PES	PVDF	PP	PTFE	GMF	DpPP	Quantity/Pack
<b>Sterile Membrane</b>								
0.2	-	6780-2502	-	-	-	-	-	50
0.2	-	6794-2512	-	-	-	-	-	1000
0.45	-	6780-2504	-	-	-	-	-	50
0.45	-	6794-2514	-	-	-	-	-	1000
1.0	-	6780-2510	-	-	-	-	-	50
<b>Nonsterile Membrane</b>								
0.1	-	-	-	-	6784-2501	-	-	50
0.1	-	-	-	-	6798-2501	-	-	1000
0.2	6750-2502	-	6746-2502	6786-2502	6784-2502	-	-	50
0.2	6751-2502	6781-2502	6747-2502	6788-2502	6785-2502	-	-	200
0.2	-	6759-2502	-	-	-	-	-	300
0.2	6753-2502	6794-2502	-	6790-2502	6798-2502	-	-	1000
0.2	-	6794-2512	-	-	-	-	-	1000
0.2	-	6794-2512	-	-	-	-	-	1000
0.45	6750-2504	-	6746-2504	-	6784-2504	-	6786-2504	50
0.45	6751-2504	6781-2504	6747-2504	6788-2504	6785-2504	-	6788-2504	200
0.45	-	6759-2504	-	-	-	-	-	300
0.45	6752-2504	-	-	-	-	-	-	500
0.45	6753-2504	6794-2504	6749-2504	-	6798-2504	-	6790-2504	1000
0.45	-	6794-2514	-	-	-	-	-	1000
0.7 GF/F*	-	-	-	-	-	6825-2517	-	50
0.7 GF/F*	-	-	-	-	-	6825-2527	-	200
0.7 GF/F*	-	-	-	-	-	6787-2520	-	1000
1.0	6750-2510	-	-	-	6784-2510	-	-	50
1.0	6751-2510	6781-2510	-	-	-	-	-	200
1.0	6753-2510	6794-2510	-	-	6798-2510	-	-	1000
1.0 GD 1*	-	-	-	-	-	6783-2510	-	100
1.0 GD 1*	-	-	-	-	-	6792-2510	-	1000
2.0 GD 2*	-	-	-	-	-	6783-2520	-	100

\* Particle retention rating

DpPP – Polypropylene Depth Filter

GD – Graded Density

GMF – Glass Microfiber

PES – Polyethersulfone

PP – Polypropylene

PTFE – Polytetrafluoroethylene

PVDF – Polyvinylidene Difluoride

### Ordering Information – Puradisc 30 mm Syringe Filters

Pore Size (µm)	Catalog Number	Description	Media Housing	Connection In/Out	Color Code	Quantity/Pack
0.2	10462200*	FP 30 CN-S	CA/PC	FLL/ML	Red	50
0.2	10462701	FP 30 CA	CA/PC	FLL/ML	Red	50
0.2	10462710	FP 30 CA	CA/PC	FLL/ML	Red	100
0.2	10462700	FP 30 CA	CA/PC	FLL/ML	Red	500
0.45	10462100*	FP 30 CA-S**	CA/PC	FLL/ML	White	50
0.45	10462601	FP 30 CA	CA/PC	FLL/ML	White	50
0.45	10462610	FP 30 CA	CA/PC	FLL/ML	White	100
0.45	10462600	FP 30 CA	CA/PC	FLL/ML	White	500

cont.

Pore Size (µm)	Catalog Number	Description	Media Housing	Connection In/Out	Color Code	Quantity/Pack
0.8	10462240*	FP 30 CA-S**	CA/PC	FLL/ML	Green	50
0.8	10462241	FP 30 CA	CA/PC	FLL/ML	Green	50
0.8	10462260*	FP 30 CA-S	CA/PC	FLL/ML	Orange	50
0.8	10462243	FP 30 CA	CA/PC	FLL/ML	Green	500
1.2	10462261	FP 30 CA	CA/PC	FLL/ML	Orange	50
1.2	10462263	FP 30 CA	CN/PC	FLL/ML	Orange	500
5.0	10462000*	FP 30 CN-S	CN/PC	FLL/ML	Black	50
5.0	10462520	FP 30 CN	CN/PC	FLL/ML	Black	50
5.0	10462510	FP 30 CN	CN/PC	FLL/ML	Black	100
5.0	10462500	FP 30 CN	CN/PC	FLL/ML	Black	500
<b>Luer-Lock Outlet</b>						
0.2	10462205*	FP 30 CA-S**	CA/PC	FLL/MLL	Red	50
0.2	10462206	FP 30 CA	CA/PC	FLL/MLL	Red	500
0.2	10462300*	FP 30	PTFE/PC	FLL/ML	-	50
0.2	10462800	FP 30 PTFE	PTFE/PC	FLL/ML	-	500
0.2	10462960*	FP 30 RC-S	RC/PC	FLL/ML	-	50
0.45	10462950*	FP 30 RC-S	RC/PC	FLL/ML	-	50

\* Sterile

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

CA – Cellulose Acetate  
CN – Cellulose Nitrate

FLL – Female Luer Lock  
ML – Male Luer

MLL – Male Luer Lock  
PC – Polycarbonate

RC – Regenerated Cellulose

## Ordering Information – Puradisc Aqua 30 mm Syringe Filters

Pore Size (µm)	Catalog Number	Description	Media Housing	Connection In/Out	Color Code	Quantity/Pack
0.45	10462656	Aqua 30 CA	CA/PC	FLL/ML	White	50
0.45	10462655	Aqua 30 CA	CA/PC	FLL/ML	White	100
0.45	10462650	Aqua 30 CA	CA/PC	FLL/ML	White	500

CA – Cellulose Acetate  
CN – Cellulose Nitrate

PC – Polycarbonate  
FLL – Female Luer Lock

ML – Male Luer  
MLL – Male Luer Lock

## SPARTAN – HPLC Certified

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

### Technical Tip:

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

To download, visit the Support section of [www.whatman.com](http://www.whatman.com). Enter the lot number, and you will receive the lot specific chromatogram and test conditions.



**Features**

- Ready-to-use filter unit with a hydrophilic, low protein-binding membrane made of regenerated cellulose
- Excellent chemical resistance against the standard aqueous and organic HPLC solvents
- 13 mm diameter with Mini-Tip
- SPARTAN syringe filters are tested and certified for the absence of UV-absorbing substances at wavelengths of 210 and 254 nm with water, methanol, and acetonitrile
- 13 mm diameter with extremely low dead volume < 10 µl

**Benefits**

- Versatile: Use for any application requiring a chemically resistant, hydrophilic, low protein-binding membrane
- Documented batch-to-batch quality and consistency ensure reproducible results
- 13 mm diameter with Mini-Tip outlet is ideal for filtration into very small sample bottles

**Applications**

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



SPARTAN 13 with Mini-Tip



SPARTAN 30

**Ordering Information – SPARTAN – HPLC Certified Syringe Filters**

Diameter (mm)	Pore Size (µm)	Catalog Number	Media/Housing	Connection (In/Out)	Color Code	Quantity/Pack
13	0.2	10463040	RC/PP	FLL/Mini-Tip	Dark Brown	100
13	0.2	10463042	RC/PP	FLL/Mini-Tip	Dark Brown	500
13	0.2	10463100	RC/PP	FLL/ML	Dark Brown	100
13	0.2	10463102	RC/PP	FLL/ML	Dark Brown	500
13	0.45	10463030	RC/PP	FLL/Mini-Tip	Light Brown	100
13	0.45	10463032	RC/PP	FLL/Mini-Tip	Light Brown	500
13	0.45	10463110	RC/PP	FLL/ML	Light Brown	100
13	0.45	10463112	RC/PP	FLL/ML	Light Brown	500
30	0.2	10463060	RC/PP	FLL/ML	Dark Brown	100
30	0.2	10463062	RC/PP	FLL/ML	Dark Brown	500
30	0.45	10463053	RC/PP	FLL/ML	Light Brown	50
30	0.45	10463050	RC/PP	FLL/ML	Light Brown	100
30	0.45	10463052	RC/PP	FLL/ML	Light Brown	500

FLL – Female Luer Lock  
ML – Male Luer

PP – Polypropylene  
RC – Regenerated Cellulose

## ReZist Syringe Filters

The Whatman ReZist™ range of syringe filters has been specifically designed to be resistant to organic solvents. These filters are suitable for the clarification of aggressive organic solvents. ReZist 30 mm filters can also be used as a venting filter for small vessels.

### ReZist for HPLC Sample Preparation

#### Features

- Hydrophobic PTFE membrane is laminated with polypropylene
- 13 mm diameter with Mini-Tip
- 13 mm diameter with extremely low dead volume < 10 µl

#### Benefits

- Excellent chemical resistance against standard organic HPLC solvents
- 13 mm diameter with Mini-Tip outlet permits filtration into very small sample bottles
- Permits optimal utilization of small sample volumes

### ReZist for Air Venting

#### Features

- Integral, permanently hydrophobic PTFE membranes
- Polypropylene support

#### Benefits

- Extremely high chemical resistance

## Typical Applications – ReZist

Filtration of organic solutions in HPLC	ReZist 13 and 30
Filtration of aggressive solutions	ReZist 13 and 30
1 µm membrane for prefiltration of high solid content solutions	ReZist 13 and 30
Moisture barrier when venting	ReZist 30

Aerosol separation for protecting vacuum pumps	ReZist 30
Sterile venting of small volumes	ReZist 30
Prefiltration of difficult-to-filter aqueous or organic solutions containing particles	ReZist 30/GF92
Air sterilization for tubing systems	ReZist 30

## Ordering Information – ReZist

Diameter (mm)	Pore Size (µm)	Catalog Number	Media/Housing	Connection (In/Out)	Color Code	Quantity/Pack
13	0.2	10463703	PTFE/PP	FLL/Mini-Tip	White	100
13	0.45	10463713	PTFE/PP	FLL/Mini-Tip	Green	100
30	0.2	10463500*	PTFE/PP	FLL/ML	White	50
30	0.2	10463503	PTFE/PP	FLL/ML	White	100
30	0.2	10463505	PTFE/PP	FLL/ML	White	500
30	0.45	10463510*	PTFE/PP	FLL/ML	Green	50
30	0.45	10463513	PTFE/PP	FLL/ML	Green	100
30	0.45	10463515	PTFE/PP	FLL/ML	Green	500



ReZist 13 mm PTFE and ReZist 30 mm PTFE

cont.

Diameter (mm)	Pore Size (µm)	Catalog Number	Media/Housing	Connection (In/Out)	Color Code	Quantity/Pack
30	> 1	10463545	GF92/PP	FLL/ML	Natural	50
30	> 1	10463543	GF92/PP	FLL/ML	Natural	100
30	1.0	10463523	PTFE/PP	FLL/ML	Yellow	100
30	1.0	10463525	PTFE/PP	FLL/ML	Yellow	500
30	5.0	10463533	PTFE/PP	FLL/ML	Grey	100
30	5.0	10463535	PTFE/PP	FLL/ML	Grey	500

\* Sterile

FLL – Female Luer Lock  
GF – Glass Fiber

ML – Male Luer  
PP – Polypropylene

PTFE – Polytetrafluoroethylene

## Anotop Syringe Filters

Anotop™ syringe filters are a universal solution for numerous filtration applications. Anotop filters can be used with most organic solvents and aqueous materials, and they are suitable for sample volumes up to 100 ml. The distinctive hexagonal housing is manufactured from pigment-free polypropylene to eliminate sample contamination. No wetting agents or adhesives are used in the manufacturing process.

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

### Anotop 10

#### Features

- 10 mm diameter syringe filter
- Inorganic membrane
- Capillary pore structure

#### Benefits

- Low protein binding
- Filters sample volume up to 10 ml
- Low hold-up volume < 20 µl ensures maximum sample recovery
- Sterile formats are 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.

#### Applications

- Filtration of heavily particulate loaded samples prior to HPLC
- Removal of solids prior to UV/Vis analysis



Anotop 10



Anotop 10 and Anotop 25

## *Anotop 25*

### **Features**

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

### **Applications**

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

## *Anotop 25 Plus*

The Anotop 25 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.

### **Applications**

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

## *Anotop IC*

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

### **Features**

- 10 mm diameter syringe filters
- 25 mm diameter syringe filters
- Each batch certified for IC



Anotop IC

### **Benefits**

- Enhanced consistency of analytical results
- Extended column life
- Certified and guaranteed low levels of anion leaching for improved results

### **Applications**

- Ion chromatography sample preparation
- HPLC sample preparation

## *Anotop LC*

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

### **Features**

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

## Typical Data – Anotop Syringe Filters

	Anotop 10	Anotop 10 Plus	Anotop 25	Anotop 25 Plus
Housing	Polypropylene	Polypropylene	Polypropylene	Polypropylene
Filtration area	0.78 cm <sup>2</sup>	0.78 cm <sup>2</sup>	4.78 cm <sup>2</sup>	4.78 cm <sup>2</sup>
Maximum pressure	100 psi (6.9 bar)	100 psi (6.9 bar)	100 psi (6.9 bar)	100 psi (6.9 bar)
Volume hold-up	< 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	15.4 mm	15.4 mm	36.8 mm	36.8 mm
Device length	18.5 mm	18.5 mm	26.3 mm	26.3 mm
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 luer	Male luer	Male luer	Male luer
Protein adsorption	Low	Medium/High	Low	Medium/High
Extractable materials	Low	Low	Low	Low
Cytotoxicity	Non-Cytotoxic	Non-Cytotoxic	Non-Cytotoxic	Non-Cytotoxic

## Typical Data – Anotop Syringe Filters

	Anotop 10 IC	Anotop 10 LC	Anotop 25 IC	Anotop 25 LC
Housing	Polypropylene	Polypropylene (pigment free)	Polypropylene	Polypropylene (pigment free)
Filtration area	0.78 cm <sup>2</sup>	–	4.78 cm <sup>2</sup>	–
Maximum pressure	100 psi (6.9 bar)	–	100 psi (6.9 bar)	–
Volume hold-up with air purge	< 20 µl	< 20 µl	< 150 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	15.4 mm	–	36.8 mm	–
Device length	18.5 mm	–	26.3 mm	–
Inlet connection	Female luer lock	–	Female luer lock	–
Outlet connection	Male luer	–	Male luer	–
Membrane type	Anopore	–	Anopore	–

## Typical Data – Anotop IC Syringe Filters

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

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

## Ordering Information – Anotop Syringe Filters

Pore Size (µm)	Media	Catalog Number	Quantity/Pack
<b>Anotop 10</b>			
0.02	Anopore	6809-1002	50
0.1	Anopore	6809-1012	50
0.2	Anopore	6809-1022	50
0.02	Anopore, sterile	6809-1102	50
0.1	Anopore, sterile	6809-1112	50
0.2	Anopore, sterile	6809-1122	50
<b>Anotop 10 Plus</b>			
0.02	Anopore with prefilter	6809-3002	50
0.1	Anopore with prefilter	6809-3012	50
0.2	Anopore with prefilter	6809-3022	50
0.02	Anopore with prefilter, sterile	6809-3102	50
0.1	Anopore with prefilter, sterile	6809-3112	50
0.2	Anopore with prefilter, sterile	6809-3122	50
<b>Anotop 25</b>			
0.02	Anopore	6809-2002	50
0.1	Anopore	6809-2012	50
0.2	Anopore	6809-2022	50
0.2	Anopore	6809-2024	200
0.02	Anopore, sterile	6809-2102	50
0.1	Anopore, sterile	6809-2112	50
0.2	Anopore, sterile	6809-2122	50
<b>Anotop 25 Plus</b>			
0.02	Anopore with prefilter	6809-4002	50
0.1	Anopore with prefilter	6809-4012	50
0.2	Anopore with prefilter	6809-4022	50
0.02	Anopore with prefilter, sterile	6809-4102	50
0.1	Anopore with prefilter, sterile	6809-4112	50
0.2	Anopore with prefilter, sterile	6809-4122	50
0.2	Anopore with prefilter	6809-4024	200
<b>Anotop 10 IC</b>			
0.2	Anopore	6809-9233	100
0.2	Anopore	6809-9234	200
0.2	Anopore	6809-9244	250
0.2*	Anopore	6839-1212	100
<b>Anotop 10 IC Blister</b>			
0.2	Anopore	6809-9232	50
0.2	Anopore	6809-9235	250
<b>Anotop 10 LC</b>			
0.2	Anopore	2001-0100	100
0.2	Anopore	2001-0200	200
<b>Anotop 25 LC</b>			
0.2	Anopore	2002-5100	100
0.2	Anopore	2002-5200	200

\* With tube tip

## Roby 25

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

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

### Features

- Optimized for Sotax®, Caliper® (Zymark®), and Varian® tablet testers
- Mechanically stable polypropylene

### Benefits

- Easy filter changing
- Ensures simple and smooth filter transport

### Applications

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

### Roby 25 Filter Validation Kit

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

### Features

- Six types of filters: six tubes each with 25 filters
- Filter validation protocol with filter selection aid



Roby 25

### ZC 13 mm Syringe Filter for Automation

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

### Features

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

### Applications

- Automated sample filtration
- Tablet dissolution tests

## Ordering Information – Roby 25 Syringe Filters for Automation

Diameter (mm)	Pore Size (µm)	Description	Catalog Number	Media/Housing	Connection In/Out	Color Code	Quantity/Pack
25	0.45	Roby 25 CA-GF92	10463813	CA-GF/PP	FLL/ML	Green	200*
25	0.45	Roby 25 CA-GF92	10463812	CA-GF/PP	FLL/ML	Green	1000
25	0.45	Roby 25 NL	10463803	NYL/PP	FLL/ML	Translucent yellow	200*
25	0.45	Roby 25 NL-GF92	10463805	NYL-GF/PP	FLL/ML	Yellow	200*
25	0.45	Roby 25 NL-GF92	10463804	NYL-GF/PP	FLL/ML	Yellow	1000
25	0.45	Roby 25 RC	10463807	RC/PP	FLL/ML	Translucent brown	200*
25	0.45	Roby 25 RC-GF92	10463809	RC-GF/PP	FLL/ML	Brown	200*
25	0.7	Roby 25/GF55	10463814	GF/PP	FLL/ML	Natural	200*

cont.

Diameter (mm)	Pore Size (µm)	Description	Catalog Number	Description	Connection In/Out	Color Code	Quantity/Pack
25	0.7	Roby 25/GF55	10463815	GF/PP	FLL/ML	Natural	1000
25	1.0	Roby 25/GF92	10463801	GF/PP	FLL/ML	Natural	200*
25	1.0	Roby 25/GF92	10463800	GF/PP	FLL/ML	Natural	1000
25	-	Filter Validation Kit**	10463898	-	FLL/ML	-	150

\* 8 tubes with 25 pieces each

\*\* Filter Validation Kit includes: Roby 25 NL; Roby 25 NL-GF92; Roby 25/RC; Roby 25/RC-GF92; Roby 25/GF55; Roby 25/GF92

FLL – Female Luer Lock

ML – Male Luer

PP – Polypropylene

GF – Glass Fiber

NYL – Nylon

RC – Regenerated Cellulose

## Typical Data – ZC 13 mm Syringe Filters

Housing	Polypropylene
Dimensions	21.7 × 29.7 mm
Weight	3 g (approx)
Filtration area	1.3 cm <sup>2</sup>
Glass microfiber	100% borosilicate
Hold-up volume full housing with air purge	0.5 ml 50 µl (approx)

Inlet connection	Female slip luer
Outlet connection	Male luer
Prefiltration media	GMF 150 10 µm: 1 µm and GF/F 0.7 µm
Biosafe	All materials pass USP Class VI
Maximum pressure	100 psi (6.9 bar)
Sterilization	Autoclave at 121°C (max 131°C) at 15 psi for 20 min.

## Ordering Information – ZC 13 and ZC 25 mm Syringe Filters

Pore Size (µm)	Media	Catalog Number	Protein Binder	Solvent Resistance	Quantity/Pack
<b>ZC 13 mm</b>					
0.2	Nylon with prefilter	6841-1302	High	Good	1000
0.45	Nylon with prefilter	6840-1304	High	Good	200
0.45	PVDF with prefilter	6842-1304	Low	Good	200
0.45	PVDF with prefilter	6843-1304	Low	Good	1000
0.2	PTFE with prefilter	6844-1302	Low	Excellent	200
0.45	PTFE with prefilter	6844-1304	Low	Excellent	200
<b>ZC 25 mm</b>					
0.2	Nylon	6841-2502	-	-	1000
0.45	Nylon	6840-2504	-	-	200
0.45	Nylon	6841-2504	-	-	1000
0.45	PVDF	6842-2504	-	-	200
0.2	PTFE	6844-2502	-	-	200
0.45	PTFE	6844-2504	-	-	200
0.45	PS	6846-2504	-	-	200
0.45	PS	6847-2504	-	-	1000
0.45	PP	6849-2504	-	-	1000
1.6	GF/A	6853-2516	-	-	1000
1.0	GF/B	6855-2510	-	-	200
1.0	GF/B	6854-2510	-	-	1000
1.0	GF/B	6888-2510	-	-	1000
2.7	GF/D	6858-2527	-	-	200
0.7	GF/F	6860-2507	-	-	200
0.45	GMF	6864-2504	-	-	200

PTFE – Polytetrafluoroethylene

PVDF – Polyvinylidene Difluoride

## Clyde Inline Filter

The most convenient way to filter sterilize and dispense tissue culture media.

- 0.2 µm version typically filter sterilizes 2 liters in one continuous process
- Completely self-contained
- Integral syringe pump provides positive pressure filtration in any location
- Includes flexible tubing and one-way check valve
- Glass microfiber prefilter
- Radiation sterilized and individually packed
- Nonpyrogenic and biosafe

Clyde™ features an asymmetric mixed cellulose ester membrane. Filtration area is 16 cm². Filter housing is acrylic; other materials featured are polypropylene, PVC, and Tygon. Syringe capacity is 20 ml.



Clyde can be used with tissue culture media and aqueous solutions compatible with the cellulose membrane. As Clyde needs no vacuum pump or other power supply, field work applications are also possible.

### Ordering Information – Clyde (Sterile)

Pore Size (µm)	Catalog Number	Quantity/Pack
0.2	6740-5002	5
0.45	6740-5004	5

## Inline Filters

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

### Polydisc Filters

Whatman Polydisc™ 50 mm inline 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 inline 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.

Whatman Inline Filter/Degassers (IFD) connect directly into an HPLC line to simultaneously filter and degas the mobile phase as it is being used.

## Polydisc AS

The Polydisc AS (Aqueous Solution) family of 50 mm filter devices features 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 g); avoids the collapsing of tubing, which can be caused by heavy filter devices

### Applications

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

## Typical Data – Polydisc AS

Pore Size (µm)*	Prefilter/Media	Water Flow Rate ml/min at 0.7 bar (10 psi)
0.2	GMF/PES	150
0.45	GMF/PES	225
1.0	GMF/Nylon	625
* Liquid rating. Retention efficiency in gas streams is significantly higher		
	GMF – Glass Microfiber PES – Polyethersulfone SLPM – Standard Liters Per Minute	

## Ordering Information – Polydisc AS

Pore Size (µm)	Catalog Number	Prefilter/Media	Quantity/Pack
<b>Sterile</b>			
0.2	6724-5002	GMF/PES	10
0.45	6724-5045	GMF/PES	10
1.0	6724-5010	GMF/Nylon	10
<b>Nonsterile</b>			
0.45	6724-5145	GMF/PES	50

*Inline connection – Polydisc, AS, TF, SPF accepts 6-10 mm ID hose*

## Polydisc TF and ReZist

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

### Features and Benefits

- Solvent-resistant membrane
- Chemical-resistant housing
- Hydrophobic PTFE membrane
- Autoclavable (multiple times)

- Integrity-testable (bubble point or water breakthrough pressure “in situ” methods)
- Biosafe
- Lightweight (11.5 g for Polydisc and 17.9 g for ReZist); avoids the collapsing of tubing, which can be caused by heavy filter devices

### Applications

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



Polydisc TF



ReZist 50 mm

### Typical Data – Polydisc TF

Pore Size (µm)	Integrity Test Data*		Water Breakthrough		Flow Rates* Methanol ml/min at 0.7 bar (10 psi)	Air SLPM at 0.2 bar (3 psi)
	IPA Bubble Point (bar)	(psi)	(bar)	(psi)		
0.1	1.7	25	3.4	50	200	8
0.2	0.9	13	2.1	38	400	16
0.45	0.5	7	1.1	16	700	24
1.0	0.2	3	0.3	13	900	30

\* Typical values

### Ordering Information – Polydisc TF and ReZist

Pore Size (µm)	Media	Catalog Number	Sterile	Quantity/Pack
<b>Polydisc TF</b>				
0.05	PTFE	6720-5005	No	10
0.1	PTFE	6720-5001	No	10
0.2	PTFE	6720-5002	No	10
0.45	PTFE	6720-5045	No	10
1.0	PTFE*	6721-5010	No	10
<b>ReZist Filter 50 mm, Sterile</b>				
0.2	PTFE	10463607	Yes	10
0.2	PTFE	10463609	No	50
0.45	PTFE	10463610**	Yes	10
0.45	PTFE	10463611	No	10
0.45	PTFE	10463612	No	50

\* With PP prefilter

\*\* Product is only available in the U.S.

Inline connection 6-10 mm ID hose

PTFE – Polytetrafluoroethylene

### Polydisc HD

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

### Features and Benefits

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

### Applications

- Large volume sample preparation

## Typical Data – Polydisc HD

Pore Size (µm)*	Air Flow Rate SLPM at 1.0 bar (14.5 psi)	Water Flow Rate ml/min at 1.0 bar (14.5 psi)
5.0	110	1500
10.0	140	2200

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

## Ordering Information – Polydisc HD

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
5.0	6728-5050	Polypropylene	10
10.0	6728-5100	Polypropylene	10
5.0	2227	Polypropylene	50
10.0	2228	Polypropylene	50

## Polydisc SPF

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

### Applications

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

## Typical Data – Polydisc SPF

Pore Size (µm)*	Air Flow Rate SLPM at 1.0 bar (14.5 psi)	Water Flow Rate ml/min at 1.0 bar (14.5 psi)
1.0	–	500

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

## Ordering Information – Polydisc SPF

Pore Size (µm)	Catalog Number	Prefilter/Media	Quantity/Pack
1.0	6724-5000	GMF/GF/Polysulfone	10

Inline connection – Polydisc SPF accepts 6-10 mm ID hose

## Polydisc GW

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

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



## Typical Data – Polydisc GW

Housing	Polypropylene
Membrane type	0.45 µm polyamide (nylon)
Prefilter	100% quartz fiber
Filtration diameter	52 mm
Filtration area	20.4 cm <sup>2</sup>
Dead volume	220 µl
Filling volume	540 µl
Maximum pressure	4.5 bar (65 psi)
Connections	Tubing nozzle 6-14 mm
Max. operating temperature	80°C

## Ordering Information – Polydisc GW 50 mm

Pore Size (µm)	Catalog Number	Prefilter/Media	Quantity/Pack
0.45	10463400	Quartz fiber/nylon	20
0.45	10463401	Quartz fiber/nylon	50

*Inline connection – Polydisc GW accepts 6-14 mm ID hose*

## Inline Filter Degasser

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

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

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



Inline Filter Degasser

## Features and Benefits

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

## Applications

- HPLC analysis
- Pharmaceutical research
- Analytical chemistry

## Typical Data – Inline Filters

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

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

\*\* For effective gas bubble removal in HPLC

## Ordering Information – Aqueous IFD and Solvent IFD

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

\* Standard catalog numbers include O-rings: 1/32"-5/32"; accepts different diameter tubing 0.8-4 mm

\*\* Catalog numbers with suffix "A" are non-o-ring style and accept 1/8" tubing only

PP – Polypropylene

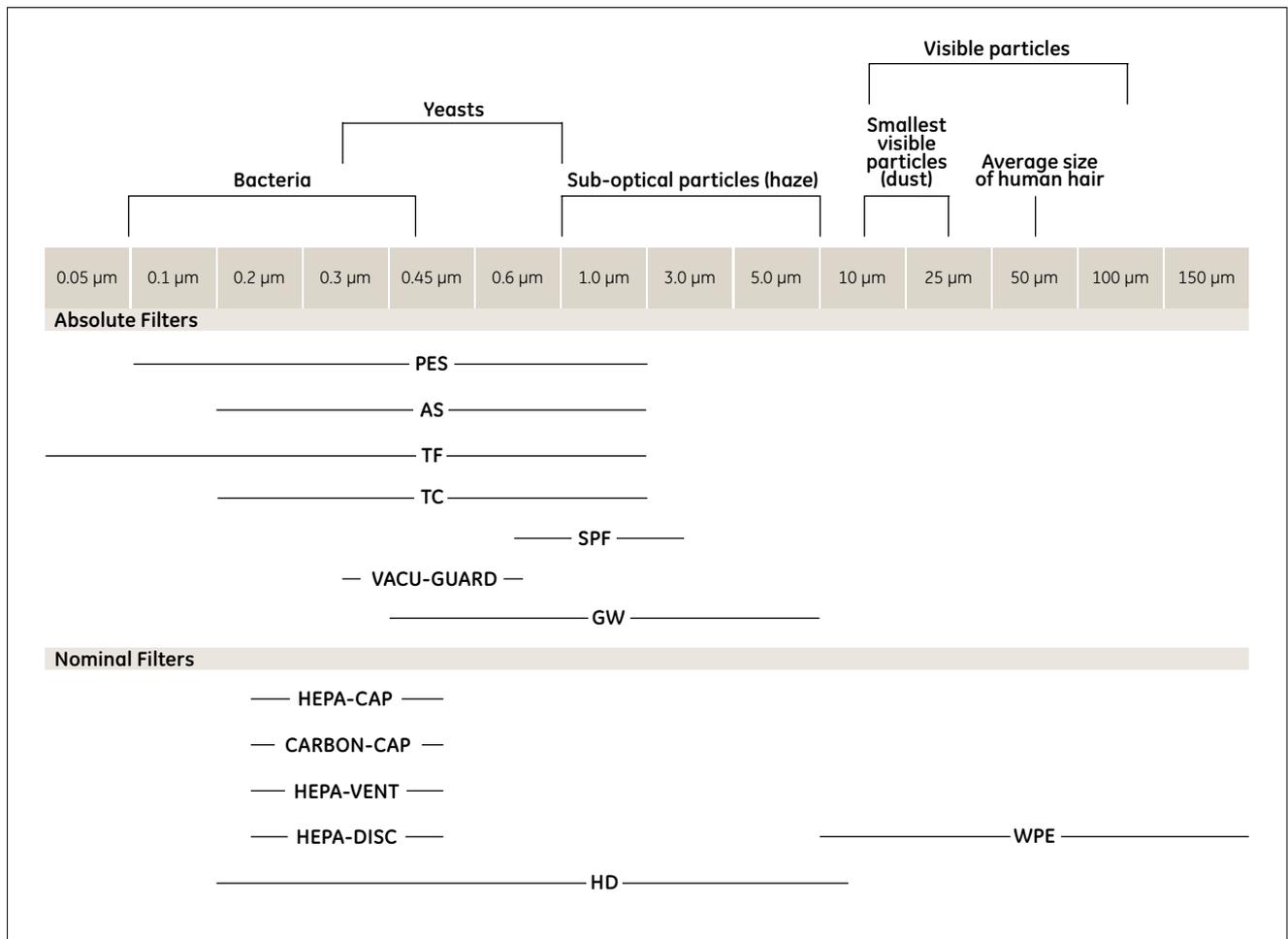
# Capsule Filters

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

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



## Product Overview – Capsule Filters



# Polycap AS

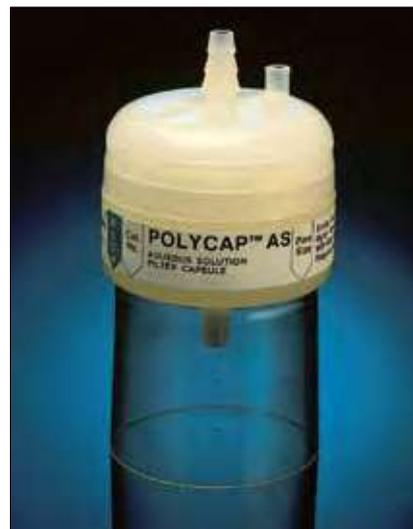
Polycap™ AS (Aqueous Solution) is recommended for filtering aqueous solutions. It combines a Glass Microfiber (GMF) prefilter and a nylon membrane, prolonging the life of the filter and allowing larger volumes and difficult samples to be filtered easily.

## Features and Benefits

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

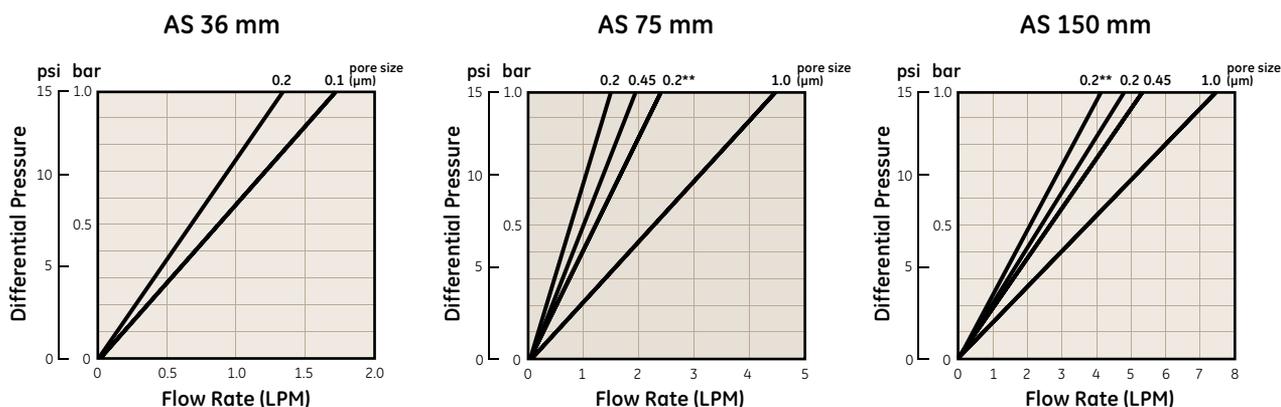
## Applications

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



Polycap AS with filling bell

## Water Flow Rates\*



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

\*\* Sanitary connectors

## Technical Properties – Polycap AS

Housing	Polypropylene
Vent	On inlet
Prefilter	Glass microfiber double laminated with polyolefin monofilament nonwoven
Membrane	Nylon
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Endotoxin level	LAL tested, ≤ 0.5 EU/ml
Biosafety	Materials pass USP Class VI
Sterilization	Certain filter devices have been sterilized.* Capsules may be autoclaved at 121°C for 20 min (maximum 132°C). However, an integrity test should be performed after autoclaving. Filling bell is not autoclavable but is detachable.
Filtration Area	36 mm capsule: 400 cm <sup>2</sup> (62 in <sup>2</sup> ) 75 mm capsule: 820 cm <sup>2</sup> (127 in <sup>2</sup> ) 150 mm capsule: 1650 cm <sup>2</sup> (256 in <sup>2</sup> )
IPA Bubble Point	0.2 µm membrane: > 1.1 bar (16 psi) 0.45 µm membrane: > 0.69 bar (10 psi) 1.0 µm membrane: > 0.14 bar (3 psi)

\* Sterile and nonsterile options offered

## Ordering Information – Polycap AS

Pore Size (µm)	Catalog Number	Media	Prefilter	Connections Inlet	Outlet	Sterile	Quantity/Pack
<b>Polycap AS 36</b>							
0.2	6708-3602	Nylon	GMF	1/2 SB	1/2 SB	Yes	1
0.2	6705-3602	Nylon	GMF	SB	SB	Yes	1
0.2	6709-3602	Nylon	GMF	MNPT	SB	Yes	1
0.2	2606T	Nylon	GMF	FNPT	FNPT	No	5
0.2	2606NS	Nylon	GMF	SB	SB	No	5
0.45	6708-3604	Nylon	GMF	1/2 SB	1/2 SB	Yes	1
0.45	6705-3604	Nylon	GMF	SB	SB	Yes	1
0.45	2607NS	Nylon	GMF	SB	SB	No	5
1.0	6705-3610	Nylon	GMF	SB	SB	Yes	1
1.0	2608NS	Nylon	GMF	SB	SB	No	5
<b>Polycap AS 36 Plus Filling Bell</b>							
0.2	6706-3602	Nylon	GMF	SB	SB	Yes	1
<b>Polycap AS 75</b>							
0.2	6709-7502	Nylon	GMF	MNPT	SB	Yes	1
0.2	6708-7502	Nylon	GMF	1/2 SB	1/2 SB	Yes	1
0.2	6705-7502	Nylon	GMF	SB	SB	Yes	1

cont.

Pore Size (µm)	Catalog Number	Media	Pre-filter	Connections Inlet	Outlet	Sterile	Quantity/Pack
<b>Polycap AS 75</b>							
0.2	2706	Nylon	–	–	–	–	5
0.2	2706T	Nylon	GMF	FNPT	FNPT	No	5
0.2	6709-7504	Nylon	GMF	MNPT	SB	Yes	1
0.45	6705-7504	Nylon	GMF	SB	SB	Yes	1
0.45	6708-7504	Nylon	GMF	1/2 SB	1/2 SB	Yes	1
0.45	2707NS	Nylon	GMF	SB	SB	No	1
1.0	6705-7510	Nylon	GMF	1/2 SB	1/2 SB	Yes	1
<b>Polycap AS 75 Plus Filling Bell</b>							
0.2	6706-7502	Nylon	GMF	SB	SB	Yes	1
<b>Polycap AS 150</b>							
0.2	2806T	Nylon	GMF	FNPT	FNPT	No	1
0.2	2806	Nylon	GMF	1/2 HB	1/2 HB	Yes	5
0.2	2805	Nylon	GMF	1 1/2 sanitary	1 1/2 SB	Yes	5
0.45	2807	Nylon	GMF	1/2 SB	1/2 SB	Yes	5
1.0	2808*	Nylon	GMF	1/2 SB	1/2 HB	Yes	5

\* Product is only available in the Americas

FNPT – Female National Pipe Thread

GMF – Glass Microfiber Filter

HB – Hose Barb

MNPT – Male National Pipe Thread

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

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

## Polycap HD

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

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

### Features and Benefits

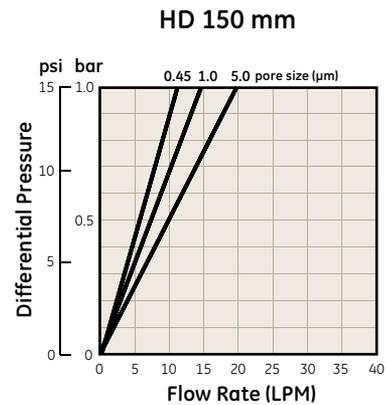
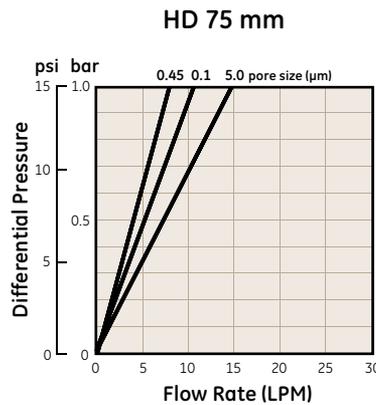
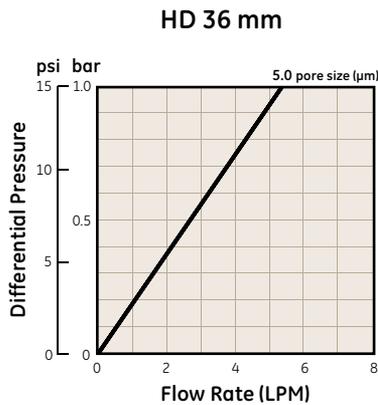
- 100% polypropylene filter media, support system, and housing allows usage with a broad range of solutions, pH and temperature
- High flow and high retention capacity
- Materials of construction are FDA approved for food contact
- Able to be sterilized by autoclaving with steam at 121°C for 20 min
-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



**Applications**

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

**Water Flow Rates\***



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

**Technical Properties – Polycap HD**

Housing	Polypropylene
Vent	On Inlet
Filter media	Polypropylene
Support system	Polypropylene
Biosafety	Materials pass USP Class VI
Filtration area	36 mm capsule: 400 cm <sup>2</sup> (62 in <sup>2</sup> ) 75 mm capsule: 820 cm <sup>2</sup> (127 in <sup>2</sup> ) 150 mm capsule: 1650 cm <sup>2</sup> (256 in <sup>2</sup> )
Sterilization	Capsules autoclavable at 121°C for 20 min (maximum temperature is 132°C)
Maximum pressure	4.1 bar (60 psi)

## Ordering Information – Polycap HD (Non-Sterile)

Pore Size (µm)	Catalog Number	Media	Prefilter	Connections Inlet	Outlet	Quantity/Pack
<b>Polycap HD 36</b>						
0.2	2610	PP	No	SB	SB	5
0.45	2610T	PP	No	FNPT	FNPT	5
0.45	2611	PP	No	SB	SB	5
1.0	6703-3610	PP	No	SB	SB	1
1.0	6707-3612	PP	No	MNPT	SB	1
1.0	2611T	PP	No	FNPT	FNPT	5
5.0	6703-3650	PP	No	SB	SB	1
5.0	2612T	PP	No	FNPT	FNPT	5
10.0	6703-3611	PP	No	SB	SB	1
10.0	2613T	PP	No	FNPT	FNPT	5
20.0	6703-3621	PP	No	SB	SB	1
20.0	2614T	PP	No	FNPT	FNPT	5
<b>Polycap HD 75</b>						
0.45	2710T	PP	No	FNPT	FNPT	5
0.45	2710	PP	No	HB	HB	5
1.0	6703-7510	PP	No	1/2 SB	1/2 SB	1
1.0	2711T	PP	No	FNPT	FNPT	5
5.0	6703-7550	PP	No	1/2 SB	1/2 SB	1
5.0	2712M	PP	No	MNPT	MNPT	5
5.0	2712T	PP	No	FNPT	FNPT	5
5.0	2712	PP	No	HB	HB	5
10.0	6703-7511	PP	No	1/2 SB	1/2 SB	1
10.0	2713M	PP	No	MNPT	MNPT	5
10.0	2713T	PP	No	FNPT	FNPT	5
10.0	2713	PP	No	1/2 HB	1/2 HB	5
20.0	6703-7521	PP	No	1/2 SB	1/2 SB	1
20.0	2714T	PP	No	FNPT	FNPT	5
20.0	2714	PP	No	HB	HB	5
<b>Polycap HD 150</b>						
0.45	6703-9502	PP	No	HB	HB	1
0.45	2810	PP	No	HB	HB	5
0.45	2810T	PP	No	FNPT	FNPT	5
1.0	6703-9504	PP	No	HB	HB	1
1.0	2811	PP	PP	HB	HB	5
1.0	2811T	PP	No	FNPT	FNPT	5
5.0	6703-9510	PP	No	HB	HB	1
5.0	2812	PP	No	HB	HB	5
5.0	2812T	PP	No	FNPT	FNPT	5

FNPT – Female National Pipe Thread  
 HB – 1/2 Hose Barb  
 MNPT – Male National Pipe Thread

PP – Polypropylene  
 1/2 SB – Stepped Barb for 10-12 mm (3/8"-1/2") tubing  
 SB – Stepped Barb for 6-10 mm (1/4"-3/8") tubing

cont.

Pore Size (µm)	Catalog Number	Media	Prefilter	Connections Inlet	Outlet	Quantity/Pack
<b>Polycap HD 150</b>						
10.0	2813T	PP	No	FNPT	FNPT	5
10.0	2813	PP	No	HB	HB	5
20.0	2814T	PP	No	FNPT	FNPT	5
20.0	2814	PP	No	HB	HB	5
20.0	6703-7521	PP	No	1/2 SB	1/2 SB	1
<i>FNPT – Female National Pipe Thread</i>		<i>PP – Polypropylene</i>				
<i>HB – Hose Barb</i>		<i>1/2 SB – Stepped Barb for 10-12 mm (3/8"-1/2") tubing</i>				
<i>MNPT – Male National Pipe Thread</i>		<i>SB – Stepped Barb for 6-10 mm (1/4"-3/8") tubing</i>				

## Polycap SPF

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

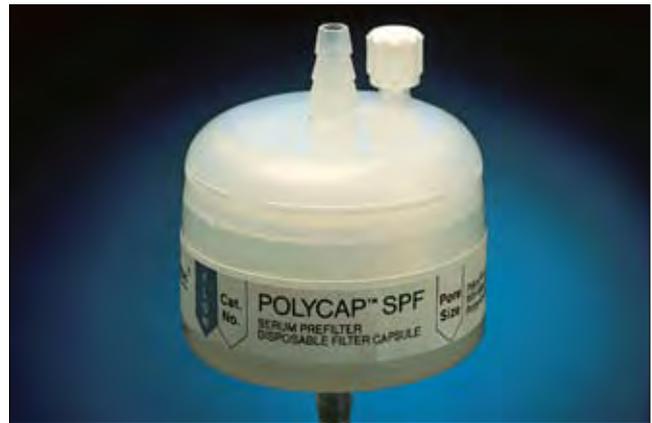
Serum is difficult to filter because it contains a high degree of loading of complex particulates, lipids, triglycerides, and lipoproteins that clog filters. When filtering serum without proper prefiltration, membrane filters clog rapidly.

### Features and Benefits

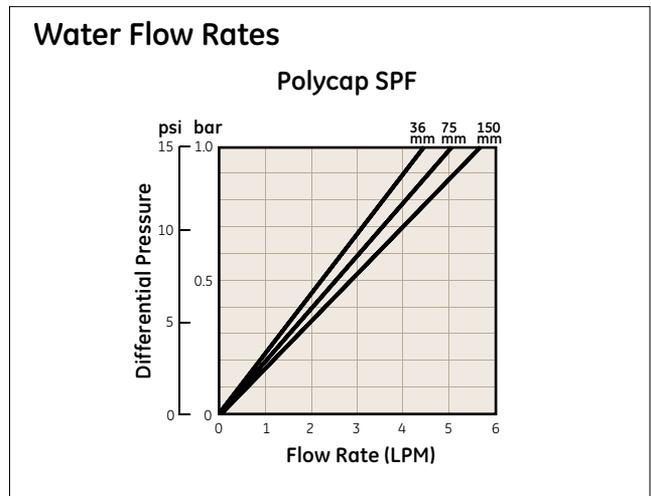
- Three layers of special media: fine and ultrafine Glass Microfiber (GMF) and polyethersulfone membrane
- Excellent for hard-to-filter solutions such as serums and protein solutions
- Able to be sterilized by autoclaving with steam
- Manufactured under ISO manufacturing system
- Suitable for filtering serums, viral suspensions, nutrients, biologicals, immunologicals, enzymes, and buffers
- Prefilters help extend the life of the final filter

### Applications

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



## Water Flow Rates



## Technical Properties – Polycap SPF

Housing	Polypropylene
Vent	On inlet
Prefilter	Two layers of glass microfiber
Membrane	Polyethersulfone (PES)
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Sterilization	Autoclave at 121°C for 20 min (132°C max)
Filtration area	36 mm capsule: 260 cm <sup>2</sup> (40 in <sup>2</sup> ) 75 mm capsule: 535 cm <sup>2</sup> (83 in <sup>2</sup> ) 150 mm capsule: 1100 cm <sup>2</sup> (170 in <sup>2</sup> )

## Ordering Information – Polycap SPF (Nonsterile)

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

GMF – Glass Microfiber Filter    PES – Polyethersulfone  
HB – 1/2 Hose Barb                SB – Stepped Barb for 6-10 mm (1/4"-3/8") tubing

## Polycap TC

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

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



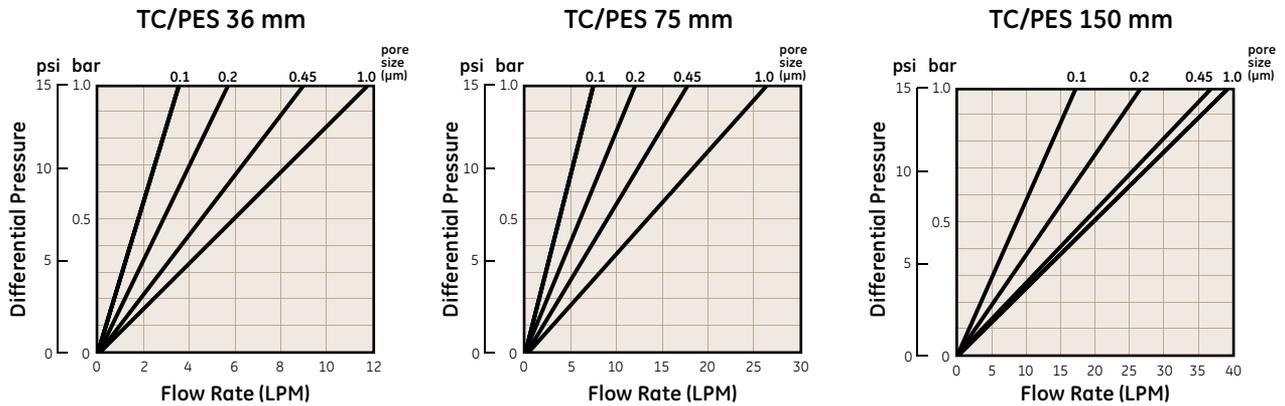
**Features and Benefits**

- Polycap TC/PES 0.2/0.1, 0.2/0.2, and 0.8/0.2 µm capsules pass the HIMA Challenge Test for Sterilizing Grade Filters
- 100% integrity-tested during manufacturing; results are correlated to microbial retention
- Housing thermally fused (no surfactants or mold releasing agents)
- Integrity-testable by bubble point, pressure decay or forward flow methods
- Available in sterile and nonsterile versions with a filling bell option
- Manufactured in clean room facilities under ISO Quality Systems
- PES membrane protein adsorption characteristics:
  - HSA 0.4 µg/cm<sup>2</sup>
  - Insulin 2.0 µg/cm<sup>2</sup>
  - Gammaglobulin 1.5 µg/cm<sup>2</sup>

**Applications**

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

**Water Flow Rates\***



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

## Technical Properties – Polycap TC

Housing	Polypropylene
Vent	On inlet
Membrane	Polyethersulfone (PES)
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Flow direction	If there is a prefilter, it is located on the inlet side and flow should follow arrows
Endotoxin level	LAL tested, ≤ 0.5 EU/ml
Biosafety	Materials pass USP class VI
Sterilization	Certain filter devices have been sterilized.* Capsule may be autoclaved at 121°C for 20 min (maximum 132°C). However, an integrity test should be performed after autoclaving.
Filtration area	36 mm capsule: 440 cm <sup>2</sup> (72 in <sup>2</sup> ) 75 mm capsule: 930 cm <sup>2</sup> (144 in <sup>2</sup> ) 150 mm capsule: 1900 cm <sup>2</sup> (302 in <sup>2</sup> )
Water bubble point (final membrane)	0.1 µm > 3.2 bar (46 psi) 0.2 µm > 2.7 bar (40 psi) 0.45 µm > 2.1 bar (30 psi) 1.0 µm > 1.1 bar (16 psi)

\* Sterile and nonsterile options offered

## Ordering Information – Polycap TC

Pore Size (µm)	Catalog Number	Media	Connections Inlet	Outlet	Sterile	Quantity/Pack
<b>Polycap TC 36</b>						
0.2/0.1	6714-3601	PES	SB	SB	Yes	1
0.2/0.2	6714-3602	PES	SB	SB	Yes	1
0.2/0.2	6717-3602	PES	1/2 SB	1/2 SB	Yes	1
0.2/0.2	2622NS	PES	HB	SB	No	5
0.65/0.45	6714-3604	PES	SB	SB	Yes	1
<b>Polycap TC 36 Plus Filling Bell</b>						
0.2/0.1	6715-3601	PES	SB	SB	Yes	1
0.2/0.2	6715-3602	PES	SB	SB	Yes	1
0.2/0.2	6716-3612	PES	1/2 SB	SB	No	1
0.2/0.2	6716-3602	PES	MNPT	SB	No	1
0.65/0.45	6715-3604	PES	SB	SB	Yes	1
0.8/0.2	6715-3682	PES	SB	SB	Yes	1
MNPT – Male National Pipe Thread		1/2 SB – Stepped Barb for 10-12 mm (3/8"-1/2") tubing				cont.
PES – Polyethersulfone		SB – Stepped Barb for 6-10 mm (1/4"-3/8") tubing				

### Ordering Information – Polycap TC

Pore Size (µm)	Catalog Number	Media	Connections		Sterile	Quantity/Pack
			Inlet	Outlet		
<b>Polycap TC 75</b>						
0.2/0.1	6714-7501	PES	SB	SB	Yes	1
0.2/0.2	6714-7502	PES	SB	SB	Yes	1
0.2/0.2	2742C	PES	1/2 SB	1/2 SB	Yes	5
0.2	2742M	PES	MNPT	MNPT	No	5
0.65/0.45	6717-7504	PES	1/2 SB	1/2 SB	Yes	1
0.65/0.45	6714-7504	PES	SB	SB	Yes	1
1.0/1.0	6717-7510	PES	1/2 SB	1/2 SB	Yes	1
<b>Polycap TC 75 Plus Filling Bell</b>						
0.2/0.1	6715-7501	PES	SB	SB	Yes	1
0.2/0.2	6715-7502	PES	SB	SB	Yes	1
0.2/0.2	6716-7502	PES	MNPT	SB	Yes	1
0.65/0.45	6718-7504	PES	1/2 SB	SB	No	1
0.8/0.2	6715-7582	PES	SB	SB	Yes	1
<b>Polycap TC 150</b>						
0.2/0.1	6717-9501	PES	1/2 SB	1/2 SB	Yes	1
0.2/0.2	6717-9502	PES	1/2 SB	1/2 SB	Yes	1
0.2/0.2	6704-9502	PES	1 1/2" Sanitary	1 1/2" Sanitary	No	1
0.65/0.45	6717-9504	PES	1/2 SB	1/2 SB	Yes	1
1.0/1.0	6717-9510	PES	1/2 SB	1/2 SB	Yes	1
<b>Polycap TC 150 Plus Filling Bell</b>						
0.2/0.2	6718-9502	PES	1/2 SB	1/2 SB	Yes	1
0.8/0.2	6718-9582	PES	1/2 SB	1/2 SB	Yes	1

MNPT – Male National Pipe Thread

PES – Polyethersulfone

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

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

# Polycap TF

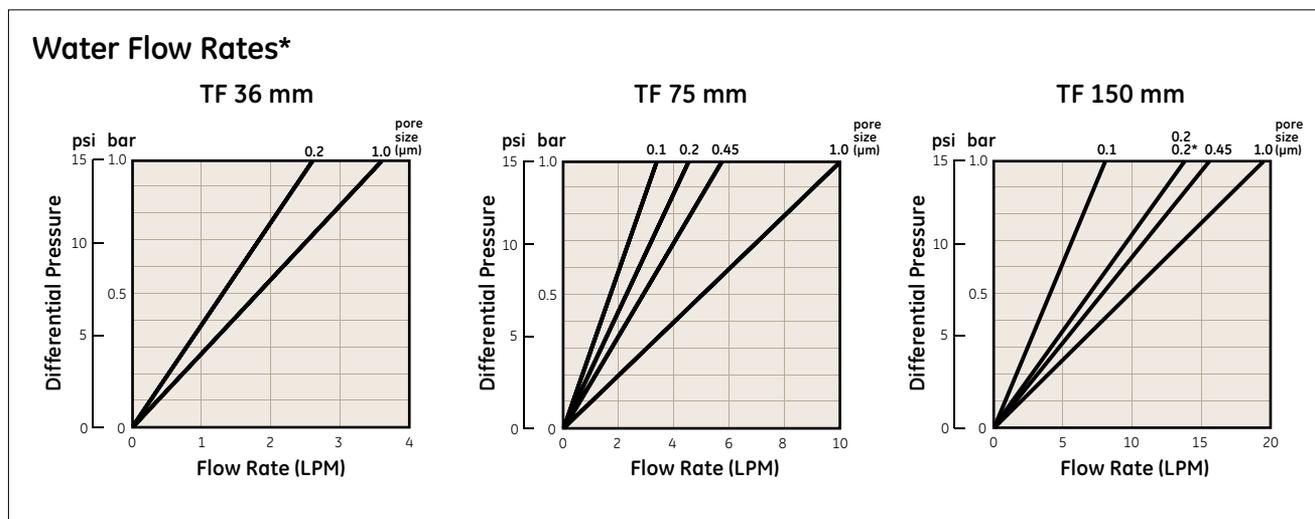
Polycap TF filter devices are among the finest disposable encapsulated filters. These capsules are made with durable, hydrophobic Polytetrafluoroethylene (PTFE) membranes in a polypropylene housing and are designed for use with organic solvents and chemically aggressive solutions.

## Features and Benefits

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

## Applications

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



## Technical Properties – Polycap TF

Housing	Polypropylene
Membrane	PTFE
Vent	On inlet
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Flow direction	Supported bi-directionally. Certain applications may require orientation, i.e., vents. Reverse flow only for low-pressure applications.
Biosafety	Materials pass USP Class VI
Sterilization	May be autoclaved at 121°C for 20 min (maximum 132°C). Multiple autoclave cycles are possible. However, the responsibility for reuse is with the operator. The device should be protected from cross contamination. An integrity test should be performed after autoclaving. Compatible with EtO sterilization.
Filtration area	36 mm capsule: 500 cm <sup>2</sup> (77 in <sup>2</sup> ) 75 mm capsule: 1,000 cm <sup>2</sup> (155 in <sup>2</sup> ) 150 mm capsule: 2,000 cm <sup>2</sup> (310 in <sup>2</sup> )
IPA bubble point	0.05 µm membrane: > 2.4 bar (35 psi) 0.1 µm membrane: > 1.7 bar (25 psi) 0.2 µm membrane: > 0.9 bar (13 psi) 0.45 µm membrane: > 0.5 bar (7 psi) 1.0 µm membrane: > 0.2 bar (3 psi)

## Ordering Information – Polycap TF (Nonsterile)

Pore Size (µm)	Catalog Number	Media	Connections		Quantity/Pack
			Inlet	Outlet	
<b>Polycap TF 36</b>					
0.1	6711-3601	PTFE	MNPT	SB	1
0.2	6711-3602	PTFE	MNPT	SB	1
0.2	6710-3602	PTFE	1/2 SB	1/2 SB	1
0.2	6700-3602	PTFE	SB	SB	1
0.2	2601T	PTFE	FNPT	FNPT	5
0.2	2601	PTFE	SB	SB	5
0.45	6711-3604	PTFE	MNPT	SB	1
0.45	6710-3604	PTFE	SB	SB	1
0.45	2602S	PTFE	1 1/2" Sanitary	1 1/2" Sanitary	5
1.0	6700-3610	PTFE	SB	SB	1
1.0	2603T	PTFE	FNPT	FNPT	5
1.0	2603	PTFE	SB	SB	5

cont.

Pore Size (µm)	Catalog Number	Media	Connections Inlet	Outlet	Quantity/Pack
<b>Polycap TF 75</b>					
0.05	6711-7505	PTFE	MNPT	SB	1
0.1	6700-7501	PTFE	SB	SB	1
0.1	6711-7501	PTFE	MNPT	SB	1
0.1	2700M	PTFE	MNPT	MNPT	5
0.1	2700T	PTFE	FNPT	FNPT	5
0.2	6711-7502	PTFE	MNPT	SB	1
0.2	6710-7502	PTFE	SB	SB	1
0.2	6700-7502	PTFE	SB	SB	1
0.2	2702M	PTFE	MNPT	MNPT	5
0.2	2702T	PTFE	FNPT	FNPT	5
0.45	6711-7504	PTFE	MNPT	SB	1
0.45	6710-7504	PTFE	1/2 SB	1/2 SB	1
0.45	6700-7504	PTFE	SB	SB	1
0.45	2703T	PTFE	FNPT	FNPT	5
1.0	6700-7510	PTFE	SB	SB	1
1.0	6701-7510	PTFE	1/2 SB	1/2 SB	1
1.0	2704T	PTFE	FNPT	FNPT	5
<b>Polycap TF 150</b>					
0.1	2800T	PTFE	FNPT	FNPT	5
0.2	2802	PTFE	HB	HB	5
0.2	2802T	PTFE	FNPT	FNPT	5
0.2	2801	PTFE	1 1/2" Sanitary	1 1/2" Sanitary	5
0.45	2803	PTFE	HB	HB	5
0.45	2803T	PTFE	FNPT	FNPT	5
1.0	2804T	PTFE	FNPT	FNPT	5

FNPT – Female National Pipe Thread  
HB – Hose Barb  
MNPT – Male National Pipe Thread

PTFE – Polytetrafluoroethylene  
1/2 SB – Stepped Barb for 10-12 mm (3/8"-1/2") tubing  
SB – Stepped Barb for 6-10 mm (1/4"-3/8") tubing

## Polycap GW

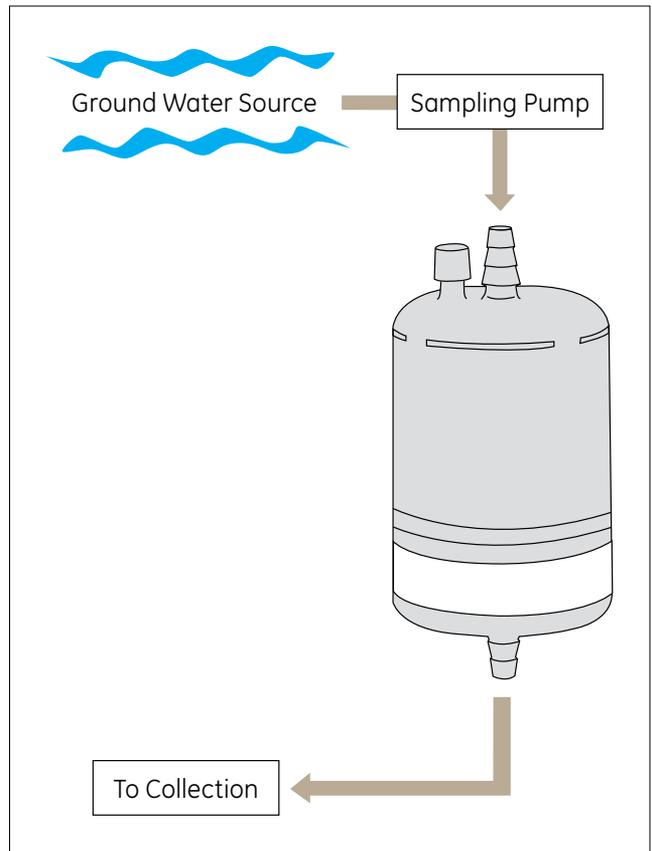
The US Environmental Protection Agency (EPA) and local Departments for Environmental Protection protocols specify filtering ground water samples with a 0.45 µm filter when analyzing dissolved or suspended metals (EPA Method 3005). Specifically designed with field sampling in mind, the Whatman Polycap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

### Features and Benefits

- Connects directly to outlet of a sampling pump
- Easy to use
- Filtration membrane is encapsulated in durable polypropylene housing
- Also available in 1.0 µm and 5.0 µm filters, as required by US and regional EPA test methods
- Large surface area optimized to provide at least 600 cm<sup>2</sup> of effective filtration area to ensure rapid sample collection
- Housing components thermally fused (no glues, adhesives, metals, epoxies or extraneous materials)
- Suitable for filtration procedure outlined in EPA Method 3005 for ground water analysis
- Stepped hose barb fittings allow for connection with various size tubings
- Lot number printed on each unit for traceability

### Applications

- Filter ground water samples before dissolved metal analysis



## Technical Properties – Polycap GW

Housing	Polypropylene
Filter media	0.45 µm: PES filter 1.0 µm: Polypropylene filter 5.0 µm: Polypropylene filter
Inlet/outlet	1/4 to 3/8 in (6-9 mm) Stepped Barb (SB)
Support system	Polypropylene
Vent	On Inlet
Filtration area	600 cm <sup>2</sup> (93 in <sup>2</sup> )
Wetting characteristics	Hydrophilic
Maximum pressure	60 psi (4.1 bar)
Water flow rate at 1.0 bar (14.5 psi)	60 l/min
Flow direction	Flow should follow arrows

## Ordering Information – Polycap GW

Pore Size (µm)	Catalog Number	Media	Connections Inlet	Outlet	Quantity/Pack
<b>Polycap GW 75</b>					
0.45	6714-6004	PES	SB	SB	1
0.45	6724-6004	PES	SB	SB	100
1.0	6703-6010	PP	SB	SB	1
1.0	6723-6010	PP	SB	SB	100
5.0	6703-6050	PP	SB	SB	1
5.0	6723-6050	PP	SB	SB	100

PES – Polyethersulfone

PP – Polypropylene

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

## Carbon Cap

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

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



Carbon Cap

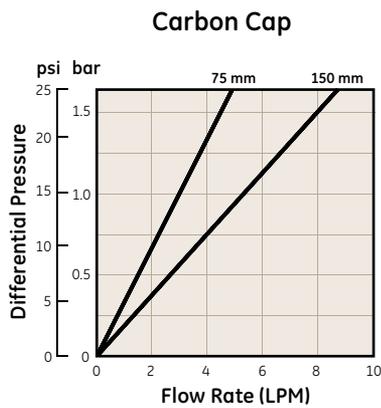
**Features and Benefits**

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

**Applications**

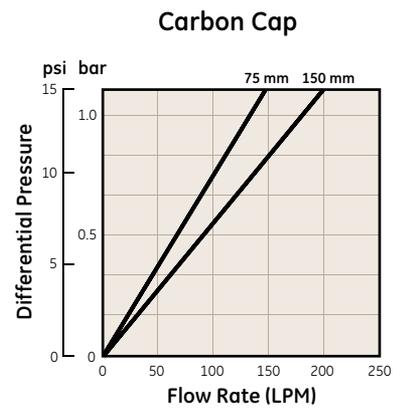
- Water, chemical, and reagent purification
- Removes noxious odors, oil mists, and contaminants
- Compressed air lines and vacuum pumps
- Instrument outlet exhausts
- Eliminates a potential health hazard from the workplace

**Carbon Cap in Water\***



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

**Carbon Cap in Air\***



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

**Technical Properties – Carbon Cap**

Housing	Polypropylene
Filter media	Activated carbon with a pleated HEPA cartridge
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	60 psi (4.1 bar)
Surface area (activated carbon)	Carbon Cap 75 capsule: 26,000 m <sup>2</sup> (40 g of activated carbon) Carbon Cap 150 capsule: 82,000 m <sup>2</sup> (126 g of activated carbon)

**Ordering Information – Carbon Cap**

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

# Centrifuge Filters

Whatman supplies centrifuge filters in two formats – both are supplied with a range of filtration and separation media.

## VectaSpin Centrifuge Filters

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

CENTREX centrifuge filters are supplied with a range of filtration and separation media. 1.5 ml and 5 ml sterile and nonsterile versions are available.

### *VectaSpin Micro*

VectaSpin Micro centrifuge filters are supplied with a range of filtration and separation media. They are 400 µl volume and are produced from pigment-free polypropylene to eliminate sample contamination. A 10 µm mesh is available for the filtration of coarse particulates, and devices 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.

### **Features and Benefits**

- Quick and easy to use. Supplied ready assembled, saving time in the laboratory
- Prefilter versions available for difficult-to-filter samples
- Frosted area on tube for easy sample identification
- Capacity 400/600 µl (insert volume/tube volume with insert in place)

### **Applications**

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



VectaSpin Micro centrifuge tube filter



CENTREX centrifuge filters



VectaSpin Micro

## Typical Data – VectaSpin Centrifuge Filters

	VectaSpin Micro	VectaSpin 3	VectaSpin 20
Housing (pigment free)	PP	PP	PP
Insert capacity	400 µl	3 ml	20 ml
<b>Receiving Tube Capacities</b>			
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 × 10.6 mm	87 × 16.4 mm	35 mm dia. × 117 mm (with cap) 31 mm dia. × 104 mm (without cap)
Cap material	PP	PP	PP
Cap closure	-	-	Screw-on
Minimum Force for RCF** (Polypropylene 0.45 µm)	-	2,000 G	-
<b>Temperature Resistance</b>			
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	PP	PP	PP
Overall height	42 mm	86 mm	61 mm

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

\*\* All other devices no minimum RCF

PP – Polypropylene

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 the performance of the filter.

## Ordering Information – VectaSpin Micro Centrifuge Filters

Pore Size (µm) Mol. Wt. Cut-off	Catalog Number	Media	Quantity/Pack
<b>VectaSpin Micro Centrifuge Tube Filter, 400 µl Insert Capacity</b>			
0.02	6830-0021	Anopore	100
0.2	6830-0201	Anopore	100
0.2	6830-0203	Anopore	100
12K	6834-1001	CA	100
20K	6834-2001	CA	100
0.45	6832-0401	PP	100
10.0	6838-0002	PP	25
0.2	6833-0201	PS	100
0.45	6833-0401	PS	100
30K	6835-3001	PS	100
100K	6835-1101	PS	100
0.45	6831-0401	PVDF	100

CA – Cellulose Acetate

PP – Polypropylene

PS – Polysulfone

PVDF – Polyvinylidene Difluoride

## VectaSpin 3

VectaSpin 3 centrifuge filters are supplied with a range of filtration and separation media. The VectaSpin 3 centrifuge filters are 3 ml volume and are produced from pigment-free polypropylene to eliminate sample contamination. A 10 µm mesh is available for the filtration of coarse particulates. They 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.

### Features and Benefits

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

### Applications

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



VectaSpin 3

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

## Ordering Information – VectaSpin 3 Centrifuge Filters

Pore Size (µm) Mol. Wt. Cut-off	Catalog Number	Media	Quantity/Pack
<b>VectaSpin 3 Centrifuge Tube Filter, 3 ml Insert Capacity</b>			
0.45	6831-0405	PVDF	25
0.45	6832-0405	PP	25
10.0	6838-0005	PP	25
10K	6835-1005	PS	25
30K	6835-3005	PS	25

PP – Polypropylene

PS – Polysulfone

PVDF – Polyvinylidene Difluoride

## VectaSpin 20

VectaSpin 20 centrifuge filters are supplied with a range of filtration and separation media. The VectaSpin 20 centrifuge filters are 20 ml volume and are produced from pigment-free polypropylene to eliminate sample contamination. A 10 µm mesh is available for the filtration of coarse particulates.

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.

### Features and Benefits

- 20 ml sample capacity is suitable for large volume samples
- Screw-top cap for easy sample storage



### Applications

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

## Ordering Information – VectaSpin 20 Centrifuge Filters

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
<b>VectaSpin 20 Centrifuge Tube Filter, 20 ml Insert Capacity</b>			
0.2	6830-0218	Anopore	10
0.45	6832-0408	PP	10
0.45	6832-0409	PP	100
0.45	6830-0220	Nylon	100
10.0	6838-0008	PP Mesh	10
10.0	6838-0009	PP Mesh	100
VectaSpin 20 tube pack	6809-0088**	-	1000
VectaSpin 20 filter pack, 0.45	6809-0089*	PS	500

\* Filter only

PP – Polypropylene

\*\* Tube only

PS – Polysulfone

## CENTREX Centrifuge Filters

CENTREX™ centrifuge filters are supplied with a range of filtration and separation media. 1.5 ml and 5 ml sterile and non-sterile versions are available.

### Features and Benefits

- Centrifugal filter units with various types of membrane filter
- Rapid and simple preparation of a large number of samples
- More than six samples can be processed at once



- Suitable for automated systems and high-speed batch filtration with robots
- Considerably reduced contamination risk when working with radioactive biologically hazardous material
- Cross contamination avoided

#### Applications

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



CENTREX MF

### Ordering Information – CENTREX Centrifuge Filters

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
<b>CENTREX 1.5 ml Sterile</b>			
0.2	10467004	CA	50
0.45	10467006	CA	50
0.8	10467008	CA	50
0.2	10467001	NC	50
0.45	10467005	NC	50
0.2	10467003	Nylon	50
0.45	10467007	Nylon	50
<b>CENTREX 1.5 ml Nonsterile</b>			
0.2	10467009	CA	250
0.45	10467011	CA	250
0.45	10467002	Nylon	250
<b>CENTREX 5.0 ml Sterile</b>			
0.2	10467013	CA	50
0.45	10467017	CA	50
0.45	10467019	NC	50
0.2	10467015	Nylon	50
0.45	10467021	Nylon	50
<b>CENTREX 5.0 ml Nonsterile</b>			
0.2	10467010	Nylon	250
0.45	10467012	Nylon	250

CA – Cellulose Acetate

NC – Nitrocellulose

# Venting Filters

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

## PolyVENT/SteriVENT

PolyVENT™ and SteriVENT™ are integral filter products for sterile venting of vessels and tanks. These devices are constructed from a single, standardized set of materials – PTFE membrane and polypropylene housing – to simplify the approval process.

### Features and Benefits

- Pass the HIMA Challenge Test for sterilizing grade
- Retain > 10<sup>7</sup> CFU/cm<sup>2</sup> *Brevundimonas diminuta* per ASTM F838-83 standards; this microbial retention is correlated to 100% integrity testing during manufacturing (rated in liquid). (100% integrity testing is carried out only on the capsules).
- Features a hydrophobic 0.2 µm PTFE membrane
- Validated for 50 steam autoclave cycles; compatible with EtO
- Testable by Water Breakthrough (WBT) Test or bubble point testing
- Pass USP Class VI biosafety tests for plastics
- Manufactured in clean room facilities
- Bidirectional and autoclavable

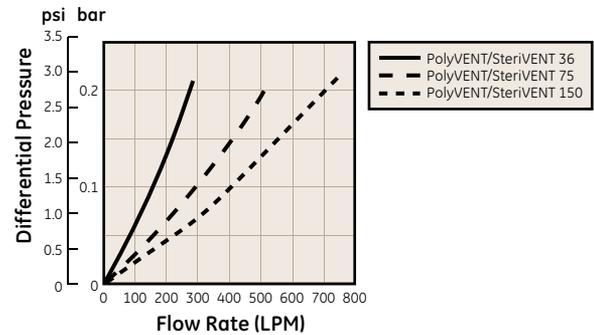
### Applications

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



### Air Flow Rates\*

#### PolyVENT/SteriVENT Capsules



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

## Technical Properties – PolyVENT/SteriVENT

Housing	Polypropylene
Filter media	PTFE (polytetrafluoroethylene)
Pore size	0.2 µm
Vent	On Inlet
Support system	Polypropylene
Sealing	Heat-fused
Maximum pressure	29 psi (2 bar) – forward direction
Water Breakthrough Test	29 psi (2 bar)/15 seconds
Flow direction	Bidirectional
Biosafety	Materials pass USP Class VI
Sterilization	Can be autoclaved at 121°C for 20 min (maximum 132°C). Multiple autoclave cycles are possible. However, the responsibility for reuse is with the operator. The device should be protected from cross contamination. An integrity test should be performed after autoclaving. Compatible with EtO sterilization.
Nonpyrogenic	LAL total, nonreactive
Filtration area	36 mm capsule: 500 cm <sup>2</sup> 75 mm capsule: 1000 cm <sup>2</sup> 150 mm capsule: 2000 cm <sup>2</sup> 50 mm disc: 16 cm <sup>2</sup> 25 mm disc: 4 cm <sup>2</sup>

## Ordering Information – PolyVENT/SteriVENT

Pore Size (µm)	Catalog Number	Housing Type	Connections*		Media	Quantity/Pack
			Inlet	Outlet		
<b>PolyVENT/SteriVENT 36</b>						
0.2	6713-5036	Capsule	SB	SB	PTFE	1
0.2	2103	Capsule	1/2 SB	1/2 SB	PTFE	1
<b>PolyVENT/SteriVENT 75</b>						
0.2	6713-1075	Capsule	1/2 SB	1/2 SB	PTFE	1
<b>PolyVENT/SteriVENT 150</b>						
0.2	2107	Capsule	1/2 SB	1/2 SB	PTFE	1
0.2	2108	Capsule	1 1/2" Sanitary	1 1/2" Sanitary	PTFE	1
<b>PolyVENT Discs</b>						
0.2	6713-0425	25 mm	FLL	ML	PTFE	50
0.2	6713-1650	50 mm	SB	SB	PTFE	10
0.2	6713-1651	50 mm	SB	SB	PTFE	100
FLL – Female Luer Lock		1/2 SB – Stepped Barb for 10-2 mm (3/8"-1/2") tubing				
ML – Male Luer Lock		SB – Stepped Barb for 6-10 mm (1/4"-3/8") tubing				
PTFE – Polytetrafluoroethylene						

## HEPA-VENT™ and HEPA-CAP™

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

### Features and Benefits

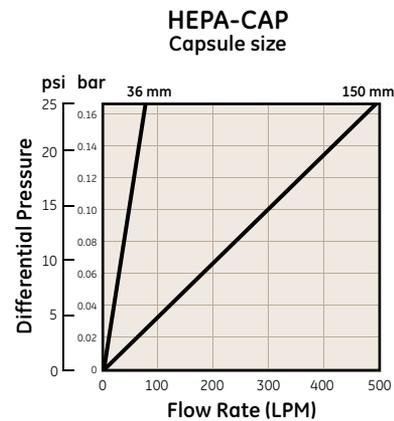
- Glass filter media strengthened by dual lamination with a tough polyester monofilament
- Retains 99.97% of all particles  $\geq 0.3 \mu\text{m}$  in air
- Durable polypropylene housing
- High flow rates with low pressure drops across filter media, ensuring clean air passing in and out of vessels
- Suitable for particulate removal from air and gases, prefilter for suction or to serve gas inline filter
- Able to be sterilized by autoclaving with steam
- Available in a variety of end-fitting configurations
- Manufactured in clean room facilities under ISO Quality Systems
- Repeatedly autoclavable at 121°C for 20 min (132°C max) for assured sterility
- Allows bidirectional flow
- Depth filter design allows for high loading capacity
- Preventing bacterial, algal or fungal contamination in fermentors or incubators
- Tissue culture applications

### Applications

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



### Air Flow Rates\*



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

## Technical Properties – HEPA Venting Filters

Housing	Polypropylene	
Filter media	Laminated hydrophobically treated glass microfiber	
Support system	Polypropylene	
Sealing	Heat-fused	
Maximum pressure	60 psi (4.1 bar) – capsule	
Flow direction	Bidirectional	
Biosafety	Materials pass USP Class VI	
Sterilization	Autoclavable	
Filtration area	36 mm capsule: 625 cm <sup>2</sup> (97 in <sup>2</sup> ) 75 mm capsule: 1300 cm <sup>2</sup> (201 in <sup>2</sup> )	150 mm capsule: 2590 cm <sup>2</sup> (402 in <sup>2</sup> ) 50 mm disc: 16 cm <sup>2</sup>

## Ordering Information – HEPA-VENT and HEPA-CAP Filters

Catalog Number	Housing Type	Connections Inlet	Outlet	Quantity/Pack
<b>HEPA-CAP 36</b>				
6702-3600	Capsule	SB	SB	1
2609T	Capsule	3/8 in. FNPT	3/8 in. FNPT	5
<b>HEPA-CAP 75</b>				
6702-7500	Capsule	1/2 in. SB	1/2 in. SB	1
2709T	Capsule	3/8 in. FNPT	3/8 in. FNPT	5
<b>HEPA-CAP 150</b>				
6702-9500	Capsule	3/8 in. FNPT	3/8 in. FNPT	1
2809	Capsule	HB	HB	5
<b>HEPA-VENT</b>				
6723-5000	50 mm disc	SB	SB	10
<i>FNPT – Female National Pipe Thread</i>		<i>1/2 SB – Stepped Barb for 10-2 mm (3/8"-1/2") tubing</i>		
<i>HB – 1/2 Hose Barb</i>		<i>SB – Stepped Barb for 6-10 mm (1/4"-3/8") tubing</i>		

## BugStopper

BugStopper™ is a reusable closure, providing a 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 ultrafine 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 (stopper sizes are country-dependent. Sizes stated are those in use in the USA. See Technical Data table for actual dimensions of BugStopper).

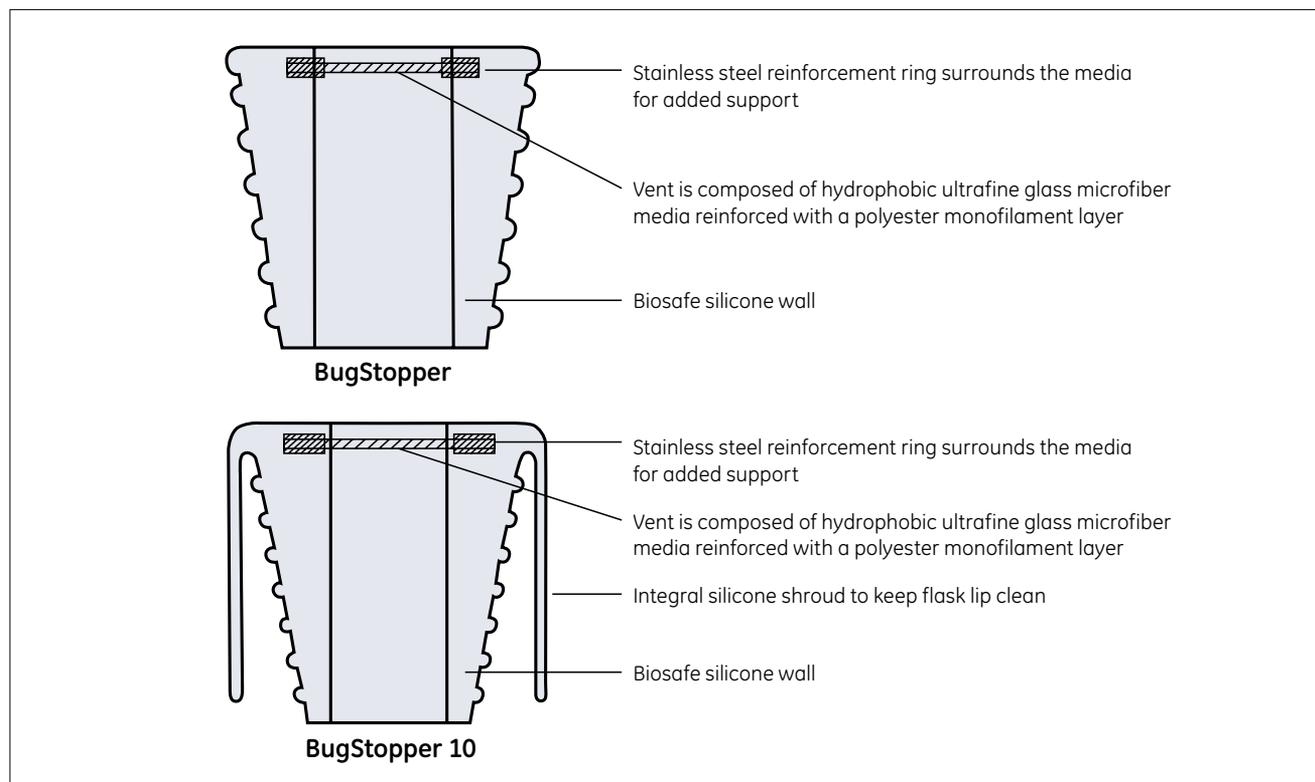
### Features and Benefits

- 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





### Technical Data – BugStopper

Top Diameter (mm)	Bottom Diameter (internal) (mm)	Bottom Diameter (external) (mm)	Device	Vent Material	Support Ring
<b>BugStopper</b>					
43	21	28	Biosafe silicone	Hydrophobic ultrafine glass microfiber	Stainless steel
<b>BugStopper 10</b>					
54	22	37	Biosafe silicone	Hydrophobic ultrafine glass microfiber	Stainless steel

### Ordering Information – BugStopper

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

# Vacuum Protection Filters

## VACU-GUARD™

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

### Features and Benefits

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

### Applications

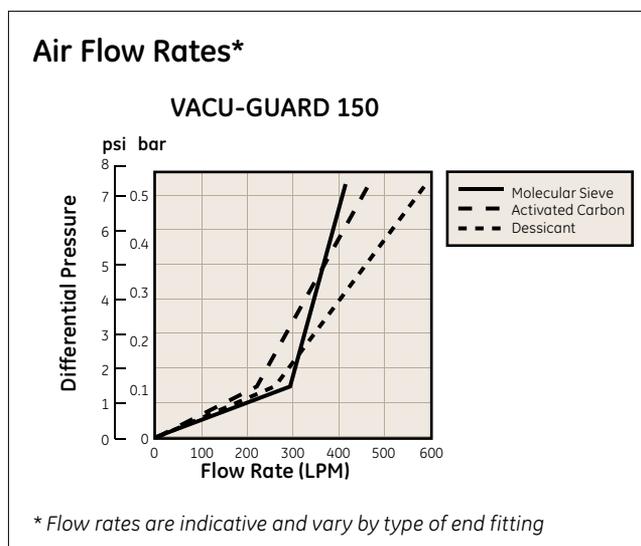
- Vacuum pump protection
- Activated carbon removes organic vapors and radioactive particles
- Molecular sieve for use with organic and alkaline air streams
- Desiccant for use with high velocity acidic air streams
- Removes a potential health hazard from the work place



VACU-GUARD



VACU-GUARD 150



### Typical Data – VACU-GUARD

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

PP – Polypropylene  
PTFE – Polytetrafluoroethylene

SB – Stepped Barb

### Typical Data – VACU-GUARD 150

Product	VACU-GUARD 150 Activated Carbon	VACU-GUARD 150 Desiccant	VACU-GUARD 150 Molecular Sieve
Chemical trap media	Activated carbon	Anhydrous calcium sulfate	Silico aluminat zeolite
Filter media	PTFE	PTFE	PTFE
Surface area* or weight (nominal)	82,000 m <sup>2</sup> (carbon)	318 g (desiccant)**	318 g (zeolite)
Connectors – inlet/outlet	HB/SB	HB/SB	HB/SB
<b>Maximum Operating Pressure</b>			
Dry gas	60 psi	60 psi	60 psi
Wet gas	14 psi	14 psi	14 psi

\* For 50 mm disc = 16 cm<sup>2</sup>; 60 mm = 25 cm<sup>2</sup>

\*\* Absorbs 6-10% of its weight in water (dependent on relative humidity)

HB – Hose Barb 1/2 cm<sup>2</sup> – inlet

PTFE – Polytetrafluoroethylene

SB – Stepped Barb

### Ordering Information – VACU-GUARD and VACU-GUARD 150

Catalog Number	Chemical Media	Housing Type	Quantity/Pack
<b>VACU-GUARD</b>			
6722-5000	PTFE*	50 mm disc	10
6722-5001	PTFE*	60 mm disc	10
<b>VACU-GUARD 150</b>			
6722-1001	Activated carbon	Capsule	1
6722-1002	Desiccant	Capsule	1
6722-1003	Molecular sieve	Capsule	1

\* PTFE – 0.2 μm Polytetrafluoroethylene

## Specialty Devices

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

### 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 for the quick and easy separation of solvent and aqueous phase layers.



## Technical Properties – Filter Tubes

Housing	Polypropylene (pigment free)
Inlet connection	Standard tube opening
Outlet connection	Male slip luer
Maximum force	100 psi for PTFE (not available for 1PS)
<b>Filtration Area</b>	
6 ml	1.2 cm <sup>2</sup>
12 ml	1.4 cm <sup>2</sup>
60 ml	5.3 cm <sup>2</sup>
<b>Weight</b>	
6 ml	3.2 g
12 ml	4.8 g
60 ml	18.8 g
<b>Bubble Point for PTFE Filter Tubes (in isopropanol)</b>	
1.0 µm	9 psi
5.0 µm	2 psi

*PTFE – 0.2 µm Polytetrafluoroethylene*

## Ordering Information – Filter Tubes

Pore Size (µm)	Catalog Number	Media	Capacity (ml)	Quantity/Pack
0.45	6988-6010	DpPP	60	100
1.0	6984-0610	PTFE	6	50
1.0	6984-1210	PTFE	12	40
5.0	6984-0650	PTFE	6	50
5.0	6984-1250	PTFE	12	40
5.0	6984-6050	PTFE	60	100
–	6987-0699	1PS	6	50
–	6987-1299	1PS	12	40
–	6987-6099	1PS	60	100
HD soil tube	6986-6010	HD	60	100

*DpPP – Depth polypropylene*

*HD – Nonwoven polypropylene*

*PTFE – Polytetrafluoroethylene*

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



### Applications

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

### Typical Data – AUTOCUP Disposable Filter Funnel

Housing	Polypropylene
Volume	20 ml
Filtration area	4.7 cm <sup>2</sup>
Filter diameter	25.7 mm
Maximum pressure	0.7 bar (10 psi)

### Ordering Information – AUTOCUP Disposable Filter Funnel

Pore Size (µm)	Catalog Number	Media	Quantity/Pack
0.45	1602-0462	Nylon	250
0.45	1602-0465	Nylon	250
0.45	1602-0472	PTFE	250
0.45	1602-0475	PTFE	250

## Disposable Filter Funnels

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

### 25 mm Disposable Filter Funnel

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

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



### Chemical Resistance

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

### Features and Benefits

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

### 47 mm Disposable Filter Funnel

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

### Features and Benefits

- 47 mm diameter Whatman brand filter
- Retrievable filter for further analysis
- Disposable for cleanliness and convenience
- 250 ml reservoir
- 0.45  $\mu\text{m}$  cellulose nitrate available sterile for culturing



### Ordering Information – 25 mm Disposable Filter Funnels

Catalog Number	Media	Nominal Particle Retention ( $\mu\text{m}$ )	Volume Capacity (ml)	Quantity/Pack
1922-1820	Grade GF/A	1.6	25	50
1922-1822	Grade GF/C	1.2	25	50

### Ordering Information – 47 mm Disposable Filter Funnels

Catalog Number	Media	Nominal Particle Retention ( $\mu\text{m}$ )	Volume Capacity (ml)	Quantity/Pack
1920-1443	Grade 934 AH	1.5	250	300
1920-7001	WCN 0.45 $\mu\text{m}$ Grid sterile	0.45	250	5
1920-7113	WCN 0.45 $\mu\text{m}$ Grid sterile with pads	0.45	250	300
1920-1441	Grade 41	20-25	250	5

## FilterCup

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

### Features and Benefits

- Choice of glass microfiber and cellulose filter media
- 250 ml capacity
- Approx. 31 cm<sup>2</sup> filtration area



### Chemical Compatibility – FilterCup

Dilute acids	Recommended
Dilute bases	Recommended
Alcohols: aliphatic	Recommended
Aldehydes	Recommended
Esters	Recommended

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

Ketones	Recommended
Hydrocarbons: aliphatic	Recommended
Hydrocarbons: aromatic	Limited applications
Hydrocarbons: halogenated	Not recommended
-	-

### Ordering Information – FilterCup Disposable Filter Funnel

Catalog Number	Media	Partical 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
<b>FilterCup Stem with Stopper</b>			
1600-900	-	-	1

## Bottle-top Filters

### VACUFLO

#### For Residue Analysis

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



VACUFLO

## ZapCap

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

### Features and Benefits

- Complete 500 ml units with tubing nozzle; for attaching to bottles (bottle-top)
- Connection seals on any standard bottles 33-45 mm
- Membrane diameter 76 mm, filter area 39.2 cm<sup>2</sup>
- ZapCap™-S with included borosilicate prefilter for high flow rates
- ZapCap-S Plus with integral borosilicate prefilter for very high flow rates
- ZapCap-CR, the chemical-resistant bottle-top filter
- Can be used up to 50°C



ZapCap

## Typical Applications – Bottle-top Filter Unit

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

## Ordering Information – VACUFLO and ZapCap Bottle-top Filters

Description	Pore Size (µm)	Catalog Number	Media/Housing**	Color Code	Quantity/Pack
<b>Residue Analysis</b>					
VACUFLO PV 050/3**	0.2	10443301	ME-GF/SBC	Blue	10
VACUFLO PV 050/2**	0.45	10443311	ME-GF/SBC	White	10
<b>Filtration of Medium Volumes, Cell Culture Media</b>					
ZapCap S CA*†	0.2	10443401	CA/SBC	-	12
ZapCap S CA*†	0.45	10443411	CA/SBC	-	12
ZapCap S Plus CA*	0.2	10443430	CA-GF/SBC	-	12
ZapCap S Plus CA*	0.45	10443435	CA-GF/SBC	-	12
<b>Filtration of HPLC solutions</b>					
ZapCap S CR NL	0.2	10443421	NYL/PP	-	12
ZapCap S CR NL	0.45	10443423	NYL/PP	-	12
ZapCap S CR TE	0.45	10443425	PTFE/PP	-	12

\* Sterilized by gamma radiation

\*\* CA – Cellulose Acetate

† Includes separate glass prefilter

GF – Glass Microfiber

ME – Mixed Ester Cellulose

PP – Polypropylene

PTFE – Polytetrafluoroethylene

SBC – Styrene-Butadiene Copolymer



## Microbiology Products

A broad range of high-quality products for microbiological quality control in food and beverage (wine, beer, soda, water). Our products help you ensure that every person who eats or drinks your products is getting the highest quality and safest ingredients.

- 142 Membrane Filtration
- 149 Membrane Filtration Accessories
- 154 Media
- 159 Swabs
- 165 Rapid Test



# Microbiological Quality Control

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

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

## Membrane Filtration

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

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

### MicroPlus and ME Membranes

#### *Membranes for Microbiological Control*

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

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

#### **Method**

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

#### **Reliability**

The quality control and product design of our membrane filters are strictly controlled and offer users significant advantages.

#### **Test Parameters**

All membranes used for microbiological quality control are tested systematically in order to ensure the same high quality from batch to batch. Parameters tested are bubble point, flow rate, bacterial retention, recovery rate, and sterility.



#### *ME Membranes*

MicroPlus membranes are high-flux-membranes, with 0.45 µm characteristics for: Bacteria challenge test with *Serratia marcescens* ATCC 14756 (DSM 1636) with  $1 \times 10^3$  germs/100 ml with reference to the Standard Methods for the Examination of Water and Waste water Part 920 (intra-laboratory Quality Control Guidelines) for microbiological quality control in the beverage industry.

#### **Features and Benefits**

- Made from mixed cellulose esters
- Economical
- Specifically for aqueous solutions
- Hydrophilic
- For use up to 125°C
- Sterile, individually packed
- All membrane filters have a high-contrast grid
- Type STL in dispenser boxes with 100 numbered membrane filters for easy removal and safe handling with the Membrane-Butler (supplied in 4 boxes each with 100 membrane filters)

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

## Ordering Information – ME Membranes

Diameter (mm)	Catalog Number	Description	Color	Grid/Color	Quantity/Pack
<b>MicroPlus (Cellulose Nitrate)</b>					
47	10407112	MicroPlus-21 STL	White	Black	100 × 4
50	10407114	MicroPlus-21 STL	White	Black	100 × 4
47	10407713	MicroPlus-21 ST	White	Black	100
50	10407714	MicroPlus-21 ST	White	Black	100
47	10407132	MicroPlus-31 STL	Black	White	100 × 4
50	10407134	MicroPlus-31 STL	Black	White	100 × 4
50	10407734	MicroPlus-31 ST	Black	White	100
47	10407170	MicroPlus-41 STL	Green	Black	100 × 4
50	10407172	MicroPlus-41 STL	Green	Black	100 × 4
<b>ME (Mixed Cellulose Ester)</b>					
47	10407312	ME25/21 STL, 0.45 µm	White	3.1 mm/black	400
50	10407314	ME25/21 STL, 0.45 µm	White	3.1 mm/black	400
47	10406870	ME25/21 ST, 0.45 µm	White	3.1 mm/black	100
47	10406871	ME25/21 ST, 0.45 µm	White	3.1 mm/black	1000
50	10406872	ME25/21 ST, 0.45 µm	White	3.1 mm/black	100
50	10406873	ME25/21 ST, 0.45 µm	White	3.1 mm/black	1000
47	10407332	ME25/21 STL, 0.45 µm	Black	3.1 mm/white	400
50	10407334	ME25/31 STL, 0.45 µm	Black	3.1 mm/white	400
47	10407370	ME25/41 STL, 0.45 µm	Green	3.1 mm/black	400
50	10407372	ME25/41 STL, 0.45 µm	Green	3.1 mm/black	400
47	10409470	ME25/41 ST, 0.45 µm	Green	3.1 mm/black	100
50	10409472	ME25/41 ST, 0.45 µm	Green	3.1 mm/black	100
47	10408712	ME24 STL, 0.2 µm	White	3.1 mm/black	400
50	10408714	ME24 STL, 0.2 µm	White	3.1 mm/black	400
50	10407324	ME25 STL, 0.45 µm	White	5.1 mm/black	400
50	10408915	ME27 STL, 0.8 µm	White	3.1 mm/black	100
47	10407342	ME27/31 STL, 0.8 µm	-	3.1 mm/white	400
50	10407345	ME27/31 STL, 0.8 µm	-	3.1 mm/white	400
50	10407615	ME27/41 STL, 0.8 µm	-	3.1 mm/black	400
50	10409834	ME26/31 STL, 0.6 µm	-	3.1 mm/white	400
50	10407344*	ME25 STL, 0.45 µm	-	-	400

\* Product is only available in the Americas

ST – Single sterile packed

STL – Sterile, for use with Whatman Membrane-Butler

## Microbiological Monitors

*Presterilized and very versatile*

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

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



47 mm and 56 mm monitors

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

**Features and Benefits**

- Cellulose nitrate membrane with choice of pore size
- Sterilized and ready for use
- Easy handling
- Significant time savings – up to 70%
- Black membranes available for better contrast

**Monitor Workflow**

Microbiological monitors have been developed specifically for membrane filter methods for aqueous samples of up to 100 ml.

1. Add sample and filter it
2. Remove the funnel
3. Add 2 ml of microbiological media and add vacuum briefly
4. Replace the lid and incubate the unit



1



2



3



4

**Ordering Information – Microbiological Monitors**

Size (mm)	Catalog Number	Description	Pore Size (µm)	Quantity/Pack
47	10497511	White/black grid, 100 ml	0.2	50
47	10497500	White/black grid, 100 ml	0.45	50
47	10497501	White/black grid, bagged, 100 ml	0.45	50
47	10497502	Black/white grid, 100 ml	0.45	50
47	10497503	Black/white grid, 100 ml	0.8	50
56	10497603	White/black grid, 100 ml	0.2	50
56	10497600	White/black grid, 100 ml	0.45	50
56	10497601	Black/white grid, 100 ml	0.45	50
56	10497602	Black/white grid, 100 ml	0.8	50

# Analytical Funnels

## *Ready-to-use Filtration Units for Microbiology*

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

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

### **Features and Benefits**

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



### **Analytical Funnel Workflow**

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



1



2



3



4

## Ordering Information – Analytical Funnels

Size (mm)	Catalog Number	Description	Pore Size (µm)	Quantity/Pack
47	10497507	White/black grid, 100 ml	0.2	50
47	10497510	White/black grid, bagged, 100 ml	0.2	50
47	10497504	White/black grid, 100 ml	0.45	50
47	10497506	White/black grid, bagged, 100 ml	0.45	50
47	10497508	White/black grid, 100 ml	0.45	50
47	10497509	White/black grid, bagged, 100 ml	0.45	50

## MBS I

### *Microbiological Filtration System*

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

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

#### Features and Benefits

- Simple to use
- Safe sealing mechanism
- Shorter preparation time
- High reproducibility
- Funnels can be autoclaved up to 50 times
- Large funnel capacity for foaming liquids
- Easier to validate
- Risk of cross contamination is minimized

#### A Combination of Comfort and Progress

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



MBS I bringing a system into your quality control



MBS I sealing mechanism

### Find the Right Funnel

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

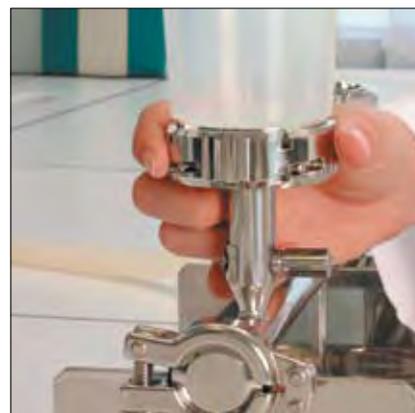
The funnels (350 ml) are of high grade polypropylene and can be autoclaved up to 50 times. For applications in which funnels are only used once, the system offers another solution: a 100 ml funnel which is presterilized and supplied ready for immediate use. A special closure mechanism at the extraction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

### MBS I Workflow

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



1



2



3



4

**MicroPlus Membrane Filter – The Plus for Stability**

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

**Ordering Information – MBS I**

Catalog Number	Product	Description	Quantity/Pack
10445890	AS220	2-place vacuum filtration manifold for MBS I	1
10445863	Frit	Steel frit with ring for AS220	1
10445870	Dispenser for funnels	Dispenser for 100 ml and 350 ml funnels for MBS I	1
10445861	Funnel – 100 ml	Plastic funnel of PP, autoclavable	20
10445865	Funnel – 100 ml	Plastic funnel of ABS	20
10445866	Funnel – 350 ml	Plastic funnel of PP, autoclavable	20
10445868	Autoclaving bags	For MBS I plastic funnels	20
10477112	Butler-Tower rack	Rack for two Membrane-Butler E	1
10477110	Membrane-Butler E	Electric Butler for dispensing filtration membranes	1
10477602	PZ 001	Tweezers, stainless steel	1
10445895	Clamp	Clamp for MBS 1	1

**Membrane-Butler**

*Membrane Filter Dispenser for Microbiological Control*

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

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

**Features and Benefits**

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



Removing a sterile membrane from Butler E



Manual dispenser for single sterile membranes

## Ordering Information – Membrane-Butler

Catalog Number	Description	Use	Quantity/Pack
10477100	Membrane-Butler	Manual Butler for dispensing filtration membranes	1
10477110	Membrane-Butler E	Electric Butler for dispensing filtration membranes	1
10477112	Butler-tower	Rack for two Membrane-Butler E	1
10477113	Foot pedal	For Membrane-Butler E	1
10477114*	Power supply	For Membrane-Butler E	1

\* Product is only available in Europe.

## Membrane Filtration Accessories

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

### Pressure Filtration Devices

Pressure filtration devices with a sample loading cylinder are suitable for batch filtration of samples from 20 ml, while devices without infusion cylinders are connected inline and are suitable for larger volumes of several liters. Filtration of liquids and gases is possible, including sterile filtration of serums or the clear filtration of media that are difficult to filter, especially those that are highly viscous. Membranes, paper or glass fiber filter discs can be used.

Cleaning and changing of filters is completed in a few steps. All units are equipped with pressure resistant filter supports. High-quality silicone or PTFE O-rings seal the systems. Please ensure you only use intact seals for safety reasons. PTFE versions are available, in addition to stainless steel devices, for use with corrosive media.

#### Applications

- Clear filtration of liquids that are difficult to filter and sterile filtration of liquids and gases. For small volumes: MD 050
- Inline sterilization of biological liquids, ophthalmics, etc.: MD 142/6
- Inline filtration of corrosive liquids which must not come into contact with metals: MD 142/7 or with infusion cylinder MD 142/7/3

### Technical Information – Pressure Filtration Devices\*

Series	Material	Seals	Max Pressure** (bar)	Max Temperature Resistance (°C)	Filter Diameter (mm)	Prefilter Diameter (mm)
MD 050	Stainless steel	Silicone/PTFE	10/4	200	50	43
MD 142/5	Stainless steel	Silicone/PTFE	10/4	200	142	134
MD 142/6	Stainless steel	Silicone/PTFE	10/4	200	142	134
MD 142/7	PTFE	PTFE	3.5	200	142	134

\* Product is only available in Europe

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

## Ordering Information – Pressure Filtration Devices\*

Catalog Number	Description	Quantity/Pack
<b>Stainless Steel</b>		
10450450	MD 050/4, 200 ml, 230 × 70 mm with rapid seal	1
10451410	MD 142/5, without infusion cylinder, 100 × 180 mm	1
10451610	MD 142/5/3, 2200 ml, 545 × 200 mm	1
10452600	MD 142/6/3 (GMP), 2200 ml, 570 × 220 mm	1
<b>PTFE</b>		
10451700	MD 142/7, without infusion cylinder, 180 × 200 mm	1
10451710	MD 142/7/3, 1500 ml, 470 × 200 mm	1
<b>Accessories – Inlet/Outlet Connections for Stainless Steel Pressure Filtration Devices of the MD 050 and MD 142/5 series**</b>		
10453000	MD 050/0/11, connection: R 3/8", for SV 004	1
10453001	MD 050/0/12, connection: rapid seal coupling, for SV 003 b and SV 003 c	1
10453002	MD 050/0/13, connection: olive external diameter 13–15 mm, for pressure hoses	1
10453007	MD 050/0/18, connection: olive external diameter 9–11 mm, for pressure hoses	1
<b>For GMP Pressure Filtration Devices of the MD 142/6 Series †</b>		
10453201	MD 142/2/11, connection: R 3/8", for SV 004	1
10453208	MD 142/2/14, connection: olive external diameter 9–11 mm, for pressure hoses	1
10453200	MD 142/2/09, connection: stainless steel clamp, for TriClover connectors	1
10453301	ST 002 stand for pressure filter	1
<b>Pressure Hoses</b>		
10471100	Pressure hose, braided, SV 003 a (connectors R 3/8"/SVK) and SV 003 b (connectors SVK/SVK), inner diameter 6 mm, length 1.5 m	1
10471101	Pressure hose, SV 003 c, loadable bar 10, connector SVK/R 3/8", inner diameter 6 mm, length 1.5 m	1
10471200	Pressure hose, PTFE, SV 004, braided with stainless steel wire, loadable bar 10, autoclavable to 121°C, connection R 3/8"/R 3/8", inner diameter 8 mm, length 1.5 m	1

\* Product is only available in Europe

\*\* All connections are supplied with PTFE seal

† Connection to the device at safety collar for TriClover with clamp, supplied complete with sealing rings

SVK – rapid seal coupling

## Vacuum Filtration Equipment

### MV 050 Series

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

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

### Applications

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



MV 050/0



MV 050A/0



MV 050/2

## Technical Data – Vacuum Filtration – MV 050 Series

Apparatus Selection		Materials Selection	
Filter size	47/50 mm	Upper and lower parts	Stainless steel 1.4301
Filter volume	100 or 500 ml	Cover	Stainless steel 1.4301
Filter area	12.5 cm <sup>2</sup>	Frit	Stainless steel 1.4571
Prefilter	40 mm diameter	Sieve	Stainless steel 1.4301
Vacuum connection	Rubber stopper	Seals	PTFE and silicone
Filter support	Sieve (frit as accessory)	Clamps	Aluminum

## Ordering Information – MV 050 Series

Catalog Number	Description	Quantity/Pack
10440000	MV050/0 Vacuum Filtration Apparatus, stainless steel, 500 ml, 47/50 mm	1
10440020	MV050A/0 Vacuum Filtration Apparatus with rapid closure clamp, stainless steel, 500 ml, 47/50 mm	1
10440200*	MV050/2 Vacuum Filtration Apparatus, stainless steel, 100 ml, 47/50 mm	1

\* Product is only available in Europe

## Multiple Vacuum Filtration Apparatus

### AS 300 and 600 Series

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

### Applications

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



AS 300/3



AS 610/3

## Technical Data – AS 300 and 600 Series – Multiple Vacuum Filtration Apparatus

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

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

## Ordering Information – Multiple Vacuum Filtration Apparatus

Catalog Number	Description	Quantity/Pack
<b>Three-Place Filtration</b>		
10445850	AS300/5 Vacuum filtration system, stainless steel 100 ml, 47/50 mm, support screen	1
10445830	AS300/3 Vacuum filtration system, stainless steel 500 ml, 47/50 mm, support screen	1
10445835*	AS310/3 Vacuum filtration system, stainless steel 500 ml, 47/50 mm, support screen	1
10498761**	Stainless steel filter funnel 3-place manifold	1
<b>Six-Place Filtration</b>		
10444850	AS600/5 Vacuum filtration system, stainless steel 100 ml, 47/50 mm, support screen	1
10444830	AS600/3 Vacuum filtration system, stainless steel 500 ml, 47/50 mm, support screen	1
10444835*	AS610/3 Vacuum filtration system, stainless steel 500 ml, 47/50 mm, support screen	1
10444820†	AS600/2 Vacuum filtration system, glass, 250 ml, 47/50 mm, support screen	1
10498762**	Stainless steel filter funnel 6-place manifold	1

\* With rapid closure clamp

\*\* Recommended for Microbiology Monitors and Analytical Funnels

† Product is only available in Europe

## Accessories and Vacuum Filtration Apparatus

### Vacuum and Pressure Pump\*

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

\* 220 Volts. This product is only available in Europe



Vacuum Pump VP003

### Features and Benefits

- AC model
- Contamination-free pumping of air, gases, and vapors
- High performance and minimum size
- Extremely quiet and smooth running
- Equipped with thermo switch and standard fuse
- Simple to use
- Maintenance free
- Oil-free membrane pump

### Witt's Bottle WT 100

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



Witt's Bottle WT 100

### Forceps PZ 001

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



Forceps PZ 001

## Performance Data – Vacuum and Pressure Pump

	Delivery (l/min) m <sup>3</sup> /h	Vacuum (mbar absolute)	Pressure (bar)	Weight (kg)
VP003	3.6	< 100	4	11

## Technical Data – Witt's Bottle WT 100

Apparatus Selection	
Size	100 mm diameter
Height	160 mm
Capacity	1000 ml
Vacuum Connection	Tubing nozzle 8 mm (inside diameter)

## Ordering Information – Vacuum Filtration Apparatus Accessories

Catalog Number	Description	Quantity/Pack
10470300	VP 003 Electrical vacuum and pressure pump	1
10464103	ML 050/0/03 Steel frit with ring	1
10477601	WT 100 Witt's flask, 1000 ml with tubing nozzle	1
10477600	SF 100 Suction flask, 1000 ml with tubing nozzle	1
10471700	SV 006 Vacuum tubing, 1 length	1
10477602	PZ 001 Tweezers, stainless steel	1

# Media

## Liquid Media

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

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

### Features and Benefits

- Wide range of products satisfies even special customer requirements
- Optimal media stability, sterility, and reproducibility
- Less time-consuming, higher productivity
- Batch-specific quality certificate in each pack

### Media Variety and Flexibility

Our extensive range of liquid media is available for a wide variety of applications. Liquid media products come with a host of advantages. Prepared nutrient media save valuable time and keep costs to a minimum. All media undergo detailed quality control checks in accordance with recognized methods, guaranteeing uniform media preparation at all times. Comprehensive end product tests ensure optimal growth and stable, and sterile media.

### Media Descriptions

#### Brilliant Green Bile Broth 2%

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

#### Cetrimide Broth

*Pseudomonas aeruginosa* is characterized by the production of pyocyanin (a blue green, water soluble, non-fluorescent, phenazine pigment), which is stimulated by the inclusion of magnesium chloride and potassium sulfate in the broth. Cetrimide (N-cetyl-NNN-trimethylammonium bromide) is added to inhibit bacteria other than *Pseudomonas aeruginosa*. Its action as a quaternary ammonium cationic detergent causes nitrogen and phosphorous to be released from bacterial cells other than *Pseudomonas aeruginosa*.



2 ml ampouled media



Brilliant green bile broth

### EC Broth

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

### EC Broth with MUG

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

### Enterococcus Broth

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

### HPC Broth and HPC Broth with TTC

HPC is used to determine total count at incubation temperatures of 35°C. All bacteria develop on HPC to give colonies with their natural colors. With TTC, the colonies produce a red color by reducing 2,3,5-triphenyltetrazolium chloride (TTC), which precipitates as formazan.

### KF-Streptococcus Broth

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

### Lauryl Sulfate or Lauryl Tryptose Broth

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

### Mannitol Salt Broth

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

### Membrane Lauryl Sulfate Broth

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



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

**M-Endo Coliform Broth**

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

**M-FC Broth**

Allows the development of fecal coliforms at elevated temperatures (44.5°C).

**M-FC with Rosolic Acid**

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

**M-Green Yeast and Mold Broth**

M-Green Yeast and Mold Broth is an improved modification of the liquid media. The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH, which aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow.

**M-Green Select Broth**

M-Green Select Broth was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of chloramphenicol further inhibits the growth of bacteria to allow for the development and enumeration of yeast and mold.

**MI Broth and MI Agar**

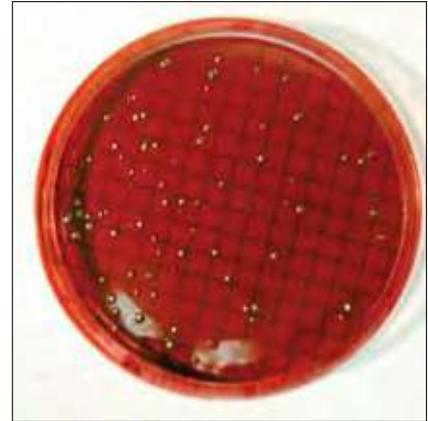
MI Broth detects the presence of coliform bacteria by the production of  $\beta$ -galactosidase, which cleaves the substrate MUGal to produce 4-methylumbelliferone, which fluoresces on exposure to UV light. Non-coliforms do not produce this enzyme and therefore do not fluoresce on the medium. *Escherichia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

**MRS Broth**

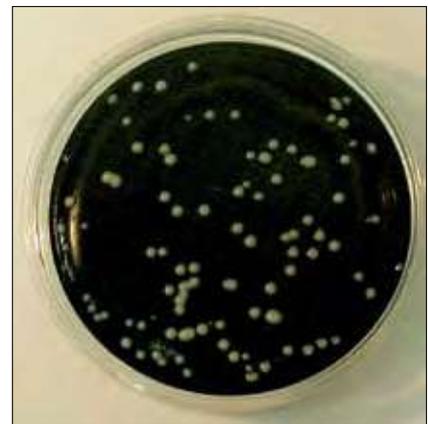
MRS medium supports luxuriant growth of all lactobacilli, even the slow growing species.

**M-TGE Total Count Media**

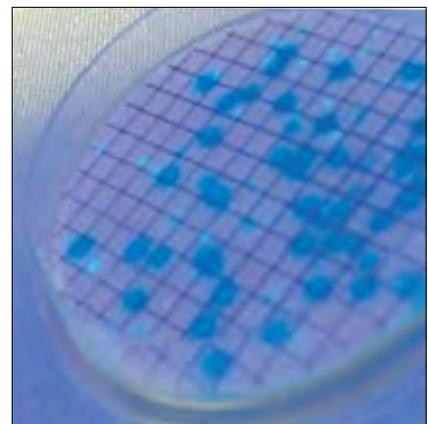
All bacteria develop on TGE media and produce a range of different colored and sized colonies.



M-Endo coliform broth



M-Green Yeast and Mold Broth:  
Typical growth of *Candida Albicans* ATCC10231 on a black membrane



MI-Media: Pure culture of *Escherichia coli* ATCC 25922 with UV light

### Orange Serum Media

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

### Potato Dextrose Broth and Agar Media

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

### Preservative-Resistant Yeast (PRY) Broth

A low pH selective medium. For the detection of spoilage microorganisms in beverages. It is used to isolate and selectively enumerate *Zygosaccharomyces* spp.

### Pseudomonas Broth

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

### Sabouraud Dextrose Broth

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

### Standard Methods Agar

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

### Total Count Media with TTC

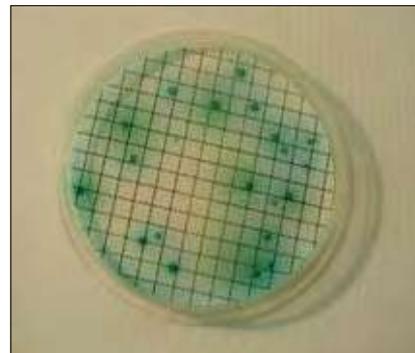
All bacteria develop on Total Count Media with indicator and produce a red color as a result of the precipitation of formazan following the reduction of 2,3,5-triphenyltetrazolium chloride (TTC) by bacteria.

### Trypticase Soy Broth – Single Strength

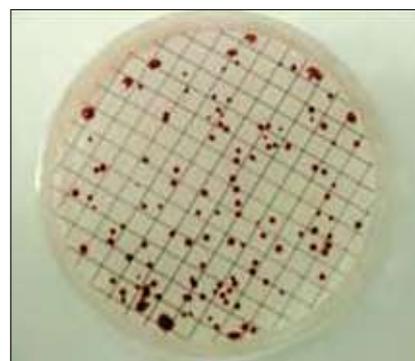
General purpose medium used in qualitative procedures for the cultivation of fastidious and non-fastidious microorganisms. Trypticase Soy Broth – Single Strength complies with the demands of the DIN Norm 10167 for the detection of *Escherichia coli* serotype 0157:H7 in foods and FDA-BAM for the isolation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

### Trypticase Soy Broth – Double Strength

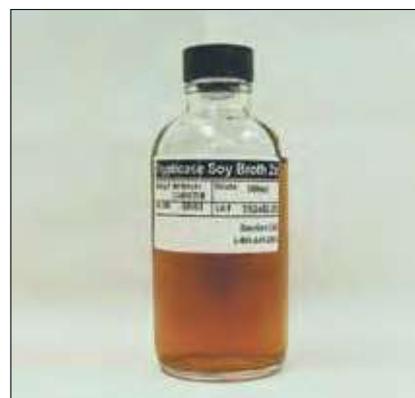
TSB is a medium that will support the growth of a wide variety of microorganisms, including aerobic, facultative, and anaerobic bacteria and fungi.



Pseudomonas media: Typical growth of *Pseudomonas aeruginosa* ATCC 10145



Total Count Media with indicator. *Escherichia coli* ATCC 25922 and *Staphylococcus aureus* ATCC 25923 can be easily detected according to their red to pink colonies



Trypticase Soy Broth (double strength not inoculated)

**Wallerstein Nutrient Broth (WL) and WL Differential Broth (WLD)**

WL Nutrient Broth is for the cultivation and enumeration of yeast, and WL Differential Broth is for determination of bacterial count. Use of the medium at pH 5.5 and incubation at 25°C will give reliable counts for brewer's yeast. Adjustment of the pH to 6.5 and incubation at 30°C allows for the selective growth of baker's and distiller's yeast.

**Ordering Information – Liquid Media**

Catalog Number	Description	Quantity/Pack
<b>2 ml Ampoules</b>		
10496146	Cetrimide Broth	50
10496120	Enterococcus Broth	50
10496164	Heterotrophic Plate Count (HPC) Broth	50
10496151	HPC Broth with TTC	50
10496125	KF-Streptococcus Broth	50
10496121	Mannitol Salt Broth	50
10496187	Lauryl Sulfate PHLS/UK Broth	50
10496103	M-Endo Coliform Broth	50
10496124	M-FC Media	50
10496114	M-FC Broth with Rosolic Acid	50
10496116	M-Green Select Broth	50
10496101	M-Green Yeast and Mold Broth	50
10496192	MI-Broth Media (2ml vials, not ampoules)	50
10496112	MRS Broth	50
10496102	M-TGE Broth	50
10496104	Orange Serum Broth	50
10496106	Preservative-Resistant Yeast (PRY) Broth	50
10496119	Pseudomonas Broth	50
10496113	Total Count Broth with TTC	50
10496108	Wallerstein Broth	50
10496109	Wallerstein Differential Broth	50
<b>9 ml Tubes</b>		
10496710	Brilliant Green Bile Bottled Broth, with Durham Tubes	20
10496714	EC Bottled Broth, with Durham Tubes	20
10496709	EC with MUG, Bottled Broth	20
10496722*	Lauryl Sulfate / Lauryl Tryptose Broth	20
<b>Bottled Media</b>		
10496700	M-Endo Coliform Bottled Broth, 50 ml	8
10496851	MI Media, Bottled Broth, 50 ml	1
10496847	MI Media, Bottled Agar, 50 ml	1
10496705	M-Green Yeast and Mold Bottled Agar, 100 ml	1
10496713	Orange Serum Bottled Agar, 100 ml	1
10496731	Potato Dextrose Bottled Agar, 100 ml	1
10496706	Standard Bottled Agar, 100 ml	1
10496707	Trypticase Soy Broth (TSB) Single Strength, Bottled Broth, 100 ml	1
10496708	Trypticase Soy Broth (TSB) Double Strength, Bottled Broth, 100 ml	1

\* Product is only available in the Americas

## Dilution Bottles

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

Butterfield's Phosphate Buffer contains monobasic potassium phosphate and is used extensively in the food, dairy, and pharmaceutical industries. Offered in 90 ml and 99 ml volumes for easy 1:10 and 1:100 dilutions. It is recommended as a general diluent in laboratory procedures by the Federal Drug Administration and in the Bacteriological Analytical Manual. This product is prepared according to Standard Methods for the Examination of Water and Wastewater for use in water testing.

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

### Ordering Information – Dilution Bottles

Catalog Number	Description	Quantity/Pack
<b>Dilution Bottles</b>		
10498503	Dilution Bottle, Butterfield's Buffer, 99 ml	72
10498504	Dilution Bottle, Butterfield's Buffer, 90 ml	72
10498505	Dilution Bottle, Phosphate Buffer, magnesium chloride, 99 ml	72

## Swabs

### SwabCheck

#### The SwabCheck Principle

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



### Features and Benefits

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

### SwabCheck Use

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

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

### Neutralizing Buffer Swabs

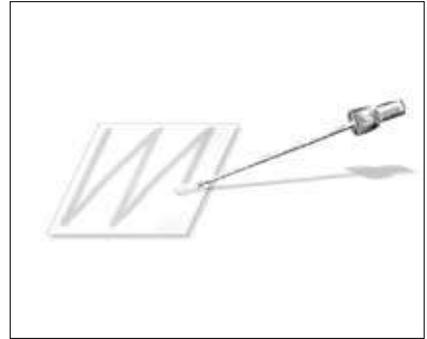
Neutralizing buffer swabs are used in the monitoring of surfaces for total bacterial count. Neutralizing buffer inactivates the bactericidal and bacteriostatic effects of chlorine and quaternary ammonium detergents. However, neutralizing buffer exhibits no toxic effects on microorganisms. This permits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

### Buffer Swabs

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

### SwabCheck

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



Total count swab kit



Coliform SwabCheck

### Coliform SwabCheck

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

### Hygiene SwabCheck

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

### Listeria SwabCheck

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

### SwabCheck *Escherichia coli*

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



Hygiene SwabCheck



Listeria SwabCheck

**Total Count Swab Kit**

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

**Yeast and Mold Swab Kit**

Used for the enumeration of yeast and molds on surfaces in accordance with HACCP. The kit includes the swabs and culture medium, packaged with a membrane device, providing a quantitative result. M-Green yeast and mold is an improved modification of the liquid medium, and was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth.

The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH that aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow. Green opaque colonies against a yellow background are indicative of the growth of yeasts. Mold colonies are green and filamentous.

**Polywipe Sponge**

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



Yeast and mold swab kit



Polywipe sponge

## Technical Specifications – Swabs and SwabChecks

Quality Control and Recommended Incubation Conditions	Formulation
<b>Neutralizing Buffer Swabs</b>	
<ul style="list-style-type: none"> <li>• Positive control: Undertaken on cultured organisms after transfer to standard methods agar plates from neutralizing buffer.</li> <li>• <i>Escherichia coli</i> ATCC 25922, incubated at 35°C for 24 hours.</li> <li>• Negative control: Not undertaken.</li> <li>• Sterility test: 7 days plated sterility test.</li> </ul>	<ul style="list-style-type: none"> <li>• Per liter of water adjusted to pH 7.2 ± 0.5</li> <li>• Sodium thiosulfate 160 mg</li> <li>• Aryl sulfonate complex 5.0 g</li> </ul>
<b>SwabCheck</b>	
<ul style="list-style-type: none"> <li>• Positive control: <i>Escherichia coli</i> ATCC 25922, 24-48 hours at 35-37°C.</li> <li>• Negative control: Not undertaken.</li> <li>• Sterility: 7 days plated sterility test.</li> </ul>	<ul style="list-style-type: none"> <li>• Proprietary</li> </ul>
<b>Buffer Swabs</b>	
<ul style="list-style-type: none"> <li>• Undertaken on cultured organisms after transfer to standard methods agar plates from the buffer solution. Positive control: <i>Escherichia coli</i> ATCC 25922, incubated at 35°C for 24 hours.</li> <li>• Negative control: Not undertaken.</li> <li>• Sterility: 7 days plated sterility test.</li> </ul>	<ul style="list-style-type: none"> <li>• Make to 1 liter and adjust pH to 7.2 ± 0.5</li> <li>• Monopotassium phosphate 42.5 mg</li> <li>• Potassium di-hydrogen phosphate 34 g</li> </ul>
<b>ColiCheck</b>	
<ul style="list-style-type: none"> <li>• Positive control: <i>Escherichia coli</i> ATCC 25922, incubated at 35°C for 48 hours.</li> <li>• Negative control: Sterile water incubated at 35°C for 48 hours.</li> <li>• Sterility test: 14 days plated sterility test.</li> </ul>	<ul style="list-style-type: none"> <li>• Per liter of water adjusted to pH 6.8 ± 0.2</li> <li>• Beef extract 3.0 g</li> <li>• Pancreatic digest of gelatin 5.0 g</li> <li>• Lactose 7.5 g</li> <li>• Pancreatic digest of casein 10.0 g</li> <li>• Dipotassium phosphate 1.375 g</li> <li>• Monopotassium phosphate 1.375 g</li> <li>• Sodium chloride 2.5 g</li> <li>• Sodium lauryl sulfate 50 mg</li> <li>• Bromocresol purple 8.5 mg</li> </ul>
<b>ColiCheck with MUG</b>	
<ul style="list-style-type: none"> <li>• Positive control: <i>Escherichia coli</i> ATCC 25922, incubated at 35°C for 48 hours. Checked for fluorescence at 366 nm.</li> <li>• Negative control: Sterile water incubated at 35°C for 48 hours.</li> <li>• Sterility test: 14 days plated sterility test.</li> </ul> <p>Organisms, Characteristics:</p> <ul style="list-style-type: none"> <li>• <i>E. coli</i> ATCC 25922 Growth</li> <li>• <i>E. aerogenes</i> ATCC 13048 Growth</li> <li>• <i>E. faecalis</i> ATCC 29212 Inhibited</li> </ul> <p>Organisms, Coloring:</p> <ul style="list-style-type: none"> <li>• <i>E. coli</i> ATCC 25922 Yellow, fluorescence</li> <li>• <i>E. aerogenes</i> ATCC 13048 Yellow, no fluorescence</li> <li>• <i>E. faecalis</i> ATCC 29212 Red, no fluorescence</li> </ul>	<ul style="list-style-type: none"> <li>• Per liter of water adjusted to pH 6.8 ± 0.2</li> <li>• Beef extract 3.0 g</li> <li>• Pancreatic digest of gelatin 5.0 g</li> <li>• Lactose 7.5 g</li> <li>• Pancreatic digest of casein 10.0 g</li> <li>• Dipotassium phosphate 1.375 g</li> <li>• Monopotassium phosphate 1.375 g</li> <li>• Sodium chloride 2.5 g</li> <li>• Sodium lauryl sulfate 50 mg</li> <li>• Bromocresol purple 8.5 mg</li> <li>• MUG 125 mg</li> </ul>

cont.

Quality Control and Recommended Incubation Conditions	Formulation
<p><b>SwabCheck <i>Escherichia coli</i></b></p> <ul style="list-style-type: none"> <li>• Positive control: <i>Escherichia coli</i> ATCC 25922, 24-48 hours at 35-37°C.</li> <li>• Negative control: <i>Enterobacter aerogenes</i> ATCC 13048, 24-48 hours at 35-37°C.</li> <li>• Growth but not fluorescence.</li> <li>• Sterility: 7 days plated sterility test.</li> </ul>	<ul style="list-style-type: none"> <li>• Per liter of water adjusted to pH 6.9 ± 0.2</li> <li>• Pancreatic digest of casein 20.0 g</li> <li>• Lactose 5.0 g</li> <li>• Bile salts mixture 1.5 g</li> <li>• Dipotassium phosphate 4.0 g</li> <li>• Monopotassium phosphate 1.5 g</li> <li>• Sodium chloride 5.0 g</li> <li>• 4-methylumbelliferyl-b-D-glucuronide 50 mg</li> </ul>
<p><b>Total Count Swab Kit</b></p> <ul style="list-style-type: none"> <li>• Positive control: <i>Escherichia coli</i> ATCC 25922, 24-48 hours at 35°C.</li> <li>• Negative control: Not undertaken.</li> <li>• Sterility: 7 days plated sterility test.</li> </ul>	<ul style="list-style-type: none"> <li>• Per liter of water adjusted to pH 7.0 ± 0.2</li> <li>• Pancreatic digest of casein 10.0 g</li> <li>• Yeast extract 5.0 g</li> <li>• Dextrose 2.0 g</li> </ul>
<p><b>Yeast and Mold Swab Kit</b></p> <ul style="list-style-type: none"> <li>• Positive control: <i>Candida albicans</i> ATCC 10231, 48 hours at 25-30°C.</li> <li>• Negative control: Not undertaken.</li> <li>• Sterility: 7 days plated sterility test.</li> </ul>	<ul style="list-style-type: none"> <li>• Per liter of water adjusted to pH 4.6 ± 0.2</li> <li>• Dipeptone 10.0 g</li> <li>• Yeast extract 9.0 g</li> <li>• Dextrose 50.0 g</li> <li>• Magnesium sulfate 2.1 g</li> <li>• Potassium phosphate 2.0 g</li> <li>• Drastase 50 mg</li> <li>• Thiamine 50 mg</li> <li>• Bromocresol green 26 mg</li> </ul>

### Ordering Information – SwabCheck

Catalog Number	Description	Quantity/Pack
10498303	Neutralizing buffer swabs, 4 ml	125
10498304	Neutralizing buffer swabs, 4 ml	500
10498305	Buffer swabs, 4 ml	125
10498306	Buffer swabs, 4 ml	500
10498404	SwabCheck, 4 ml	125
10498402	SwabCheck <i>Escherichia coli</i> , 4 ml	125
10498315	Total Count Swab Kit	30
10498316	Yeast and Mold Swab Kit	30
10498406	Coliform SwabCheck, units ready to use	25
10498407	Hygiene SwabCheck, units ready to use	25
10498408	Listeria SwabCheck, units ready to use	25
10498521	Polywipe sponge, ready to use, single packed	50

# Rapid Test

## Contamination Testing

### ColiCheck with MUG

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

The addition of MUG (4-methylumbelliferyl-b-D-glucuronide), which is a fluorogenic substrate, allows the media to selectively identify *Escherichia coli*. MUG is hydrolyzed by the *Escherichia coli* specific enzyme b-glucuronidase to release 4-methylumbelliferone, which fluoresces under ultraviolet light (approx. 366 nm wavelength).



ColiCheck with MUG

### Ordering Information – Rapid Test

Catalog Number	Description	Quantity/Pack
10496745	ColiCheck with MUG, P/A Test Kit – with sample bottles	30



## Specialty Products

Separate the organic from the inorganic. Protect lab surfaces. Test the pH levels in swimming pools. A range of products for a variety of tasks – to help you touch lives with safety and security.

- 168 Extraction Thimbles
- 172 Benchkote and Benchkote Plus
- 174 Weighing Papers
- 175 Ashless Filter Aids
- 175 Paper for Ignition Strength (IS) Measurement of Cigarettes
- 176 Seed Testing Papers
- 177 pH Indicators and Test Papers
- 180 Papers for Healthcare
- 181 Phase Separator Paper
- 183 Lens Cleaning Tissue

# Specialty Products

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

## Extraction Thimbles

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

### Cellulose Extraction Thimbles

#### *High-Performance Cellulose Extraction Thimbles*

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

Standard single thickness thimbles have a wall thickness of approximately 1 mm (10.0  $\mu\text{m}$  nominal particle retention).

Double thickness thimbles have a wall thickness of approximately 2 mm (6.0  $\mu\text{m}$  nominal particle retention) for applications where higher retention and increased wet or dry strength, or rigidity are required.

The high purity of the materials ensures reliable and reproducible analytical results.

#### **Standard Cellulose Extraction Thimbles**

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

#### **Thimble Size Selection Guide**

Thimble sizes should be selected carefully to fit extractors correctly. The different sizes represent the established practice of showing the internal diameter and overall length of the thimble in millimeters. Therefore, an extra allowance for wall thickness should be made when calculating external diameters. The thimble should pass through the narrower end of the upper extractor socket, allowing 1-2 mm clearance, and be 5-10 mm above the level of the top of the siphon tube.



## Technical Data – Standard Extraction Thimbles

Grade	Material	Maximum Temperature °C
603	Cellulose	120
603 g	Borosilicate glass fibers*	500

\* With inorganic binder

## Ordering Information – High-Performance Cellulose Extraction Thimbles

Dimensions (mm)* †	Catalog Number	Quantity/Pack
<b>Single Thickness (Wall = 1 mm)</b>		
10 × 50	2800-105	25
18 × 55	2800-185	25
19 × 90	2800-199	25
22 × 65	2800-226	25
22 × 80	2800-228	25
25 × 80	2800-258	25
25 × 90	2800-259	25
25 × 100	2800-250	25
26 × 60	2800-266**	25
26 × 100	2800-260	25
28 × 80	2800-288	25
28 × 100	2800-280	25
28 × 120	2800-282	25
30 × 77	2800-307	25
30 × 80	2800-308	25
30 × 100	2800-300	25
33 × 80	2800-338	25
33 × 94	2800-339	25
33 × 100	2800-330	25
33 × 118	2800-331	25
37 × 130	2800-373	25
41 × 123	2800-412	25
43 × 123	2800-432	25
60 × 180	2800-608	25
<b>Double Thickness (Wall = 2 mm)</b>		
16 × 60	2810-166	25
22 × 80	2810-228	25
25 × 80	2810-258	25
26 × 60	2810-266	25
33 × 80	2810-338	25
33 × 94	2810-339	25
43 × 123	2810-432	25

\* Internal diameter and external length

\*\* Fits Soxtec™ extractor

† See Thimble Size Selection Guide on p. 168

## Ordering Information – Standard Cellulose Extraction Thimbles

Dimensions (mm)* †	Grade	Wall Thickness (mm)	Catalog Number	Quantity/Pack
22 × 60	603	2.0	10350306	25
22 × 80	603	1.5	10350211	25
25 × 50	603	1.5	10350116	25
25 × 60	603	1.5	10350215	25
25 × 70	603T	1.5	10350216	25
25 × 80	603	1.5	10350217	25
25 × 100	603	1.5	10350219	25
26 × 60	603	1.5	10350220	25
27 × 80	603	1.5	10350223	25
28 × 60	603	1.5	10350225	25
28 × 80	603	1.5	10350226	25
28 × 100	603	1.5	10350227	25
30 × 80	603	1.5	10350234	25
30 × 90	603	1.5	10350235	25
30 × 100	603	1.5	10350236	25
31 × 80	603	1.5	10350303	25
33 × 60	603	1.5	10350238	25
33 × 80	603	1.5	10350240	25
33 × 80	603T	1.0	10350437	25
33 × 90	603	1.5	10350241	25
33 × 94	603	1.5	10350242	25
33 × 100	603	1.5	10350243	25
33 × 118	603	1.5	10350245	25
33 × 130	603	1.5	10350247	25
33 × 205	603	1.5	10350250	25
34 × 130	603	1.5	10350252	25
35 × 120	603	1.5	10350254	25
35 × 150	603	1.5	10350255	25
40 × 85	603	2.0	10350261	25
41 × 123	603	2.0	10350265	25
44 × 230	603	2.0	10350275	25
48 × 145	603	2.0	10350273	25
48 × 200	603	2.0	10350274	25
75 × 250	603	2.5	10350287	25
80 × 250	603	3.0	10350324	25

\* Internal diameter and external length

† See Thimble Size Selection Guide on p. 168

## Ordering Information – Standard Cellulose Extraction Thimbles for DIONEX ASE

Extraction Volume (ml)	Extraction System	Wall Thickness (mm)	Catalog Number	Quantity/Pack
11	200	2.0	10350106	25
22	200	1.5	10350108	25
33	200	1.5	10350109	25
34	100/300	1.5	10350328	25
66	100/300	1.5	10350327	25
100	100/300	1.5	10350315	25

## Glass & Quartz Extraction Thimbles

### High-Purity Glass Microfiber Thimbles

High-purity glass microfiber thimbles manufactured from 100% pure borosilicate glass are available for specialized applications. The thimbles are completely free of binders or additives and can be used at temperatures up to 500°C or when using solvents that are incompatible with cellulose thimbles. These thimbles are also used in pollution monitoring techniques (0.8 µm nominal particle retention). Typical thickness 1.7 mm.

#### Features and Benefits

- Available in a range of sizes and wall thicknesses to suit your application
- Designed to fit most commercially available Soxhlet extractors
- No binders are added

#### Applications

- Smoke stack gas monitoring
- Soxhlet extraction
- Analyzing pesticide residues
- Determining oil/fat content of foods (e.g., French fries)
- Analysis of oil and grease in solid wastes

### Quartz Microfiber Thimbles

Made from high-purity quartz microfiber, this thimble is able to withstand high temperatures (up to 1000°C). Suitable for both solvent extraction and air sampling applications.

### Standard Glass Fiber Thimbles

Thimbles of type 603 g are made from borosilicate glass fibers with inorganic binder. There is also a selection of borosilicate glass thimbles without binder.

## Ordering Information – High-Purity Glass or Quartz Microfiber

Dimensions (mm)*	Catalog Number	Quantity/Pack
<b>Glass Microfiber Thimbles – Grade HP-GF</b>		
19 × 90	2814-199	25
25 × 90, tapered	2814-259	25
30 × 100	2814-300	25
43 × 123	2814-432	25
33 × 135	2814-533	25
<b>Quartz Microfiber Thimble</b>		
25 × 90, tapered	2812-259	10

\* See *Thimble Size Selection Guide* on p. 168

## Ordering Information – Standard Glass Microfiber Extraction Thimbles

Dimensions (mm)*	Wall Thickness (mm)	Catalog Number	Quantity/Pack
<b>Grade 603 g (Glass Fiber with Inorganic Binder)</b>			
10 × 38	1.5	10371103	25
16 × 50	1.0	10371005	25
19 × 90	1.0	10371007	25
22 × 80	1.5	10371011	25
23.8 × 68	1.5	10371114	25
25 × 98	1.5	10371029	25
25 × 100	1.5	10371019	25
26 × 63	1.5	10371122	25
26 × 100	1.5	10371023	25
28 × 60	1.5	10371025	25
30 × 100	1.5	10371036	25
33 × 94	1.5	10371042	25
33 × 100	1.5	10371043	25
33 × 118	1.5	10371045	25
35 × 150	1.5	10371055	25
44 × 230	1.5	10371075	25
<b>Glass Microfiber Thimbles (without Binder)</b>			
25 × 80	-	2811-258	25
30 × 80	-	2811-308	25

\* Internal diameter and external length

## Benchkote and Benchkote Plus

### Benchkote

Benchkote is an absorbent, impermeable material designed to protect laboratory surfaces against hazardous spills. The material features a high-quality, smooth, absorbent Whatman paper, which quickly absorbs liquid spills, and a laminated polyethylene layer that prevents flow through to the working surface. After use, the sheet is incinerated or disposed of according to local regulations.



## Benchkote Plus

Benchkote Plus™ is a thicker, more absorbent material for more demanding applications and can absorb in excess of 0.75 liters of water per square meter.

### Features and Benefits

- Material is very strong, making it tear resistant, wet or dry
- Smooth white surface can be written on with ink or pencil and lies flat
- Suitable for saturation with disinfectant to protect benches where pathogens and other bacteria are present
- Use polyethylene side up to collect deposits without absorption
- Paper side quickly absorbs liquid spills, preventing liquids from going through to the work surface

- Spillages are trapped in the absorbent paper
- Benchkote can be incinerated after use; the polyethylene layer does not melt or drip but is rapidly consumed in the flames

### Applications

- Containing radiochemical spillage and avoiding contamination
- Recovering spillage of expensive materials
- Protecting hard surfaces to lessen impact
- Water or solvent wick for humidity chambers
- Lining of chemical cabinets, laboratory bench drawers, and laboratory hoods

## Ordering Information – Benchkote for Blotting

Dimensions (mm)	Catalog Number	Description	Quantity/Pack
<b>Benchkote Surface Protector</b>			
460 × 570	2300-594*	Pad	1 (50 sheets)
460 × 570	2300-599	Pad	1 (50 sheets)
460 × 570	2300-916	Sheets	50
460 × 570	2300-917	Sheets	100
460 mm × 50 m	2300-731	Reel	1
920 mm × 50 m	2300-772	Reel	1
<b>Benchkote Plus Surface Protector</b>			
500 × 600	2301-6150	Sheets	50
600 mm × 50 m	2301-6160	Reel	1

\* Product is only available in the Americas

# Weighing Papers

## Kjeldahl Weighing Boats

### Features and Benefits

- Excellent for weighing and transferring Kjeldahl samples safely and reliably
- Dissolves residue-free in the digestion solution without influencing the analytical results in any way
- Made from very low nitrogen parchment paper without any glue or additives

Transfer your samples completely loss-free by simply dropping the entire weighing boat containing the sample into the acid solution in the Kjeldahl flask/digestion tube.

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

## Parchment Paper

### Features and Benefits

- Transparent and smooth
- Simplifies sample transfer
- Quantitative transfer from paper



## Typical Properties – Weighing Papers

Product	Grade	Thickness (mm)	Weight (g/m <sup>2</sup> )
Weighing boat, ≤ 0.07% N	609	0.07	80
Pergamyne paper	2122	0.03	40
Parchment paper, ≤ 0.05% N	B-2	0.04	43

## Ordering Information – Weighing Papers

Size (mm)	Grade	Catalog Number	Description	Quantity/Pack
55 × 10 × 10	609	10313032	Kjeldahl Weighing Boat	100
100 × 100	2122	10347893	Sheets	500
150 × 150	2122	10347890	Sheets	500
3 × 3"	B-2	10347671	Sheets	500
4 × 4"	B-2	10347672	Sheets	500
6 × 6"	B-2	10347673	Sheets	500
12 × 12"	B-2	10347670	Sheets	500

# Ashless Filter Aids

Whatman ashless filter aids enhance filtration speed by coagulating precipitates or suspensions to form a thick retentive “prefilter” layer on top of normal filter paper.

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

## Ordering Information – Ashless Filter Aids

Size (g)	Catalog Number	Description	Quantity/Pack
100	1704-010	Ashless floc	1
250	1700-025	Ashless powder	1
500	1703-050	Ashless clippings	1

# Paper for Ignition Strength (IS) Measurement of Cigarettes

Specifically developed for use in measuring the Ignition Strength of Cigarettes according to ASTM standard E 2187-04. This certified Grade 2 is tested according to the procedure detailed in ASTM E 2187-04, Sections 9.3.1 and 9.3.2. The paper meets both the conditioned ( $26.1 \pm 0.5$  g, SD < 0.3 g) and dried ( $24.7 \pm 0.5$  g, SD < 0.3 g) weight requirements.



Ignition strength testing of cigarettes

The lot specific certificate can be downloaded from the Certificates section.

### Features and Benefits

- Each lot is guaranteed to meet the ASTM E 2187-04 specifications
- Simplifies testing process by eliminating lot suitability testing
- Lot specific certificate is downloadable from the web
- Just condition and use

## Ordering Information - Paper for Ignition Strength (IS) Measurement of Cigarettes

Diameter (mm)	Grade	Catalog Number	Quantity/Pack
150	2	1002-147	100

## Seed Testing Papers

Owing to their extremely high purity our seed testing papers provide reliable and reproducible results. The papers are made from pure cellulose without any additives and do not contain any substances which could influence the growth of the seeds. The constant water absorption of the papers ensures the continuous provision of the required amount of water.

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



### Product Selection – Seed Testing Papers

Grade	Description	Thickness (mm)	Weight (g/m <sup>2</sup> )
<b>PP Method</b>			
3014	Pleated strips, white*	0.22	113
3236	Pleated strips, white*	0.22	110
<b>TP Method</b>			
597	For Petri dishes or Jacobsen/Copenhagen tanks, white	0.18	85
598	For Petri dishes or Jacobsen/Copenhagen tanks, white	0.32	140
3621	Blotter, light blue	1.45	700
3633	Blotter, light blue	0.65	300
3644	Blotter, blue	1.4	720
3645	Yellow	0.35	165

\* 50 double pleats

### Application – Seed Testing Papers

Grade	Description
181	Support filter for seed tests using Copenhagen tank system
182	Thicker paper for "Between Papers" method of germination for larger seeds
597, 598	Small Seeds (e.g., grasses, flowers)
3014, 3236	Medium-large and coated seeds (e.g., sugar beet, fodder beet, grain, sunflower, rapeseed, mustard)
3014	Particularly sensitive seeds
3621, 3633, 3645	Seeds with small white rootlets

## Ordering Information – Seed Testing Papers

Size (mm)	Grade	Catalog Number	Description	Quantity/Pack
<b>Circles</b>				
70	597	10311808	Circles	100
90	597	10311809	Circles	100
90	598	10312209	Circles	100
90	3633	10342710	Circles	1000
90	181	2181-090	Circles	100
410	182	2182-410	Circles	100
<b>Sheets</b>				
80 × 120	3621	10342577	Sheets	1000
270 × 410	3633	10342766	Sheets	100
500 × 600	181	2181-904	Sheets	100
110 × 170	3645	10342583	Sheets	100
140 × 200	3644	10342580	Sheets	100
<b>Pleated Strips</b>				
110 × 20*	3014	10344672	Double pleated strips	1000
110 × 20*	3014	10344676	Double pleated strips	1000
110 × 20**	3236	10345572	Double pleated strips	1000
110 × 20**	3236	10345576	Double pleated strips	1000

\* White

\*\* Grey

## pH Indicator & Test Papers

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

The convenience of using indicator papers for the rapid determination of pH values has led to many applications in laboratories and industry.

### 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, eight or more different color segments marked with corresponding pH values for matching purposes. The pH test value can be read off by direct comparison of the test strip color and the color bars. Excellent for colored solutions, when any changes in color of the paper stock are automatically cancelled out.

### **Dispensers Type TC**

The strip has three separate indicator dye color bands. The individual combination of color change resulting from each test is compared with the color-coded comparison chart printed on the dispenser, giving improved speed and accuracy in reading.

### **Dispensers Type SR**

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 preblackening the paper in  $H_2S$ . Concentrations as low as 4 ppm can be detected.

### **Potassium Iodide Test Paper**

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

## Ordering Information – pH Indicators and Test Papers

Dimensions (mm)	pH Range	Catalog Number	Description	Packaging	Quantity/Pack
<b>Strips</b>					
6 × 80	0.0 – 14.0	2613-991	Color bonded	100	1
6 × 80	4.5 – 10.0	2614-991	Color bonded	100	1
11 × 100	1.0 – 12.0	2612-990	Integral comparison strip	200	1
11 × 100	1.8 – 3.8	2626-990	Integral comparison strip	200	1
11 × 100	3.8 – 5.5	2627-990	Integral comparison strip	200	1
11 × 100	5.2 – 6.8	2628-990	Integral comparison strip	200	1
11 × 100	6.0 – 8.1	2629-990	Integral comparison strip	200	1
11 × 100	8.0 – 9.7	2630-990	Integral comparison strip	200	1
11 × 100	9.5 – 12.0	2631-990	Integral comparison strip	200	1
<b>Dispensers (Reel)</b>					
10 mm × 5 m	1.0 – 11.0	2611-628	Three colors	-	1
7 mm × 5 m	1.0 – 14.0	2600-100A	Standard full range	-	1
7 mm × 5 m	0.5 – 5.5	2600-101A	Standard narrow range	-	1
7 mm × 5 m	4.0 – 7.0	2600-102A	Standard narrow range	-	1
7 mm × 5 m	6.4 – 8.0	2600-103A	Standard narrow range	-	1
7 mm × 5 m	8.0 – 10.0	2600-104A	Standard narrow range	-	1

## Ordering Information – Acid-Alkali Test Papers

Dimensions	pH Range	Catalog Number	Description	Packaging	Quantity/Pack
<b>Dispensers (Reel)</b>					
7 mm × 5 m	-	2600-201A	Litmus blue	-	1
7 mm × 5 m	-	2600-202A	Litmus red	-	1
7 mm × 5 m	-	2600-203A	Congo red	-	1
7 mm × 5 m	-	2600-204A	Phenolphthalein	-	1
<b>Books</b>					
-	-	2600-601	Litmus blue	10 books of 20 strips	10
-	-	2600-602	Litmus red	10 books of 20 strips	10
-	1.0 – 11.0	2600-500	-	10 books of 10 strips	20
-	6.8 – 8.3	2638-500	-	10 books of 20 strips	10
<b>Specialized Test Paper Dispensers (Reel)</b>					
7 mm × 50 m	-	2602-501A	Lead acetate	-	1
7 mm × 5 m	-	2602-500A	Potassium iodide	-	1
<b>Specialized Test Paper Dispensers (Book)</b>					
-	-	2651-500	Starch iodide	10 books of 20 strips	10

## Universal Indicator Papers

Universal indicator papers have been impregnated with a mixture of several indicators. On contact with the sample

solution they assume a particular color. A check against the color comparison table supplied allows the pH to be determined.

### Ordering Information – Universal Indicator Papers

pH Range	Catalog Number	Quantity/Pack
<b>PANPEHA (Roll)</b>		
1 – 11	10362030	1
<b>PANPEHA Plus (Nonbleeding) (Strips)</b>		
0 – 14	10362000	100
2 – 9	10362010	100
<b>PANPEHA Nr. 112 (Strips)</b>		
0 – 14	10360005	200
<b>Litmus Blue (Roll)</b>		
0 – 12	10360300	100
<b>Litmus Red (Roll)</b>		
0 – 13	10360400	100

## Papers for Healthcare

### Antibiotic Assay Discs

For determining the type of causal agent of infectious diseases and for checking their sensitivity to antibiotics and chemotherapeutic agents in vitro by means of the inhibition zone determination method. The antibiogram allows rational and selective chemotherapy.

The test discs can be coated with chemotherapeutic agents, placed on the inoculated nutrient agar and incubated. The size of the inhibition zone is a measure for the effectiveness of the substances.

### Ordering Information – Antibiotic Assay (AA) Paper

Dimensions (mm)	Catalog Number	Quantity/Pack
<b>AA Discs</b>		
6	2017-006	1000
9	2017-009	1000
13	2017-013	1000
<b>Grade 17 Chr (Circles)</b>		
47	1017-047	100
70	1017-070	100
80	1017-080	100
185	1017-185	100
210, with 60 mm central hole	1017-411	100

# Papers for Healthcare Applications

## Grade 470

Soft surface. For gelatinous samples. Used for the absorption of culture media, as a blotting paper, for electrophoresis, and amino acid chromatography.

## Grade 165

Special paper used for blood grouping tests by the Technicon method.

## Ordering Information – Papers for Healthcare Applications

Dimensions (mm)	Catalog Number	Quantity/Pack
<b>Grade 470 (Sheets)</b>		
200 × 200	10318487	100
460 × 570	10318493	100
203 × 305	10318489	25
<b>Grade 165 (Roll)</b>		
25 mm × 150 m	2165-623	1

## Phase Separator Paper

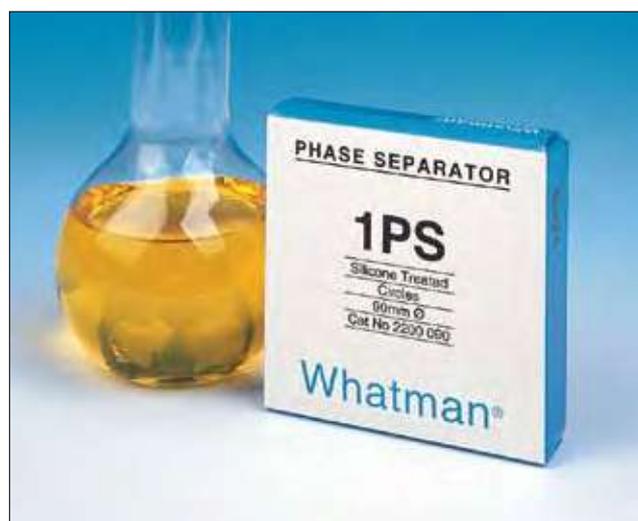
The Whatman 1PS Phase Separator is a high-grade filter paper impregnated with a stabilized silicone that renders it hydrophobic, retaining the aqueous phase and passing the solvent phase through.

### Features and Benefits

- Ease of use – no special training required
- Any number of separations can be processed together
- Staff involvement in routine separations is at a minimum

### Automatic Cut-Off, Separatory Funnel Replacement

After being shaken, the mixed phases are simply poured directly into the 1PS circle, which is quadrant-folded in a funnel. The separation is extremely rapid so it is unnecessary to wait until the two phases have settled into separate layers. Droplets are automatically separated after only a few moments, giving a solvent phase completely free of the aqueous phase.



In many applications, 1PS can replace the use of separatory funnels. The solvent phase flows through the paper quickly and cleanly. It then stops automatically, leaving the aqueous phase completely in the paper. This feature is particularly important when carrying out a large number of routine solvent extractions at the same time. Samples can be shaken with solvent in stoppered conical flasks or test tubes and transferred directly to funnels containing 1PS.

#### Unsupervised Separation

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

*\* Water may break through upon prolonged standing.*

### Ordering Information – 1PS Phase Separators

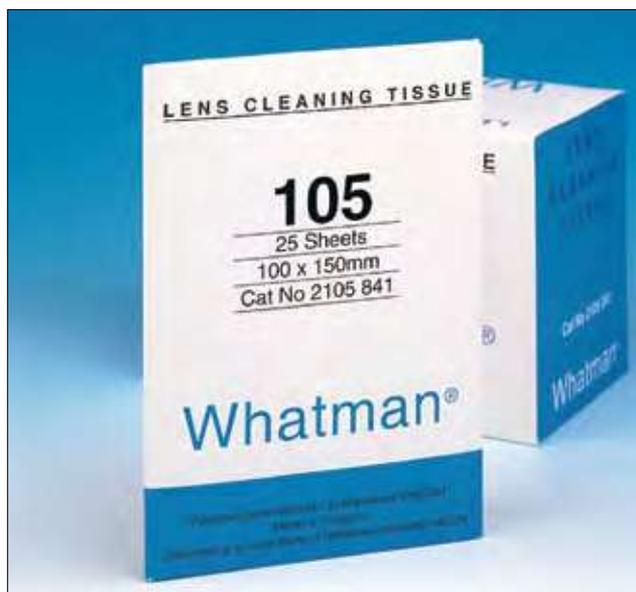
Dimensions (mm)	Catalog Number	Quantity/Pack
<b>Circles</b>		
70	2200-070	100
90	2200-090	100
110	2200-110	100
125	2200-125	100
150	2200-150	100
185	2200-185	100
240	2200-240	100
270	2200-270	100
<b>Sheets</b>		
280 × 460	2200-890	25

# Lens Cleaning Tissue

Lenses and other optical surfaces made from glass, quartz or plastic can be easily scratched if you do not clean them with a very soft surface. High-quality Whatman lens cleaning tissue provides the solution. The tissue is chemically pure and free from silicones and other additives. Most importantly, it can be relied on to safely remove surface moisture and grease.

## Features and Benefits

- Soft texture will not damage lenses or optical surfaces
- Chemically pure tissue is free from silicones and other additives
- High absorbency ensures the safe removal of surface moisture and grease
- Thickness 0.035 to 0.040 mm
- Very strong and leaves no fibers



## Ordering Information – Lens Cleaning Tissues

Dimensions (mm)	Catalog Number	Packaging	Quantity/Pack
<b>Grade 105 (Sheets)</b>			
100 × 150	2105-841	25 wallets of 25 sheets	25
200 × 300	2105-862	-	100
460 × 570	2105-918	-	500



## Chromatography Products

From pesticide analysis to pharmaceutical QC, our chromatography solutions separate individual chemical constituents for testing and analysis.

- 186 Chromatography Paper
- 190 Cellulose Chromatography Media
- 191 Advanced Ion Exchange Cellulose
- 195 Solid Phase Extraction (SPE)
- 198 High-Performance Liquid Chromatography (HPLC)
- 207 Silica Media for Column and Flash Chromatography
- 210 Thin Layer Chromatography (TLC)



# Chromatography Products

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

Today's pharmaceutical, chemical and biotechnology industries are facing demands for purity in the development of commercially important products. As a result, chromatography has become a major purification technique on a process and preparative scale. Separation media with assured uniformity

and reproducibility have become vital components in the ultimate goal of bringing a new product to market. Whatman has a complete line of chromatography products to suit these exacting requirements.

## Chromatography Paper

Whatman chromatography papers are the most widely used papers for chromatography worldwide. This acceptance and usage reflect the purity, high quality, and consistency of Whatman papers. These qualities are relied upon by chromatographers and are essential to successful, reproducible chromatography. Whatman chromatography paper media are made from specially selected cotton cellulose. They are rigorously quality controlled for characteristics important to the chromatographer and to ensure uniformity within the grade. The chromatography paper product line includes standard cellulose and ion exchange grades.

### Features and Benefits

- Pure cellulose produced entirely from the highest quality cotton linters with no additives of any kind
- Manufactured and tested specifically for chromatographic techniques – this ensures the wicking capability and uniformity of capillary action that are important in chemical separations.
- Also widely used in protein and nucleic acid blotting (see Blotting Products)

## Cellulose Chromatography Papers

### Grade 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.



### Grade 2 Chr

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

### Grade 3 Chr

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

### Grade 3MM Chr

Though widely used as a blotting paper, 3MM Chr is also used both in 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.

**Grade 4 Chr**

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

**Grade 17 Chr**

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

**Grade 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.

**Grade 31ET Chr**

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

**Grade 54 SFC**

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

**Grade 2668 Chr**

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

**Grade 2727 Chr**

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

## Ordering Information – Cellulose Chromatography Paper

Catalog Number	Description	Quantity/Pack
<b>Grade 1 Chr</b>		
3001-964	1 Chr chromatography strips, CRL, 11 × 21.3 cm with 12 strips of 1.5 cm 1 Chr sheet divided into 15 mm lanes for running up to 12 samples in parallel	100.
3001-845	1 Chr sheets, 10 × 30 cm	100
3001-861	1 Chr sheets, 20 × 20 cm	100
3001-878	1 Chr sheets, 25 × 25 cm	100
3001-917	1 Chr sheets, 46 × 57 cm	100
3001-931	1 Chr sheets, 58 × 68 cm	100
3001-604	1 Chr roll, 1.0 cm × 100 m	1
3001-614	1 Chr roll, 2.0 cm × 100 m	1
3001-640	1 Chr roll, 3.0 cm × 100 m	1
3001-652	1 Chr roll, 4.0 cm × 100 m	1
3001-653	1 Chr roll, 5.0 cm × 100 m	1
3001-672	1 Chr roll, 10.0 cm × 100 m	1
3001-681	1 Chr roll, 15.0 cm × 100 m	1
3001-633	1 Chr roll, 1" × 300 ft.	1
3001-651	1 Chr roll, 1.5" × 300 ft.	1
<b>Grade 2 Chr</b>		
3002-917	2 Chr sheets, 46 × 57 cm	100
3002-911	2 Chr sheets, 58 × 60 cm	100
<b>Grade 3 Chr</b>		
3003-917	3 Chr sheets, 46 × 57 cm	100
3003-911	3 Chr sheets, 58 × 60 cm	100

cont.

Catalog Number	Description	Quantity/Pack
<b>Grade 3MM Chr</b>		
1030-023	3MM Chr circles, 2.3 cm	100
1030-024	3MM Chr circles, 2.4 cm	100
1030-025	3MM Chr circles, 2.5 cm	100
1030-047	3MM Chr circles, 4.7 cm	100
3030-6185	3MM Chr sheets, 11 × 14 cm	100
3030-6132	3MM Chr sheets, 12 × 14 cm	100
3030-153	3MM Chr sheets, 15 × 17.5 cm	100
3030-6188	3MM Chr sheets, 15 × 20 cm	100
3030-221	3MM Chr sheets, 18 × 34 cm	100
3030-861	3MM Chr sheets, 20 × 20 cm	100
3030-6461	3MM Chr sheets, 26 × 41 cm	100
3030-347	3MM Chr sheets, 35 × 43 cm	100
3030-392	3MM Chr sheets, 35 × 45 cm	100
3030-335	3MM Chr sheets, 31.5 × 35.5 cm	100
3030-917	3MM Chr sheets, 46 × 57 cm	100
3030-931	3MM Chr sheets, 58 × 68 cm	100
3030-6189	3MM Chr sheets, 4 × 5.25"	100
3030-6187	3MM Chr sheets, 6 × 8"	100
3030-866	3MM Chr sheets, 8 × 10"	100
3030-614	3MM Chr roll, 2 cm × 100 m	1
3030-662	3MM Chr roll, 7.5 cm × 100 m	1
3030-672	3MM Chr roll, 10 cm × 100 m	1
3030-675	3MM Chr roll, 12.5 cm × 100 m	1
3030-681	3MM Chr roll, 15 cm × 100 m	1
3030-690	3MM Chr roll, 19 cm × 100 m	1
3030-700	3MM Chr roll, 23 cm × 100 m	1
3030-704	3MM Chr roll, 27 cm × 100 m	1
<b>Grade 4 Chr</b>		
3004-919	4 Chr sheets, 21 × 29.7 cm	100
3004-917	4 Chr sheets, 46 × 57 cm	100
3004-614	4 Chr roll, 2.0 cm × 100 m	1
3004-651	4 Chr Roll, 1.5" × 300 ft.	1
<b>Grade 17 Chr</b>		
3017-8793	17 Chr sheets, 2.5 × 22 cm	100
3017-8355	17 Chr sheets, 6.9 × 9 cm	200
3017-915	17 Chr sheets, 46 × 57 cm	25
3017-917	17 Chr sheets, 46 × 57 cm	100
3017-820	17 Chr sheets, 70 × 90 cm	100
3017-621	17 Chr roll, 2.5 cm × 30 m	1
<b>Grade 20 Chr</b>		
3020-917	20 Chr sheets, 46 × 57 cm	100

cont.

Catalog Number	Description	Quantity/Pack
<b>Grade 31ET Chr</b>		
3031-901	31ET Chr sheets, 2 × 5 cm	1000
3031-915	31ET Chr sheets, 46 × 57 cm	25
3031-917	31ET Chr sheets, 46 × 57 cm	100
3031-681	31ET Chr roll, 15 cm × 100 m	1
<b>Grade 54 SFC</b>		
3454-7051	54 SFC roll, 27 cm × 100 m	1
3454-651	54 SFC roll, 1.5" × 300 ft.	1
<b>Grade 2668 Chr</b>		
10382461	2668 Chr sheets, 58 × 60 cm	100
<b>Grade 2727 Chr</b>		
10382581	2727 Chr sheets, 19 × 19 cm	100
10382562	2727 Chr sheets, 58 × 60 cm	50

## Ion Exchange Papers

### 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
- Suitable for two-dimensional chromatography (change in direction of the solvent front) with possible improved resolution
- Used in enzyme assays to separate product from reactant by charge or polarity

### Grade 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  $\mu\text{eq}/\text{cm}^2$  and wicking flow rate is 95 mm/30 min. For use with reverse transcriptase assays and DNA polymerase. Also available in Multiwell filter plates (Mesh Bottom UNIFILTER).

### Grade P81

A thin (0.23 mm) cellulose phosphate paper. Strong cation exchanger of high capacity. Ion exchange capacity is 18.0  $\mu\text{eq}/\text{cm}^2$  and the flow rate is 125 mm/30 min. For use with protein kinase assay with peptide substrates. Also available in multiwell filter plates (Protein Kinase and Mesh Bottom UNIFILTER).

### Grade SG81

A novel paper (0.27 mm thick) combining cellulose and large pore silica gel. Not charged, but binds polar molecules from less-polar solvent. 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.

Ion Exchange Celluloses are also available as microgranular and fibrous media.

## Ordering Information – Ion Exchange Papers

Catalog Number	Description	Quantity/Pack
<b>Grade DE81</b>		
3658-323	DE81 circles, 23 mm	100
3658-023	DE81 circles, 23 mm	400
3658-324	DE81 circles, 24 mm	100
3658-325	DE81 circles, 25 mm	100
3658-915	DE81 sheets, 460 × 570 mm	25
3658-917	DE81 sheets, 460 × 570 mm	100
<b>Grade P81</b>		
3698-321	P81 circles, 21 mm	100
3698-023	P81 circles, 23 mm	400
3698-325	P81 circles, 25 mm	100
3698-875	P81 sheets, 200 × 200 mm	25
3698-915	P81 sheets, 460 × 570 mm	25
3698-917	P81 sheets, 460 × 570 mm	100
<b>Grade SG81</b>		
3668-915	SG81 sheets, 460 × 570 mm	25

## Cellulose Chromatography Media

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

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

### Cellulose Powders

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

#### CC31

Pure, microgranular cellulose powder for column separations.

#### CC41

Pure, binder-free microgranular cellulose powder for TLC.

#### CF1

Fibrous, long cellulose for batch separations.

#### CF11

Fibrous, medium cellulose powder for general column chromatography.



## Ordering Information – Cellulose Powders

Catalog Number	Description	Size
4020-050	CF1 cellulose powder	500 g
4021-050	CF11 cellulose powder	500 g
4021-500	CF11 cellulose powder	5 kg
4014-050	CC31 cellulose powder	500 g
4014-200	CC31 cellulose powder	2 kg
4061-050	CC41 cellulose powder	500 g

### *CDR (Cell Debris Remover)*

Serves as a filter aid in protein purification for initial clean-up of cell lysates; removes unwanted, suspended colloidal and insoluble matter, leaving target proteins in solution. Additional filter aids are also available; see Ashless Powder.

## Ordering Information – CDR (Cell Debris Remover)

Catalog Number	Description	Size
4025-050	Cell debris remover	500 g
4025-200	Cell debris remover	2 kg

## Advanced Ion Exchange Cellulose

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

- Preswollen microgranular AIEC for high load capacity, fast kinetics and resolution; saves time by eliminating the need for precycling prior to buffer equilibrium
- Dry microgranular AIEC for similar performance characteristics as preswollen media after precycling; reduces the 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

Ion exchange celluloses are also available in paper format; see Chromatography Paper.

## EXPRESS-ION High Flow Rate Ion Exchange Media

EXPRESS-ION™ media are matrices whose flow characteristics have been greatly improved. The manufacturing process has been optimized so that the matrix allows faster flow while retaining its inherently fast kinetics of adsorption and desorption. They are supplied as moist powders, so precycling and fines removal are not required.

### EXPRESS-ION D

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

### EXPRESS-ION Q

A strong (charge independent of pH) 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.

Standard Anion and Cation Exchange Media are described separately. Ion Exchange Celluloses are also available in paper format.

### Typical Data – EXPRESS-ION Linear Flow Rate (cm/h)

Pressure	Linear Flow Rate (cm/h)		
	at 5 psi	at 7.5 psi	at 10 psi
EXPRESS-ION D	172	214	239
EXPRESS-ION Q	135	174	212
EXPRESS-ION C	94	127	165
EXPRESS-ION S	94	127	161

Column dimensions: 45 cm ID × 15 cm H

## Properties – EXPRESS-ION High Flow Rate Media

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
<b>Typical Protein Capacity (mg/ml)</b>				
BSA	60	55	-	-
Lysozyme	-	-	162	153
Small Ion Capacity	←————— 1 meq/dg*		—————→	
Fiber Length	←————— 60-130 µm		—————→	
Base Matrix	←————— Microgranular cellulose		—————→	
Typical Flow Rate	←————— 150 cm/hr		—————→	
Physical Stability	←————— Negligible volume changes due to ionic strength or pH		—————→	
Bed Volume g**/ml	0.72	0.64	0.7	0.8

\* dg – dry gram; typical moisture content 65-68%

\*\* Grams as supplied

## Ordering Information – EXPRESS-ION High Flow Rate Ion Exchange Media

Catalog Number	Description	Size
<b>Weak Anion Exchange Cellulose</b>		
4079-0025	EXPRESS-ION D	250 g
4079-0200	EXPRESS-ION D	2 kg
<b>Strong Anion Exchange Cellulose</b>		
4079-3025	EXPRESS-ION Q	250 g
<b>Weak Cation Exchange Cellulose</b>		
4079-1025	EXPRESS-ION C	250 g
<b>Strong Cation Exchange Cellulose</b>		
4079-2025	EXPRESS-ION S	250 g

## Anion Exchangers

The DE weak (charge dependent on pH) anion exchangers are based on the diethylaminoethyl (DEAE) tertiary amine functional group. QA52 is a strong (charge independent of pH) anion exchange medium, containing quaternary amine groups.

### DE23 Dry Fibrous DEAE Cellulose

Allows fast flow rates especially after fines removal; suitable for negatively charged biopolymers.

### DE32 Dry Microgranular DEAE Cellulose

Similar performance characteristics after precycling as DE52.

### DE52 Preswollen Microgranular DEAE Cellulose

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 DEAE Cellulose

Partially quaternized DEAE anion exchanger, highly substituted and with higher capacity than DE52; can be used in series with DE52 media.

### QA52 Preswollen Microgranular QA Cellulose

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

## Typical Data – Anion Exchange Media

Physical Form	Functional Group	Normal pH Range	Small Ion Capacity (meq/dg*)†	Protein Capacity**		Packing Density** Dry Exchanger/ml Bed Volume (dg*/ml)
				Dry Gram (mg/dg*)†	Bed Volume (mg/ml)†	
<b>Dry Fibrous</b>						
DE23	Diethylaminoethyl	2-9.5	0.88-1.08	425	60	0.15
<b>Dry Microgranular</b>						
DE32	Diethylaminoethyl	2-9.5	0.88-1.08	700	140	0.24
<b>Preswollen Microgranular</b>						
DE52	Diethylaminoethyl	2-9.5	0.88-1.08	700	130	0.9
DE53	Diethylaminoethyl	2-12	1.8-2.2	750	150	1.1
QA52	Quaternary ammonium	2-12	1.1	750	150	1.2

\* dg – dry gram

\*\* g – gram as supplied (dry or preswollen)

† Bovine serum albumin in 10 mm phosphate buffer pH 8.5

## Ordering Information – Anion Exchange Celluloses

Catalog Number	Product	Description	Size
4053-010	DE23	Dry fibrous DEAE cellulose	100 g
4053-025	DE23	Dry fibrous DEAE cellulose	250 g
4055-010	DE32	Dry microgranular DEAE cellulose	100 g
4055-050	DE32	Dry microgranular DEAE cellulose	500 g
4057-050	DE52	Preswollen microgranular DEAE cellulose	500 g
4057-200	DE52	Preswollen microgranular DEAE cellulose	2 kg
4058-050	DE53	Preswollen microgranular DEAE cellulose	500 g
4058-200	DE53	Preswollen microgranular DEAE cellulose	2 kg
4065-050	QA52	Preswollen microgranular quaternary amine cellulose	500 g
4065-200	QA52	Preswollen microgranular quaternary amine cellulose	2 kg

## Cation Exchangers

### CM23 (Dry Fibrous Carboxymethyl Cellulose)

Uniformly substituted fibrous media allowing very fast flow rates, especially after fines removal; exhibits high binding for proteins and biopolymers bearing positive charges.

### CM32 (Dry Microgranular Carboxymethyl Cellulose)

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 after swelling to CM52.

### CM52 (Preswollen Microgranular Carboxymethyl Cellulose)

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

### P11 (Dry Fibrous Cellulose Phosphate)

Dry fiber. Recommended for column separations.

EXPRESS-ION High Flow Rate Ion Exchange Media are described separately. Ion exchange celluloses are also available in paper format.

## Typical Data – Cation Exchange Media

Physical Form	Functional Group	Normal pH Range	Small Ion Capacity (meq/dg*)	Protein Capacity Dry Gram (mg/dg*)	Bed Volume (mg/ml)	Packing Density Dry Exchanger/ml Bed Volume (dg*/ml)
<b>Dry Fibrous</b>						
CM23	Carboxymethyl	3-10	0.6-0.7	675	85‡	0.15
<b>Dry Microgranular</b>						
CM32	Carboxymethyl	3-10	2.1-2.8	1180†	200	0.24
<b>Preswollen Microgranular</b>						
CM52	Carboxymethyl	3-10	0.90-1.15	1180‡	210	1.1
<b>Dry Fibrous</b>						
P11	Orthophosphate	2-10	3.2-5.3	400-500	–	0.22

\* dg – dry gram

† Lysozyme in 10 mm acetate buffer pH 4.4

‡ Lysozyme in 10 mm acetate buffer pH 5.0

## Ordering Information – Cation Exchange Celluloses

Catalog Number	Product	Description	Size
4033-025	CM23	Dry fibrous CM cellulose	250 g
4035-010	CM32	Dry microgranular CM cellulose	100 g
4035-050	CM32	Dry microgranular CM cellulose	500 g
4037-050	CM52	Preswollen microgranular CM cellulose	500 g
4037-200	CM52	Preswollen microgranular CM cellulose	2 kg
4071-010	P11	Dry fibrous cellulose phosphate	100 g
4071-050	P11	Dry fibrous cellulose phosphate	500 g
4071-200	P11	Dry fibrous cellulose phosphate	2 kg

## Solid Phase Extraction (SPE)

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

- Columns of 3, 6, and 12 ml sizes
- Cartridges for use with a syringe
- SPE discs for hydrophobic extraction from relatively large water samples
- Sample drying devices for removal of water from samples in organic solvent



Solid phase extraction columns

## Solid Phase Extraction Columns and Cartridges

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

### Features and Benefits

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

### Applications

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



Solid phase extraction cartridge

## Technical Data – Solid Phase Extraction (SPE) Media

Product	Key to Sorbent Abbreviations	Description
ODS	Octadecyl silica	5% carbon load
ODS-4	Octadecyl silica	14% carbon load, end capped*
ODS-5	Octadecyl silica	18% carbon load, end capped
C-8	Octyl silica	8.5% carbon load, end capped
FLO	Florisil™	Magnesium silicate (US Silica Company)
NH <sub>2</sub>	Weak anion exchanger	Primary amine
SAX	Strong anion exchanger	Quaternary amine (-NR <sub>3</sub> <sup>+</sup> )
SCX	Strong cation exchanger	Aromatic benzene sulfonic acid
SIL	Normal phase silica	-

\* End capping masks residual silanol groups, reducing ionic affinity for amines. Weight of sorbent per device is shown in Ordering Information.

## Ordering Information – Solid Phase Extraction (SPE) Columns and Cartridges

Catalog Number	Functional Group	Column (Wt/Vol)	Quantity/Pack
<b>Column Type</b>			
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
6803-1769	SIL	690 mg/3 ml	300
6803-2705	NH <sub>2</sub>	500 mg/3 ml	50
<b>Cartridge Type</b>			
6802-0005	ODS	500 mg/unit	50
6804-0405	ODS-4	500 mg/unit	50
6804-0505	ODS-5	500 mg/unit	50

## Solid Phase Extraction (SPE) Discs

The Whatman SPE disc incorporates Octadecyl (C18) silica 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 hydrophobic 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 analyte extraction and retention
- Hydrophobic polypropylene prefilters available for difficult samples, minimizing water retention

### Applications

- US EPA Method 1664A for measurement of oil & grease in wastewater
- Other hydrophobic analytes in water

## Ordering Information – Solid Phase Extraction (SPE) Discs

Diameter (mm)	Pore Size (µm)	Catalog Number	Description	Filter Media	Quantity/Pack
<b>C18 SPE Discs for Oil &amp; Grease and Other Analyses</b>					
47	–	6805-3042	SPE disc	–	20
47	–	6805-4043	SPE disc	–	48
47	–	6805-3043	SPE disc	–	80
90	–	6805-3048	SPE disc	–	20
90	–	6805-3049	SPE disc	–	80
<b>Polypropylene Prefilters</b>					
42.5	5	6805-8034	Prefilter	PP	48
47	5	6805-8035	Prefilter	PP	48
90	5	6805-8037	Prefilter	PP	16

## Sample Drying Device

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

The device includes 1500 mg sodium sulfate, a 0.45 µm polypropylene filter, and a tube tip for dispensing into a narrow-mouth vial.



## Ordering Information – Sample Drying Device

Catalog Number	Description	Size (mg)	Quantity/Pack
6805-8020	Sample drying device with tube tip	1500	50

# High-Performance Liquid Chromatography (HPLC)

Whatman offers an extensive product line of High-Performance Liquid Chromatography (HPLC) products ranging from the Partisil high-purity silica gel for normal phase separations to several different bonded phases for reversed phase or ion exchange separations. In addition, the PartiSphere™ 5 µm spherical media are available with different chemistries in a void sealing column configuration for optimum speed and resolution.

## Partisil, PartiSphere, and UniSep Media for HPLC

Whatman offers a variety of media for HPLC. Available formats include Whatman Void Sealing (WVS) columns, standard Whatman Compression Screw (WCS) columns, and unpacked media for customer-packed columns.

### *Normal Phase (Adsorption) Media*

#### **Partisil Silica (5 and 10 µm)**

Pure silica stationary phase for adsorption chromatography. Partisil 10 is used particularly for routine separations for higher flow rates and lower back pressures. Partisil 5 is used particularly for higher resolution and fast analysis. These are the supports on which the Partisil bonded phases are based.

#### **PartiSphere Spherical Silica (5 µm)**

PartiSphere silica features homogenous particles with narrow particle size distribution for sharp separations and excellent reproducibility. It is the basis for PartiSphere bonded phases.

### *Ion Exchange Media*

#### **Partisil SAX (5 and 10 µm)**

A strong anion exchanger based on quaternary ammonium groups (-NR<sub>3</sub><sup>+</sup>). Supplied in the H<sub>2</sub>PO<sub>4</sub> form in methanol, Partisil 10 SAX has been widely reported in literature and is best known for the 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.

#### **Partisil SCX (5 and 10 µm)**

Based on aromatic benzene sulfonic acid groups. Supplied in the ammonium form. Excellent for separation of nucleosides, 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.

#### **Solvecon Precolumn**

Column (4.6 mm ID × 25 cm) with WCS fittings, filled with silica and connected between HPLC pump and injector. It saturates the mobile phase with silica, reducing damage to the analytical column at pH > 7.5 or temperature > 50°C.

**PartiSphere SAX and SCX (5 µm)**

Strong ion exchange media based on homogenous spherical silica particles with very tight size distribution. They produce very sharp separations.

**Partisil and PartiSphere PAC**

Polar Amino Cyano weak anion exchanger – described on p. 200.

*Reverse Phase Media***Partisil ODS (10 µm)**

A C-18 phase with a 5% carbon load for both normal adsorption and reversed phase partitioning. Dual-mode operation for added selectivity with 50% residual silanols. Lightly loaded C-18 packing is particularly effective for compounds having greater water solubility when used in the reversed phase mode. Creates a moderately polar surface, different from that of pure silica, in normal phase mode.

**Partisil ODS-2 (10 µm)**

The high carbon load (16%) of this polymeric phase makes it the most nonpolar and, therefore, the most retentive of the reversed phases. An alternative to end-capped C-18 where different elution order is desirable for optimum separation. High sample load capacity and 10 µm particle size are very suitable for preparative work.

**Partisil ODS-3 (5 and 10 µm)**

A C-18 polymeric phase with a 10.5% carbon load. Medium of choice for improved speed, efficiency, and resolution in applications requiring C-18 phases. End-capped for deactivation of silanols to minimize the need for ion suppression or ion pairing agents. Used in a wide range of applications with optimal selectivity, including pharmaceuticals, natural products, food, biological, and environmental pollutants.

**PartiSphere C-18 (5 µm)**

C-18 stationary phase on homogenous, spherical silica particles for very high separation efficiency.

**PartiSphere RTF C-18 (5 µm)**

PartiSphere RTF (Reduced Tailing Factor) C-18 is base-deactivated. It employs a proprietary process that effectively “deactivates” the secondary chromatographic effect due to residual silanols. In addition, this material is 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. One type has a polar linker similar but not identical to the UniSep C-8 media.

**Partisil C8 (5 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.

**PartiSphere C-8 (5 µm)**

Octyl bonded phase on homogenous spherical particles for maximal resolution.

### UniSep C-8 (5 µm)

Hydrophobic octyl chain on hydrophilic silica surface, enabling the silica to be wetted out. Suited to highly aqueous mobile phases.

### Partisil PAC (5 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.

### PartiSphere PAC (5 µm)

Polar amino cyano bonded to homogenous spherical particles for maximal resolution.

## Application-Specific Media

### TAC 1 (5 µm)

For great discoveries such as Taxol, Whatman technology optimally separates the closely eluting taxanes of Pacific yew trees. Whatman worked closely with two leading customers to develop a specific bonded phase that achieves baseline resolution of the paclitaxel molecule from its closest impurity. Each lot of TAC 1 (Taxane Analysis Column) is tested with a paclitaxel chromatographic purity separation to ensure the best possible reproducibility. (Richheimer SL et al. Anal Chem. 1992; 64: 2323-2326)

### MAX-1 (5 µm)

For use in specialized separations for corn and soy protein.

## Technical Data and Formats – HPLC Media

Media	Type	Typical Values	Availability		
			WVS	WCS	Media
<b>Partisil Bonded Phase (5 and 10 µm)</b>					
Silica	Normal	Irregular; pore size 85Å	•	•	•
SAX	IEC*	0.85% N	•	•	•
SCX	IEC*	0.40% S	•	•	•
ODS	Reverse	5% carbon load; uncapped		•	•
ODS-2	Reverse	16% carbon load; polymeric	•	•	•
ODS-3	Reverse	10.5% carbon load; end-capped; polymeric	•	•	•
C-8	Reverse	8.5% carbon load; end-capped; monomeric brush		•	•
PAC	Mixed	Mixed nodes; 0.85% N		•	•
<b>PartiSphere Bonded Phase (5 µm)</b>					
Silica	Normal	Spherical; pore size 85Å	•		
SAX	IEC*	0.80% N	•		
SCX	IEC*	0.40% S	•		
C-18	Reverse	10% carbon load; end-capped; brush	•		
C-8	Reverse	6% carbon load; end-capped; brush	•		
C-18 RTF	Reverse	Base-deactivated; 22% carbon load; monomeric brush		•	
PAC	Mixed	Mixed modes; 0.85% N	•		
<b>UniSep (5 µm)</b>					
C-8	Reverse	100Å pore size; 16% carbon load	•		
<b>Application-Specific Media</b>					
TAC 1	AM**	For taxane analysis	•		
MAX-1	AM**	For corn and soy protein analysis	•		

\* IEC – Ion Exchange Chromatography

\*\* AM – Application-Specific Media

## Partisil and PartiSphere Void Sealing (WVS) Columns

Whatman WVS columns are renowned for their high quality, innovative design and exceptional durability.

WVS columns allow easy adjustment of the top frit to fill the void that gradually develops and reduces resolution as silica dissolves.

### Features and Benefits

- Void sealing columns can last twice as long as standard end fitting columns, saving as much as 50% on column 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 wrenchless installation, and rapid column changes

### Optimum Resolution

Typical column efficiencies for:

- Partisil 10  $\mu\text{m}$  media – 45,000 N/m
- Partisil 5  $\mu\text{m}$  media – 65,000 N/m
- PartiSphere 5  $\mu\text{m}$  media – 90,000 N/m

### *WVS Columns: Engineered to Provide Unsurpassed Consistency and Longevity*

#### Partisil Irregular Media

Available in prepacked, replaceable columns and a choice of 5  $\mu\text{m}$  and 10  $\mu\text{m}$  phases. These include silica and our popular ODS-3 and ODS-2 packings. 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. The neutral pH of Partisil media also provides better peak symmetry without the need for mobile phase modifiers.

#### PartiSphere Spherical Media

Available in prepacked columns and a choice of 5  $\mu\text{m}$  high-performance phases. In addition to its efficient pure silica and monomeric C-18 and C-8, Whatman has added SAX, SCX, and PAC. PartiSphere media feature narrow particle size distribution and excellent reproducibility.



#### PartiSphere RTF

PartiSphere RTF (Reduced Tailing Factor) HPLC columns contain base-deactivated C-18 media. They employ a 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.

### Features and Benefits

- Partisil and PartiSphere columns 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 proprietary process that effectively “deactivates” residual silanol groups

PartiSphere and Partisil media are described in the HPLC media section. Guard cartridges are available to prolong analytical column life.

**Note:** Use of WVS columns requires a one-time purchase of WVS end fittings (catalog number 4631-1001).

## Ordering Information – Partisil and PartiSphere<sup>†</sup> Void Sealing (WVS) Columns

Dimensions (mm)	Particle Size (µm)	Catalog Number	Column Type	Quantity/Pack
<b>Partisil* 5 µm and 10 µm Columns Only**</b>				
<i>Partisil Silica</i> 4.6 × 250	5	4681-1501	Whatman Void Sealing	1
<i>Partisil SAX</i> 4.6 × 125	5	4681-0505	Whatman Void Sealing	1
4.6 × 250	5	4681-1505	Whatman Void Sealing	1
<i>Partisil SAX</i> 4.6 × 250	10	4682-1505	Whatman Void Sealing	1
<i>Partisil SCX</i> 4.6 × 250	5	4681-1507	Whatman Void Sealing	1
<i>Partisil SCX</i> 4.6 × 250	10	4682-1507	Whatman Void Sealing	1
<i>Partisil ODS-2 (C-18)</i> 4.6 × 250	5	4681-1509	Whatman Void Sealing	1
<i>Partisil ODS-3 (C-18)</i> 4.6 × 125	5	4681-0502	Whatman Void Sealing	1
4.6 × 250	5	4681-1502	Whatman Void Sealing	1
<i>Partisil ODS-3 (C-18)</i> 4.6 × 250	10	4682-1502	Whatman Void Sealing	1
<b>PartiSphere<sup>†</sup> 5 µm Columns*</b>				
<i>PartiSphere Silica</i> 4.6 × 125	5	4621-0501	Whatman Void Sealing	1
4.6 × 250	5	4621-1501	Whatman Void Sealing	1
<i>PartiSphere C-18</i> 4.6 × 125	5	4621-0502	Whatman Void Sealing	1
4.6 × 250	5	4621-1502	Whatman Void Sealing	1
<i>PartiSphere C-8</i> 4.6 × 125	5	4621-0503	Whatman Void Sealing	1
<i>PartiSphere SCX</i> 4.6 × 125	5	4621-0507	Whatman Void Sealing	1
4.6 × 250	5	4621-1507	Whatman Void Sealing	1
<i>PartiSphere SAX</i> 4.6 × 125	5	4621-0505	Whatman Void Sealing	1
4.6 × 250	5	4621-1505	Whatman Void Sealing	1
<i>PartiSphere PAC</i> 4.6 × 125	5	4621-0508	Whatman Void Sealing	1
4.6 × 250	5	4621-1508	Whatman Void Sealing	1

\* Irregular media

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

† Spherical media

## Partisil and PartiSphere HPLC Columns with WCS Standard Fittings

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 Whatman Compression Screw (WCS) standard end fitting column configurations for your analytical and preparative needs. They are specifically designed for compatibility with all HPLC instrumentation.

Whatman Partisil is a high-purity irregular silica gel available in both 5  $\mu\text{m}$  and 10  $\mu\text{m}$  particle sizes with a pore size of 80Å. The choice of column packing includes Silica, C-18 polymeric phases (ODS-3, ODS-2) and C-8. Also available are SAX (Strong Anion Exchanger), SCX (Strong Cation Exchanger) and PAC (Polar Amino Cyano). These columns provide reproducible results, column to column, lot to lot.

### PartiSphere RTF (Reduced Tailing Factor)

PartiSphere RTF are base-deactivated spherical media for very high resolution with minimal silanol effect. The media are described in the HPLC Media section.

Guard cartridges are available to prolong analytical column life.

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. The neutral pH of Partisil media also provides better peak symmetry without the need for mobile phase modifiers.

### Standard Analytical

4.6 mm ID  $\times$  25 cm long, standard analytical column for research, methods development, and routine separations. After optimization, other sizes can be considered for greater speed or capacity. Allows direct scale-up or scale-down to other size columns. Supplied with Whatman Compression Screw (WCS) end fittings. PartiSphere RTF columns are also available – 2.1 mm ID  $\times$  15 cm long.



### RAC II

Available in 4.6 mm ID  $\times$  10 cm and 4.6 mm ID  $\times$  25 cm columns. Second-generation rapid analysis chromatography for faster analytical separations and reduced solvent consumption. Operates at low back pressure, even at high flow rates, prolonging column life. Connects easily to most LC instrumentation with convenient Whatman Compression Screw (WCS) end fittings.

### Magnum 9 (50 cm)

9.4 mm ID  $\times$  50 cm long. Semi-preparative columns for microgram to gram quantities. 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  $\times$  25 cm long.

### Magnum 20 (50 cm)

22 mm ID  $\times$  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  $\times$  25 cm long.

**Ordering Information – Partisil and Partisphere HPLC Columns with WCS Standard Fittings**

Dimensions (mm)	Particle Size (µm)	Catalog Number	Column Configuration	Quantity/Pack
<b>Bonded Phase</b>				
<i>Partisil Silica</i>				
4.6 × 100	5	4222-006	RAC II	1
4.6 × 250	5	4215-001	Standard analytical	1
4.6 × 250	10	4216-001	Standard analytical	1
9.4 × 250	10	4230-120	Magnum 9	1
9.4 × 500	10	4230-220	Magnum 9	1
22 × 500	10	4232-220	Magnum 20	1
<i>Partisil 10 ODS</i>				
4.6 × 250	10	4223-001	Standard analytical	1
<i>Partisil 10 ODS-2</i>				
4.6 × 250	10	4224-001	Standard analytical	1
9.4 × 250	10	4230-124	Magnum 9	1
9.4 × 500	10	4230-224	Magnum 9	1
<i>Partisil ODS-3</i>				
4.6 × 100	5	4222-225	RAC II	1
4.6 × 250	5	4238-001	RAC II	1
4.6 × 250	10	4228-001	RAC II	1
9.4 × 250	10	4230-125	Magnum 9	1
9.4 × 500	10	4230-225	Magnum 9	1
<i>Partisil C-8</i>				
4.6 × 100	5	4222-232	RAC II	1
4.6 × 250	5	4239-001	Standard analytical	1
4.6 × 250	10	4229-001	Standard analytical	1
<i>Partisil SAX</i>				
4.6 × 100	5	4222-227	RAC II	1
4.6 × 250	5	4236-001	Standard analytical	1
4.6 × 250	10	4226-001	Standard analytical	1
4.6 × 250	10	4250-001*	Standard analytical	1
<i>Partisil SCX</i>				
4.6 × 100	5	4222-228	RAC II	1
4.6 × 250	10	4227-001	Standard analytical	1
4.6 × 250	10	4251-001*	Standard analytical	1
<i>Partisil PAC</i>				
4.6 × 250	5	4235-001	Standard analytical	1
4.6 × 250	10	4225-001	Standard analytical	1
<b>Accessories</b>				
–	–	4334-225	Frits, 1/4" diameter, 2 µm Porosity	10
<b>Whatman Base-Deactivated (WCS) HPLC Columns – Partisphere** 5 µm (reduced tailing factor)</b>				
<i>Partisphere RTF C-18</i>				
4.6 × 250	5	4522-0102	Standard analytical	1
4.6 × 150	5	4522-0202	Standard analytical	1
2.1 × 150	5	4242-0103	Standard analytical	1
2.1 × 150	5	4242-0202†	Standard analytical	1

\* With Solvecon precolumn – see media descriptions.

\*\* Spherical media

† Contains a polar linker (similar but not identical to UniSep Columns)

## UniSep High-Performance Liquid Chromatography (HPLC) Columns

The UniSep™ HPLC column is the newest C-8 reverse phase HPLC column from Whatman. Using state-of-the-art technology, UniSep was developed for conditions that call for a highly aqueous mobile phase.

The advantage of the UniSep C-8 column over a traditional C-8 column is that 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 benefit to the chromatographer is the flexibility gained when developing a method for highly water soluble compounds.

### Features and Benefits

- C-8 reverse phase
- Hydrophilic silica surface
- 5 µm particle size
- 100Å pore size
- 16% carbon load
- Easy scale-up
- Whatman Void Sealing (WVS) format

### Applications

- Life science
- Food and beverage
- Pharmaceutical

This and other media are described in the HPLC media section. Guard cartridges are available to prolong analytical column life.

**Note:** Use of WVS columns requires a one-time purchase of WVS end fittings (catalog number 4631-1001).

## Ordering Information – UniSep High-Performance Liquid Chromatography (HPLC) Columns

Dimensions (mm)	Particle Size (µm)	Catalog Number	Quantity/Pack
<b>Reverse Phase HPLC Columns</b>			
4.6 × 50	5	4550-4605	1
4.6 × 100	5	4550-4610	1
4.6 × 150	5	4550-4615	1
4.6 × 250	5	4550-4625	1
<b>Reusable WVS Column End Fittings</b>			
Reusable WVS End Fittings	–	4631-1001	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.

### MAX-1

For use in specialized separations for corn and soy protein.

Both are available in Whatman Void Sealing format. Reusable WVS end fittings (catalog number 4631-1001) are needed for connection.

These and other Whatman HPLC media are described separately.

\* Richheimer SL et al. *Anal Chem.* 1992; 64: 2323-2326

## Ordering Information – Application-Specific HPLC Columns

Dimensions (mm)	Particle Size (µm)	Description	Catalog Number	Quantity/Pack
4.6 × 250	5	TAC 1*	4601-1001	1
4.6 × 250	5	MAX-1*	4120-001	1
–	–	WVS end fittings, reusable	4631-1001	1 pair

\* Both in Whatman Void Sealing format

## 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. These cartridges fit into either of two reusable guard cartridge holders. The Integral system attaches directly to and becomes an integral part of a Whatman Void Sealing HPLC column, requiring no connecting tubing. Because of this, there is virtually no loss in efficiency.

The universal system can be used with any standard analytical column, bringing guard cartridge convenience to traditional HPLC columns.

Guard cartridges are available in four phases: silica, reversed phase, anion exchanger, and cation exchanger.

### Zero-Dead-Volume

Guard columns offer protection by trapping unwanted compounds that would otherwise be strongly retained on the HPLC column. One of the problems inherent with other guard columns is that they either contribute too much dead volume or add to the analysis times of the separation (especially in short, high speed columns). Whatman has overcome this by developing a zero-dead-volume HPLC guard cartridge system which eliminates almost all extra void volume and does not detrimentally affect the separation.

## Ordering Information – HPLC Guard Cartridge System

Catalog Number	Description	Quantity/Pack
<b>Reusable Guard Cartridge Holders</b>		
4631-1003	Integral WVS guard cartridge holder	1
4631-1004	Universal guard cartridge holder	1
<b>Disposable Guard Cartridges</b>		
4641-0001	SIL cartridge	5
4641-0002	RP cartridge (reverse phase)	5
4641-0005	SAX cartridge	5
4641-0007	SCX cartridge	5
4641-0008	PAC cartridge	5
<b>Reusable End Fittings for WVS Columns</b>		
4631-1001	Reusable WVS end fittings	1 pair

## Partisil Media for Customer Packed Columns

Several Partisil media are available unpacked for customers who prefer to pack their own HPLC columns.

### Ordering Information – Partisil Media for Customer Packed Columns

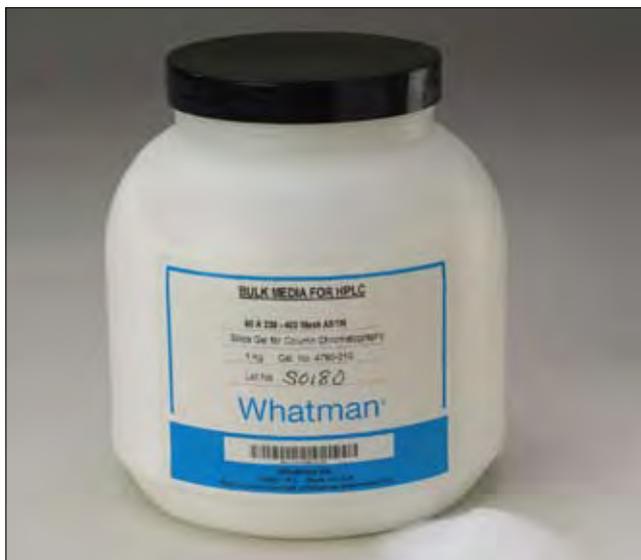
Particle Size (µm)	Description	Catalog Number	Bonded Phase	Package (g)
5	Partisil Silica	4115-010	None	10
10	Partisil Silica	4116-010	None	10
10	Partisil ODS	4123-010	C-18 polymeric; 5% carbon load; uncapped	10
5	Partisil ODS-2	4134-010	C-18 polymeric 16% carbon load; end-capped	10
10	Partisil ODS-2	4124-010	C-18 polymeric; 16% carbon load; uncapped	10
5	Partisil ODS-3	4138-010	C-18 polymeric; 10.5% carbon load; end-capped	10
10	Partisil ODS-3	4128-010	C-18 polymeric; 10.5% carbon load; end-capped	10
5	Partisil C-8	4139-010	C-8 monomeric; 8.5% carbon load; end-capped	10
10	Partisil C-8	4129-010	C-8 monomeric; 8.5% carbon load; end-capped	10
10	Partisil SAX	4126-010	Quaternary amino groups (-NR <sub>3</sub> <sup>+</sup> )	10
10	Partisil SCX	4127-010	Aromatic benzene sulfonic acid functional groups; may also be loaded with metallic cations for ligand exchange chromatography	10
5	Partisil PAC	4135-010	Alkyl groups containing amino-cyano groups in a 2:1 ratio	10
10	Partisil PAC	4125-010	Alkyl groups containing amino-cyano groups in a 2:1 ratio	10

## Silica Media for Column and Flash Chromatography

Whatman bulk silica media are used for low pressure columns. Same base silica and chemistries as those used for Whatman TLC plates. Particularly useful for scaling up separations optimized by TLC. In addition, Whatman offers all-purpose media for general column chromatography. Applicable for preparative low pressure column separations scaled up from Partisil analytical HPLC columns.

### Features and Benefits

- High resolution
- Good flow characteristics
- High surface area



Bulk silica media for column chromatography



Bulk silica media

## Media Properties

Media	Particle size	Type	Detail
LRP-2 ODS	37 to 53 $\mu\text{m}$	Reverse phase	Octadecyl, 16% carbon load, end-capped, may be dry-packed
Partisil ODS-3	32 to 75 $\mu\text{m}$	Reverse phase	Octadecyl, 10.5% carbon load, end-capped
Silica 60Å	38 to 63 $\mu\text{m}$ 230 to 400 mesh	Adsorption	Bulk media for column or dry chromatography
Silica 60Å	63 to 212 $\mu\text{m}$ 70 to 230 mesh	Adsorption	Bulk media for column or dry chromatography

## Ordering Information – Silica Media for Column Chromatography

Catalog Number	Description	Quantity/Pack
4776-001	LRP-2 ODS, 37 to 53 $\mu\text{m}$	100 g
4776-005	LRP-2 ODS, 37 to 53 $\mu\text{m}$	500 g
4132-100	Partisil 40 ODS-3	100 g
4132-301	Partisil 40 ODS-3	1 kg
4790-010	Silica, 230 to 400 mesh	1 kg
4790-050	Silica, 230 to 400 mesh	5 kg
4790-250	Silica, 230 to 400 mesh	25 kg
4791-005	Silica, 70 to 230 mesh	500 g
4791-010	Silica, 70 to 230 mesh	1 kg
4791-050	Silica, 70 to 230 mesh	5 kg
4791-250	Silica, 70 to 230 mesh	25 kg

## Purasil 60Å Silica Gel for Flash Chromatography

Whatman Purasil™ high-purity silica gel provides an excellent separation medium for flash chromatography purification of target molecules. Narrow particle size distribution and minimal fines enable fast separations with no loss of chromatographic performance.

### Features and Benefits

- High resolution
- Excellent flow rates
- Direct scalability

### Typical Data – Purasil 60Å Silica Gel

Iron Content	< 0.02%
Chloride Content	< 0.10%
Loss on Drying	< 7%
pH (10% suspension)	7 ± 0.5
Pore Volume	0.7–0.9 ml/g
Surface Area	500–600 m <sup>2</sup> /g

### Ordering Information – Purasil 60Å Silica Gel for Flash Chromatography

Product	Particle Size (µm)	Catalog Number	Quantity/Pack
Purasil 60Å	38–63 230–400 mesh	4745-010	1 kg
Purasil 60Å	38–63 230–400 mesh	4745-250	25 kg
Purasil 60Å	63–212 70–230 mesh	4746-010	1 kg
Purasil 60Å	63–212 70–230 mesh	4746-250	25 kg

# Thin Layer Chromatography (TLC)

Product innovations from Whatman have made thin layer chromatography (TLC) a practical laboratory tool for both qualitative and quantitative analysis.

## Features and Benefits

- Stringent quality standards ensure 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 fluorescent indicator for easy detection of many UV-absorbing compounds

## 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 preadsorbent layer, Whatman made it thicker than the silica layer. This allows the analyst to apply sample in amounts never before attainable with standard TLC plates, and to apply dilute samples in less-volatile solvents without sacrificing resolution.



Examples of TLC plate formats

## Whatman TLC Product Types

<b>Partisil K6 and K5 Absorption TLC Plates</b>	Normal phase analysis and purification of most samples; recovery of analytes by scraping sample spots; analytical and preparative thicknesses
<b>Partisil Reversed Phase TLC Plates</b>	Reverse phase separations and 2-dimensional reverse/normal separations
<b>Flexible TLC Plates</b>	Cutting plates to custom sizes; recovery of analytes by cutting sample spots; normal phase or anion exchange
<b>Diamond Series Silica TLC Plates</b>	Normal phase; increased hardness and reflectance for resistance to solvents and reagents and for scanning densitometry
<b>EH6 Extra Hard TLC Plates</b>	Normal phase; very hard, smooth surface for writing on plate; high resistance to solvents and reagents
<b>Partisil High-Performance TLC Plates</b>	Normal phase; small, uniform silica particles for maximum resolution and sensitivity

## TLC Plates: Designations and Formats

Whatman has designed nomenclature as a simple and convenient way of distinguishing among the different types of plates. 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.

<b>K – Silica Gel</b>	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.
<b>HP – High-Performance</b>	High-performance silica is prefixed by the letters HP: HP-K 4.5 µm silica, pore size 60Å.
<b>KC-2, KC-18 Reverse Phase</b>	Reverse 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
<b>L – Preadsorbent Layer</b>	This compresses each sample into a narrow horizontal band. Hence, it is known as Linear-K; prefix L.
<b>D – Channeled Plates</b>	2 mm channels of clear glass separate sample lanes, preventing crossover. D indicates division.
<b>F – Fluorescent Indicator</b>	Fluorescent plates glow bright green under shortwave UV light. Samples that absorb UV at 254 nm show as dark, quenched spots
<b>M – Microscope Slide</b>	Plate size 1 × 3", 2.5 × 7.5 cm
<b>P – Preparative Layer</b>	Has 500 µm or 1000 µm thickness for large sample sizes

## Partisil K6 60Å and K5 150Å TLC Plates

Whatman Partisil K6 60Å and K5 150Å TLC plates provide a choice of high-purity silica gels with polarity for normal phase separations. They give superior performance compared to silica gel "G" through better resolution, higher sensitivity, and increased durability. Moderate layer hardness makes possible convenient spot recovery.

### Features and Benefits

- Excellent reproducibility; negligible moisture uptake
- Chemically and optically inert organic binder
- Outstanding layer stability
- Fast separation with excellent resolution
- Quality separation of moderately to strongly polar compounds
- Aggressive reagent resistance
- Wide applicability, including carbohydrates, antibiotics, alkaloids, amino acids, and phospholipids

### Key to Labeling

- K6** 60Å  
**K5** 150Å  
**M** Microscope slide size  
**F** With fluorescent indicator  
**L** With preadsorbent layer below origin  
**D** Divided into channels  
**P** Preparative layer 500 or 1000 µm thick (others are 250 µm)

**Ordering Information – Partisil K6 and K5 Absorption TLC Plates**

Product	Plate Size (cm)	Catalog Number	Linear-K Preadsorbent	Channeled	Fluorescent Indicator	Quantity/Pack
<b>Partisil K6 60Å TLC Plates (250 µm unless noted) without Preadsorbent Zone</b>						
MK6F	1 × 3"	4861-110	-	-	Yes	500
K6	5 × 10	4860-320	-	-	-	150
K6F	5 × 10	4861-320	-	-	Yes	150
K6	5 × 20	4860-620	-	-	-	75
K6F	5 × 20	4861-620	-	-	Yes	75
K6	10 × 20	4860-720	-	-	-	50
K6F	10 × 20	4861-720	-	-	Yes	50
K6	20 × 20	4860-820	-	-	-	25
K6F	20 × 20	4861-820	-	-	Yes	25
PK6F	20 × 20	4861-830*	-	-	Yes	22
PK6F	20 × 20	4861-840**	-	-	Yes	20
<b>Partisil K6 60Å TLC Plates (250 µm unless noted) with Preadsorbent Zone</b>						
LK6D	10 × 10	4865-001	Yes	9 channels	-	100
LK6	5 × 20	4865-620	Yes	-	-	75
LK6F	5 × 20	4866-620	Yes	-	Yes	75
LK6D	5 × 20	4865-621	Yes	4 channels	-	75
LK6DF	5 × 20	4866-621	Yes	4 channels	Yes	75
LK6	20 × 20	4865-820	Yes	-	-	25
LK6F	20 × 20	4866-820	Yes	-	-	25
LK6D	20 × 20	4865-821	Yes	19 channels	-	25
LK6DF	20 × 20	4866-821	Yes	19 channels	-	25
<b>Partisil K5 150Å TLC Plates (250 µm unless noted) without Preadsorbent Zone</b>						
K5F	5 × 10	4851-320	-	-	Yes	150
K5	5 × 20	4850-620	-	-	-	75
K5F	5 × 20	4851-620	-	-	Yes	75
K5	10 × 20	4850-720	-	-	-	50
K5F	10 × 20	4851-720	-	-	Yes	50
K5	20 × 20	4850-820	-	-	-	25
K5F	20 × 20	4851-820	-	-	-	25
PK5	20 × 20	4850-830*	-	-	-	22
PK5	20 × 20	4850-840**	-	-	-	20
PK5F	20 × 20	4851-830*	-	-	Yes	22
PK5F	20 × 20	4851-840**	-	-	Yes	20

\* Preparative 500 µm layer

\*\* Preparative 1000 µm layer

cont.

Product	Plate Size (cm)	Catalog Number	Linear-K Preadsorbent	Channeled	Fluorescent Indicator	Quantity/Pack
<b>Partisil K5 150Å TLC Plates (250 µm unless noted) with Preadsorbent Zone</b>						
LK5	5 × 20	4855-620	Yes	–	–	75
LK5D	5 × 20	4855-621	Yes	4 channels	–	75
LK5DF	5 × 20	4856-621	Yes	4 channels	Yes	75
LK5	20 × 20	4855-820	Yes	–	–	25
LK5F	20 × 20	4856-820	Yes	–	Yes	25
LK5D	20 × 20	4855-821	Yes	19 channels	–	25
LK5DF	20 × 20	4856-821	Yes	19 channels	Yes	25
LPK5	20 × 20	4855-840**	Yes	–	–	20
LPK5F	20 × 20	4856-840**	Yes	–	Yes	20

\* Preparative 500 µm layer

\*\* Preparative 1000 µm layer

## Partisil Reversed Phase TLC Plates

With reverse phase plates, Whatman provides 60Å K6 with a choice of two carbon chain lengths plus Multi-K Dual Phase plates. The chain length of the hydrocarbon functional groups primarily affects retention and the ability to accommodate the water content of solvent systems. The shorter C-2 carbon chain is used for increased polarity and affinity for aqueous solutions while the longer C-18 chains give greater retention and hydrophobicity. KC-18 plates are also available with a preadsorbent zone, which facilitates sample application, especially with dilute samples in less volatile solvents.

### Features and Benefits

- Proven performance, quality, and reliability
- Compatibility with highly aqueous solvent systems, for greater flexibility
- Ready correlation with reverse phase HPLC results

### Multi-K Dual Phase for Demanding Samples

Multi-K combines a 3 × 20 cm C-18 reverse phase stationary phase with a 17 × 20 cm normal phase silica stationary phase on one TLC plate. It allows two-dimensional separations of mixed polarity samples on one plate. Components are first separated by reverse phase TLC, then the plate is dried, turned 90°, and developed with a normal phase solvent mix.

### Features and Benefits

- Cleanup and analysis of complex samples
- Two-dimensional TLC on one plate

**Key to Labeling**

C-2 Ethyl-silica

C-18 Octadecyl-silica

M Microscope slide size

F With fluorescent indicator

L With preadsorbent layer below origin

P Preparative layer 1000 µm thick

**Ordering Information – Partisil Reversed Phase TLC Plates**

Type	Product	Plate Size (cm)	Catalog Number	Linear-K Preadsorbent	Fluorescent Indicator	Quantity/Pack
<b>C-2 Reverse Phase TLC Plates (200 µm)</b>						
C-2	K-C2	20 × 20	4809-800	-	-	25
C-2	KC-2F	20 × 20	4809-820	-	Yes	25
<b>C-18 Reverse Phase Plates (200 µm except where noted)</b>						
C-18 Microslide	MKC-18F	1" × 3"	4803-110	-	Yes	100
C-18	KC-18	5 × 20	4801-600	-	-	75
C-18	KC-18F	5 × 20	4803-600	-	Yes	75
C-18	KC-18	10 × 10	4801-425	-	-	25
C-18	KC-18F	10 × 10	4803-425	-	Yes	25
C-18	KC-18	20 × 20	4801-800	-	-	25
C-18	KC-18F	20 × 20	4803-800	-	Yes	25
C-18 with Linear-K	LKC-18	5 × 20	4800-600	Yes	-	75
C-18 with Linear-K	LKC-18F	5 × 20	4800-620	Yes	Yes	75
C-18 with Linear-K	LKC-18	20 × 20	4800-800	Yes	-	25
C-18 with Linear-K	LKC-18F	20 × 20	4800-820	Yes	Yes	25
C-18 with Linear-K*	PLKC-18F	20 × 20	4800-840**	Yes	Yes	20
<b>Multi-K Dual Phase Plates (250 µm)</b>						
Multi-K Dual Phase (3 cm C-18 Strip on Silica Gel Layer)	-	20 × 20	4804-820	-	-	25

\* Preparative

\*\* 1000 µm layer

## Flexible TLC Plates

Flexible backed TLC plates (supplied in a single 20 × 20 cm size) offer you economy and convenience. They can be cut with scissors to match individual separation requirements, making them suitable for applications that require rapid sample isolation or elution prior to other analytical techniques (e.g., scintillation counting).

### Features and Benefits

- Silica gel 60Å flexible plates exhibit similar selectivity to the glass backed K6 plates and are widely applicable for moderately to strongly polar analytes (available on aluminum or polyester backing material)
- DEAE (diethylaminoethyl tertiary amine) cellulose anion exchange plates with polyester backing are used for separating anions
- Aluminum backing is particularly useful for applications requiring charring
- Polyester backed plates can be heated up to 110°C and are compatible with mobile phases containing strong acids or bases



### Key to Labeling

- PE** Polyester backing  
**AL** Aluminum backing  
**F** Fluorescent  
**SIL** Silica 60Å  
**DEAE** DEAE cellulose

## Ordering Information – Flexible TLC Plates

Type	Product	Plate Size (cm)	Catalog Number	Flexible Backing	Fluorescent Indicator	Quantity/Pack
<b>Polyester-backed Flexible Silica TLC Plates (250 µm)</b>						
Silica gel 60Å	PE-SIL	20 × 20	4410-221	PE	–	25
Silica gel 60Å	PE-SIL-F	20 × 20	4410-222	PE	Yes	25
<b>Aluminum-backed Flexible Silica TLC Plates (250 µm)</b>						
Silica gel 60Å	AL-SIL	20 × 20	4420-221	AL	–	25
Silica gel 60Å	AL-SIL-F	20 × 20	4420-222	AL	Yes	25
<b>Polyester-backed Flexible DEAE Cellulose TLC Plates (100 µm)</b>						
DEAE cellulose (diethylaminoethyl)	PE-DEAE	20 × 20	4410-224	PE	–	25

## Diamond Series TLC Plates

Whatman Diamond Series TLC plates exhibit gem-like qualities of hardness and reflectance. These technologically advanced glass-backed plates facilitate dipping and spraying and will not crack or flake. They allow you to perform scanning densitometry with the lowest noise backgrounds for maximum range in detection. The smooth surface of the plates prevents ripples from interfering with scanning or development.

### Features and Benefits

- Highly reflective surface minimizes background noise while scanning
- Superior organic binder prevents surface deterioration even when using the strongest reagent
- Uniform particle size and distribution add to efficiency by reducing band spreading
- The 60Å pore, 450 m<sup>2</sup>/g surface area provides optimum characteristics for most clinical, educational, and general analytical applications. Fast development of spots with excellent resolution makes the Diamond Series plates very suitable for screening and toxicology work. They are excellent for the analysis of micro samples.

The plates will withstand most solvent systems and any applied developing reagent without silica falling off the plate or reacting with reagents. They can be charred to 180°C with cupric acetate/phosphoric acid reagents.

Because 85% of all TLC users employ fluorescent plates, Diamond Series offers the best format for UV quenching and visual work. All plates are silica gel with UV-254 fluorescent indicator and are available with channeling and a linear preadsorbent spotting area for faster, more accurate sample application.

### Key to Labeling

**K6** 60Å

**M** Microscope slide size

**F** With fluorescent indicator

**L** With preadsorbent layer below origin

**D** Divided into channels

## Ordering Information – Diamond Series Silica TLC Plates

Product	Plate Size (cm)	Catalog Number	Linear-K	Channeled	Fluorescent Indicator	Quantity/Pack
<b>Partisil K6 60Å TLC Plates (250 µm unless noted) without Preadsorbent Zone</b>						
MK6F	1 × 3"	4500-101	-	-	Yes	500
K6F	20 × 20	4500-105	-	-	Yes	25
LK6DF	5 × 20	4500-303	Yes	4 channels	Yes	75
LK6DF	20 × 20	4500-305	Yes	19 channels	Yes	25

## EH6 Series Extra Hard TLC Plates

Whatman EH6 Series Extra Hard TLC plates address chromatographers' need for harder, smoother, more abrasion-resistant layers. These technologically advanced glass-backed plates facilitate dipping and spraying and will not crack or flake. The plates will withstand most solvent systems and any applied visualization reagent without silica falling off the plate or reacting with the reagents. They can be charred to 180°C with cupric acetate/phosphoric acid reagents.

Each lot of EH6 TLC plates undergoes extensive quality control testing, including a pendulum hardness test to ensure outstanding lot-to-lot reproducibility.

### Features and Benefits

- Extra hard surface makes it easier to write on with a pen or pencil
- Highly reflective surface minimizes background noise while scanning
- Superior organic binder prevents surface deterioration even when using the strongest reagent
- Uniform particle size and distribution add to efficiency by reducing band spreading
- Available in bulk quantities

### Applications

- The silica stationary phase (60Å pore, 450 m<sup>2</sup>/g surface area, 250 µm layer thickness) provides optimum characteristics for most clinical, educational, and general analytical applications
- Moderate development times and bands with excellent resolution make the EH6 Series plates very suitable for screening and toxicology work
- Ultra low noise background allows you to perform scanning densitometry with maximum detection range

### Key to Labeling

**EH6** 60Å silica, extra-hard layer

**F** With fluorescent indicator

### Ordering Information – EH6 Extra Hard TLC Plates

Product	Plate Size (cm)	Catalog Number	Layer Thickness	Fluorescent Indicator	Quantity/Pack
EH6	10 × 20	4840-725	250	–	250
EH6F	20 × 20	4841-820	250	Yes	25
EH6F	2.5 × 7.5	4841-125	250	Yes	500

## Partisil High-Performance TLC Plates

Whatman HPTLC plates can be used for your most sensitive separations. These plates consist of a 4.5  $\mu\text{m}$  particle size silica gel plus an inert binder in a uniform 200  $\mu\text{m}$  layer on glass. They exhibit product characteristics typical of Whatman silica gel media: narrow particle size distribution, homogeneity, and overall uniformity. The results are performance and reproducibility, giving you the ultimate in TLC resolution and sensitivity.

### Features and Benefits

- Dense, uniform layer provides stable baseline in densitometry
- Short development distance and times
- Low band diffusion provides very compact sample bands and increased detection sensitivity
- Micro samples (nanograms and picograms) can be analyzed
- Reproducibility inherent in Whatman chromatography products

Whatman HPTLC plates are referenced in a patented procedure for fetal lung maturity testing (Juan G. Alvarez and Jack Ludmir, US Patent Number 5,443,989).

### Key to Labeling

**HPK** High-performance silica (4.5  $\mu\text{m}$  particles, 200  $\mu\text{m}$  layer)

**F** With fluorescent indicator

**L** With preadsorbent layer below origin

**D** Divided into channels



## Ordering Information – Partisil High-Performance TLC Plates

Product	Plate Size (cm)	Catalog Number	Linear-K Preadsorbent	Channeled	Fluorescent Indicator	Quantity/Pack
HPK	5 × 5	4807-050	-	-	-	100
HPKF	5 × 5	4802-050	-	-	Yes	100
HPK	10 × 10	4807-425	-	-	-	25
HPK	10 × 10	4807-400	-	-	-	100
HPKF	10 × 10	4802-425	-	-	Yes	25
HPKF	10 × 10	4802-400	-	-	Yes	100
HPK	10 × 20	4807-700	-	-	-	50
HPKF	10 × 20	4802-700	-	-	Yes	50
LHPK	10 × 10	4805-420	Yes	-	-	25
LHPK	10 × 10	4805-410	Yes	-	-	100
LHPKD	10 × 10	4805-421	Yes	9 channels	-	25
LHPKF	10 × 10	4806-420	Yes	-	Yes	25
LHPKF	10 × 10	4806-410	Yes	-	Yes	100
LHPKDF	10 × 10	4806-421	Yes	9 channels	Yes	25
LHPK	20 × 10	4805-710	Yes	-	-	50
LHPKD	20 × 10	4805-711	Yes	19 channels	-	50
LHPKF	20 × 10	4806-710	Yes	-	Yes	50
LHPKDF	20 × 10	4806-711	Yes	19 channels	Yes	50



## Nucleic Acid and Protein Sample Preparation

Collect DNA from plant or animal sources and store it on a FTA or FTA Elute Card at room temperature. Amplify DNA to track mutations and create genetic profiles. Just two applications of many performed with FTA technology, with unlimited potential to help humans around the world today and tomorrow.

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- 240 Plasmid/BAC Sample Preparation



# Nucleic Acid and Protein Sample Preparation

Whatman has manufactured quality paper products since 1740 and is recognized as a world leader in filter separation technologies and products.

With this knowledge and remarkable testimonies to quality, Whatman has taken its products to a new level, in the genomics/proteomics industry. Our area of expertise in this evolving industry lies in sample preparation, where our FTA Cards – an innovative patented technology for collecting, transporting, purifying, and archiving DNA and RNA all on a single device stored at room temperature – have become a market leader.

The nucleic acid sample preparation products incorporate proprietary Whatman technologies, which offer several outstanding advantages to molecular biologists. These include the encapsulation of solid media into devices and DNA separation products designed for the collection, transportation, purification, and analysis of nucleic acids. All of these Whatman products create breakthrough applications that yield accurate results much faster than previously possible. Offering an extensive, leading-edge product range means that all your DNA processing requirements are met by one established provider.

Whatman offers an extensive range of products to facilitate genomic studies of humans, animals, plants, and microorganisms. Collection, storage, and analysis of DNA and RNA are facilitated with the use of FTA, FTA Elute™, and other Whatman tools.



FTA Classic Card

## EasiCollect

*Consistent, reliable DNA collection – every time.*

Whatman is a market leading manufacturer of sample collection and preparation products, which serve a variety of markets. Whatman has a long history of developing cutting-edge products that meet the needs of today's genetic analysis laboratories.

The collection of DNA samples for genetic analysis has evolved to meet current needs. Blood samples have always provided high yields of DNA for a number of genetic tests. However, the invasive nature of blood collection has caused laboratories to look for alternative methods. Buccal epithelial cell collection is a preferable substitute for blood collection due to the noninvasive method of obtaining samples. A simple rubbing of the inside of the cheek with a mildly abrasive surface is adequate to collect cells for genetic analysis. Buccal cell collection using foam tipped applicator swabs and FTA Cards is an accepted method used by forensic laboratories worldwide.



EasiCollect\*

\* EasiCollect is patent pending.

EasiCollect™ features a novel foam applicator for the adsorption of cells to its surface and for maximal cell transfer. Dual clips on the handle and on the front of the device apply constant pressure of the foam applicator to the collection card. Cells are applied across the sample area in a consistent manner, ensuring amplifiable DNA in all locations.

The indicating FTA material inside the device contains an inert dye that changes color upon application of a colorless sample to indicate the location of the sample area. Individual sample punches are taken from within the sample area for DNA purification and amplification.



Swab the inside of each cheek for 15 seconds.



Peel off the protective film exposing the Indicating FTA Card.



Close the device to transfer cells to the Indicating FTA Card; ensure the foam applicator is snapped into place.



Open the device by bending back the handle to release the foam applicator from under the snap clips.

## Ordering Information – EasiCollect

Description	Catalog Number	Quantity/Pack
EasiCollect	WB120462	50

## FTA and FTA Elute

### FTA Technology

*Collect, Transport, Archive, and Isolate Nucleic Acids – all at room temperature*

FTA and FTA Elute 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, oxidative, and UV damage. FTA Cards rapidly inactivate organisms, including bloodborne pathogens, and prevent the growth of bacteria and other microorganisms. US Patent Nos. 5496562, 5756126, 5807527, 5972386, 5985327 and other patents pending.



Whatman FTA devices format

### Advantages and Benefits

- Capture nucleic acid in one easy step
- Captured nucleic acid is ready for downstream applications in less than 30 minutes
- DNA collected on FTA Cards is 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

### Use FTA for a Wide Range of Applications:

- Forensics
- Transgenic identification
- Plasmid screening
- Food and agriculture testing
- Drug discovery
- Genomics
- STR analysis
- Animal identification
- Molecular diagnostics
- Whole genome amplification
- 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 matrix. 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 in the field without worrying about immediate refrigeration. Ship your samples back to the laboratory without expensive special handling or dry ice and process at your convenience.

Indicating FTA Cards are recommended for colorless samples.



Electron micrograph showing DNA entrapped within the FTA matrix (magnification  $\times 10,000$ )

These FTA Cards change from pink to white when sample is applied, verifying the location of the sample.

### FTA Cards Used with Virtually Any Sample Type

- Blood
- Cultured cells
- Buccal cells
- Plant material
- Bacteria
- Plasmids
- Microorganisms
- Solid tissue

### 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<sup>-1</sup> (10 mM Tris-HCl, 0.1 mM EDTA, pH 8) buffer. DNA on the washed punch is ready to use in applications such as PCR, SNP analysis, whole genome amplification, and real-time 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 17 years (and counting) has been successfully amplified by PCR. RNA, being chemically less stable than DNA, is best analyzed upon return of samples to the laboratory. Frozen storage is helpful for RNA preservation.

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  $\mu$ l whole blood or 100  $\mu$ l plant homogenate per card. Convenient for multiple applications of the same specimen or collection of multiple animal or plant samples on one card. Different samples can be processed independently.

### Indicating FTA Classic Card

Same as FTA Classic Card with a color indicator that changes from pink to white when sample is applied. Recommended for use with colorless samples such as buccal or cultured cells.

### FTA Mini Card

Two sample areas for application of up to 250  $\mu$ l whole blood or 50  $\mu$ l plant homogenate per card. Convenient for protocols that require different locations for testing and archiving samples. Different samples can be processed independently.

### Indicating FTA Mini Card

Same as FTA Mini Card with a color indicator that changes from pink to white when sample is applied. Recommended for use with clear samples such as buccal or cultured cells.

### FTA Micro Card

One sample area for application of up to 125  $\mu$ l whole blood or 25  $\mu$ l plant homogenate per card. Recommended when only one sample is needed.

### Indicating FTA Micro Card

Same as FTA Micro Card with a color indicator that changes from pink to white when sample is applied. Recommended for use with clear samples such as buccal or cultured cells.



FTA Plant Kit

### FTA Gene Card

An FTA Card enclosed in a rigid card frame. Three sample areas for application of up to 225  $\mu$ l whole blood or 30  $\mu$ l plant homogenate per card. Can be utilized in many automatic dispensing/pipetting systems when used with the FTA Gene Card Tray (catalog number WB100030).

### FTA PlantSaver™ Card

Plant friendly FTA Card, in a Classic Card format. Features a laminated flap that allows you to vigorously crush the plant sample into the FTA matrix without damaging the FTA Card.

### FTA Kit

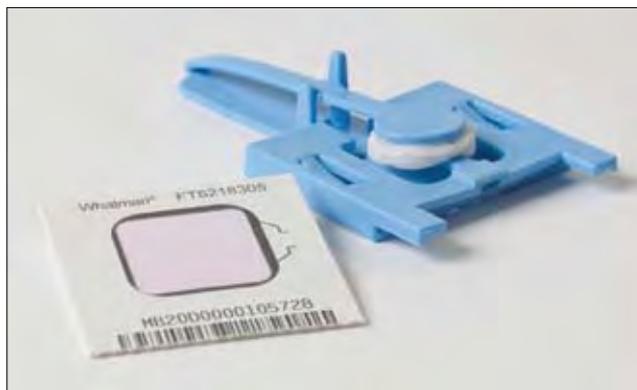
Includes: 25 FTA Micro Cards, 50 ml FTA Purification Reagent, 2 Harris Uni-Core Punches with cutting mat, instructions.

### FTA Plant Kit

Includes: 20 FTA PlantSaver Cards, 2.0 mm Uni-Core Punch with cutting mat, 50 ml FTA Purification Reagent, 1 pair of nitrile gloves, 1 cutting mat and round bottom test tube for sample crushing, instructions.

**EasiCollect**

EasiCollect is a device for collecting buccal cells and transfer to FTA Cards for DNA capture. Indicating FTA Cards in a 2 × 2" (50 × 50 mm) format fits automated sample punching equipment for efficient sample processing. A novel foam applicator collects cells for an all-in-one transfer to FTA Cards for even distribution of cells across the sample area.



**Ordering Information – FTA Nucleic Acid Collection, Storage, and Purification**

Description	Catalog Number	Maximum Volume/ Sample Area (µl)	Maximum Total Volume/Card (µl)	Sample Areas/Card	Cards/Pack
<b>FTA Cards</b>					
EasiCollect	WB120462	–	–	1	50
FTA Micro Card	WB120310	125	125	1	25
FTA Micro Card	WB120210	125	125	1	100
FTA Mini Card	WB120355	125	250	2	25
FTA Mini Card	WB120055	125	250	2	100
FTA Classic Card	WB120305	125	500	4	25
FTA Classic Card	WB120205	125	500	4	100
FTA Gene Card	WB120308	75	225	3	25
FTA Gene Card	WB120208	75	225	3	100
<b>Indicating FTA Cards</b>					
Indicating FTA Micro Card	WB120311	125	125	1	25
Indicating FTA Micro Card	WB120211	125	125	1	100
Indicating FTA Mini Card	WB120356	125	250	2	25
Indicating FTA Mini Card	WB120056	125	250	2	100
Indicating FTA Classic Card	WB120306	125	500	4	25
Indicating FTA Classic Card	WB120206	125	500	4	100
<b>PlantSaver Cards</b>					
FTA PlantSaver Card	WB120365	–	–	4	25
FTA PlantSaver Card	WB120065	–	–	4	100
<b>FTA Kits and Packs</b>					
FTA Kit	WB120067	–	–	–	25
FTA Plant Kit	WB120068	–	–	–	20

## FTA Elute Technology

### *Collect, Transport, Archive, and Isolate Nucleic Acids – all at room temperature*

FTA Elute Cards utilize patented Whatman FTA technology that simplifies the handling and processing of nucleic acids. DNA is eluted in an easy step, providing you with DNA in solution for your amplification needs.

The FTA Elute matrix is chemically treated with proprietary reagents that lyse cells upon contact causing the release of nucleic acids. DNA is recovered from the FTA Elute matrix through a simplified elution process using water and heat. Inhibitory components, such as hemoglobin, are retained on the FTA Elute matrix.

The Indicating FTA Elute matrix is the same chemistry as FTA Elute with an indicating dye that changes from purple to white upon application of a colorless sample such as saliva, urine, buccal cell swabs, cultured cells, and bacterial cultures.

#### Advantages and Benefits

- **Samples can be collected, shipped, and stored at room temperature.** Eliminates high costs associated with shipping samples on ice. Eliminates high costs associated with laboratory freezer storage requirements. DNA stored on FTA Elute Cards is stable at room temperature for at least 12 years...and counting.
- **Rapidly inactivates organisms, including bloodborne pathogens.** Eliminates the risk of contamination for the individuals handling the sample. Eliminates classifying samples as biohazards.
- **Sample processing time to isolate DNA is 15-30 minutes.** Eliminates lengthy and multiple step isolation procedures.
- **Sample processing requires a simple hot water elution procedure to isolate DNA.** Eliminates cost of using a purification kit.
- **Sample volume requirements are minimal: 12-40 µl per collection area.** Eliminates venous blood samples and large blood volume handling/processing. Eliminates the need for venipuncture equipment and a medical attendant at the site of collection.
- **Hemoglobin, a known PCR inhibitor, is bound to the FTA Elute matrix.** DNA is recovered in solution free of PCR inhibitors.

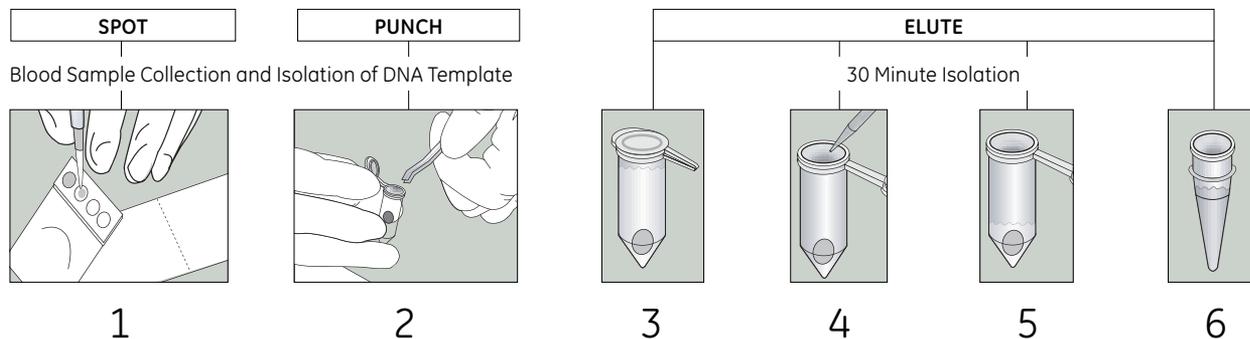


FTA Elute Micro Card



Indicating FTA Elute Micro Card

Collect and isolate samples quickly and easily



**Procedure Outline**

1. Apply sample to FTA Elute matrix; dry thoroughly
2. Punch a 3 mm disc and place in a microcentrifuge tube
3. Rinse punch in 500  $\mu$ l water, pulse vortex 3 times for 5 seconds
4. Remove water and centrifuge for 5 seconds; pipette off excess water
5. Add 30  $\mu$ l sterile water, heat at 95°C for 30 min; pulse vortex 60 times; centrifuge
6. Use 5-10  $\mu$ l eluted mono-stranded DNA in a PCR mixture

**Use FTA Elute for a Wide Range of Applications:**

- Multiplex PCR
- Sequencing after PCR amplification
- SNP analysis
- STR analysis
- Whole genome amplification
- Quantitative PCR
- Biobanking
- Pharmacogenomics
- Genotyping
- Genetic identification
- Molecular diagnostics
- Transgenic detection

**FTA Elute Micro Card**

Four sample application circles (11 mm diameter) per card, 40  $\mu$ l sample per circle.

**Indicating FTA Elute Micro Card**

One sample application area (25 mm diameter) per card, 40  $\mu$ l sample per circle.

## Ordering Information – FTA Elute

Description	Catalog Number	Sample Areas/Card	Cards/Pack
FTA Elute Micro Card	WB120401	4	25
FTA Elute Micro Card	WB120410	4	100
Indicating FTA Elute Micro Card	WB120412	1	25
Indicating FTA Elute Micro Card	WB120411	1	100
Dessicant packets (1 g)	WB100003	-	1000

## FTA Concentrator-PS Parasite Purification

The FTA Concentrator-PS™ is a 25 mm filter funnel with an FTA disc as the filter. It has a plastic laminate with three 6 mm holes cut into the laminate. This directs the flow of solution to concentrate the sample.

The FTA Concentrator-PS is designed for fast purification of parasite DNA in preparation for PCR analysis. The new product combines concentration and purification into one step, speeding time to detection, and enhanced sensitivity thanks to FTA technology incorporated in the unit. It is not recommended for archiving or for bacterial samples.

A 47 mm filter funnel containing Whatman Grade 4 filter paper is recommended as a prefilter for samples containing large particulates.

### Features and Benefits

- **Speeds time to detection.** Combines concentration and purification in one step to speed results.
- **Time- and cost-effective.** Eliminates DNA template preparation steps.
- **Increases sensitivity.** FTA technology supports detection of small numbers of organisms.
- **Effective.** Patented chemical formula lyses cells on contact, entrapping DNA in the matrix.
- **Increases productivity.** DNA is immediately ready for PCR analysis.
- **High-quality DNA.** FTA chemicals protect DNA from enzymatic degradation, environmental damage, and fungal/microbial attack.
- **Safe.** Infectious pathogens are inactivated after coming in contact with FTA coated matrices.
- **Eliminates errors.** Capture method avoids problems typically associated with pathogen isolation and concentration and DNA template preparation.
- **Easy-to-use.** No special skills required.



FTA Concentrator-PS



**FTA Concentrator-PS**

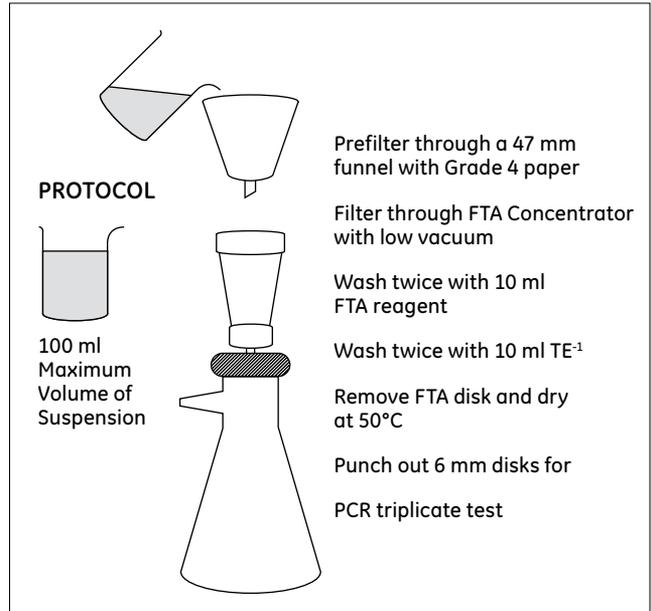
Fifty 25 mm funnel units containing FTA, barrel of funnel has 40 ml volume.

**FTA Concentrator-PS Sample-Kit**

Five FTA Concentrator-PS funnels, 2 x 25 ml FTA Purification Reagent, 6 mm Harris Uni-Core Punch, instructions.

**Disposable Filter Funnel, Grade 4**

Five 47 mm prefilter funnels to remove large particulates.



**Ordering Information – FTA Concentrator-PS Parasite Purification**

Description	Catalog Number	Quantity/Pack
FTA Concentrator-PS Sample Kit	SWB120220	5
Disposable Filter Funnel, Grade 4	WB120070*	5
FTA Concentrator-PS	WB120220	50

\* Product is only available in the Americas

# FTA Purification Reagent and Accessories

*For Collection, Storage, Processing, and Shipping FTA and FTA Elute Cards*

**FTA Purification Reagent**

- For purification of nucleic acids stored on FTA Cards
- Ensures superior quality DNA for PCR or SNP analysis
- Removes heme, PCR inhibitors, and other potential contaminants

**FTA Gene Card Tray**

- Holds 2 FTA Gene Cards for use in automatic dispensing/pipetting systems
- Tray footprint conforms to ANSI/SBS standards



FTA purification reagent

### **Harris Micro Punches™ (1.2 mm, 2.0 mm or 3.0 mm) and Cutting Mat**

- Recommended for the precise punching of FTA Cards. No sample carryover when recommended procedures are used. Tips provide up to 2000 punches. Polished steel tip is case hardened and can be sterilized. The cutting mat ensures clean sample cuts and extends the life of the cutting tip.
- 1.2 mm punch recommended for use with FTA Cards containing whole blood and samples with high DNA content
- 2.0 mm punch recommended for use with FTA Cards containing buccal cells, plasmids, plant, and other samples with lower DNA content
- 3.0 mm punch recommended for use with FTA Elute Cards

### **Harris Uni-Core Punches**

- Disposable punch recommended for punching of FTA Cards. No sample carryover when recommended procedures are used. Tips provide up to 500 punches.
- 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, plant, and other samples with lower DNA content
- 3.0 mm punch recommended for use with FTA Elute Cards
- 6.0 mm punch recommended for use with FTA Concentrator-PS

### **Sterile Foam Tipped Applicator**

- For the collection of saliva and buccal cells
- Nonabrasive foam head is same size as sample area on Indicating FTA Cards to facilitate sample application

### **Sterile Omni Swab**

This is a noninvasive device for the collection of saliva and cheek buccal cells. Sterile Omni Swab features a brush-like swab head that easily ejects from the stem of the swab for transfer of samples into tubes and multiwell plates. Sterile Omni Swab is presterilized and individually wrapped for single use.

## *Multi-Barrier Pouches*

### **Large**

- For transporting or storing FTA Classic Cards
- Seven laminated layers protect the card from exposure to gas or liquid contamination
- Tamper-evident seal maintains sample security
- Outer paper surface for labeling or writing



Harris Uni-Core Punches



Sterile Omni Swab

**Small**

- Same construction in a smaller size for storing FTA Gene Cards, Mini Cards or Micro Cards
- Suitable for FTA Elute Micro Cards as well

**Desiccant Packets**

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



Multi-barrier pouches

**Ordering Information – FTA Purification Reagent and Accessories**

Description	Catalog Number	Quantity/Pack
<b>Harris Micro Punch</b>		
1.2 mm (with cutting mat)	WB100005	1
2.0 mm (with cutting mat)	WB100007	1
3.0 mm (with cutting mat)	WB100038	1
Replacement tip 1.2 mm	WB100006	1
Replacement tip 2.0 mm	WB100008	1
Replacement tip 3.0 mm	WB100042	1
Replacement plunger 1.2 mm	WB100025	1
Replacement Plunger 2.0 mm	WB100026	1
Replacement plunger 3.0 mm	WB100041	1
Replacement cutting mat	WB100020	1
<b>Harris Uni-Core Punch</b>		
1.2 mm	WB100028	4
2.0 mm	WB100029	4
3.0 mm	WB100039	4
6.0 mm	WB100040	4
<b>FTA Purification Reagent</b>		
FTA purification reagent 500 ml	WB120204	1
<b>Swabs</b>		
Sterile foam tipped applicators	WB100032	100
Sterile omni swab	WB100035	100
<b>Multi-Barrier Pouches</b>		
Small (8 × 7 cm)	WB100036	100
Large (9 × 15 cm)	WB100037	100
<b>Accessories</b>		
FTA Gene Card tray	WB100030	20
Blood stain cards	WB100014	100
Desiccant packets (1 g)	WB100003	1000

# GenSolve DNA Extraction Kit

## *For Elution of DNA from FTA Cards*

GenSolve is an enzymatic based method for extracting high-quality, double-stranded DNA from FTA Cards.

DNA is completely extracted from the FTA matrix and, after purification, is available for a variety of downstream processes such as PCR, whole genome amplification, and SNP analysis by Taqman probes, Affymetrix, and Illumina methods.

### **DNA Yield from a 6 mm Disc with 10 µl of Whole Blood Applied:**

- Yield average: 132 ng
- Yield range: 51-363 ng
- Overall CV of 96 samples: 11%
- Size: up to 35 Kb

### **Kit Components:**

- Recovery solution A, 6 vials
- 1.0% LiDS (Lithium Dodecyl Sulfate) solution, 40 ml
- Protease, > 16 U/g, 1.5 ml
- Recovery solution B, 1.5 ml



## **Ordering Information – GenSolve: Extracting DNA from FTA Cards**

Description	Catalog Number
GenSolve Kit	WB100050

## Clone Archiving

Whatman offers a patented technology to collect, store, backup, and process clone samples. This revolutionary FTA technology is available in two formats: 96 well card and 384 well plate.

### CloneSaver Card

#### *FTA Technology in 96 Well Format for High-Throughput Applications*

Designed for the collection, long-term storage, and purification of plasmid and BAC DNA from bacterial clones in a 96 well format.

#### **Prepare BAC and Plasmid DNA with Amazing Ease**

- Apply 5  $\mu$ l bacterial culture, resuspended colony or glycerol stock. Cells are lysed and plasmid or BAC DNA is stabilized for long-term storage or immediate processing.
- Bacteriophages are inactivated
- DNA is easily accessible for downstream applications
- Store up to 96 samples on each card

#### **Store Sample DNA for Years at Room Temperature**

Plasmid DNA stored on CloneSaver Cards is stable at room temperature for at least four years...and counting.

#### *DNA is Easily Accessible for Downstream Applications*

##### **Transformation**

Plasmid DNA can be eluted or used directly on a punch to transform bacteria either by electroporation or heat-shock methods.

##### **PCR**

Immobilized plasmid DNA on a CloneSaver Card punch can be used directly in a PCR. The PCR products remain in solution, do not bind to the punch, and are easily recoverable. Plasmid DNA can also be eluted for PCR or other studies.

##### **Sequencing**

Plasmid DNA eluted from a CloneSaver punch can be amplified by Rolling Circle Amplification, such as TempliPhi™ from GE Healthcare, and then sequenced without the need for culture regrowth and plasmid purification.



Sample application to CloneSaver Card



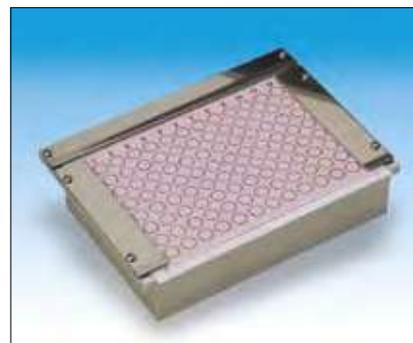
CloneSaver Card with Multi-Barrier Pouches

### CloneSaver Resealable Multi-Barrier Pouches

Used for transporting or storing the CloneSaver Card. The pouch is constructed with seven laminated layers that protect the card from exposure to gas or liquid contamination. There is a zip-lock resealable closure for easy access to the CloneSaver Card. The tamper-evident seal maintains sample security and the outer paper surface can be used for labeling or writing.

### SPOT CloneSaver Holder

SPOT CloneSaver Holder is a rigid frame that allows automated spotting to standard CloneSaver Cards. It keeps the card flat for uniform and precise spotting of biological samples. The 96 well card is easily inserted into the ANSI/SBS-compatible frame, which can then be placed onto a liquid-handling deck just like a multiwell plate. The SPOT CloneSaver Holder is compatible with standard liquid handlers manufactured by companies such as Beckman Coulter and Tecan Instruments.



SPOT Holder

## Ordering Information – CloneSaver Card

Description	Catalog Number	Maximum Volume/ Sample Area (µl)	Maximum Total Volume/Card (µl)	Sample Areas/Card	Cards/Pack
CloneSaver Card	WB120028	5	480	96 Well Format	5
CloneSaver Resealable Multi-Barrier Pouch	WB100024	–	–	–	50
SPOT CloneSaver Holder for semi-automated spotting	WB100034	–	–	–	1 holder

## Elu-Quik DNA Purification Kit

The Elu-Quik™ Kit provides a convenient and versatile method for purifying DNA from 500 bp to 200 Kb. The kit is recommended for the isolation of genomic DNA from whole cells and tissues, as well as purification of single- and double-stranded fragments from gel slices or plasmid minipreps.

The Elu-Quik Kit relies on the affinity of DNA for glass particles in the presence of sodium perchlorate binding buffer. After several washing steps to remove contaminants and cellular debris, the DNA is eluted from the glass in TE<sup>-1</sup> buffer or water. The highly pure DNA is ready for further analysis without the need for ethanol precipitation. The optimized buffers in the kit provide high yields and the rod-shaped glass particles reduce shearing of genomic DNA. Yields typically are greater than 650 µg from 10<sup>8</sup> cells.

### Features and Benefits

- Optimized buffer system provides high DNA yields
- Versatile kit allows isolation of DNA from a variety of sources
- Samples are eluted in TE<sup>-1</sup> buffer or water, ready for further assays without ethanol precipitation
- Uniform glass rods minimize shearing of DNA



Elu-Quik DNA Purification Kit

### Ordering Information – Elu-Quik DNA Purification Kit

Description	Catalog Number
Elu-Quick DNA Purification Kit*	10462620

\* Includes: 5 ml Glass Concentrate in Binding Buffer, 125 ml Sodium Perchlorate Binding Buffer, 20 ml Lysis Buffer, 125 ml Wash Buffer Concentrate, 125 ml Salt Reduction Buffer (1) and 125 ml Salt Reduction Buffer (1)

# Elutip-d Purification Minicolumns

## High Recovery of DNA

The Elutip-d™ minicolumns are designed for purification of DNA with high recovery rates. They provide a simple and convenient method for purification of DNA in the 15 bp to 50 Kb range.

The Elutip-d columns are excellent for the removal of unincorporated nucleotides and other contaminants from radiolabeling reactions to reduce background levels and increase sample activity. They also provide an excellent method for isolation of nucleic acids from low-melt agarose gels.

The Elutip-d column matrix binds nucleic acids in high quantities upon sample application under low salt conditions. Contaminants are washed through the column and the purified DNA is then eluted with high salt. The eluted sample is ready for use in a variety of assays that require high purity of the nucleic acid.

Elutip-d columns are used with standard syringes. Optional prefilters contain nonbinding cellulose acetate membranes and are designed to increase efficiency by removing gel pieces that could otherwise clog the column.

### Features and Benefits

- High recovery of single- and double-stranded DNA
- Eliminates contaminants that can cause high background or interfere with sample activity
- Sample is eluted in a small volume
- 100 µg capacity

## Ordering Information – Elutip-d Purification Minicolumns

Description	Catalog Number	Quantity/Pack
Elutip-d Starter Kit*	10462615	1
Elutip-d columns	10462617	50
Elutip-d columns	10462618	250
Elutip-d prefilters	10484224**	50

\* Includes: 15 Columns and 15 Prefilters (0.45 µm CA membrane)

\*\* Product is only available in the Americas



Elutip-d

## Elutrap Electroelution System

### *Elution of Nucleic Acids and Proteins from Gel Slices*

The Elutrap™ System is designed to isolate nucleic acids and proteins from agarose or polyacrylamide gel slices by electroelution. Samples are purified with excellent recovery into volumes as low as 200 µl, without requiring sample pretreatment or special buffers.

The Elutrap System can be used with most horizontal gel electrophoresis chambers. The Elutrap Electrophoresis Chamber allows for the most efficient flow of current through the device and can be used for up to four samples simultaneously.

Assembly of the Elutrap System is very easy. Gel slices are placed in the middle of the Elutrap device, which is then placed into a horizontal electrophoresis chamber. Molecules migrate from the gel slice into a trap area formed by BT1 and BT2 membranes. The membrane placement is adjustable, allowing final elution trap volumes to be optimized for the particular assay. The Elutrap System can also be used for concentration of dilute solutions.

#### Features and Benefits

- Versatile system can be used for nucleic acids and proteins
- Purifies nucleic acids 14 bp to 150 Kb; proteins larger than 3-5 kD
- No salt cushions or special buffers required for elution
- Adjustable trap allows optimization of final sample volume
- Electrophoresis chamber holds up to four Elutrap devices simultaneously



Elutrap Electroelution System

### Ordering Information – Elutrap Electroelution System

Description	Catalog Number	Quantity/Pack
Elutrap BT1 Membranes for Elutrap System	10404090	100
Elutrap BT2 Membranes for Elutrap System	10404092	100
<b>Elutrap Starter Kit</b> Includes: Elutrap Device (1), BT1 Membranes (50), BT2 Membranes (50)	10447700	1
<b>Elutrap System Kit – 4-Pack</b> Includes: Elutrap Device (4), Electrophoresis Chamber (1), BT1 Membranes (50), BT2 Membranes (50)	10447705	1
<b>Elutrap System Starter Kit</b> Includes: Elutrap Device (1), Electrophoresis Chamber (1), BT1 Membranes (50), BT2 Membranes (50)	10447724	1

## PCR Clean-up UNIFILTER

Process 96 or 384 samples quickly by a bind-wash-elute method with greater than 85% recovery. The PCR Clean-up UNIFILTER eliminates time-consuming precipitations and labor-intensive resin purifications. Purified DNA is ready for sequencing, hybridization assays, and microarrays.

The PCR Clean-up UNIFILTER can be used with both vacuum and centrifuge techniques. (Centrifugation is recommended for final elution with the 384 well UNIFILTER.)



96 well PCR Clean-up UNIFILTER

### Ordering Information – PCR Clean-up UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Well Bottom	Quantity/Pack
<b>UNIFILTER</b>						
96	800	7700-2810	Clear polystyrene	DNA binding	Filter, LDD	25
384	100	7700-2110	Clear polystyrene	DNA binding plate	Filter, LDD	50
<b>UNIPLATE Collection Plate</b>						
96	250	7701-5250*	Natural polypropylene	-	"V"	50
384	100	7701-1100	Clear polystyrene	-	Flat	50

\* Does not comply with ANSI/SBS standards

LDD – Long Drip Director

## Dye Terminator Removal UNIFILTER – 96 Well and 384 Well

The Whatman Dye Terminator Removal plates are available in 96 well and 384 well formats. These plates can be used with gel filtration media for high-throughput sequencing reaction clean-up, including removal of dye blobs.

They are constructed from rigid polystyrene that can withstand centrifugation. Laboratory packing of gel filtration media is less expensive than prepacked plates or spin columns.



96 well Dye Terminator Removal UNIFILTER

## Ordering Information – Dye Terminator Removal UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Well Bottom	Quantity/Pack
<b>UNIFILTER</b>					
96	800	7700-2801	Clear polystyrene, GF/C	Filter, LDD	25
384	100	7700-1101	Clear polystyrene, GF/C	Filter, LDD	50
<b>UNIPLATE Collection Plate</b>					
96	750	7701-5750	Natural polypropylene	Round	25
384	80	7701-5101	Natural polypropylene	“V”	50

LDD – Long Drip Director

## Plasmid/BAC Sample Preparation

### 96 Well Bacterial Growth Plate

The Whatman high-throughput Bacterial Growth Plate can simplify and accelerate the growth of 96 individual 1.5 ml bacterial cultures. It is used for both overnight cultivation and the initial “spin down” of bacteria. Made of medical-grade polypropylene with a clear polystyrene lid, this gamma-irradiated plate eliminates the need to grow multiple, discrete cultures. It also optimizes space and efficiency in the incubator.

### 96 Well Lysate Clarification UNIFILTER

The Whatman Lysate Clarification UNIFILTER can utilize either vacuum or a centrifuge. The vacuum process is significantly easier to automate with consistency across all wells. It also has an average DNA recovery rate 10-30% higher than the manual centrifuge method. This method filters out cell debris to obtain plasmid DNA in the aqueous phase. Whatman filter technology results in high particle retention and fast flow rates while producing a clean lysate. The Lysate Clarification plate is an important tool for high-throughput plasmid DNA purification.

### 96 Well DNA Binding UNIFILTER

Whatman Plasmid DNA Binding UNIFILTER works either as a stand-alone plate 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<sup>-1</sup> buffer. The DNA is ready to use and further ethanol precipitation is unnecessary. The final concentration is 50-100 ng/µl, depending on the original culture. The OD<sub>260/280</sub> ratio is 1.9 and the yields in all 96 wells “max out” at 6 µg.

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 laboratory.

### 384 Well DNA Binding UNIFILTER

The 384 well DNA Binding UNIFILTER Plate effectively binds and purifies DNA molecules. It provides highly reproducible results with yields exceeding 2 µg/well, from bind-wash-elute processing with collection by filtration. Minimal liquid hang-up allows for reduced elution volume, enabling DNA concentration as high as 150 ng/µl. Further ethanol precipitation is unnecessary. The DNA is ready to use.

### BAC Prep UNIFILTER

With increasing demand for simple and fast methods to purify DNA from bacterial cultures, the Whatman BAC Prep Microplate provides the 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 – Plasmid/BAC Sample Preparation

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Description	Well Bottom	Quantity/Pack
<b>96 Well Bacteria Growth Plate UNIPLATE</b>						
96	2000	7701-5205	Natural polypropylene	Irradiated with lid	Round	25 (individually bagged)
<b>96 Well Lysate Clarification UNIFILTER</b>						
96	800	7720-2830	Clear polystyrene	Lysate clarification plate	-	25
<b>96 and 384 Well DNA Binding UNIFILTER</b>						
96	800	7700-2810	Clear polystyrene	DNA binding	Filter, LDD	25
384	100	7700-2110	Clear polystyrene	DNA binding	Filter, LDD	50
<b>BAC Prep UNIFILTER</b>						
96	800	7700-2808	Clear polystyrene	0.45 µm CA	Filter, LDD	25
<b>UNIPLATE Collection Plates</b>						
96	750	7701-5750	Natural polypropylene	N/A	Round	25
96	2000	7701-5203	Natural polypropylene	N/A	-	25
384	100	7701-1100	Clear polystyrene	N/A	-	50

CA – Cellulose Acetate

LDD – Long Drip Director



## Neonatal Screening Products

Originally used to test for phenylketonuria (PKU), these cards now screen for more than 30 potential diseases. Simple. Accurate. Effective. Lifesaving. Now you can help every infant be safe, be healthy.

244 903 Specimen Collection Paper

248 Specimen Collection Devices

# Neonatal Screening Products

Whatman offers a line of products for neonatal and population screening. These products are used in physicians' offices, home blood sample collection kits for use by healthcare professionals, and in methods for sample archiving.

Specimen collection papers allow researchers to collect samples for analysis from a wide range of sources. Samples can be collected in a controlled laboratory environment or in more challenging field environments.

It is important that the paper selected for specimen collection is extremely pure and consistent and has excellent absorption characteristics.



Neonatal screening

## 903 Specimen Collection Paper

### For Specimen Collection and Transport

Since Dr. Robert Guthrie first published procedures for screening newborns for phenylketonuria (PKU), the 903 specimen collection paper has been widely used globally for body fluid sample collection, transport, analysis, and archiving.

The 903 paper is used in virtually all Europe and US Newborn Screening Programs and in most Newborn Screening Programs throughout the world. In Europe, it is registered by our regulatory body and complies with CE directive 98/79/CE. In the US, it is considered an FDA listed Class II medical device. Widespread testing for phenylketonuria (PKU) has led to early detection and intervention for tens of thousands of babies worldwide. Newborn Screening Programs today screen for, depending on the state or country, anywhere from three to eleven or more conditions, including congenital

hypothyroidism, galactosemia, branched-chain ketonuria, maple sugar urine disorder, and sickle-cell anemia. More recently, with the advent of tandem mass spectrometry technology, many programs are adding less frequently occurring disorders to their panel of assays, including MCAD, cystic fibrosis, and a range of amino acid disorders.

### Guaranteed Consistency

Whatman maintains statistical process control (SPC) over the manufacture of 903 specimen collection paper. State-of-the-art equipment ensures uniformity and adherence to specified parameter ranges. Since the stability of the collected sample can be affected by the composition of the paper, Whatman carefully controls the manufacturing process to ensure consistent composition, uniform thickness, flow-rate, absorbency, and purity.

### **Manufacturing Quality**

The 903 paper is manufactured from 100% pure cotton linters with no wet-strength additives. Whatman guarantees to the newborn screening community that each lot of paper that is manufactured will last for at least 12 months at current usage levels.

As 903 paper is a regulated product (in Europe a CE compliant device and in the U.S. an FDA Class II medical device), Whatman complies with FDA Regulations during 903 manufacture. Products are tested to ensure that the product complies with the FDA consensus performance standard for blood collection on filter paper for Newborn Screening Programs. This Clinical and Laboratory Standards Institute (CLSI) standard defines the performance requirements required when blood is applied to the filter paper. These requirements include: the time for 100 µl of blood applied to the paper to be absorbed, the spot diameter made by 100 µl of blood, serum uptake volume of a 1/8" disc, and grammage. Whatman 903 paper is strictly quality controlled for serum uptake, absorption characteristics, and lot-to-lot consistency.

During the production of a lot of 903 paper, Whatman Quality Control test the time for 100 µl of blood applied to the paper to be absorbed, together with the diameter of the spot made by the blood. Random samples taken throughout the lot are then subject to testing by an independent lab and by the Centers for Disease Control, Newborn Screening Program. This test is undertaken to demonstrate that the lot of paper complies with all the requirements, including serum uptake, of the CLSI performance standard for blood collection on filter paper for Newborn Screening Programs.

### **Post-Printing Quality**

For most applications, the 903 paper is printed and provided as part of a form that includes detailed demographic information about the patient being tested. Requirements for printing filter paper for use in Newborn Screening Programs are provided in the CLSI (formally NCCLS) standard. Improper printing can calender or crush the paper, negatively impacting its absorption characteristics. This can result in unacceptably long absorption times, layering of blood spots, and incomplete absorption. Therefore, Whatman Quality Assurance tests a random sampling of forms from all printed collection form lots for blood absorption time, circle size, and caliper. A certificate of analysis is available upon request for each lot of printed blood collection forms.

### **Beyond Neonatal Testing**

903 paper is a medium for whole blood collection in Newborn Screening Programs; however, 903 can also be used in other related applications, for example as a specimen receptacle for the primary containment and preservation of blood derived from the body for in vitro diagnostic examination. Such applications may include the collection of blood spots at a physician's office for subsequent analysis of the concentration of lead in blood at a central laboratory. Users should qualify protocols for any specific downstream assay of blood held on 903 for validity and safety, and define and validate the limits of detection.

Some laboratories analyze nucleic acids in samples collected on 903 paper. While this work can be done, we strongly recommend our FTA and FTA Elute range of products as being much more suitable for DNA and RNA applications. See p. 223 for more information on these products.

**Dry Rak for Collection Card Drying**

The Whatman Dry Rak™ is designed to accommodate multiple collection forms at one time, safely and properly air-drying the blood specimens in a suspended horizontal position (CLSI Document LA4-A5, Vol. 27, No. 20). The Dry Rak is easily assembled and can be affixed to a wall (reference 10539521) or counter top (reference 10537173) with optional Velcro stickers.

## 903 Protein Saver Cards

Whatman offers a variety of generic collection cards that meet the requirements for many sampling programs.

*903 Multiple-Part Neonatal Card*

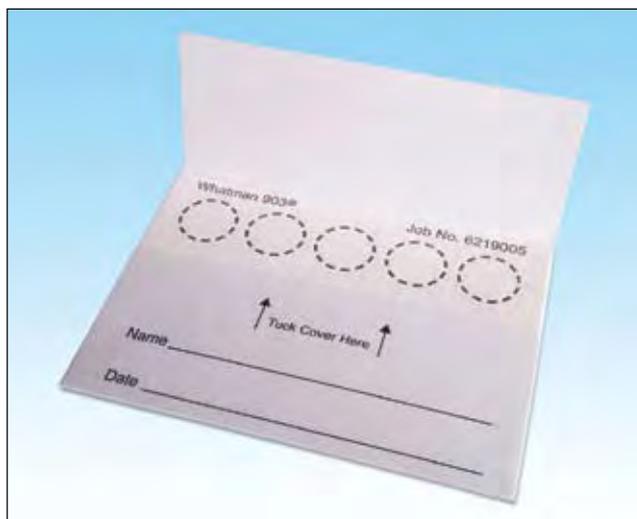
The multiple-part neonatal card includes a demographic portion in duplicate where information about the newborn, parents, physician, and care can be entered. Each card has a unique sequential number and bar code. The multi-part 903 collection paper is imprinted with five half-inch (13 mm) circles and has a wraparound cover to protect the 903 paper before and after sample collection. Each circle holds 75-80  $\mu$ l of blood.

*903 Protein Saver Card*

The sample collection area of the 903 Protein Saver Card contains five half-inch (13 mm) circles. Each circle holds 75-80  $\mu$ l of sample. The wraparound cover has spaces for name and date of collection and is imprinted with the universal biohazard symbol in accordance with USPS regulations. It fits into Whatman foil barrier Ziploc® bags for storage. This is for research use only.



Multiple-part neonatal card



903 Protein Saver Card

## 903 Protein Saver Snap-apart Card

The 903 paper in this device, imprinted with four half-inch circles, is enclosed between two pieces of cover stock. Each circle holds 75-80 µl of sample. To use, one cover is snapped off, the sample is collected, and the remaining cover is folded over the sample. This cover is imprinted with the universal biohazard symbol in accordance with USPS regulations. This is for research use only.

### Regulation Disclaimer – CE Mark

Under current regulations, specimen collection cards, including neonatal screening cards, which are to be used for human diagnostic tests, are classified as “other” IVD devices under the European IVD Directive 98/79/CE and require the CE Mark if sold within the European Union. All 903 specimen collection devices manufactured and printed by Whatman for neonatal testing in the EU undergo post-printing quality control and carry the CE Mark. Whatman will assume no responsibility for the quality or performance of 903 collection devices converted, printed or packaged by third party suppliers.

### Training Materials

Educational materials illustrating the proper method for collecting neonatal samples are available from Whatman in five languages: English, German, French, Italian, and Spanish.



Protein Saver Snap-apart Card

Please contact our Technical Support for more information, or visit our web site at <http://www.whatman.com/neonatalscreeningproducts.aspx>

Within Europe, our 903 card packs now include instructions for use in various languages. These documents can be downloaded from our web site at <http://www.whatman.com/productinserts.aspx>

## Ordering Information – 903 Protein Saver Cards

Description	Catalog Number	Quantity/Pack
903 Protein Saver Card	10534612*	100
903 Protein Saver Card	10531018**	100
903 Multiple-Part Neonatal Card	10537279*	100
903 Protein Saver Snap-apart Card	10534320	100
903 Neonatal cards	10538069	100
Dry Rak (without Velcro)	10537173	10
Dry Rak (with Velcro)	10539521	10
Hand punch 3.1 mm	10495010	1
Biohazard labels 7/8" × 7/8"	10534150	1000
Foil-Barrier Ziploc bags (for cards 95 × 130 mm max)	10534321	100
Plastic Ziploc storage bags 4" × 6"	10548232	100
Desiccant pack	10548234	100
Glassine envelopes 3 1/4" × 4 7/8"	10548236	100

\* Product is only available in the Americas

\*\* Product is only available in Europe

# Specimen Collection Devices

## *Custom Printing*

Whatman offers customized collection devices for use in large sampling studies. Specimen collection papers enable researchers and clinicians to obtain samples for analysis from a wide range of sources.

Regardless of where a sample is collected, information about the sample must be recorded and cataloged for each sample. Whatman custom printed forms are designed with this function in mind.

Whatman can develop individually designed collection matrices, which can be used as a single-part form or incorporated into multiple-part specimen collection forms.

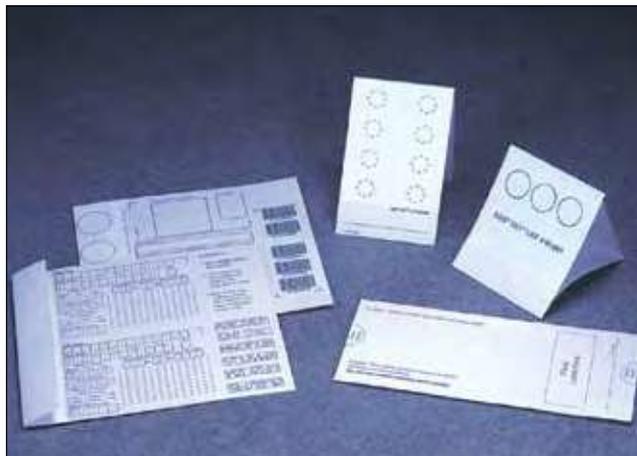
## *Custom Collection Device Options*

Whatman recommends that the following information be included on a custom 903 card as recommended by CLSI. This is to ensure that your laboratory is compliant with the CLSI recommendations. Information below is taken from the CLSI document (LA4-A5, Vol. 27, No. 20): Blood Collection on Filter Paper for Newborn Screening Programs; Approved Standard-Fifth Edition.

### **Minimum Preprinted Information**

The following is the minimum necessary demographic information required to achieve the screening goals. Additional information may be included at the discretion of the screening programs in order to meet specific needs. Consult local regulations and institutional policies for deviations from minimum preprinted information.

- Infant's last name (first if available)
- Mother's first and last name (optional: include mother's maiden name)
- Sex
- Birth date (optional: include time of birth)
- Date of specimen collection
- Infant's age (indicate if less than 24 hours; optional: include time of collection)



Customized collection devices

- Patient identification number (e.g., medical record number; optional: include address and phone number)
- Birth weight
- Submitter's identification and address (optional: include birth facility)
- Physician's name (healthcare provider) and telephone number
- Name of Newborn Screening Program and address
- Unique nonrepeating serial number
- Expiration date of specimen collection device
- Appropriate number of preprinted circles should be available with preprinted broken- or dotted-line circles on one side of the filter paper section (with optional printing of circles on both sides). (In the United States, the preprinted circle (1/2 inch [13 mm] internal diameter) is filled to the printed line by 75  $\mu$ l of blood while 100  $\mu$ l fills slightly beyond the print.)
- Manufacturer and lot number of filter paper indicated on the filter paper section, and manufacturer or printer listed on the patient information section of the form (optional: bar codes may be imprinted on the specimen collection device)

Whatman also recommends that the expiration date is printed on the card, as per the CLSI recommendations.

### Shelf Life

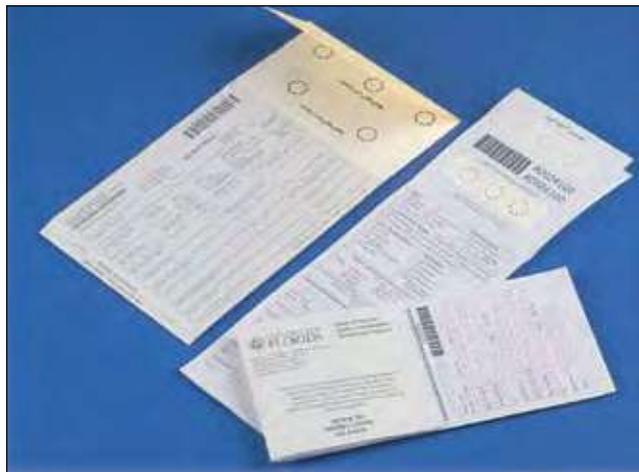
The printed collection device (card) for newborn screening has a shelf life of three years. Carbonless paper has a shelf life of approximately three years and is sensitive to temperature changes. When cards are removed from the shipping carton, they should be stored in their original wrapping and stacked in a manner that avoids compressing the filter paper. Compression of the filter paper will alter its performance characteristics.

### Sequential Numbering

Forms can be provided with sequential numbering for tracking and identification.

### Cassette Format

Custom cassette formats are suited for automated processing.



Specimen collection forms

### Dual Paper Specimen Collection Cards

With increasing frequency, Newborn Screening Programs and diagnostics companies are doing both protein-based and molecular testing from the same blood spots, often in different laboratories. To assist in this process, Whatman has developed a variety of sample collection card designs that incorporate two pieces of filter paper, one sheet of FTA and two sheets of 903. In order to ensure accuracy of identification, the papers can be bar coded. This is not an in vitro diagnostic device.

### Bar Codes

Forms can be provided with bar coding on the demographic portion of the form and/or directly on the specimen collection paper in any bar code format that can print alphanumeric characters (letters, digits, and some special symbols). Data integrity is fortified by the use of modulus check digit characters.

### OCR-Scannable Format

Whatman can use special inks for printing forms that are invisible to optical character recognition (OCR) scanners, ensuring that scanners will detect only the variable demographic information.

### Parent Information Sheets/Pamphlets

Parent information sheets that are part of the neonatal collection device and include the device numbers can be provided as the first part of a multiple-part form. Alternatively, detailed parent information pamphlets can be glued to the form.

### Transfer or Mailing Envelopes

Whatman can provide custom envelopes for mailing of samples to the central laboratory, for sending a screening form home with the parent for follow-up sampling, or sending samples to separate laboratories for nonstandard screening tests, for example, for DNA testing or supplemental screening. These envelopes are frequently color-coded.



Parent information pamphlets



Envelopes

### **Hearing Section**

It is possible to add a section to a form for hearing test results. This puts all the screening results together in a database under a single control number.

### **Tip-ons**

This is an economical alternative to using a full sheet of collection paper. Whatman can attach a small piece of 903 filter paper onto the end of a form, minimizing costs while ensuring high-quality results.

### **Color Coding**

Custom printed forms can be color-coded to simplify form distribution before and after sample collection and to readily identify samples that require nonstandard or supplemental testing.

### **Colored Inks and Papers**

Forms can be printed in colored inks and/or screen tints as well as your choice of colored papers.

### **Multiple-Part Forms**

Printing of up to 8-part forms offers convenience and maintains integrity of information on all parts.

### **Wraparound Covers**

Offering a variety of wraparound covers to ensure long-term sample integrity. Some of the options include 28-pound paper, translucent glassine or clear moisture-proof barrier.

### **Custom Packaging**

A specified coding system can be printed on every package, carton, and shipping box. Outside cartons can be labeled to reflect the sequential numbering of the forms enclosed.

### **Snap-apart Format**

903 specimen collection paper is protected prior to use. After sample application, the cover folds over and tucks into the flap in "matchbook" fashion.



## Protein Microarrays

In many applications, these tools are used for advanced research applications such as identifying novel protein-protein interactions, screening entire proteomes for new proteins, and profiling hundreds of patient samples simultaneously – all so we can better understand the human body.

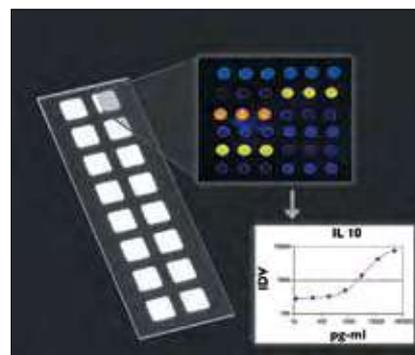
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# Protein Microarrays

Protein microarrays are tools that can be used in many different areas of research, including basic and translational research. Protein arrays can take on many different formats and can be used to do more than simple expression profiling of samples.

Recent publications have demonstrated that protein microarrays can be used to phenotype leukemia cells, identify novel protein-protein interactions, screen entire proteomes for new proteins, and profile hundreds of patient samples simultaneously. Whatman has led the way in protein array technology starting with the development of the FAST™ Slide: the premier protein arraying surface.

Whatman offers kits, reagents, and protocols for scientists who wish to develop their own protein arrays, as well as off-the-shelf arrays and a variety of protein array services.



Quantitative immunoassays

## Proteomic Arrays

Proteomic arrays are typically high-density arrays (> 1000 elements/array) that are used to identify novel proteins or protein-protein interactions. The library that is arrayed can come from many possible sources, including expression libraries, and can contain known, as well as unknown, elements. The sample to probe the array can come from virtually any source.

To detect proteins that are bound to the array, the samples must be labeled directly with a fluorophore or a hapten. Alternatively, in some applications antibodies can be used to detect binding events. One common use is for antibody screening.



Proteomic arrays

## Microspot ELISA and Antibody Arrays

Microspot ELISA and antibody arrays are used for quantitative profiling of protein expression in cell cultures or clinical specimens. Typically, these arrays are low-density (9-100 elements/array). In these arrays, known antibodies are arrayed and used to capture antigens from unknown samples. To detect antigen that is bound to the array, the antigen either needs to be labeled directly with a fluorophore, or a second binder/antibody can be used. The latter option creates a sandwich assay similar to a traditional ELISA, only in a microspot format. The Whatman FAST Quant Cytokine Quantification Kits offer an example of a microspot sandwich assay.



Microspot ELISA and antibody arrays

### Single-Capture Antibody Arrays

Single-capture antibody arrays consist of multiple, known antibodies arrayed to a solid surface and used to profile the presence of specific antigens from a pooled sample, usually consisting of both a normal and disease-present sample. A single capture antibody array utilizes a direct or hapten labeling system, which does not require a matched antibody. Single-capture antibody arrays offer a qualitative profiling tool to detect binding events. The Whatman Serum Biomarker Chip offers an example of a single-capture antibody array.

### Antigen Arrays or Reverse Arrays

One application of antigen arrays is to interrogate research or clinical samples for the presence of auto-antibodies. Normally, a low-density array is probed with serum or plasma samples. Reverse arrays are used to profile dozens or hundreds of samples (research or clinical) for the presence of a small number of antigens (1-3). Cell lysates, material from laser capture microdissection or serum samples are arrayed. This creates an array of “unknowns” that can be probed with a small number of antibodies. Visualization can be performed with a detection or “top” antibody linked to a fluorophore or color detection reagent.

### Microarray Westerns

An alternative strategy for protein microarrays is to array samples containing multiple proteins on the FAST Slide and probe with a labeled antibody or set of antibodies. The advantage of the micro format is that extracts from various treatments and time points can be arrayed on the same slide. Once arrayed, the levels of multiple proteins can be measured and compared simultaneously.

### Protein Binder Arrays

Protein arrays can be used to identify novel protein binding motifs or protein-protein interactions. Engineered or synthetic proteins, or peptides with various binding motifs are arrayed, and the array is probed with complex protein samples. Detection with a known antibody allows the researcher to identify previously unknown binding events.



Single-capture antibody arrays



Antigen arrays or reverse arrays



Protein binder arrays

# FAST Slides

## *Protein Microarray Surface*

FAST Slides are the premier surface for protein microarray applications. They are now manufactured in a highly automated process that provides excellent control and very high reproducibility.

FAST Slides are glass slides coated with a proprietary nitrocellulose polymer. The polymer binds proteins in a non-covalent, irreversible manner and can be probed using the same method as in traditional blots.

The three-dimensional surface of a FAST Slide maintains reactivity of proteins and gives excellent reproducible results. It is usable with fluorescent, chemiluminescent or radiographic detection systems and is compatible with microarray scanners and robots.

Perhaps the most significant advantage of FAST Slides over modified glass surfaces is that the matrix retains arrayed proteins in near-quantitative fashion. This property translates into antibody arrays with unparalleled sensitivity down to antigen concentrations of 1 pg/ml. These qualities make FAST Slides the most reliable surface for microarray experiments and provide a high level of confidence.

### **Features**

- Superior protein binding capacity
- Highest sensitivity and dynamic range
- Excellent long-term stability of printed proteins
- Compatible with all detection methodologies
- Compatible with commercially available arraying robots

FAST Slides are suitable for many types of protein microarrays, including antibody arrays and microarray Westerns. There are tremendous advantages to using FAST Slides over traditional ELISAs and Westerns, including less sample required, better sensitivity, linearity, and quantitation. The major advantage is that hundreds or thousands of antibodies or samples can be screened simultaneously.



### **Compatible Detection Methodologies**

FAST Slides are compatible with fluorescent, chemiluminescent or radiographic detection systems.

### **Accessories**

Optimal use of FAST Slides is supported by Incubation Chambers, Slide Holders, and Protein Array Buffers and Reagents. The FAST PAK Kit combines these items (except Slide Holders) in a convenient starter format.

## Product Specifications – FAST Slides

Slide: 1 × 3" (25 × 76 mm) Surface: Nitrocellulose Thickness: 11 µm	Description
FAST Slides, 1 pad	Up to 10,000 spots (150 µm spot size, 300 µm pitch) Bar coded
FAST Slides, 2 pad	2× up to 3600 spots (150 µm spot size, 300 µm pitch) Bar coded
FAST Slides, 8 pad	Pad spacing: 9 mm (microplate spacing) 8× up to 256 spots (150 µm spot size, 300 µm pitch) Not bar coded
FAST Slides, 16 pad	Pad spacing: 9 mm (microplate spacing) 16× up to 256 spots (150 µm spot size, 300 µm pitch) Not bar coded

## Ordering Information – FAST Slides

Description	Pad Dimensions (mm)	Catalog Number	Bar Coded	Quantity/Pack
FAST Slides, 1 pad	20 × 51	10484182	Yes	20
FAST Slides, 1 pad	20 × 60	10486111	–	20
FAST Slides, 2 pad	20 × 20	10485317	Yes	10
FAST Slides, 8 pad	6 × 6	10485320	–	10
FAST Slides, 16 pad	6 × 6	10485323	–	10

## FAST PAK

### Protein Array Kits

FAST PAK Protein Array Kits provide the necessary components for researchers to conveniently build and process protein microarrays.

FAST PAK Kits are available for all FAST Slide formats (1, 2, 8, and 16 pads). Each kit contains 10 FAST Slides, 10 Incubation Chambers, 40 Chamber Covers, 10 ml 2× Protein Arraying Buffer, 15 ml Protein Array Blocking Buffer, and 125 ml 10× Protein Array Wash Buffer.

A reusable slide holder is also needed, either FAST Frame for 1-4 slides or Chip Clip™ for 1 slide.



Protein Array Kits

**Features and Benefits**

- 1, 2, 8 or 16 array pads on each slide
- Each pad can be processed separately to increase the number of arrays on each slide and reduce sample volume
- Suitable for multiplex experiments, side-by-side comparisons, and control experiments all on the same slide
- Reproducible results from slide-to-slide and pad-to-pad
- Increased protein stability and enhanced signal intensity with FAST PAK array buffer
- Proprietary protein array blocking buffer ensures optimum signal-to-noise ratios and promotes specific binding
- Flexibility for detection by fluorescent, chemiluminescent, colorimetric, and radiographic methods

**Applications**

- ELISA format (sandwich assay) experiments using antibody arrays
- Reverse phase (micro-Western) arrays using cell or tissue lysates
- Purified protein arrays
- Carbohydrate arrays
- Lipids and other materials which can be arrayed on nitrocellulose

**Ordering Information – FAST PAK Protein Array Kits**

Description	Catalog Number	Quantity/Pack
FAST PAK, 1 pad*	10485262	1
FAST PAK, 2 pad*	10485319	1
FAST PAK, 8 pad*	10485322	1
FAST PAK, 16 pad*	10485325	1
<b>Slide Holders</b>		
FAST Frame	10486001	1
Chip Clip	10486081	1

\* Includes: FAST Slides (10), Incubation Chambers (10), Chamber Covers (40), 2x Protein Arraying Buffer (10 ml), Protein Array Blocking Buffer (15 ml) and 10x Protein Array Wash Buffer (125 ml)

# Slide Incubation Chambers

Whatman array incubation chambers are designed for protein microarray applications on FAST Slides. The chambers provide a convenient way to carry out binding reactions on protein microarrays.

Used in conjunction with the FAST Frame or Chip Clip slide holder, the incubation chambers have a secure gasket design forming a tight, leak-proof seal with the FAST Slides. Simply remove the incubation chamber when the reaction is finished. These reusable chambers are recommended for use at room temperature and elevated incubation temperatures up to 76°C.



## Product Specifications – FAST Slide Incubation Chambers

Description	External Dimensions (mm)	Well Dimensions (L x W x D) (mm)	Volume (µl)
Single well array incubation chamber*	79 x 25.4	53 x 22 x 4	600-700
Dual well array incubation chamber**	79 x 25.4	21 x 21 x 4	300-400
16 well array incubation chamber †	79 x 25.4	7 x 7 x 4	60-100

\* For use with 1 pad FAST Slides, catalog number 10484182

\*\* For use with 2 pad FAST Slides, catalog number 10485317

† For use with 8 and 16 pad FAST Slides, catalog numbers 10485320 and 10485323

## Ordering Information – FAST Slide Incubation Chambers

Description	Catalog Number	Quantity/Pack
Single well incubation chamber (for 1 pad FAST Slides)	10486137	10
Dual well incubation chamber (for 2 pad FAST Slides)	10486087	10
16 well incubation chamber (for 8 and 16 pad FAST Slides)	10486046	10

# Slide Holders

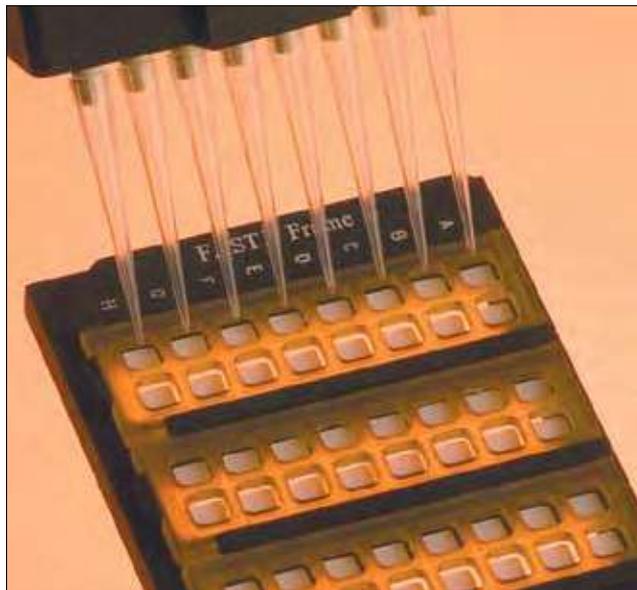
## *FAST Frame Multi-Slide Plate*

The FAST Frame multi-slide plate is designed to hold four 16 pad FAST Slides and the corresponding multiwell incubation chambers in a microplate footprint for high-throughput processing of microarrays. The footprint dimensions meet the standards recommended by the Society for Biomolecular Screening.

The 96 well spacing (9 mm center to center) of the array pads on 16 pad FAST Slides makes the loaded FAST Frame compatible with automated liquid handling systems and 8 channel manual pipettors.

Each plate processes up to 64 arrays simultaneously. The rows and columns on each plate are labeled for easy indexing and sample application.

The FAST Frame multi-slide plate is constructed of autoclavable plastic and is compatible with standard 1 x 3" (25 x 76 mm) glass slides when used with Whatman reusable incubation chambers (1, 2, 16). The FAST Frame is available as a stand-alone, reusable unit or as a starter kit. The starter kit contains ten 16 pad FAST Slides, ten 16 pad Incubation Chambers, and 40 Chamber Covers with the FAST Frame.



FAST Frame

## Product Specifications – FAST Frame Multi-Slide Plate

Number of slides	up to 4
Row spacing	9 mm
Footprint	128 x 86 mm
Material	Delrin, autoclavable

## Chip Clip

### The Single Grip Slide Holder

The Chip Clip securely holds one FAST Slide and incubation chamber for processing multiple arrays simultaneously. Used in conjunction with Whatman Incubation Chambers, the Chip Clip ensures leak-proof barriers around the arrayed pads on the slide.

The slide and incubation chamber are easily inserted into and removed from the Chip Clip slide holder; side rails hold the chamber firmly against the slide surface. The Chip Clip is compatible with 1 × 3" (25 × 76 mm) slides when used with incubation chambers.



Chip Clip

## Product Specifications – Chip Clip

Number of slides	1
Footprint	50 × 85 mm
Material	Delrin, autoclavable

## Ordering Information – Slide Holders

Description	Catalog Number	Quantity/Pack
FAST Frame Multi-Slide Plate	10486001	1
FAST Frame Starter Kit*	10486003	1
Chip Clip Slide Holder	10486081	1

\* Includes: 1 FAST Frame, 16 pad FAST Slides (10), 16 Well Incubation Chambers (10), and Chamber Covers (40)

# Protein Array Buffers and Reagents

Whatman protein array reagents have been optimized for use on FAST Slides. These reagents include Protein Arraying Buffer, Protein Array Blocking Buffer, and Protein Array Wash Buffer.

## Protein Arraying Buffer

- Enhances long-term protein stability and molecular recognition activity
- Enhances fluorescent signal from arrayed sample
- Optimized for use on FAST Slides

## Protein Array Blocking Buffer

- Demonstrates highly efficient blocking of protein microarrays
- Exhibits strong reduction of nonspecific antibody-antibody interactions
- Exhibits minimal effects on specific antibody-antigen interactions
- Results in superior signal-to-noise ratios in protein microarray applications
- Superior blocking capabilities

## Reduction of Nonspecific Protein-Protein Interaction:

Monoclonal capture antibodies were arrayed on FAST Slides and probed with an antibody cocktail consisting of 16 biotinylated polyclonal antibodies followed by Streptavidin-Cy5 detection. Images were taken at an identical laser/PMT setting. The first row of the array field is a positive detection control.

## Blocking with Protein Array Blocking Buffer:

Reduction of nonspecific antibody-antibody interactions by the protein array blocking buffer.

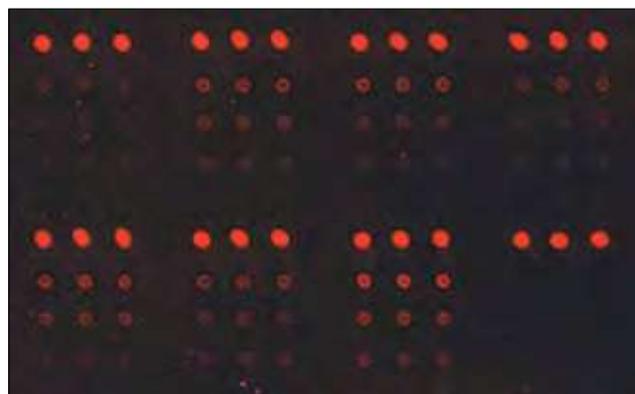
## Protein Array Wash Buffer

- Excellent washing buffer for protein microarrays
- Conveniently supplied as 10× concentrate
- Optimized for use on FAST Slide

The Protein Array Wash Buffer has been optimized for efficient washing of protein microarrays to ensure optimum results. This buffer is used as the washing buffer in FAST PAK, FAST Quant, and the Serum Biomarker Chip Kits.



Protein Array Buffers and Reagents



Blocking with TBS Tween 20®, 0.1% – nonspecific binding of biotinylated antibodies



Blocking with Protein Array Blocking Buffer

## Ordering Information – Protein Array Buffers and Reagents

Description	Catalog Number	Quantity/Pack
Protein Array Buffer (2x) 10 ml	10485331	4
Protein Array Blocking Buffer (1x) 100 ml	10485356	1
Protein Array Wash Buffer (10x) 125 ml	10485330	4

## MicroCaster Arrayer

### Handheld Microarraying System

The MicroCaster™ is an economical, entry-level manual microarraying system for principle and pilot studies. With the MicroCaster 8 Pin hand tool, samples can be loaded from 96 well or 384 well microtiter plates.

The MicroCaster slide holder accommodates two slides. It has a built-in indexing system that enables precise printing of up to 768 spots in an array of 32 × 24 spots. It is very easy to set up and use with processing time of 5-20 minutes per slide.

The MicroCaster is designed for 1 pad FAST Slides with 20 × 51 mm pad size and is compatible with other slide surfaces.



MicroCaster arrayer

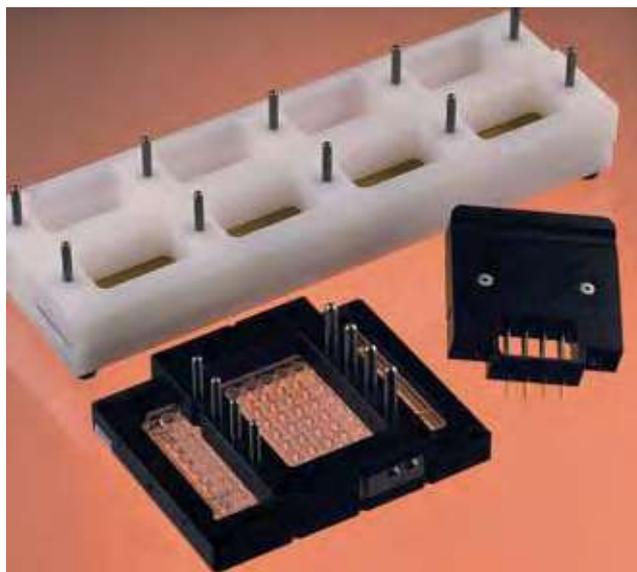
## Product Specifications – MicroCaster Arrayer

Number of spots	up to 768
Horizontal pitch	x-axis 1250 µm
Vertical pitch	y-axis 750 µm
Spot size	500-1000 µm
Print volume (varies with buffer and viscosity)	20-70 nl

## MicroCaster Accessories

MicroCaster accessories can be used to increase the flexibility of the manual arrayer system by providing accurate source-plate indexing and reliable pin-tool cleaning.

The MicroCaster accessories are compatible with standard 96 well microplates and they reduce hassle with pin-tool cleaning.



FAST Frame

### Ordering Information – MicroCaster Arrayer

Description	Catalog Number	Quantity/Pack
MicroCaster System*	10485047	1
MicroCaster pin conditioner, 30 ml	10485061	1
MicroCaster replacement pin	10485326	1
MicroCaster pad (pin support pad)	10485370	1
Wash and blot station	10486043	1
96 well microplate indexer	10486044	1

\* MicroCaster System includes: MicroCaster 8 Pin System Hand Tool, MicroCaster 8 Pin System Slide Holder, MicroCaster Pin Conditioner, and Spare Replicator Pins

# FAST Quant System

## *MicroSpot ELISA for High-Throughput Multiplex Cytokine Quantification*

FAST Quant™ represents a quantum leap forward in protein microarray technology. With FAST Quant, a researcher can accurately determine the concentration of multiple cytokines in dozens of biological samples simultaneously, using familiar ELISA immunochemistry.

Built on FAST technology, the high protein binding capacity surface chemistry, FAST Quant combines the power of array technology with the quantitative nature and high-throughput capabilities of traditional ELISA. FAST Quant exhibits greater sensitivity and reproducibility than traditional ELISA.

The standard FAST Quant Kits contain 64 arrays of 8-10 monoclonal antibodies with affinities for common human or mouse cytokines. The antibodies are arrayed in a quantitative fashion in triplicate on each array. The whole group of 8-10 cytokines is measured in 56 samples. The new FAST Quant 40 Human™ Kit measures 40 cytokines in 24 samples. (See following section.)

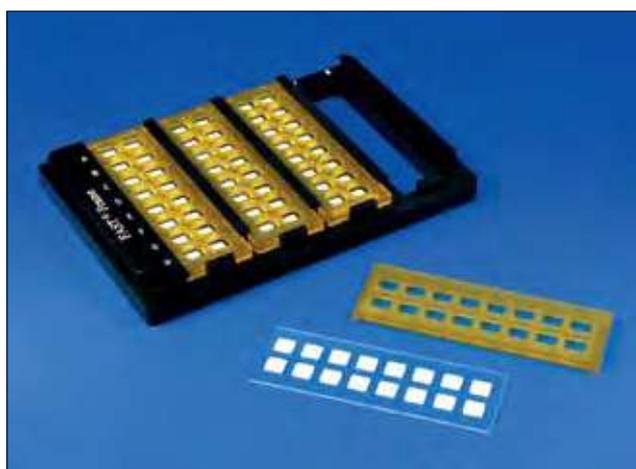
Using four 16 pad FAST Slides placed in a FAST Frame (sold separately) FAST Quant offers an 8 × 12 cm footprint – the same as the traditional microplate format. A standard curve can be generated by creating a dilutional series from recombinant antigen mass standards. Due to the solid-phase nature of a microspot assay, it is not necessary to take duplicate measurements of each sample. The MicroSpot is entirely concentration dependent, unlike an ELISA where the reaction is both concentration and volume dependent.

FAST Quant antibody arrays offer a variety of human and mouse menus. Each kit includes four 16 Pad FAST Slides prearrayed with one of the cytokine antibody panels, four 16 Well Incubation Chambers, Recombinant Antigen Standard Cocktail for standard curves, Biotinylated Detection Antibody Cocktail, Whatman Protein Array Blocking Buffer, and Wash Buffer.

A reusable slide holder is also needed, either FAST Frame for 4 slides or Chip Clip for 1 slide.



FAST Quant System



FAST Frame

Data analysis is seamless using data reduction software, MicroVigene™ for FAST Quant, the cutting edge utility for protein array image analysis. The software provides rapid data acquisition and comprehensive reports. It analyzes any TIFF image from virtually all commercial imaging instruments. The application provides standard curve data, concentrations of unknowns, and percent coefficient of variation for each analyte. FAST Quant is another clear example of Whatman commitment to providing the scientific community with the best solution for multiplex cytokine measurements.

### FAST Quant Human and Mouse Menus\*

Description	Catalog Number	Description	Catalog Number
<b>FAST Quant Human Th1/Th2</b>	<b>10486031</b>	<b>FAST Quant Mouse Th1/Th2</b>	<b>10486061</b>
Cytokines commonly associated with the human Th1/Th2 immune response system		Cytokines commonly associated with the mouse Th1/Th2 immune response system	
IL-1β	IL-10	IL-1β	IL-10
IL-2	IL-13	IL-2	IL-13
IL-4	TNFα	IL-4	TNFα
IL-5	IFNγ	IL-5	IFNγ
IL-6		IL-6	
<b>FAST Quant Human II</b>	<b>10486060</b>	<b>FAST Quant Human Angiogenesis</b>	<b>10486063</b>
IL-1β	IL-10	PDGF-BB	KGF
IL-2	IL-12p70	VEGF	TIMP-1
IL-4	GM-CSF	FGFβ	ICAM-1
IL-6	RANTES	Angiogenin	Angiopoietin-2
IL-8	MCP-1		

\* For research use only

### Ordering Information – FAST Quant Kits for Cytokine Quantitation

Description	Catalog Number	Quantity/Pack
FAST Quant Human Th1/Th2 Kit	10486031	1
FAST Quant Human II Kit	10486060	1
FAST Quant Human Angiogenesis Kit	10486063	1
FAST Quant Mouse Th1/Th2 Kit	10486061	1
FAST Quant 40 Human Kit	10486257	1

Each kit includes: 16 pad FAST Slides (4); each pad is prearrayed with a panel of cytokine antibodies (choice of six panels), 16 Well Incubation Chambers (4), Recombinant Antigen Standard Cocktail for dilutional series (standard curve), Biotinylated Detection Antibody Cocktail, and Whatman Protein Array Wash Buffer and Protein Array Blocking Buffer.

# FAST Quant 40 Human

New FAST Quant 40 Human Kit lets you measure concentrations of 40 human cytokines at once.

Angiogenin	IGF-I	IL-12p40	PDGF-BB
Angiopoietin-2	IGF-II	IL-12p70	RANTES
CRP	IL-1alpha	IL-13	TGF-alpha
Eotaxin	IL-1beta	IP-10	TGF-beta1
FAS ligand	IL-2	KGF	TGF-beta3
FGF-basic	IL-4	MCP-1	TIMP-1
Fibronectin	IL-5	MCP-3	TNF-alpha
GM-CSF	IL-6	MIP-1alpha	TNFR-I
ICAM-1	IL-8	MMP-7	TNFR-II
IFN-gamma	IL-10	MMP-9	VEGF



FAST Quant 40 Human Kit

FAST Quant Kits combine carefully tested, sensitive immunoassays with Whatman FAST Slides, the surface of choice for protein microarrays. Previous kits allow measurement of concentrations of 8–10 human or mouse cytokines in one assay. This new kit combines the 40 most-requested human cytokines in one kit, allowing you to collect data and analyze relationships that were impractical to explore before.

## MicroSpot ELISA for High-Throughput Multiplex Cytokine Quantification

FAST Quant represents a quantum leap forward in protein microarray technology. With FAST Quant, a researcher can accurately determine the concentration of forty human cytokines in 24 biological samples simultaneously, using familiar ELISA immunochemistry and fluorescent detection.

Built on FAST technology, the high protein binding capacity surface chemistry, FAST Quant combines the power of array technology with the quantitative nature and high-throughput capabilities of traditional ELISA. FAST Quant exhibits sensitivity and reproducibility better than traditional ELISA.

A standard curve is generated for each analyte by creating a dilutional series from recombinant antigen mass standards. Due to the solid-phase nature of a MicroSpot assay, it is not necessary to take duplicate measurements of each sample. The MicroSpot is entirely concentration dependent, unlike an ELISA where the reaction is both concentration and volume dependent.

The 40 analytes are divided into 2 sub-arrays of individual cytokine-specific antibodies, spotted in triplicate. Each slide contains 8 pads arrayed with Sub-Array A and 8 pads with Sub-Array B. The kit of 4 slides, used with a FAST Frame holder (ordered separately) gives standard curves for each Sub-Array plus full cytokine concentration measurement on 24 samples. The FAST Frame provides an 8 × 12 cm footprint for use with standard multiwell pipettors and liquid handling devices.

Data analysis uses MicroVigene for FAST Quant data reduction software, the cutting edge utility for protein array image analysis. Adaptation to the 2-sub-array format of the new kit is underway. Until a customized version becomes available customers will send scanned .tif files to Whatman by FTP for data analysis.

FAST Quant 40 Human is another clear example of Whatman commitment to providing the scientific community with the best solution for multiplex cytokine measurements. For research use only.

### Sub-Array A – Analytes, Limits of Detection and Ranges

Analyte	LOD (pg/ml)	Range (pg/ml)
IL-1alpha	1	1-1000
IL-1beta	1	1-2000
IL-2	1	1-3000
IL-4	1	1-6000
IL-5	1	1-3000
IL-6	1	1-2000
IL-8	1	1-1000
IL-10	50	50-50,000
IL-12p70	20	20-20,000

Analyte	LOD (pg/ml)	Range (pg/ml)
IL-13	50	50-25,000
IFN-gamma	20	20-25,000
TNF-alpha	1	1-1000
MMP-9	3	3-6000
MCP-1	1	1-2000
IGF-II	2000	2000-300,000
TNFR-I	2	2-3000
TGFalpha	1	1-600
TGFbeta3	1	1-2000

### Sub-Array B – Analytes, Limits of Detection and Ranges

Analyte	LOD (pg/ml)	Range (pg/ml)
Angiogenin	5	5-20,000
Angiopoietin-2	50	50-50,000
Eotaxin	4	4-3000
ICAM-1	5	5-30,000
IGF-I	10	10-50,000
MMP-7	3	3-6000
KGF	5	5-10,000
IP-10	5	5-6000
GM-CSF	1	1-2000
IL-12p40	30	30-50,000
CRP	1	1-1000

Analyte	LOD (pg/ml)	Range (pg/ml)
FGF basic	60	60-60,000
FAS ligand	1	1-6000
MCP-3	5	5-2000
Fibronectin	10	10-20,000
PDGF-BB	15	15-50,000
TGF beta1	9	9-20,000
TIMP-1	9	9-30,000
TNFR-II	10	10-30,000
VEGF	2	2-10,000
RANTES	2	2-2000
MIP-1alpha	5	5-10,000

### Ordering Information – FAST Quant 40 Human

Description	Catalog Number	Quantity/Pack
FAST Quant 40 Human Kit	10486257	1
FAST Frame Multi-Slide Holder	10486001	1

*Each kit contains 4 arrayed 16 Pad Slides (each with 8 pads of Sub-Array A and 8 of B), 4 Incubation Chambers, Blocking Buffer, Washing Buffer, Biotinylated Detection Antibody Solutions for each sub-array, Recombinant Antigen Solutions for each sub-array, Streptavidin-Cy 5 for fluorescent detection, an Array Template, and a Protocol Booklet.*

# MicroVigene for FAST Quant Analysis Software

The customized software from VigeneTech for use with Whatman FAST Quant Kits provides high-quality image quantification and automates the data analysis.

## The Main Features Are:

- Integrated image and data analysis
- Ability to support multiple slides
- Array wells are automatically detected, grids placed, and spot intensity quantified
- Replicates average are calculated
- Negative, positive control calibration, and normalizations
- Imbedded multi-level quality controls

## The Main Benefits Are:

- Results are highly reproducible and are operator independent
- Actual spot boundary definition to obtain accurate spot signal
- Automatic dust removal with back fill
- Regional background subtraction to obtain highest sensitivity
- 3D visualization enables convenient quality assurance
- Spot intensity is quantified in mean, median, volume
- Spot quantities are reported in spot shape, size, edge, and noise level

## Ordering Information – MicroVigene for FAST Quant Analysis Software

Description	Catalog Number
FAST Quant Analysis Software, 4 week trial	10486245
FAST Quant Analysis Software, Whatman preconfigured version	10486246
FAST Quant Analysis Software, research version	10486247

# Serum Biomarker Chip

## High-Density Profiling

The Serum Biomarker Chip enables proteomics researchers to profile and pattern the molecular signature of human serum. The chip addresses the need for a high-throughput technology to enable research in the fields of risk stratification, disease prognosis, drug eligibility, prediction of safety and efficacy, and therapeutic monitoring.

The Serum Biomarker Chip is a single-capture antibody array built on the FAST Slide dual pad platform. Each slide has two identical arrays of antibodies printed in triplicate. Fluorescent detection permits the researcher to reproducibly pattern the relative abundance of 120 human serum proteins between two samples, such as serum samples from diseased and healthy individuals.

Fluorescent labeling is done with the ULS Biotin Single Color Labeling System, available separately. Two-color labeling is also available for customers who prefer to do hapten and label swapping experiments. The chip can be scanned with any standard fluorescence scanner. A reusable slide holder is also needed, either FAST Frame for 4 slides or Chip Clip for 1 slide.

The Serum Biomarker Chip Kit includes two Arrayed 2 pad FAST Slides, and two Dual Incubation Chambers.



Serum Biomarker Chip Kit

## Specific Antibodies on the Serum Biomarker Chip

Alpha fetoprotein	Carcinoembryonic antigen (group 2 specific)	Epidermal growth factor
Alpha 1 antichymotrypsin	Carcinoembryonic antigen (group 4 specific)	Epidermal growth factor receptor
Alpha 2 macroglobulin	Cathepsin B	ErbB2
Angiogenin	Ceruloplasmin	E-selectin
Angiopoietin-2	Chondroitin sulfate	Estrogen receptor
Angiostatin	Chorionic gonadotropin $\alpha$	Fas
Angiopoprotein	Chorionic gonadotropin $\beta$	Fas ligand
Angiopoprotein J	Chromagranin	Ferritin
Beta-2 microglobulin	Collagen Type I	Fibroblast growth factor-7
Bone sialoprotein	Complement C4	Fibroblast growth factor-basic

cont.

CA 15-3	C-Reactive Protein	G-CSF
CA 19-9	Cyclic-dependent kinase inhibitor 2A	GM-CSF
CA 50	Cytokeratin fragment 21-1 (CYFRA 21-1)	Haptoglobin
CA 125	Eotaxin	Hemoglobin
Hepatocyte growth factor	Kallikrein-5	PSA (total)
ICAM-1	Kallikrein-9	PSA-ACT complex
IgA	Kallikrein-12	S100
IgG	Kallikrein-14	Serum albumin
IgM	Laminin	Sialyl Lewis X
IL-1 $\alpha$	Low-density lipoprotein	TAG-72
IL-1 $\beta$	MCP-1	Tetranectin
IL-2	MCP-2	TGF $\alpha$
IL-2 receptor $\alpha$	MCP-3	TGF $\beta$
IL-2 receptor $\beta$	MCP-4	Thrombopoietin
IL-3	MIP-1 $\alpha$	Thrombospondin-1
IL-4	MMP-2	Thyroglobulin
IL-5	MMP-3	TIMP1
IL-6	MMP-9	TIMP2
IL-7	Myeloperoxidase	TNF $\alpha$
IL-8	Myoglobin	TNF $\beta$
IL-10	Neuron-specific enolase	TNF $\beta$
IL-12p40	RANTES	Transferrin
IL-12p70	Osteopontin	Tumor-associated trypsin inhibitor
IL-13	PDGF (all isoforms)	Tyrosinase
IL-17	PDGF (BB isoform only)	Urokinase plasminogen activator
Insulin	Placental alkaline phosphatase	VCAM-1
Insulin growth factor binding protein 3	Plasminogen	VE-Cadherin
Insulin-like growth factor 1	Plasminogen activator Inhibitor	VEGF
Interferon- $\gamma$	Prostatic acid phosphatase	VEGF-D
IP-10	PSA (free)	Von Willebrand factor

## Ordering Information – Serum Biomarker Chip

Description	Catalog Number	Quantity/Pack
Serum Biomarker Chip Kit*	10486077	1
<b>Slide Holders</b>		
FAST Frame Slide Holder, for 1-4 slides	10486001	1
Chip Clip Slide Holder, for 1 slide	10486081	1

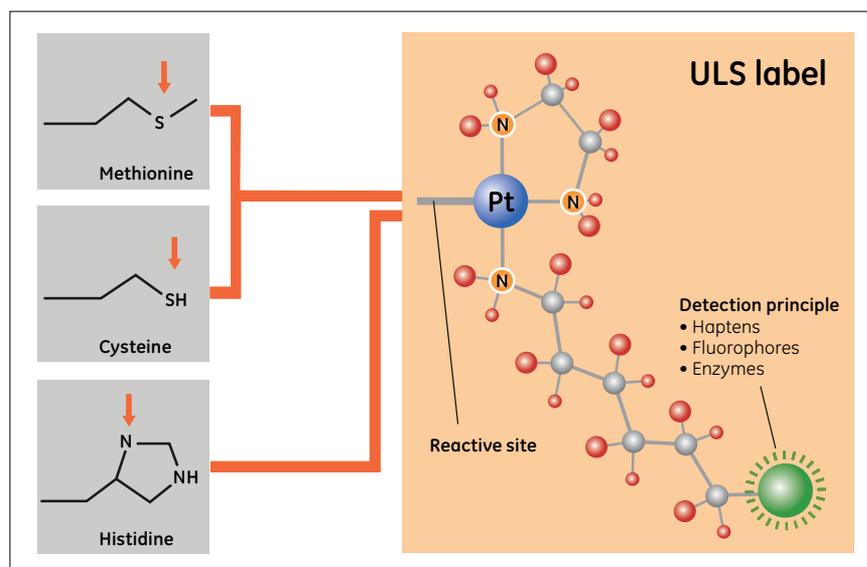
\* Each kit includes: Serum Biomarker Chip Arrayed FAST Slides (2) and Dual Pad Incubation/Processing Chambers (2)

# ULS Biotin Single Color Labeling System

The Whatman Single Color ULS™ Biotin Labeling Kit is designed to label serum or cell lysate proteins in order to detect their binding to complementary antibodies. The kit is especially intended for use with 2 pad FAST Slides, including the Serum Biomarker Chip and other single-capture antibody chips. The kit contains Universal Linkage System (ULS) chemistry from KREATECH® Biotechnology to label samples containing approximately 100 to 120 µg of protein in serum or plasma or 60 µg protein in a whole cell lysate.

## Features

- Highly efficient and uniform labeling of complex protein samples
- Reproducible labeling and signal detection
- Stable, robust, and fast nonenzymatic process
- Broad pH range of labeling
- Compatible with most buffers, salts, detergents, and reducing agents
- Labels multiple amino acids



ULS chemistry tags protein methionine, cysteine, and histidine residues with biotin (normally at least two biotins per molecule). The attached biotin is then detected with fluorescent streptavidin.

## Ordering Information – ULS Biotin Single Color Labeling System

Description	Catalog Number
Single color ULS Labeling Kit for serum	10486243
Single color ULS Labeling Kit for cell lysates	10486244

## Two-Color Labeling and Detection System

The Whatman Two-Color Labeling and Fluorescent Detection Kit is designed to label two protein samples. The labeled proteins are pooled and probed against arrayed antibodies in a competitive binding assay and detected using indirect fluorescence.

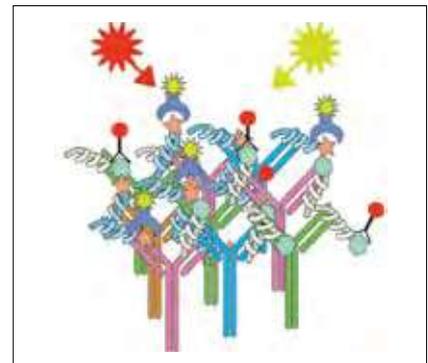
The kit is intended for use with the 2 pad FAST Slides, including the Serum Biomarker Chip. The kit contains the Universal Linkage System (ULS) chemistry to label samples containing approximately 250 µg of protein in serum, plasma or a whole cell lysate. The kit is designed to label two different protein samples, each with a different hapten. Sufficient labeling reagent is provided to perform a hapten swapping experiment.

### Features

- Highly efficient and uniform labeling of complex serum samples
- Reproducible labeling and signal detection
- Stable, robust, and fast nonenzymatic procedure
- Reduces pH dependency of labeling efficiency
- System solution includes labeling reagents, fluorescent conjugate, and bench-friendly protocol
- Accounts for hapten-specific differences in either Biotin-ULS or Fluorescein-ULS labeling efficiencies
- Averages differences in antibody-antigen binding interactions caused by steric hindrance
- Minimizes chip-to-chip variability – includes an internal control within the assay



Two-Color Labeling and Fluorescent Detection Kit



Two-Color Labeling and Fluorescent Detection

The first pad on the slide is probed with a mixture of two different protein samples, each labeled with a different hapten; the second pad is probed with the same two protein samples but with the haptens reversed. The normalized intensity for each element of each pad is calculated as the average of the biotin and fluorescein labeled derived intensities from a two pad experiment. The ratio between the signal intensity at each spot corresponds to the concentration ratio of the proteins found in the two samples. This method is attractive for antibody chips as it takes into account any hapten-specific differences in antigen-antibody interactions.

The use of the ULS labeling system minimizes background by using indirect fluorescence detection, labels multiple amino acids, and requires no additional materials or reagents.

### Ordering Information – Two-Color Labeling and Detection System

Description	Catalog Number	Quantity/Pack
Two-Color Labeling & Detection Kit*	10486085	1

\* Each kit includes: Biotin-ULS (20 µl), Fluorescein-ULS (20 µl), 10× Protein Labeling Buffer (80 µl), 10× KREAstop Solution (80 µl), Streptavidin-DY 647 Conjugate (150 µl), Anti-Fluorescein Antibody-DY 547 Conjugate (350 µl), Micro Bio-Spin Chromatography Columns (8), and User's Manual.

## Protein Array Services

Whatman offers a comprehensive group of protein array services, all based on the widely accepted FAST Slide protein microarray platform.

- Printing custom arrays
- Designing custom assays
- Running custom or standard assays
- Scanning slides and analyzing data

Whatman protein array services allow the researcher to concentrate on interpretation and use of results, rather than on array mechanics. They provide access to microarray benefits for labs that lack the necessary instrumentation or software. The services also permit testing of different approaches when planning a major program.



Running assay

### Printing Custom Arrays

Whatman can array proteins from our antibody library or from your protein collection. Our library currently consists of specific antibodies against approximately 230 human and 20 mouse proteins, including many cytokines. They include those used in our FAST Quant kits for cytokine quantitation and our Serum Biomarker Chip for biomarker screening. A frequent application for custom arraying is making FAST Quant Kits assaying different combinations of cytokines by MicroSpot ELISA (with fluorescent readout), or biomarker screening slides that include alternate or additional potential biomarkers.

Specificity can be determined by cross-reactivity studies. Custom arrays may be designed for quantitation or screening, depending on goals and on availability of reagents.

In addition to specific proteins, Whatman can array your cell lysates and similar complex samples for assaying with antibodies or other specific probes.

### Designing and Running Assays

Whatman can assay your samples with our FAST Quant Kits or Serum Biomarker Chips, or with custom FAST slides arrayed to your design and specifications. The assay design process includes proof-of-principle, determination of specificity (if necessary), assay design, array design and printing, sample processing and data analysis.

Applicable sample types include serum, plasma, amniotic fluid, cell culture supernatants cellular extract, tissue lysate, and wound effluent. You can choose to receive scans and raw data as well as the final results if you wish.

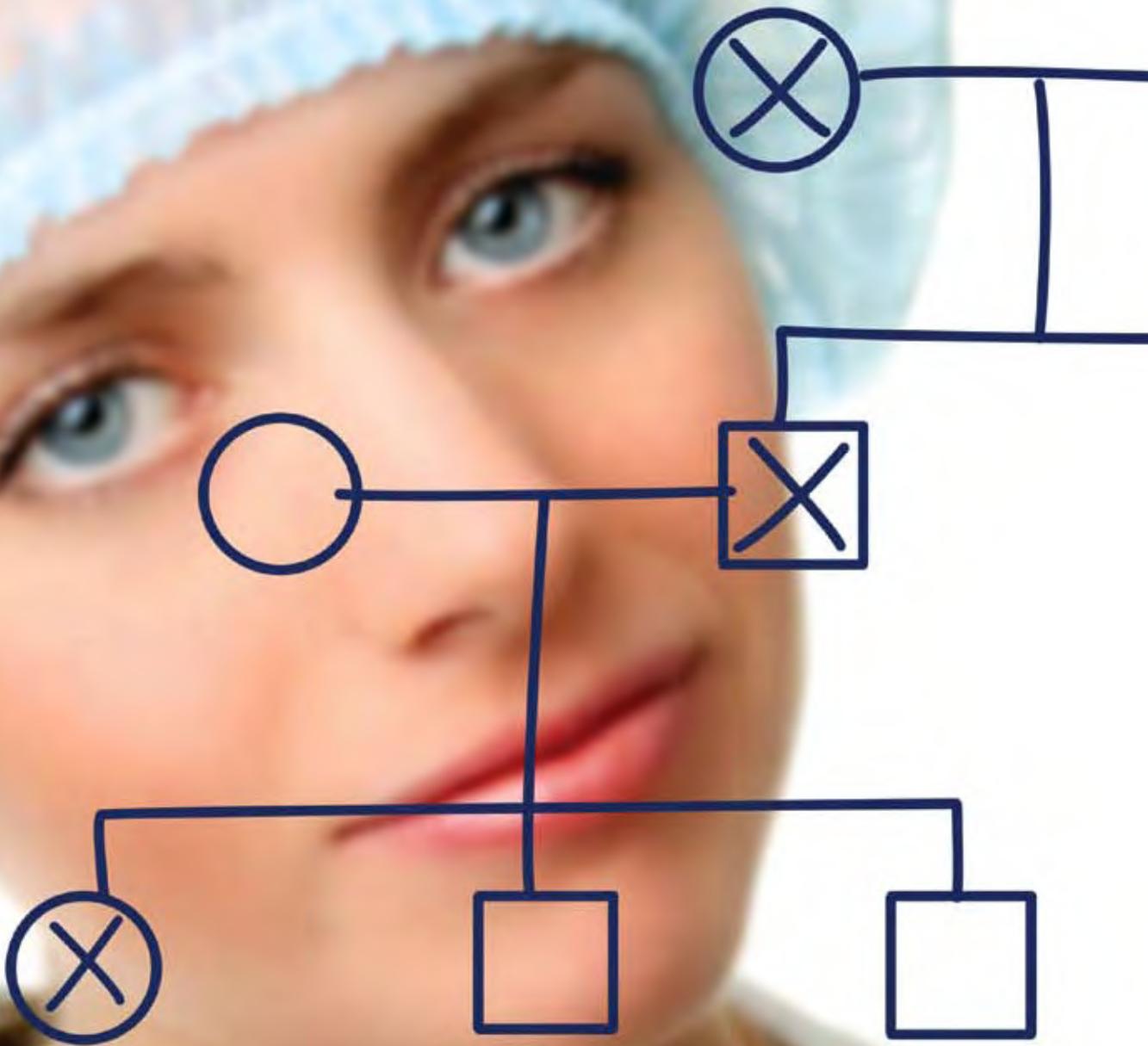
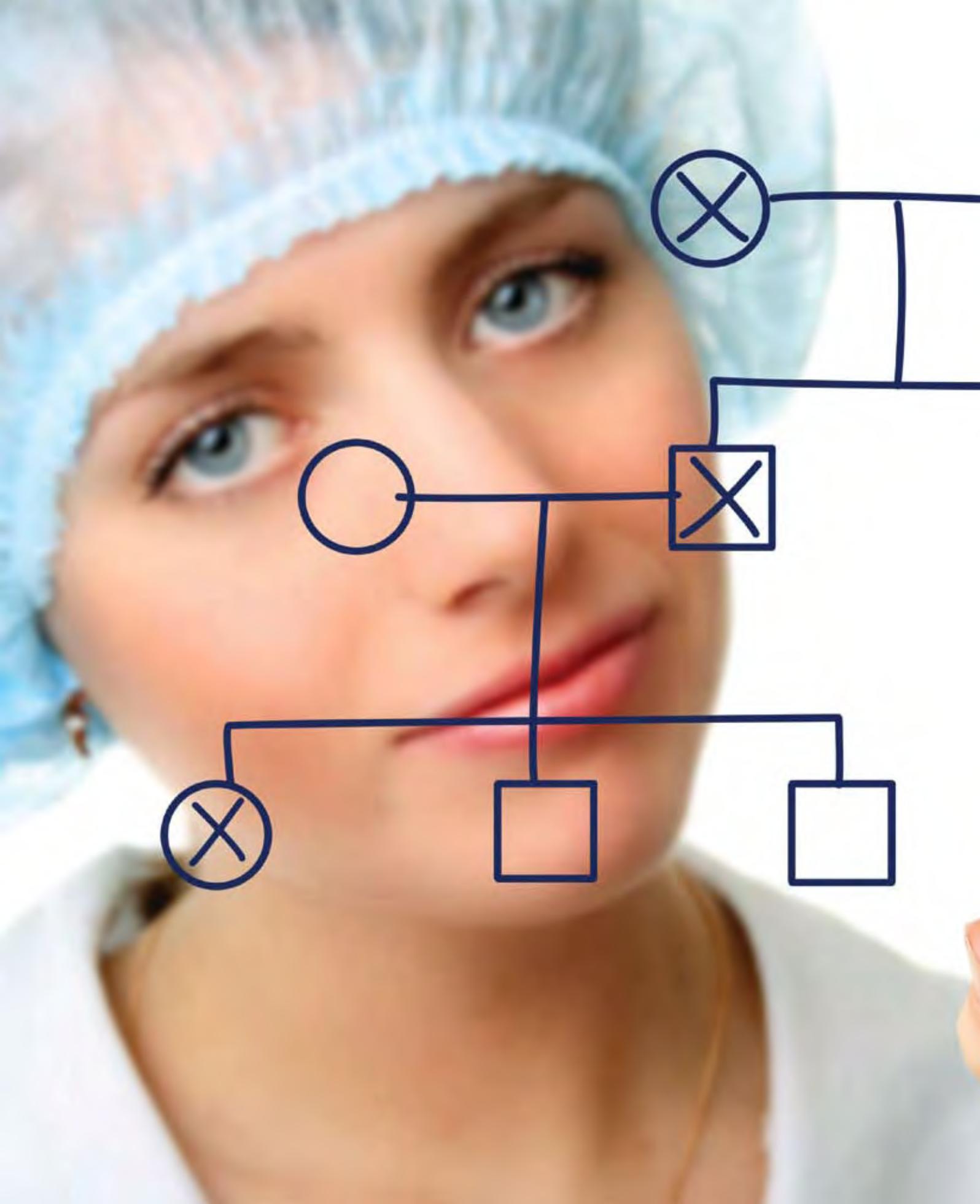
### Slide Scanning and Data Analysis

If you lack only the fluorescent scanner you can send processed FAST slides to Whatman for scanning. The resulting graphic file can be downloaded from a GE Healthcare web site. For our FAST Quant and Serum Biomarker Chip products we can do the calculations either from your scans or from your slides that we scan.

Please contact us ([whatmaninfo@ge.com](mailto:whatmaninfo@ge.com) or 1-800-WHATMAN) to discuss your specific microarray interests.



Printing arrays





## Blotting Products

Whether you are blotting for proteomics, testing for diseases, analyzing genetic mutations or profiling DNA, our blotting products are extensively used around the world. Just one more way you can help advance science and promote health every day.

- 279 Blotting Membranes
- 286 Blotting Papers
- 289 Blotting Devices
- 294 Blotting Accessories
- 295 Waste Reduction

# Blotting Products

Whatman offers an extensive line of blotting products for all of your application requirements. This includes premium blotting membranes and blotting devices for screening many samples on one membrane. We also offer circular membranes in a variety of membrane types, which are suitable for colony hybridization and plaque lift applications.

## Blotting Membranes

### Blotting Membrane Selection Guide

	Protran	Optitran	Nytran N	Nytran SuPerCharge	Westran S	Westran Clear Signal
<b>Membrane Type</b>	Nitrocellulose 100% pure	Nitrocellulose, reinforced	Nylon, moderately positively charged	Nylon, highly positively charged	PVDF	PVDF
<b>Applications</b>	Western, Southern, Northern blotting...	Western, Southern, Northern blotting...	Southern, Northern blotting...	Southern, Northern blotting...	Western blotting... Sequencing	Western blotting...
<b>Binding</b>	80-150 µg/cm <sup>2</sup>	75-90 µg/cm <sup>2</sup>	> 400 µg/cm <sup>2</sup>	> 600 µg/cm <sup>2</sup>	> 50-100 µg/cm <sup>2</sup>	> 50-100 µg/cm <sup>2</sup>
<b>Pore Sizes</b>	0.45 µm 0.2 µm 0.1 µm	0.45 µm 0.2 µm -	0.45 µm 0.2 µm -	0.45 µm - -	- 0.2 µm -	0.45 µm - -
<b>Transfer Methods</b>						
Semi-dry Blotting	**	**	**	**	**	**
Tank Blotting	**	**	**	**	**	**
Vacuum Blotting	**	**	**	**	*	*
Capillary Blotting	**	**	**	**	*	*
Alkaline Method	not recommended	not recommended	**	**	not recommended	not recommended
<b>Immobilization</b>						
UV-crosslinking, DNA, RNA	**	**	**	**	-	-
Baking (80°C), DNA, RNA	**	**	*	*	-	-
Drying, DNA, RNA	-	-	*	*	-	-
Drying, protein	**	**	-	-	**	**
<b>Detection Methods</b>						
Colorimetric	**	**	*	*	**	**
Chemiluminescent	**	**	**	**	**	**
Isotopic	**	**	**	**	**	**
Fluorescent	**	-	-	-	-	-
<b>Reprobing</b>	limited	**	**	**	**	**

\* Satisfactory

\*\* Recommended

# Protran Nitrocellulose Membranes

## 100% Pure Nitrocellulose Membranes

Protran™ nitrocellulose (NC) membranes are the most frequently specified transfer media in the world for a wide range of applications. Protran membranes are manufactured using 100% pure nitrocellulose to ensure the highest binding capacity possible.

Other membranes referred to as “nitrocellulose” may actually contain large amounts of cellulose acetate, which will lower the protein binding capacity. Protran membranes have the best handling strength of all pure nitrocellulose membranes. They are compatible with a variety of detection methods, including isotopic, chemiluminescent (luminol-based), colorimetric, and fluorescent.

Unlike PVDF membranes, Protran nitrocellulose does not require a methanol prewetting step. This makes Protran the membrane of choice for proteins which prefer aqueous environments. Prior to transfer, the membrane is simply wetted in water, and then placed in the transfer buffer. No other pretreatment steps are necessary.

### High Binding, Low Background

In addition to high binding capacity, Protran nitrocellulose membranes inherently have very low background. The superior surface properties of the membrane guarantee superior signal-to-noise ratios, without the need for stringent washing conditions.

### High Retention of Small Proteins

The 0.2 µm pore size Protran BA83 nitrocellulose membrane has high surface area, ensuring binding of small proteins below 20 kD by reducing “blow-through.” The 0.45 µm pore size membrane BA85 is suitable for larger molecular weight samples. BA79, with 0.1 µm pore size, is the membrane of choice for smaller proteins below 7 kD.

A key benefit of the proprietary Protran nitrocellulose formula is the proven shelf life of bound proteins. Empirical evidence shows that proteins maintain molecular recognition activity for five years on Protran.

## Protran Blotting Sandwiches

A precut nitrocellulose membrane and two sheets of 3MM Chr blotting paper are prepackaged into a sandwich to help save time. This is made with our Protran BA83 or BA85, the highest quality NC membranes available for blotting.

For orders for NC membranes from Canada, please add a C to the end of the catalog number, for example, 10485376C.



Protran nitrocellulose membrane



Protran BA85 nitrocellulose membrane

## Ordering Information – Protran Nitrocellulose Membranes

Dimensions	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>Protran BA79 Membranes (Sheets)</b>			
7 × 8.5 cm	0.1	10549088	50
10.2 × 13.3 cm*	0.1	10402088	10
20 × 20 cm	0.1	10402062	5
20 × 20 cm	0.1	10402091	25
33 × 56 cm	0.1	10484212	5
<b>Protran BA79 Membrane (Roll)</b>			
30 cm × 3 m	0.1	10402096	1
<b>Protran BA83 Membranes (Circles)</b>			
82 mm	0.2	10401316	50
132 mm	0.2	10402426	50
<b>Protran BA83 Membranes (Sheets)</b>			
7 × 8.5 cm	0.2	10549084	50
10.2 × 13.3 cm*	0.2	10402488	10
6.3 × 22.8 cm**	0.2	10402493	10
15 × 15 cm	0.2	10402405	5
15 × 20 cm	0.2	10401465	10
20 × 20 cm	0.2	10402452	5
20 × 20 cm	0.2	10401391	25
25 × 25 cm	0.2	10402453	5
30 × 60 cm	0.2	10401380	5
33 × 56 cm	0.2	10402480	5
<b>Protran BA83 Membranes (Rolls)</b>			
15 cm × 3 m	0.2	10402468	1
20 cm × 3 m	0.2	10402495	1
30 cm × 3 m	0.2	10401396	1
<b>Protran BA85 Membranes (Circles)</b>			
25 mm	0.45	10402506	100
25 mm	0.45	10402578	1000
82 mm	0.45	10401116	50
82 mm†	0.45	10405316	50
82.5 mm	0.45	10402579	50
87 mm	0.45	10401164	50
132 mm	0.45	10401124	25
132 mm	0.45	10402525	50
137 mm	0.45	10401147	25
137 mm	0.45	10402548	50

cont.

\* Fits Minifold I System

\*\* Fits Minifold II System

† With 5 mm grid

 Protran nitrocellulose membrane binding capacity: 80-150 µg/cm<sup>2</sup>; autoclavable (liquid cool cycle)

Dimensions	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>Protran BA85 Membranes (Sheets)</b>			
7 × 8.5	0.45	10549085	50
10.2 × 13.3 cm*	0.45	10402588	10
6.3 × 22.8 cm**	0.45	10402593	10
8.2 × 12 cm	0.45	10401218	10
15 × 15 cm	0.45	10402606	5
15 × 15 cm	0.45	10401261	25
20 × 20 cm	0.45	10402680	5
20 × 20 cm	0.45	10401191	25
25 × 25 cm	0.45	10402694	5
30 × 60 cm	0.45	10401180	5
33 × 56 cm	0.45	10402580	5
<b>Protran BA85 Membranes (Rolls)</b>			
15 cm × 3 m	0.45	10402594	1
20 cm × 3 m	0.45	10401197	1
30 cm × 3 m	0.45	10401196	1

\* Fits Minifold I System

\*\* Fits Minifold II System

† With 5 mm grid

Protran nitrocellulose membrane binding capacity: 80-150 µg/cm<sup>2</sup>; autoclavable (liquid cool cycle)

## Ordering Information – Protran Blotting Sandwiches

Dimensions (cm)	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>Protran BA83 Blotting Sandwiches</b>			
7 × 8.5	0.2	10485376	20
8.5 × 13.5	0.2	10485377*	20
<b>Protran BA85 Blotting Sandwiches</b>			
8.5 × 13.5	0.45	10485375	20
7 × 8.5	0.45	10485374	20
7.3 × 8.5	0.45	10540107**	20

\* Product is only available in the Americas

\*\* Product is only available in Europe

## Optitran Nitrocellulose Membranes

### Reinforced Nitrocellulose Membranes

Optitran™ membrane consists of 100% pure nitrocellulose supported by an inert polyester nonwoven material within the membrane. The support does not affect transfer conditions or results and gives the membrane exceptional handling characteristics, allowing it to be reprobbed repeatedly.

The Optitran nitrocellulose membrane provides high sensitivity with very low nonspecific binding. Using standard nitrocellulose protocols, stringent washing and blocking conditions are not necessary.

Optitran membranes combine flexibility, strength, and excellent signal-to-noise ratios, which are especially beneficial when experiments involve repeated stripping and reprobing.

Optitran supported nitrocellulose membranes combine sensitivity, strength, and savings.



Optitran nitrocellulose membranes

### Ordering Information – Optitran Nitrocellulose Membranes

Dimensions	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>Optitran BA-S 83 (Circle)</b>			
82 mm	0.2	10439316	50
<b>Optitran BA-S 83 (Sheets)</b>			
7 × 8.5 cm	0.2	10549087	50
10.2 × 13.3 cm*	0.2	10439388	10
15 × 15 cm	0.2	10439351	5
20 × 20 cm	0.2	10439361	5
20 × 20 cm	0.2	10439391	25
25 × 25 cm	0.2	10439362	5
30 × 60 cm	0.2	10439380	5
<b>Optitran BA-S 83 (Rolls)</b>			
20 cm × 3 m	0.2	10439394	1
30 cm × 3 m	0.2	10439396	1
<b>Optitran BA-S 85 (Circles)</b>			
82 mm	0.45	10439116	50
132 mm	0.45	10439126	50
<b>Optitran BA-S 85 (Sheets)</b>			
7 × 8.5 cm	0.45	10549086	50
10.2 × 13.3 cm*	0.45	10439188	10
15 × 15 cm	0.45	10439251	5
20 × 20 cm	0.45	10439282	5
20 × 20 cm	0.45	10439191	25
25 × 25 cm	0.45	10439262	5
30 × 60 cm	0.45	10439180	5
<b>Optitran BA-S 85 (Rolls)</b>			
20 cm × 3 m	0.45	10439194	1
30 cm × 3 m	0.45	10439196	1

\* Fits Minifold I System

Optitran binding capacity: 75-90 µg/cm<sup>2</sup>; autoclavable (liquid cool cycle)

## Westran PVDF Membranes

Whatman Westran™ PVDF (Polyvinylidene Fluoride) membranes are available in two formats: the Westran S used for protein sequencing and the Westran Clear Signal used for Western blotting.

### Westran S

Westran S PVDF is a 0.2 µm pore size hydrophobic membrane designed specifically for protein sequencing applications. The small pore size of this membrane eliminates “blow-through” and increases protein binding over a wide range of molecular weights.

#### Features and Benefits

- Protein binding capacity (over 200 µg/cm<sup>2</sup>) for easy signal detection
- Chemical resistance needed for N-terminal sequencing
- High protein retention even after harsh wash steps
- Maximum capture of proteins during transfers, minimizing sample loss
- 0.2 µm pore size for higher surface area, resulting in better binding of low molecular weight proteins
- Compatible for use with Western blotting applications
- Available in popular precut sizes for your application

### Westran Clear Signal

Westran Clear Signal (CS) PVDF is a 0.45 µm membrane specifically designed for Western blotting and protein dot-blotting applications.

#### Features and Benefits

- Protein binding capacity over 125 µg/cm<sup>2</sup>
- Extremely low backgrounds with chemiluminescent and colorimetric applications providing you with clear signals and sharp bands
- Excellent results with general protein stains such as Coomassie® Brilliant Blue, Amido Black, and Ponceau S Red
- Increased strength allows for multiple stripping and reprobing, which results in savings

### Westran PVDF Blotting Sandwiches

A precut PVDF membrane and two sheets of 3MM Chr blotting paper are prepackaged into a sandwich to help save time. Sandwiches are available with either Westran S or CS.



Protran nitrocellulose membrane

## Ordering Information – Westran PVDF Blotting Sandwiches

Dimensions	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>Westran S Blotting Sandwiches</b>			
7 × 8.5 cm	0.2	10485378*	20
8.5 × 13.5 cm	0.2	10485379*	20
<b>Westran CS Blotting Sandwiches</b>			
7 × 8.5 cm	0.45	10485380*	20
8.5 × 13.5 cm	0.45	10485381*	20

\* Product is only available in the Americas

## Ordering Information – Westran PVDF Blotting Membranes

Dimensions	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>Westran S Blotting Membranes (Sheets)</b>			
7 × 8.5 cm	0.2	10485292	50
10 × 10 cm	0.2	10413052	10
15 × 15 cm	0.2	10485290	10
20 × 20 cm	0.2	10485291	10
<b>Westran S Blotting Membranes (Roll)</b>			
26 cm × 3 m	0.2	10413096	1
<b>Westran CS Blotting Membranes</b>			
7 × 8.5 cm	0.45	10485293	50
15 × 15 cm	0.45	10485287	10
20 × 20 cm	0.45	10485288	10
<b>Westran CS Blotting Membranes (Roll)</b>			
30 cm × 3 m	0.45	10485289	1

## Nytran Nylon Membranes

Whatman Nytran™ nylon membranes are available in two formats. The Nytran N is moderately charged and the Nytran SuPerCharge (SPC) has a very high positive charge.

### Nytran Nylon

The Whatman Nytran nylon membrane is suitable for applications that require a lower charge. It is designed for Southern and Northern blotting as well as colony and plaque lifts and Dot-/Slot-Blots. Nytran N is compatible with isotopic and nonisotopic detection methods.

Nytran N membrane allows for excellent signal-to-noise ratios. The membrane is cast uniformly on both sides of a support matrix, demonstrating excellent symmetry. This gives the membrane the ability to lie flat without curling. Nytran N membrane is a highly consistent membrane with uniform pore size and distribution. It is available in 0.2 µm and 0.45 µm pore sizes for optimal retention of oligos and larger DNA fragments.



Nytran N nylon membranes

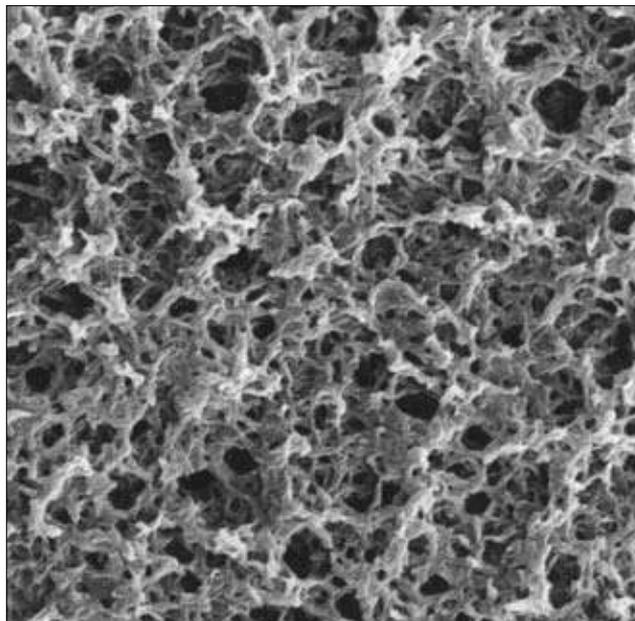
### Nytran SuPerCharge (SPC)

Nytran SPC nylon membranes have a very high positive charge. Improvements in the manufacturing process result in a membrane with a higher density of nylon per unit area. The increased charge and greater nylon density provide increased binding sites for your samples.

Nytran SPC membranes show a very uniform pore size and pore distribution compared to typical nylon membranes. They are free of surface microvoids, which are common in other membranes. These characteristics lead to greater reproducibility of results across a membrane and from blot to blot.

Nytran SPC membrane is cast uniformly on both sides of a support matrix, demonstrating excellent symmetry. This gives the membrane the ability to lie flat without curling.

With typical manufacturing techniques, increasing positive charge tends to increase background. Nytran SPC membranes are manufactured using a process that allows the combination of high positive charge with low background. Whether using radioactive or nonradioactive detection techniques, Nytran SPC consistently gives high signal with extremely low background.



Nytran SuPerCharge nylon membrane (1250× magnification)

## Ordering Information – Nytran N Nylon Membranes

Dimensions	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>Sheets</b>			
20 × 20 cm	0.2	10416085	10
30 × 60 cm	0.2	10416080	5
20 × 20 cm	0.45	10416185	10
11 × 14 cm	0.45	10416130	10
25 × 25 cm	0.45	10416163	10
30 × 60 cm	0.45	10416180	10
<b>Circles</b>			
82 mm	0.45	10416116*	50
137 mm	0.45	10416147	50
<b>Rolls</b>			
20 cm × 3 m	0.2	10416094	1
30 cm × 3 m	0.2	10416096	1
20 cm × 3 m	0.45	10416194	1
30 cm × 3 m	0.45	10416196	1

\* Product is only available in the Americas

Nytran binding capacity: > 400 µg/cm<sup>2</sup>; Nytran SuPerCharge: > 600 µg/cm<sup>2</sup>

## Ordering Information – Nytran SuPerCharge (SPC) Blotting Membranes

Dimensions	Pore Size (µm)	Catalog Number	Quantity/Pack
<b>Circles</b>			
82 mm	0.45	10416216	50
132 mm	0.45	10416224	50
<b>Sheets</b>			
10 × 15 cm	0.45	10416289	10
15 × 20 cm	0.45	10416287	10
20 × 20 cm	0.45	10416285	10
11 × 14 cm	0.45	10416230	10
15 × 15 cm	0.45	10416284	10
25 × 25 cm	0.45	10416263	10
30 × 60 cm	0.45	10416280	5
22.2 × 22.2 cm*	0.45	10416291	48
82 × 120 mm**	0.45	10416257	10
<b>Rolls</b>			
20 cm × 3 m	0.45	10416294	1
30 cm × 3 m	0.45	10416296	1

\* Macroarray membrane size

\*\* Multiwell plate format with black grid

Nytran binding capacity: > 400 µg/cm<sup>2</sup>; Nytran SuPerCharge: > 600 µg/cm<sup>2</sup>.

## Blotting Papers

### 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) is used extensively in electrophoresis for lifting of sequencing gels.

### GB003

A general purpose blotting paper (0.8 mm) made from pure raw materials with a high absorbency used as a membrane gel support. A thick paper recommended for the lysis/denaturation of colony or plaque lifts and Western blots.

### GB004

A thick gel blotting paper (1.0 mm) used for wicking purposes only. Provides higher absorbency and more consistent wicking than paper towels. Recommended for applications where fewer layers of gel blotting paper must still ensure a high capacity. Fewer layers of blotting paper reduce the risk of trapping air bubbles. Recommended for capillary blotting of nucleic acids.

### GB005

A thick (1.5 mm) highly absorbent paper recommended for applications where fewer layers of blotting paper must still ensure a high capacity. Recommended for semi-dry blotting of proteins.



3MM Chr



GB004

## 17 Chr

A thick (0.92 mm) and highly absorbent paper.

## 31 ET Chr

An extremely fast and thick paper (0.5 mm) with a fairly soft surface.

### Features and Benefits

- Pure cellulose produced entirely from the highest quality cotton linters with no additives of any kind. Ensures that no contamination will occur during the transfer steps.
- Manufactured and tested specifically for chromatographic and blotting techniques. This ensures the wicking capability and uniformity of capillary action that are important in obtaining clean and even transfers during blotting.
- Whatman 3MM Chr is considered the industry standard for blotting procedures
- Convenient sizes available in sheets precisely cut to the most popular gel and transfer membrane sizes. Allows "out-of-the-box" usage and eliminates sheet-to-sheet variations.

## Ordering Information – Pure Cellulose Blotting Papers

Dimensions	Catalog Number	Quantity/Pack
<b>Grade 3MM Chr (Sheets)</b>		
11 × 14 cm	3030-6185	100
12 × 14 cm	3030-6132	100
15 × 17.5 cm	3030-153	100
15 × 20 cm	3030-6188	100
18 × 34 cm	3030-221	100
20 × 20 cm	3030-861	100
26 × 41 cm	3030-6461	100
31.5 × 35.5 cm	3030-335	100
35 × 43 cm	3030-347	100
35 × 45 cm	3030-392	100
46 × 57 cm	3030-917	100
58 × 68 cm	3030-931	100
4 × 5 1/4"	3030-6189	100
6 × 8"	3030-6187	100
8 × 10"	3030-866	100
<b>Grade 3MM Chr (Rolls)</b>		
2 cm × 100 m	3030-614	100
7.5 cm × 100 m	3030-662	100
10 cm × 100 m	3030-672	100
12.5 cm × 100 m	3030-675	100
15 cm × 100 m	3030-681	100
19 cm × 100 m	3030-690	100
23 cm × 100 m	3030-700	100
27 cm × 100 m	3030-704	100

cont.

Dimensions	Catalog Number	Quantity/Pack
<b>Grade GB003 (Sheets)</b>		
10 × 10 cm	10426880	50
10.2 × 13.3 cm*	10427824	100
15 × 15 cm	10427810	100
15 × 20 cm	10427812	100
16 × 18 cm	10427813	100
20 × 20 cm	10427818	100
30 × 60 cm	10426890	25
46 × 57 cm	10427826	100
58 × 60 cm	10426892	50
<b>Grade GB004 (Sheets)</b>		
7 × 10 cm	10484124	100
10 × 15 cm	10427900	100
11 × 14 cm	10427902	100
12 × 14 cm	10427904	100
15 × 15 cm	10427910	100
15 × 20 cm	10427912	100
15 × 25 cm	10427914	100
20 × 20 cm	10427918	100
20 × 24 cm	10427920	100
20 × 25 cm	10427922	100
46 × 57 cm	10427926	100
<b>Grade GB005 (Sheets)</b>		
8 × 12 cm	10426956**	25
15 × 15 cm	10426972	25
20 × 20 cm	10426981	25
58 × 58 cm	10426994	25
<b>Grade 17 Chr (Sheets)</b>		
2.5 × 22 cm	3017-8793	100
46 × 57 cm	3017-915	25
46 × 57 cm	3017-917	100
<b>Grade 31 ET Chr (Sheets)</b>		
46 × 57 cm	3031-915	25

\* Fits Minifold I System

\*\* Product is only available in the Americas

# Blotting Devices

Whatman offers a line of blotting devices to simplify your testing processes. These provide a method for screening many samples on one membrane.

The product line includes the TurboBlotter™ for rapid downward transfers and the Minifold Systems for Dot, Spot, and Slot-Blot techniques.

## Minifold I System

*Superior 96 and 48 Well Manifolds for Proteins and Nucleic Acids: Dot, Spot, and Slot-Blot Array Systems*

The Minifold I System consists of four basic components: sample well plate, filter support plate, vacuum plenum, and metal clamping plate. The sample well plate is available in three configurations for producing spots, dots or slots.

The Minifold I System is compatible with multichannel pipettes. All three plates are interchangeable and can be purchased as accessory plates or in conjunction with a complete system. The tension on the clamping is adjustable, permitting use of a variety of blotting and filtration media.

### Minifold I Dot-Blot System – 96 Well

Novel O-ring design – ensures discrete dot formation without leakage of samples by cross lateral flow.

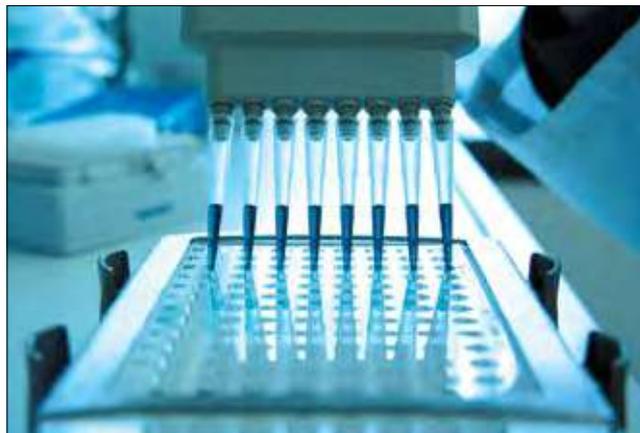
Generates even, uniform dots that eliminate uneven test areas resulting from manual sample application.

### Minifold I Spot-Blot System – 96 Well

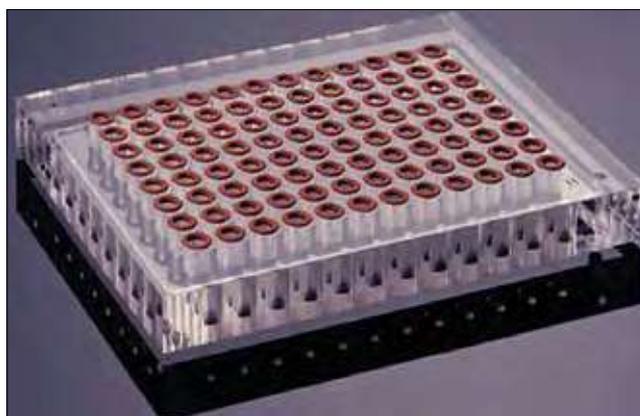
Small volume required – sample volumes as low as 25 µl can be applied using less of your precious sample.

Very high signal intensity – 2 mm<sup>2</sup> sample application area results in increased signal intensity.

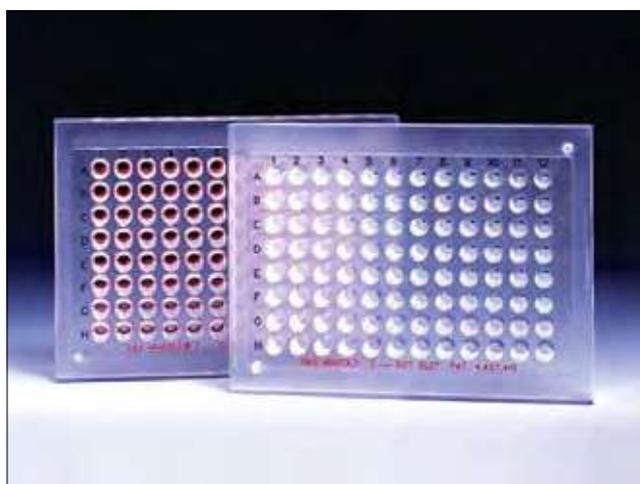
Standard microtitration format – 96 samples on a single membrane, same as the standard Minifold Dot-Blot System.



Minifold I System



Minifold I Dot-Blot System – 96 well



Minifold I Spot-Blot System – 96 well

### Minifold I Slot-Blot System – 48 Well

Preferred format for densitometric scanning, since slots can be easily quantitated.

Concentrated signal – 6 mm<sup>2</sup> sample application area results in high signal intensity.

Easy to survey format – 48 samples on your membrane are easier to view than 96 samples.



Minifold I Spot-Blot System – 48 well

### Specifications – Minifold I System

Description	Material	Filter Area	Max Capacity	Pressure
96 well Dot-Blot plate	Acrylic	12.5 mm <sup>2</sup> Dot	500 µl/well, 96 wells	0.9 bar, vacuum
96 well Spot-Blot plate	Acrylic	2 mm <sup>2</sup> Spot (1 × 2 mm)	200 µl/well, 96 wells	0.9 bar, vacuum
48 well Slot-Blot plate	Acrylic	6.24 mm <sup>2</sup> Slot (7.8 × 0.8 mm)	1000 µl/well, 48 wells	0.9 bar, vacuum

### Ordering Information – Minifold I System

Description	Catalog Number	Quantity/Pack
<b>Complete Systems*</b>		
Dot-Blot System, complete 96 well (acrylic)	10447900	1
Dot-Blot System, complete 96 well (Delrin®)	10447910	1
Spot-Blot System, complete 96 well (acrylic)	10447850	1
Slot-Blot System, complete 48 well (acrylic)	10447941	1
<b>Replacement Parts and Accessories</b>		
Dot-Blot System, replacement plate	10447905	1
Spot-Blot System, replacement plate	10447852	1
Slot-Blot System, replacement plate	10447906	1
Clamping plate	10447960	1
Dot-Blot System, replacement filter support plate	10447903	1
Vacuum Plenum	10447968	1
Dot-Blot System, replacement O-ring	10447902	50
Incubation plate	10447909	1
Membrane cutting template	10447901	1

\* Systems include: Manifold Apparatus, Protran BA85 Sheets (5), 3MM Chr Sheets (5)

cont.

Description	Catalog Number	Quantity/Pack
<b>Transfer Membranes and Blotting Paper**</b>		
BA79 Protran 0.1 µm blotting membrane	10402088	10
BA83 Protran 0.2 µm blotting membrane	10402488	10
BA85 Protran 0.45 µm blotting membrane	10402588	10
BA-S 83 Optitran 0.2 µm	10439388	10
BA-S 85 Optitran 0.45 µm	10439188	10
3MM Chr cellulose blotting sheet	3030-6189	100
GB003 cellulose blotting sheet	10427824	100

\*\* Fits Minifold 1 System, 10.2 × 13.3 cm sheet

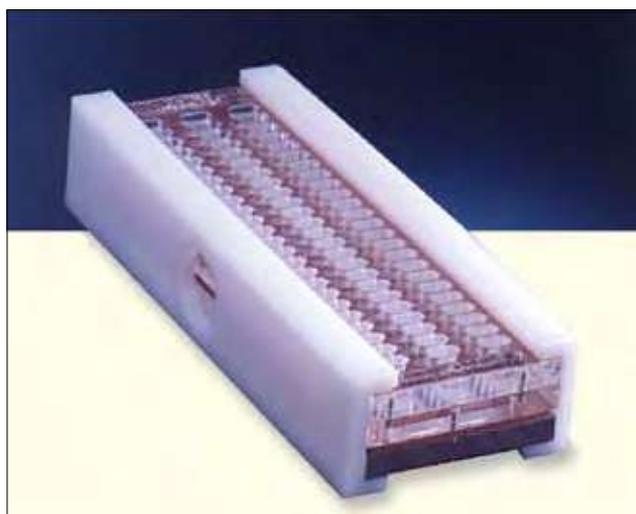
## Minifold II System

### 72 Well Slot-Blot Array System

The Minifold II System is designed for precise, quantitative solid-phase assays with three rows of 24 slots, spaced according to multi-tip pipette format. The smaller slot surface area results in higher signal intensity and requires less sample than standard dot-blot formats. The resulting blot can be read with a densitometer.

#### Features and Benefits

- Higher signal intensity – smaller slot surface area results in increased signal
- Less sample – small slot dimensions require less sample than dot-blotters
- Faster results – more intense signal generated with the slot-blotter – allows users to visualize results in less time
- Accepts all types of transfer membranes – allows for choice of membrane with the highest binding capacity
- Easy to assemble – bevelled side rails ensure rapid and accurate assembly



Slot-Blot Array System – 72 well

### Specifications – Minifold II System

Description	Material	Filter Area	Max Capacity	Pressure
Acrylic	6.3 × 22.8 cm	6.0 mm <sup>2</sup> /well (0.75 × 8.0 mm slots)	600 µl/slot	0.9 bar, vacuum

## Ordering Information – Minifold II System

Description	Catalog Number	Quantity/Pack
<b>Complete System*</b>		
Minifold II Slot-Blot System, complete	10447800	1
<b>Replacement Parts</b>		
Sample well plate	10447801†	1
Vacuum filter support with 1/4" vacuum tube adaptor	10447864†	1
Silicone O-ring	10447813†	1
Silicone sheet	10447805†	5
Vacuum connector	10447866†	1
<b>Replacement Parts and Accessories**</b>		
BA83 Protran 0.2 µm blotting membrane	10402493	10
BA85 Protran 0.45 µm blotting membrane	10402593	10

\* System includes: *Manifold Apparatus, Protran BA85 Sheets (5), 3MM Chr Sheets (5)*

\*\* Fits *Minifold II System, 6.3 × 22.8 cm sheet*

† Product is only available in the Americas

## TurboBlotter

### Rapid Downward Transfer System

The TurboBlotter System is a rapid downward blotting device for high-resolution transfer of DNA and RNA.

The conventional Northern/Southern transfer stack has been turned upside down in order to take advantage of gravity. No heavy weights are required on the top of the transfer stack, eliminating the messy set-up of standard upward capillary transfers.

The TurboBlotter System offers greater speed, target resolution, and convenience versus traditional blotting procedures. Alkaline DNA transfers can be performed in as little as one hour, while neutral (SSC) transfers of DNA and RNA take only three hours.



TurboBlotter

## Features and Benefits

- Rapid – downward capillary transfer allows for alkaline buffer transfers in one hour and neutral (SSC) transfers in three hours
- Economical – reusable blotting device requires less buffer and blotting paper. Convenient refill packs available.
- Compact – has a smaller footprint than most homemade devices and is stackable. Up to five units can be stacked on top of each other during transfers.
- Easy to use – very easy to set up and works without power or vacuum source
- Uses Whatman Nytran SPC membrane and Whatman 3MM Chr and GB004 blotting papers for top performance

TurboBlotter is available in two sizes. The smaller model is 12 × 16 cm, for gels from 7 × 8 cm to 11 × 14 cm. The larger model is 21 × 26 cm, for gels from 12 × 21 cm to 20 × 25 cm. Each size comes in your choice of refill packs and the refill packs are available separately.

Each transfer uses one sheet of Nytran SPC, one wick of 3MM Chr, and a blotter stack composed of eight sheets of 3MM Chr and 20 sheets of GB004. Each TurboBlotter Kit or TurboBlotter refill contains five sets of these materials, enough for five transfers.



TurboBlotter set-up

## Ordering Information – TurboBlotter System

Dimensions (cm)	Catalog Number	Quantity/Pack
<b>Nytran SPC TurboBlotter Kits*, small</b>		
<i>12 × 16 cm transfer device with Nytran SPC, wicks, and blotter stacks for indicated gel size</i>		
7 × 10	10416328	1
9 × 11	10416336	1
10 × 15	10416300	1
11 × 14	10416304	1
<b>Nytran SPC TurboBlotter Refills**, small</b>		
<i>Nytran SPC, wicks, and blotter stacks for five transfers from indicated gel size</i>		
7 × 10	10416330	1
9 × 11	10416338	1
10 × 15	10416302	1
11 × 14	10416306	1

\* Each TurboBlotter Kit includes: Transfer Device, Membrane Sheets (5), 3MM Chr Sheets (40), GB004 Sheets (100), and 3MM Chr Wicks (5)

cont.

\*\* TurboBlotter refills include: Membrane Sheets (5), 3MM Chr Sheets (40), GB004 Sheets (100), and 3MM Chr Wicks (5)

All TurboBlotter kits and refills 0.45 μm

Dimensions (cm)	Catalog Number	Quantity/Pack
<b>Nytran SPC TurboBlotter Kits*, Large</b>		
<i>21 × 26 cm transfer device with Nytran SPC, wicks, and blotter stacks for indicated gel size</i>		
12 × 21	10416308	1
15 × 15	10416312	1
15 × 20	10416316	1
20 × 20	10416320	1
20 × 25	10416324	1
<b>Nytran SPC TurboBlotter Refills**, Large</b>		
<i>Nytran SPC, wicks, and blotter stacks for five transfers from indicated gel size</i>		
12 × 21	10416310	1
15 × 15	10416314	1
15 × 20	10416318	1
20 × 20	10416322	1
20 × 25	10416326	1

\* Each TurboBlotter Kit includes: Transfer Device, Membrane Sheets (5), 3MM Chr Sheets (40), GB004 Sheets (100), and 3MM Chr Wicks (5)

\*\* TurboBlotter refills include: Membrane Sheets (5), 3MM Chr Sheets (40), GB004 Sheets (100), and 3MM Chr Wicks (5)

All TurboBlotter kits and refills 0.45 µm

## Blotting Accessories

Whatman offers a range of blotting accessories to simplify your testing processes. Products include membrane marking pens and reaction folders (sealable hybridization bags).

### Membrane Marking Pen

#### For Marking Nitrocellulose and Nylon Transfers

The membrane marking pen is a high-xylene, felt-tipped marker that permanently writes on nitrocellulose and nylon membranes used in standard transfer procedures.

This indispensable tool ensures easy identification and orientation of gel transfers, colony and plaque lifts, and Western blots, even when the membrane is damp. It is compatible with hybridization and incubation buffers. An excellent marker for keeping records of transfers.



Membrane marking pen

### Ordering Information – Membrane Marking Pen

Description	Catalog Number	Quantity/Pack
Membrane Marking Pen	10499001	1

## Reaction Folders

### Sealable Hybridization Bags

Whatman Reaction Folders are sealable bags for hybridization and incubation reactions.

The folders are open on three sides to allow easier insertion of a wet membrane when compared to standard hybridization bags. The folders can be sealed with a standard heat-sealer. Available in 8 × 10" (20.3 × 25.8 cm) size.



Sealable hybridization bags

## Ordering Information – Reaction Folders

Dimensions	Catalog Number	Quantity/Pack
8 × 10" (20.3 × 25.8 cm)	10483064	50

## Waste Reduction

Whatman offers products to safely reduce waste and protect the laboratory environment. These include the Extractor™ System for removal of ethidium bromide from gel-staining solutions and Benchkote, an absorbent, impermeable material designed to protect laboratory surfaces.

### Benchkote and Benchkote Plus

#### Benchkote

Benchkote is an absorbent, impermeable material designed to protect laboratory surfaces against hazardous spills. The material features a high-quality, smooth, absorbent Whatman paper, which quickly absorbs liquid spills and a laminated polyethylene layer that prevents flow through to the working surface. After use, the sheet is incinerated or disposed of according to local regulations.

#### Benchkote Plus

Benchkote Plus is a thicker, more absorbent material for more demanding applications and can absorb in excess of 0.75 liters of water per square meter.



Benchkote

**Features and Benefits**

- Material is very strong, making it tear resistant, wet or dry
- Smooth white surface can be written on with ink or pencil and lies flat
- Suitable for saturation with disinfectant to protect benches where pathogens and other bacteria are present
- Use polyethylene side up to collect deposits without absorption
- Paper side quickly absorbs liquid spills, preventing liquids from going through to the work surface
- Spillages are trapped in the absorbent paper
- Benchkote can be incinerated after use; the polyethylene layer does not melt or drip but is rapidly consumed in the flames

**Applications**

- Containing radiochemical spillage and avoiding contamination
- Recovering spillage of expensive materials
- Protecting hard surfaces to lessen impact
- Water or solvent wick for humidity chambers
- Lining of chemical cabinets, laboratory bench drawers, and laboratory hoods

**Ordering Information – Benchkote for Specialty Products**

Dimensions	Catalog Number	Quantity/Pack
<b>Sheets</b>		
460 x 570 mm	2300-916	50
460 x 570 mm	2300-917	100
<b>Pads</b>		
460 x 570 mm*	2300-594	1 (50 sheets per pad)
460 x 570 mm**	2300-599	1 (50 sheets per pad)
<b>Reels</b>		
460 mm x 50 m	2300-731	1
920 mm x 50 m	2300-772	1

\* Product is only available in the Americas

\*\* Product is only available in Europe

**Ordering Information – Benchkote Plus for Specialty Products**

Dimensions	Catalog Number	Quantity/Pack
<b>Sheets</b>		
500 x 600 mm	2301-6150	50
<b>Reel</b>		
600 mm x 50 m	2301-6160	1

## Extractor EtBr System

### Ethidium Bromide (EtBr) Waste Reduction System

The Extractor System is a one-step filtration funnel device for the rapid removal of ethidium bromide from gel-staining solutions.

This disposable unit contains an activated carbon matrix, which removes > 99% of ethidium bromide from electrophoretic buffer quickly and easily. Each device can decontaminate up to 10 liters of gel-staining solution. After filtration, the decontaminated solution can be safely poured down the laboratory drain.

The Extractor funnel device fits most standard laboratory flasks and bottles (neck size 33-45 mm), and the unit includes a cap for storage between uses. The polypropylene housing is chemically resistant to organics. Also included in the package are glass fiber prefilters, which remove gel pieces and other debris to avoid premature clogging of the carbon filter.



Extractor EtBr System

### Ordering Information – Extractor EtBr System

Description	Catalog Number	Quantity/Pack
Extractor EtBr System, Starter Pack	10448030	2
Extractor EtBr System, Standard Pack	10448031	6



## **Multiwell Plates**

Their novel design allows for numerous applications, such as sample preparation, drug discovery, genomics, and filter based assays.

- 300 Application Specific Plates
- 312 UNIFILTER Filtration Microplates
- 319 UNIPLATE Collection Plates
- 323 Specialty Microplates
- 326 Multiwell Accessories

# Multiwell Plates

Whatman is dedicated to providing the most advanced technology for sample preparation to meet the growing demands of the life sciences market. Whatman filters are used worldwide for research, analysis, and quality control in the pharmaceutical and biotechnology industries. These high-quality filters are provided in a range of multiwell analytical plates for pharmaceutical and life science research.

Whatman utilizes a patented process to encapsulate the filter media, which ensures no cross talk or contamination between wells. This proprietary technology allows for use of a variety of Whatman filter media. In addition, to further optimize the filter plates for specific applications, novel polymers, surface treatments, well densities, profiles, and accessories are incorporated into the process. Our microplate technology is applied by a team of engineers, scientists, polymer engineers and filtration experts to ensure Whatman is at the leading edge of new developments.

The Whatman multiwell range of products is extremely diverse. The novel design of the filter plates allows for a large number of applications. Applications for disciplines such as sample preparation, genomics, and filter based assays are served by the multiwell approach to filtration technology. Some core applications include sample clean-up, cell-based immunoassay, isolation of nucleic acids, and compound library generation using parallel synthesis procedures.



Whatman multiwell plates

## Application Specific Plates

Whatman has developed consistent and reproducible microplates and microplate systems to improve throughput and reduce cost for a number of biological sample preparations and clean-up procedures.

Comprehensive protocols are provided to enable implementation by all types of users. Whatman microplates conform to the ANSI/SBS standards and are engineered for fast and convenient processing applications.



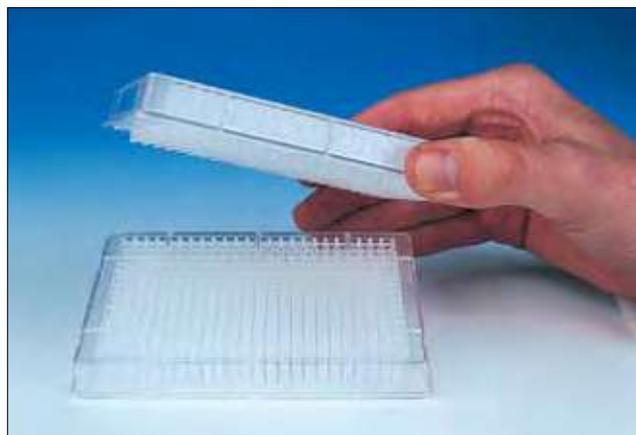
UNIFILTER plate

## 384 Well DNA Binding UNIFILTER Plate

The 384 well DNA Binding UNIFILTER plate effectively binds and purifies DNA molecules. It provides highly reproducible results with yields exceeding 2 µg/well, from bind-wash-elute processing with collection by filtration. Minimal liquid hang-up allows for reduced elution volume, enabling DNA concentration as high as 150 ng/µl. Further ethanol precipitation is unnecessary. The DNA is ready to use.

### Features and Benefits

- High efficiency bind-wash-elute processing with collection by filtration
- Simplifies automation with no cross contamination
- Highly reproducible results yielding DNA purity exceeding 2 µg/well, sufficient for sensitive downstream applications
- Minimal liquid hang-up allows for reduced elution volume with DNA concentration as high as 150 ng/µl



384 well DNA Binding UNIFILTER

### Ordering Information – 384 Well DNA Binding UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Well Bottom	Filter Media	Quantity/Pack
<b>DNA Binding UNIFILTER</b>						
384	100	7700-2110	Clear polystyrene	Filter, LDD	DNA binding	50
<b>UNIPLATE Collection Plate</b>						
384	100	7701-1100	Clear polystyrene	Flat	–	50

LDD – Long Drip Director

See also 96 well DNA Binding UNIFILTER chart on p. 310.

## Dye Terminator Removal UNIFILTER

The Whatman Dye Terminator Removal plates are available in 96 well and 384 well formats. These plates can be used with gel filtration media for high-throughput sequencing reaction clean-up, including removal of dye blobs.

They are constructed from rigid polystyrene that can withstand centrifugation. Laboratory packing of gel filtration media is less expensive than prepacked plates or spin columns.



96 well Dye Terminator Removal UNIFILTER

### Ordering Information – Dye Terminator Removal UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Well Bottom	Quantity/Pack
<b>Dye Terminator Removal UNIFILTER</b>					
96	800	7700-2801	Clear polystyrene	Filter, LDD*	25
384	100	7700-1101	Clear polystyrene	Filter, LDD*	50
<b>UNIPLATE Collection Plate</b>					
96	750	7701-5750	Natural polypropylene	Round	25
384	80	7701-5101	Natural polypropylene	"V"	50

\* Whatman GF/C

LDD – Long Drip Director

## ELISA UNIFILTER

Traditional ELISA is performed in plastic microplates. Whatman offers speed, sensitivity, and simple washing protocols with nitrocellulose filter plates.

ELISA performed with the Whatman ELISA UNIFILTER takes less time than traditional methods using regular microplates. Coating the nitrocellulose filter with antibody takes only minutes, compared with overnight procedures employed for coating polystyrene microplates. Also, the use of vacuum filtration greatly reduces the time required for rinsing and enables quantitative collection of filtrate into a collection plate.



ELISA UNIFILTER

## Ordering Information – ELISA UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Well Bottom	Quantity/Pack
<b>ELISA UNIFILTER</b>						
96	350	7700-3307	White polystyrene	0.45 µm CN	Filter, SDD	50
<b>UNIPLATE Collection Plate</b>						
96	350	7701-1350	Clear polystyrene	-	Flat	50
96	2000	7701-5200	Natural polypropylene	-	Round	25
<b>Microplate Seals</b>						
Clear polyester thin cold sealing film with adhesive backing 0.05 mm thick		7704-0001	-	-	-	100
<b>UniVac 3 Vacuum Manifold</b>						
Univac 3 acrylic filter/collect vacuum manifold for volumes from 100 µl to 10 ml		7705-0107	-	-	-	1

CN – Cellulose Nitrate  
SDD – Short Drip Director

## BAC Prep UNIFILTER

With ever increasing demand for simple, fast methods to purify DNA from bacterial cultures, the Whatman Genomics microplate is an excellent solution for the clarification of lysates containing large insert vectors.

This microplate has a cellulose acetate membrane with a special support, which clears non-chaotropic bacterial lysates, and long drip directors to eliminate cross talk between wells. Without further purification the DNA is clean enough for further enzymatic manipulation. Cellulose acetate acts as both a depth filter and a fine particle filter. The 0.45 µm pores do not block because of the depth effect of the membrane. Cellulose acetate is also inert and does not bind either DNA or protein.



BAC prep UNIFILTER

## Ordering Information – BAC Prep UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Well Bottom	Quantity/Pack
<b>BAC Prep UNIFILTER</b>						
96	800	7700-2808	Clear polystyrene	0.45 µm CA	Filter, LDD	25
<b>Bacterial Growth Plate</b>						
96	2000	7701-5205	Natural polypropylene	-	Round, irradiated with lid	25
<b>UNIPLATE Collection Plate</b>						
96	2000	7701-5200	Natural polypropylene	-	Round	25
96	750	7701-5750	Natural polypropylene	-	Round	25

CA – Cellulose Acetate  
LDD – Long Drip Director

## PCR Clean-Up UNIFILTER

Process 96 or 384 samples quickly by a bind-wash-elute method with greater than 85% recovery. The PCR Clean-up UNIFILTER eliminates time-consuming precipitations and labor-intensive resin purifications. Purified DNA is ready for sequencing, hybridization assays, and microarrays.

The PCR Clean-up UNIFILTER can be used with both vacuum and centrifuge techniques. (Centrifugation is recommended for final elution with the 384 well UNIFILTER.)



96 well PCR Clean-up UNIFILTER

### Ordering Information – PCR Clean-Up UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Well Bottom	Quantity/Pack
<b>PCR Clean-up UNIFILTER</b>						
96	800	7700-2810	Clear polystyrene	DNA binding	Filter, LDD	25
384	100	7700-2110	Clear polystyrene	DNA binding	Filter, LDD	50
<b>UNIPLATE Collection Plate</b>						
96	250	7701-5250*	Natural polypropylene	-	"V"	50
384	100	7701-1100	Clear polystyrene	-	Flat	50
<b>Microplate Seals</b>						
Microplate Seals, thin cold sealing film with adhesive backing 0.05 mm thick		7704-0001	Clear polyester	-	-	100

\* Does not comply with ANSI/SBS standards

LDD – Long Drip Director

## Phase Separation UNIFILTER

The Phase Separation plate allows for a quick separation of halogenated solvents from an aqueous phase, with no carryover and no close manual contact. The plate consists of a 2 ml, 96 well, rigid glass-filled polypropylene body. It has long drip directors to ensure accurate dispensing of the filtrate. Whatman 1PS media is sealed into each well.

Whatman 1PS is a silicone-treated medium, which remains impervious to aqueous solvents but allows the unimpeded passage of organic solvents. Providing that the solvent layer is in contact with the 1PS, the organic solvent layer will drain under gravity until the aqueous interface is reached, when flow will stop automatically. If subsequent harvesting of the aqueous layer is required, a vacuum can then be applied to collect this layer.



Phase Separation UNIFILTER

## Ordering Information – Phase Separation UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Well Bottom	Quantity/Pack
<b>Phase Separation UNIFILTER</b>						
96	2000	7720-7229-01	Glass-filled polypropylene	Filter, LDD	Phase separation	1
<b>UNIPLATE Collection Plate</b>						
96	750	7701-5750	Natural polypropylene	-	Round	25
96	2000	7701-5200	Natural polypropylene	-	Round	25

LDD – Long Drip Director

## Protein Kinase Assay UNIFILTER

The Protein Kinase Assay filter plate incorporates a P81 filter in each well. P81 is a cation exchanger that binds peptides but does not bind unincorporated ATP, resulting in low nonspecific background noise and high sensitivity in kinase assays.

The filter plate is produced to ANSI/SBS standards in rigid white polystyrene or Barex to eliminate optical cross talk problems during liquid scintillation counting. The 150 µl UNIFILTER has shallow wells enabling higher detection sensitivity.



Protein Kinase Assay UNIFILTER

## Ordering Information – Protein Kinase Assay UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Well Bottom	Drip Director	Quantity/Pack
<b>Protein Kinase Assay UNIFILTER</b>							
96	150	7700-0512*	White Barex	Whatman P81	Mesh	Mesh	50
96	350	7700-3312*	White polystyrene	Whatman P81	Filter	Short	50
96	350	7700-4312*	White polystyrene	Whatman P81	Mesh	Mesh	50
<b>UniVac 1 Vacuum Manifold</b>							
Vacuum to waste manifold		7705-0101	Polyurethane	-	-	-	1

\* Comes with 55 backing seals

## Protein Precipitation UNIFILTER FF

The Protein Precipitation UNIFILTER FF (Fast Flow) is optimized for removing acetonitrile-precipitated proteins from plasma or serum samples. This 2 ml, 96 well, rigid glass-filled polypropylene microplate is both robust and chemically resistant.

The plate contains 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.



Protein Precipitation UNIFILTER FF

### Features and Benefits

- 96 samples purified at the same time
- Purified samples available in less than 10 minutes
- Precipitation and filtration in the same well
- No laborious pipetting and/or centrifugation required and minimal liquid handling
- Dual Whatman filter media
- Ensures no fluid loss during incubation and fast flow during filtration
- Over 98% protein removal
- Sample volumes up to 150  $\mu$ l for plasma and 200  $\mu$ l for serum
- ANSI/SBS compatible
- Robotics friendly

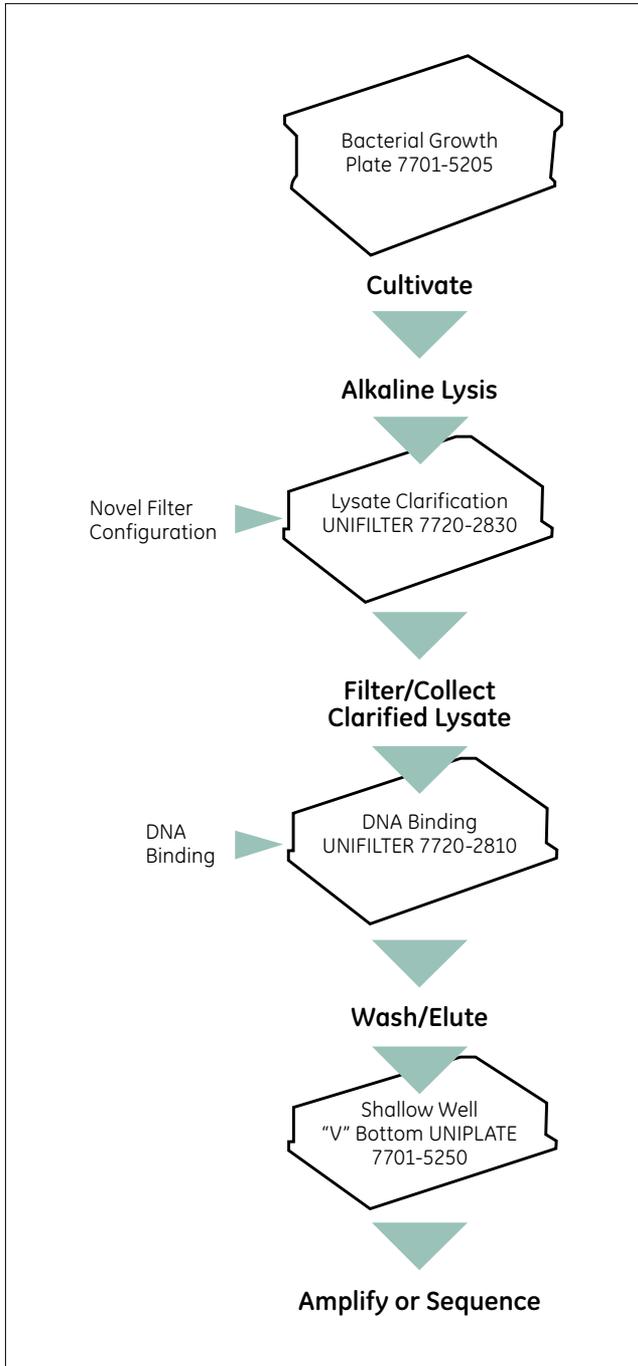
### Ordering Information – Protein Precipitation UNIFILTER FF

Well Format	Well Volume ( $\mu$ l)	Catalog Number	Plate Material	Filter Media	Well Bottom	Quantity/Pack
<b>Protein Precipitation UNIFILTER</b>						
96	2000	7720-7235	Glass polypropylene	Standard	-	1
96	2000	7720-7236	Glass polypropylene	Fast flow	-	1
<b>UNIPLATE Collection Plate</b>						
96	750	7701-5750	Natural polypropylene	-	Round	25
96	2000	7701-5200	Natural polypropylene	-	Round	25

## Plasmid Miniprep

The preparation of plasmid DNA from bacterial culture is an extremely common procedure. The Plasmid Miniprep System simplifies the process, increases the throughput, and improves the purity of plasmid DNA.

The Plasmid Miniprep System consists of a few basic steps, each with an optimized microplate.



## Sample Results

Average yield per well	6.0 µg
A260/A280	1.94
EcoR1 digest	Yes
Sequencing accuracy (BLAST)	97% over 600 bp

Full protocol available at [www.whatman.com](http://www.whatman.com)

## Ordering Information – Plasmid Miniprep

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Well Bottom	Irradiated with Lid	Quantity/Pack
<b>UNIPLATE Bacterial Growth Plate</b>							
96	2000	7701-5205	Natural polypropylene	–	Round	Yes	25
<b>Lysate Clarification UNIFILTER</b>							
96	800	7720-2830	Clear polystyrene	Lysate clarification	Filter, LDD	No	25
96	800	7770-0062	Clear polystyrene	Lysate clarification 0.45 µm PP	Filter, LDD	No	25
<b>DNA Binding UNIFILTER</b>							
96	800	7700-2810	Clear polystyrene	DNA binding	Filter, LDD	No	25
<b>UNIPLATE Collection Plate</b>							
96	2000	7701-5200	Natural polypropylene	–	Round	No	25
96	750	7701-5750	Natural polypropylene	–	Round	No	25
96	250	7701-5250*	Natural polypropylene	–	“V”	No	50
<b>UniVac 3 Vacuum Manifold</b>							
UniVac 3 Teflon coated aluminum filter/collect vacuum manifold for volumes from 100 µl to 10 ml		7705-0102	–	–	–	–	1

\* Does not comply with ANSI/SBS standards

LDD – Long Drip Director

## 96 Well Bacterial Growth Plate

The high-throughput Bacterial Growth plate can simplify and accelerate the growth of 96 individual 1.5 ml bacterial cultures. It is used for both overnight cultivation and the initial “spin down” of bacteria. Made of medical-grade polypropylene with a clear polystyrene lid, this gamma-irradiated plate eliminates the need to grow multiple, discrete cultures. It also optimizes space and efficiency in the incubator.

Whatman has demonstrated that culture integrity is not affected by the close proximity of neighboring cultures and that each culture grows to the same density as it would in individual culture tubes (at 325 rpm and 37°C for 16 hours).



96 well Bacterial Growth plate

### Features and Benefits

- Consistent cell densities across all 96 wells
- Eliminates cross contamination between wells
- Growth comparable to individual test tubes
- Ability to automate allows for increased productivity

### Ordering Information – 96 Well Bacterial Growth Plate

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Well Bottom	Irradiated with Lid	Quantity/Pack
96	2000	7701-5205	Natural polypropylene	Round	Yes	25

## 96 Well DNA Binding UNIFILTER

Plasmid DNA Binding UNIFILTER works either as a stand-alone or as part of our high-throughput miniprep system.

Plasmid DNA is bound to the filter under chaotropic conditions, washed twice, and then vacuumed to dryness on a vacuum manifold. The plasmid DNA is eluted by vacuum in a final volume of 100  $\mu$ l into a nonbinding polypropylene collection plate using water or TE<sup>-1</sup> buffer. The DNA is ready to use and further ethanol precipitation is unnecessary. The final concentration is 50-100 ng/ $\mu$ l, depending on the original culture. The OD<sub>260/280</sub> ratio is 1.9 and the yields in all 96 wells “max out” at 6  $\mu$ g. Full protocol is available at [www.whatman.com](http://www.whatman.com)

The Plasmid DNA binding plate can be used with both vacuum and centrifuge techniques, making it a vital and flexible tool in every high-throughput laboratory.

### Features and Benefits

- DNA recovery of 6  $\mu$ g per well on average
- Consistent yield across all 96 wells
- Eluted plasmid DNA is free of genomic DNA contamination when used with Lysate Clarification UNIFILTER
- High-quality DNA suitable for PCR, restriction digestion, and sequencing
- Save time: no desalting or ethanol precipitation
- No kit required, significantly reduces costs



96 well Plasmid DNA Binding UNIFILTER

### Ordering Information – 96 Well DNA Binding UNIFILTER

Well Format	Well Volume ( $\mu$ l)	Catalog Number	Plate Material	Filter Media	Well Bottom	Quantity/Pack
96	800	7700-2810	Clear polystyrene	DNA binding	Filter, LDD	25

LDD – Long Drip Director

## 96 Well Lysate Clarification UNIFILTER

The Lysate Clarification UNIFILTER can utilize either vacuum or a centrifuge. The vacuum process is significantly easier to automate with consistency across all wells when used with the DNA Binding UNIFILTER; it also has an average DNA recovery rate 10-30% higher than the manual centrifuge method. This method filters out cell debris to obtain plasmid DNA in the aqueous phase.

Whatman filter technology results in high particle retention and fast flow rates while producing a clean lysate. The Lysate Clarification plate is an important tool for high-throughput plasmid DNA purification.

### Features and Benefits

- Processes 96 lysates in less than 10 minutes
- Increases DNA recovery by 10-30%
- Consistent yield across all 96 wells
- User flexibility of using either centrifugation or vacuum
- 96 well format is easily automated



96 well Lysate Clarification UNIFILTER

### Ordering Information – 96 Well Lysate Clarification UNIFILTER

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Well Bottom	Quantity/Pack
96	800	7700-0062	Clear polystyrene	Lysate clarification 0.45 µm PP	Filter, LDD	25
96	800	7720-2830	Clear polystyrene	Lysate clarification	-	25

LDD – Long Drip Director

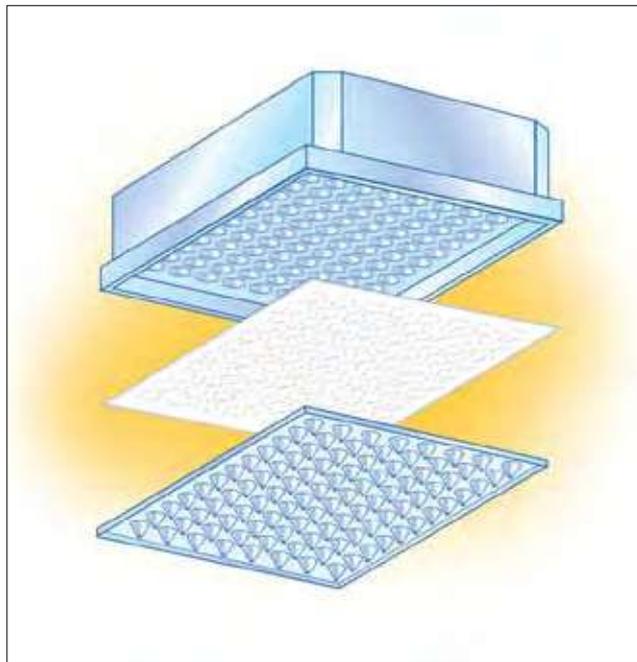
## UNIFILTER Filtration Microplates

The proprietary Whatman UNIFILTER microplates with filter bottom wells are convenient and ready to use. Available in 24, 96, and 384 well formats, UNIFILTER microplates offer a choice of filter media to meet exact application requirements.

The novel 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  $\mu$ l to 10 ml.

### Features and Benefits

- No cross talk. Patented integral filter design prevents well-to-well cross contamination.
- Economical to use. Wide range of well volume options ensures efficient use of materials.
- Better control. Choice of filter media allows control of the flow rates and retention characteristics.
- Versatile. A broad range of filtration media is available, including glass fiber, polypropylene, cellulose nitrate, cellulose acetate, nylon, and ion exchange cellulose.

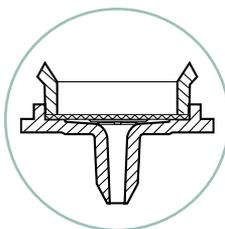


UNIFILTER construction

## 24 Well 10 ml UNIFILTER Microplate

The 10 ml UNIFILTER microplate is widely used for applications that require very large sample or reagent volumes. Typically these applications include biomolecule purification by solid phase extraction and organic synthesis in combinatorial chemistry library generation.

The polypropylene construction of the 10 ml UNIFILTER microplate permits chemical and heat-resistant operation. The long drip directors facilitate collection of filtrate with no cross talk.



Long drip director



24 well 10 ml UNIFILTER microplate

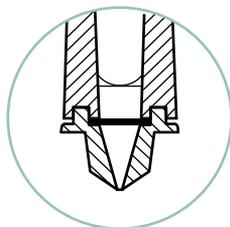
### Ordering Information – 24 Well 10 ml UNIFILTER Microplate

Well Format	Well Volume (ml)	Catalog Number	Plate Material	Drip Director	Filter Media	Quantity/Pack
24	10	7700-9901	Natural polypropylene	Long	Whatman GF/C	25
24	10	7700-9904	Natural polypropylene	Long	25-30 $\mu\text{m}$ melt blown polypropylene	25
24	10	7700-9905	Natural polypropylene	Long	1 $\mu\text{m}$ PTFE laminate	25
24	10	7700-9917	Natural polypropylene	Long	10-12 $\mu\text{m}$ melt blown polypropylene	25

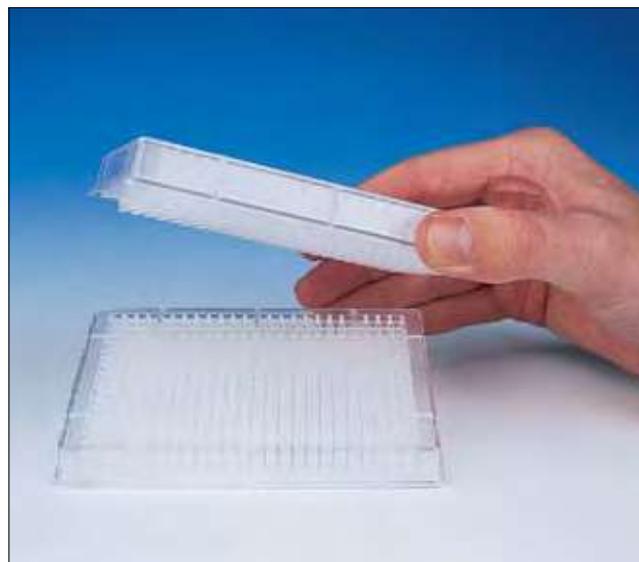
## 384 Well 100 µl UNIFILTER Microplate

The 100 µl UNIFILTER is the only 384 well filter microplate with a 100 µl well volume to allow a large enough sample for recovery after filtration. Beneath the filter plate are long drip directors designed to eliminate well-to-well contamination during the filtration process.

The 384 well filter plate has been successfully used for DNA template clean-up, cell capture, and for the removal of unwanted debris.



Long drip director



384 well 100 µl UNIFILTER microplate

### Ordering Information – 384 Well 100 µl UNIFILTER Microplate

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Drip Director	Filter Media	Quantity/Pack
384	100	7700-1101	Clear polystyrene	Long	Whatman GF/C	50
384	100	7700-1102	Clear polystyrene	Long	Whatman hydrophobic GF/C	50
384	100	7700-2106	Clear polystyrene	Long	0.45 µm hydrophilic PVDF	50
384	100	7700-2110	Clear polystyrene	Long	DNA binding	50
384	100	7700-2117	Clear polystyrene	Long	10 µm melt blown polypropylene	50

## 96 Well 2 ml UNIFILTER Microplate

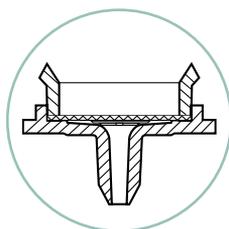
The 2 ml UNIFILTER microplate is widely used for applications that require larger sample or reagent volumes. Typically these applications include biomolecule purification by solid phase extraction and organic synthesis in combinatorial chemistry library generation.

The glass-filled polypropylene construction of the 2 ml UNIFILTER microplate permits chemical and heat-resistant operation. The long drip directors facilitate collection of filtrate with no cross talk.

Two filter media for the 2 ml chemically resistant filter plate are PKP and GF/D. Both are chemically resistant with the PKP used for retaining solvent, while the GF/D is used for fast flow rates.



Glass-filled polypropylene 96 well UNIFILTER



Long drip director



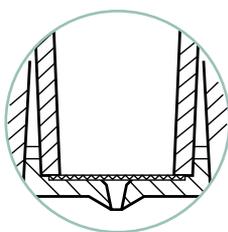
Protein Precipitation UNIFILTER

### Ordering Information – 96 Well 2 ml UNIFILTER Microplate

Well Format	Well Volume (ml)	Catalog Number	Plate Material	Drip Director	Filter Media	Quantity/Pack
96	2	7700-7201	Glass-filled polypropylene	Long	Whatman GF/C	25
96	2	7700-7202	Glass-filled polypropylene	Long	Whatman hydrophobic GF/C	25
96	2	7700-7203	Glass-filled polypropylene	Long	Whatman GF/B	25
96	2	7700-7204	Glass-filled polypropylene	Long	25-30 µm melt blown polypropylene	25
96	2	7700-7206	Glass-filled polypropylene	Long	0.45 µm hydrophilic PVDF	25
96	2	7700-7210	Glass-filled polypropylene	Long	Whatman GF/F	25
96	2	7700-7211	Glass-filled polypropylene	Long	Whatman GF/D	25
96	2	7700-7224	Glass-filled polypropylene	Long	10 µm polypropylene	25
96	2	7700-7228	Glass-filled polypropylene	Long	Whatman oleophobic PKP	10
96	2	7720-7229-01	Glass-filled polypropylene	Long	Phase separation	1
96	2	7720-7235	Glass-filled polypropylene	Long	Protein precipitation	1
96	2	7720-7236	Glass-filled polypropylene	Long	Protein precipitation fast flow	1

## 96 Well 350 µl UNIFILTER Microplate

The 350 µl UNIFILTER is the plate of choice for filter-based assays in high-throughput screening (HTS). It is available in opaque white polystyrene for efficient use with liquid scintillation, fluorescence, and chemiluminescence detections. The dimensions are compatible with most microplate readers for screening procedures. These plates are also available in clear polystyrene.



Short drip director



96 well 350 µl UNIFILTER microplate

### Ordering Information – 96 Well 350 µl UNIFILTER Microplate

Well Format	Well Volume (µl)	Catalog Number	Drip Director	Filter Media	Quantity/Pack
<b>UNIFILTER – Clear Polystyrene</b>					
96	350	7700-1301	Short	Whatman GF/C	50
96	350	7700-1303	Short	Whatman GF/B	50
96	350	7700-1305	Short	0.45 µm polypropylene	50
96	350	7700-1306	Short	0.45 µm hydrophilic PVDF	50
96	350	7700-1308	Short	0.45 µm cellulose acetate	50
96	350	7920-8365*	Closed bottom	0.2 µm cellulose nitrate and lid	50
<b>UNIFILTER – White Polystyrene</b>					
96	350	7700-3301	Short	Whatman GF/C	50
96	350	7700-3302	Short	Whatman hydrophobic GF/C	50
96	350	7700-3303	Short	Whatman GF/B	50
96	350	7700-3304	Short	25-30 µm melt blown polypropylene	50
96	350	7700-3305	Short	0.45 µm polypropylene	50
96	350	7700-3306	Short	0.45 µm hydrophilic PVDF	50
96	350	7700-3307	Short	0.45 µm cellulose nitrate	50
96	350	7700-3308	Short	0.45 µm cellulose acetate	50
96	350	7700-3310	Short	Whatman GF/F	50
96	350	7700-3312	Short	Whatman P81	50
96	350	7700-3356	Short	0.45 µm hydrophobic PVDF	50
96	350	7770-0001	Short	0.45 µm hydrophobic PVDF and 0.45 µm polypropylene	50
96	350	7770-0006**	Short	0.45 µm hydrophobic PVDF and 0.45 µm polypropylene, irradiated with lid	50

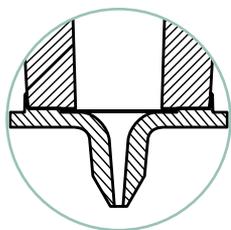
\* Closed bottom for ELISPOT plate with membrane

\*\* Recommended for ELISPOT assays

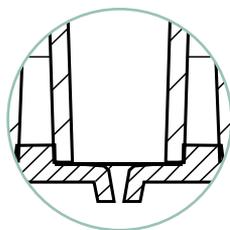
## 96 Well 800 µl UNIFILTER Microplate

The 800 µl UNIFILTER is the microplate most typically used in purifications, isolations, and separations of biomolecules, particularly DNA.

The microplate has a well volume of 800 µl, which is excellent 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.



Long drip director



Short drip director



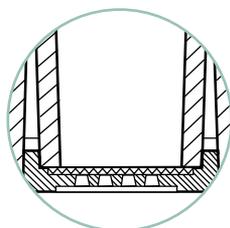
96 well 800 µl UNIFILTER microplate

### Ordering Information – 96 Well 800 µl UNIFILTER Microplate

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Quantity/Pack
<b>UNIFILTER – Short Drip Director</b>					
96	800	7700-1801	Clear polystyrene	Whatman GF/C	25
96	800	7700-1804	Clear polystyrene	25-30 µm melt blown polypropylene	25
96	800	7700-1806	Clear polystyrene	0.45 µm hydrophilic PVDF	25
96	800	7700-1808	Clear polystyrene	0.45 µm cellulose acetate	25
96	800	7700-1818	Clear polystyrene	5-7 µm melt blown polypropylene	25
<b>UNIFILTER – Long Drip Director</b>					
96	800	7700-2801	Clear polystyrene	Whatman GF/C	25
96	800	7700-2803	Clear polystyrene	Whatman GF/B	25
96	800	7700-2804	Clear polystyrene	25-30 µm melt blown polypropylene	25
96	800	7700-2805	Clear polystyrene	0.45 µm polypropylene	25
96	800	7700-2806	Clear polystyrene	0.45 µm hydrophilic PVDF	25
96	800	7700-2808	Clear polystyrene	0.45 µm cellulose acetate	25
96	800	7700-2809	Clear polystyrene	0.45 µm nylon positive	25
96	800	7700-2810	Clear polystyrene	DNA binding	25
96	800	7700-2811	Clear polystyrene	Whatman GF/D	25
96	800	7700-2817	Clear polystyrene	10-12 µm melt blown polypropylene	25
96	800	7720-2830	Clear polystyrene	Lysate clarification plate	25
96	800	7770-0062	Clear polystyrene	Lysate clarification media and 0.45 µm PP	25

## 96 Well UNIFILTER Microplate: Mesh Bottom

Mesh bottom UNIFILTER plates with 150 and 350 µl wells are designed to accommodate rapid flow rates when vacuuming solutions to waste, for scintillation counting or other analysis of the trapped cells or particles. All mesh bottom UNIFILTER microplates are supplied with 55 backing seals for plate bottoms.



Mesh bottom



96 well UNIFILTER microplate: mesh bottom

### Ordering Information – 96 Well UNIFILTER Microplate: Mesh Bottom

Well Format	Well Volume (µl)	Catalog Number	Drip Director	Filter Media	Quantity/Pack
<b>UNIFILTER – White Barex</b>					
96	150	7700-0512	Mesh	Protein Kinase Assay with Whatman P81	50
<b>UNIFILTER – White polystyrene</b>					
96	350	7700-4301	Mesh	Whatman GF/C	50
96	350	7700-4302	Mesh	Whatman hydrophobic GF/C	50
96	350	7700-4303	Mesh	Whatman GF/B	50
96	350	7700-4312	Mesh	Whatman P81	50
96	350	7700-4313	Mesh	Whatman DE81	50

# UNIPLATE Collection Plates

Whatman microplates for collection and analysis are available in single, 24, 48, 96 and 384 well formats. These microplates are manufactured from polystyrene, polypropylene, and Multi-Chem™ materials to accommodate a wide range of sampling and storage applications.

## Multi-Chem Microplates

Multi-Chem is a chemically resistant material that exhibits extremely useful properties over a wide range of applications. Providing an excellent choice for storage applications, Multi-Chem microplates are suitable for aggressive organic solvents such as DMF, TFA, THF, acetonitrile, chloroform, and methylene chloride. Nonbinding properties of Multi-Chem microplates also make them suitable for storage of biological materials.



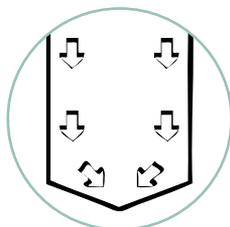
Multi-Chem microplates

### Ordering Information – Multi-Chem Microplates

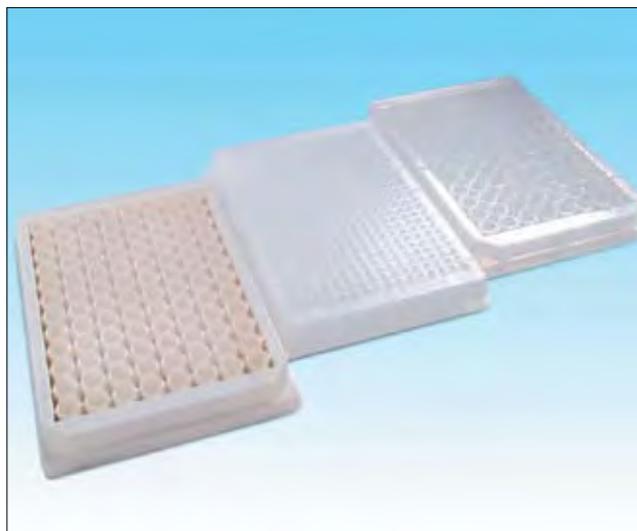
Well Format	Well Volume (µl)	Catalog Number	Plate Material	Filter Media	Quantity/Pack
<b>Multi-Chem – 24 Well</b>					
24	10,000	7701-6102	Multi-Chem	Round	10
<b>Multi-Chem – 96 Well</b>					
96	250	7701-6250	Multi-Chem	“V”	10
96	750	7701-6750	Multi-Chem	Round	10
96	2000	7701-6200	Multi-Chem	Round	10
<b>Multi-Chem – 384 Well</b>					
384	80	7701-6101	Multi-Chem	“V”	10

## UNIPLATE “V” Bottom Microplates

The 96 and 384 well format UNIPLATE™ with “V” bottom is suitable 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, approximately 99% liquid sample recovery is attained.



“V” bottom for maximum sample recovery



UNIPLATE “V” bottom microplates

### Ordering Information – UNIPLATE “V” Bottom Microplates

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Well Bottom	Quantity/Pack
<b>UNIPLATE – 96 Well</b>					
96	250	7701-1250	Clear polystyrene	“V”	50
96	250	7701-2250	Black polystyrene	“V”	50
96	250	7701-3250	White polystyrene	“V”	50
96	250	7701-6250	Multi-Chem	“V”	10
96	250	7701-5250*	Natural polypropylene	“V”	50
<b>UNIPLATE – 384 Well</b>					
384	80	7701-5101	Natural polypropylene	“V”	50
384	80	7701-6101	Multi-Chem	“V”	10

\* Does not comply with ANSI/SBS standards

## UNIPLATE Collection and Analysis Microplates

Whatman offers a wide range of UNIPLATE microplates, including various well profiles, well volumes, and well densities, in diverse polymer materials. Most UNIPLATE microplates conform to the ANSI/SBS microplate standard and fit most microplate readers and automated plate handling devices.

Whatman UNIPLATE microplates are suitable for a wide range of applications, including simple filtrate collection, when used in conjunction with our UNIFILTER microplates, as well as homogeneous assay techniques utilized in HTS.

### Features and Benefits

- Widest selection from a single source. Choice of well volumes ranging from 80  $\mu$ l to 10 ml, well densities from 24 to 384 wells with round or "V" bottom for maximum recovery.
- Chemical compatibility. Available in chemically resistant polymers capable of withstanding low temperatures for long-term storage. Opaque plates prevent optical cross talk in light emitting assays.
- Conforms to ANSI/SBS microplate standard
- Guaranteed for use with robotic handlers and centrifuge carriers

### Applications

- Sample storage
- Assay development
- High-throughput screening
- Plasmid miniprep
- ELISA assays
- Luminescence/chemiluminescence
- Cell culture
- Filtrate collection



UNIPLATE collection microplates



384 well 400  $\mu$ l UNIPLATE

## Ordering Information – UNIPLATE Collection and Analysis Microplates

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Well Bottom	Irradiated with Lid	Quantity/Pack
<b>UNIPLATE – Single Well</b>						
1	75,000	7701-0176	Clear polystyrene	Flat with grid	No	50
<b>UNIPLATE – 24 Well</b>						
24	3000	7701-7300*	Black polypropylene	Flat (square well)	No	25
24	10,000	7701-5102	Natural polypropylene	Round	No	25
24	10,000	7701-5110	Natural polypropylene	Round	Yes	25
<b>UNIPLATE – 48 Well</b>						
48	1500	7701-1150	Clear polystyrene	Flat	No	50
48	5000	7701-5500	Natural polypropylene	Flat (rectangular well)	No	25
48	5000	7701-5505	Natural polypropylene	Flat	Yes	25
<b>UNIPLATE – 96 Well</b>						
96	300	7701-1350	Clear polystyrene	Flat	No	50
96	300	7701-3350	White polystyrene	Flat	No	50
96	300	7701-2350	Black polystyrene	Flat	No	50
96	300	7701-5350*	Clear polypropylene	Flat	No	50
96	300	7701-4350*	White polypropylene	Flat	No	50
96	300	7701-7350*	Black polypropylene	Flat	No	50
96	650	7701-1651	Clear polystyrene	Flat (square well)	No	50
96	750	7701-1750	Clear polystyrene	Round	No	25
96	750	7701-5750	Natural polypropylene	Round	No	25
96	800	7701-1800	Clear polystyrene	Flat	No	25
96	2000	7701-5200	Natural polypropylene	Round	No	25
96	2000	7701-5205	Natural polypropylene	Round	Yes	25
<b>UNIPLATE – 384 Well</b>						
384	100	7701-1100	Clear polystyrene	Flat	No	50
384	100	7701-3100	White polystyrene	Flat	No	50
384	100	7701-2100	Black polystyrene	Flat	No	50
384	400	7701-5400	Natural polypropylene	Square to round	No	25

\* Does not comply with ANSI/SBS standards

# Specialty Microplates

Whatman offers an extensive range of specialty microplates to meet the demanding requirements of sample preparation in the life sciences market.

## Clear View Microplates

Whatman Clear View™ microplates have optically clear polymer bottoms. They eliminate the need for numerous transfer steps by providing the means to grow, observe, count, and assay cells in a single device. Tissue culture treatment facilitates cell adhesion. Whatman Clear View microplates have a very low visible-wavelength absorbance background.

### Ordering Information – Clear View Microplates

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Quantity/Pack
<b>No Surface Treatment, No Lid</b>				
96	300	7706-2380	Black polystyrene	50
384	100	7706-2103	Black polystyrene	50
<b>Tissue Culture Treated, Irradiated with Lid</b>				
96	300	7716-2380	Black polystyrene	50
96	300	7716-3380	White polystyrene	50

## Glass Bottom Microplates

Whatman Glass Bottom microplates are designed for high-sensitivity detection, including fluorescent and luminescent detection and scintillation counting, where extremely low backgrounds with no cross talk are needed. Glass Bottom microplates have excellent uniformity in flatness and thickness (0.175 mm glass thickness) to provide optically clear as well as optically flat surfaces. This ensures confluence and planarity for confocal imaging and detection techniques.

They are suitable for FRET and GFP. The skirtless glass bottom plate allows the bottom of the plate to be positioned very close to microscope objectives. This is the plate of choice for Zeiss Confocal Microscopes. The Glass Bottom microplates are available in clear and black in a 96 well format.

### Features and Benefits

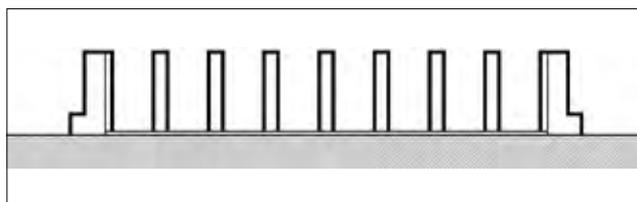
- Superior optical clarity
- Optics using single or dual wavelength probe
- Sensitivity
- Absolute flatness

### Applications

- Receptor-ligand interaction
- DNA-protein interaction
- Enzyme studies
- Cell based assays



Glass Bottom microplates



Skirtless Glass Bottom microplates

## Ordering Information – Glass Bottom Microplates

Well Format	Well Volume (µl)	Catalog Number	Plate Material	Characteristics	Quantity/Pack
<b>Tissue Culture Treated, Irradiated with Lid, Standard Skirt</b>					
96	300	7716-2375	Black polystyrene	Glass	5
<b>Tissue Culture Treated, Irradiated with Lid, Skirtless for Microscopy</b>					
96	300	7716-2370	Black polystyrene	Glass	5
<b>No Surface Treatment, Standard Skirt</b>					
96	300	7706-2375	Black polystyrene	Glass	5
<b>No Surface Treatment, Skirtless for Microscopy</b>					
96	300	7706-1365	Clear polystyrene	Glass	5
96	300	7706-2370	Black polystyrene	Glass	5

## UniCell Microplates

The UniCell™ 24 microplate is a versatile product that is specifically designed for cell culture.

The UniCell 24 consists of three components:

- 24 well filtration microplate containing a polycarbonate membrane with a pore size of 0.4 µm
- 24 well feeder tray with round wells, which have a volume of 3.5 ml
- Polystyrene lid cover

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

The membrane becomes translucent when wet and retains its strength, allowing for the harvesting of cells either by sloughing or by mechanical removal. The growth well, contained in the top microplate, sits neatly inside the feeder tray. Each well is completely sealed and sits in its own individual feeder well. The complete UniCell 24 is supplied irradiated and tissue culture treated. The clearance between the bottom of the membrane and the bottom of the feeder tray is 2 mm.

### Applications

- Permeability studies
- Cocultivation
- Tissue resistance
- Cell migration
- Toxicology



UniCell microplates

### Ordering Information – UniCell Microplates

Well Format	Catalog Number	Plate Material	Filter Media	Tissue Treated/Irradiated	Quantity/Pack
24	7703-1400	Polystyrene	0.4 µm polycarbonate membrane	Yes	5

## Multiwell Accessories

Whatman offers a line of multiwell plate accessories to simplify your testing processes. The product line includes capmats, seals, lids, vacuum manifolds, and accessories for Biomek® 2000 and F/X liquid handling systems.

### Biomek and Liquid Handling System Accessories

Designed specifically for the Biomek 2000 and F/X liquid handling systems from Beckman Coulter, Whatman Adapter Collars eliminate many of the problems common to generic vacuum systems such as cross contamination, unnecessary collection steps, and the need for spacer plates.

The adapter collars are offered in two sizes to accommodate the wide range of Whatman specialty filter and collection plates – small, to enable collection into standard 300 µl collection and filter plates (~14 mm high), and medium, to accommodate collection into 800 µl collection and filter plates (~30 mm high). Chemically resistant and easy to install, Whatman adapter collars ensure quality is maintained in a wide range of high-throughput applications. When vacuuming to waste during wash steps, the 96 well Filtrate Director assures crosstalk-free filtration by isolating the flow from each well without collecting it.



Adapter collars for Biomek 2000

### Ordering Information – Biomek and Liquid Handling System Accessories

Description	Catalog Number	Quantity/Pack
Small Whatman vacuum adapter collar	7705-0120	1
Medium Whatman vacuum adapter collar	7705-0121	1
96 well filtrate director	7725-0118	25

## BugStopper Microplate Capmat

The Whatman BugStopper Capmat provides 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 a 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 removes well-to-well cross contamination.
- Autoclave and reuse. Cost-effective; repeated autoclave cycles do not affect gas exchange or retention capabilities.
- Rated 99.9% efficient for bacteria and viruses. Restricts microorganisms while allowing O<sub>2</sub> and CO<sub>2</sub> to pass through the membrane.
- Prevents aerosol formation. Suitable for growth of infectious microorganisms.



BugStopper microplate capmat



Growth plate

## Ordering Information – BugStopper Microplate Capmat

Item	Well Format	Catalog Number	Material	Well Bottom	Quantity/Pack
BugStopper Venting Capmat for 10 ml microplates	24	7704-0014	Silicone rubber	-	5
Growth plate 10 ml	24	7701-5110	Natural polypropylene	Round, irradiated with lid	25

## Flexible Capmats

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

### Silicone Capmat

- Pierceable capmats, suitable for autosamplers
- Autoclavable (121°C, 15 min.)
- Resistant to ethanol, methanol, DMSO, and DMF
- Stable at a wide temperature range – autoclave at 120°C or store at -70°C
- Reseal after needle puncture

### EVA and Santoprene Capmat

- Less expensive capmat for aqueous solutions. Not suitable for organic solvent.
- Stable down to -20°C
- EVA is not autoclavable. Santoprene is autoclavable at a temperature of 120°C.
- 7704-0007 is pierceable



Pierceable capmat

## Ordering Information – Flexible Capmats

Well Format	Catalog Number	Capmat Material	Microplate Compatibility	Quantity/Pack
<b>Silicone Capmat</b>				
96	7704-0104	Square format silicone	2 ml microplates	50
96	7704-0105	Round format silicone	300 µl, 750 µl, and 800 µl microplates	50
384	7704-0115	Square format silicone	100 µl and 400 µl microplates	50
<b>EVA and Santoprene Capmat</b>				
96	7704-0004	Square format EVA	2 ml microplates	100
96	7704-0005	Round format EVA	750 µl and 800 µl microplates	100
48	7704-0006	Rectangular format EVA	5 ml microplates	100
24	7704-0007	Square format santoprene	10 ml microplates	100
384	7704-0015	Square format santoprene	400 µl microplates	100
<b>Venting Capmat (Autoclavable)</b>				
24	7704-0014	BugStopper venting silicone rubber	10 ml microplates	5

## Lids

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



Polystyrene microplate lids

### Ordering Information – Lids

Description	Catalog Number	Quantity/Pack
Clear polystyrene universal lid	7704-1001	100
Natural polypropylene lid	7704-1002	100

## Seals

Seals are used to control humidity and reduce evaporation of samples. They prevent spills and contamination. Cold seals are self-sticking with inert adhesive. Heat seals are available in a clear polyester or aluminum foil. Heat seals are for polypropylene microplates only and are applied with heat and pressure.



Microplate seals

### Ordering Information – Seals

Description	Catalog Number	Quantity/Pack
Clear polyester thin cold sealing film with adhesive backing, 0.05 mm thick	7704-0001	100
Clear polypropylene cold sealing film, adhesive backing, 0.05 mm thick	7704-0009	100
Aluminum foil, applied with heat and pressure	7704-0002	100
Clear polypropylene film, applied with heat and pressure	7704-0003	100

## UniVac Vacuum Manifolds

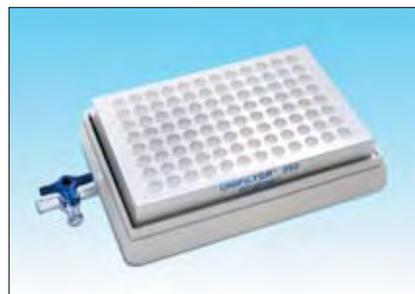
### UniVac 1 Vacuum to Waste Manifold

The Whatman UniVac™ 1 is a single station unit that can be used for evacuating all liquid from a filter plate to waste when the filtrate is not required for further analysis.

### UniVac 3 Vacuum to Collect Manifold

The Whatman UniVac 3 is a universal filter/collection manifold designed to hold all the UNIPATE 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 UNIPATE. The UniVac 3 comes complete with vacuum gauge, regulator, and two-way control valve.



UniVac 1 vacuum to waste manifold



UniVac 3 vacuum to collect manifold

## Ordering Information – UniVac Vacuum Manifolds

Description	Catalog Number	Quantity/Pack
<b>UniVac 1 Vacuum to Waste Manifold</b>		
Polypropylene vacuum to waste manifold	7705-0101	1
<b>UniVac 3 Vacuum to Collect Manifold</b>		
Teflon coated aluminum filter/collect vacuum manifold for volumes from 100 µl to 10 ml	7705-0102	1
Solid Teflon filter/collect vacuum manifold for volumes from 100 µl to 10 ml	7705-0106	1
Acrylic filter/collect vacuum manifold for volumes from 100 µl to 10 ml	7705-0107	1
Replacement Viton gaskets for UniVac 3 filter/collect manifold	7705-0108	5
Replacement Viton O-rings for UniVac 3 filter/collect manifold	7705-0109	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

Description	Catalog Number	Quantity/Pack
Vacuum Assist (PTFE film) Frame	7705-0112	1
Vacuum Assist (PTFE/silicone) without Frame	7705-0205	6



# Appendices

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# Filtration Simplified

## *Basic Filtration Concepts and Terms*

Selecting a filter with the appropriate properties can help you achieve accurate results and reach discovery faster. But with so many types of filters to choose from, how can you be sure you're making the right choice? 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.

### **Ash Content**

Determined by ignition of the cellulose filter at 900°C in air. Minimizing ash content is essential in gravimetric applications and also a useful measure of the level of general purity.

### **Chemical Compatibility**

It is very important to ensure that the pore structure of the filter media and the integrity of the housing (if applicable) 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 contact time, temperature, concentration, and applied pressure can all affect compatibility. Whatman has provided chemical compatibility charts to aid your membrane selection (see p. 340).

### **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 good loading capacity.

### **Herzberg Method**

Whatman quantifies liquid flow rate for its range of filters by using a Herzberg flow rate test. Prefiltered deaerated water is applied to the test filter (effective area 10 cm<sup>2</sup>) 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**

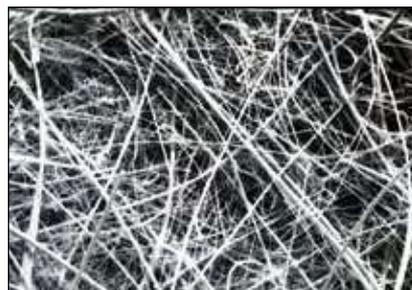
Because hydrophilic filters possess an affinity for water and can be wetted with virtually any liquid, they are typically used for aqueous solutions and compatible organic solvents.

### **Hydrophobic**

These filters repel water, and are thus best suited for filtering organic solvents as well as for venting and gas filtration applications.



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



Glass microfiber filters are manufactured from 100% borosilicate glass.



Whatman cellulose filter papers exhibit particle retention levels down to 2.5 µm.



Multigrade GMF 150 combines two filters in one for fast, effective, multilayered filtration.

### **Liquid Flow Rate**

Under practical filtration conditions, the liquid flow rate will depend on a number of factors, many of which will be specific to the solid/liquid being filtered. In order to compare filter performances, a standardized set of conditions is required, which will characterize liquid flow rate for a given filter without the complicating secondary effects derived from the presence of particulates. Liquid flow rate is tested with prefiltered, deaerated water using a flat filter subjected to a constant hydrostatic head. Test methods based on quadrant folded filters are considered unreliable. See "Herzberg Method."

### **Loading Capacity**

This relates to the ability of a filter to load particulates into the fibrous matrix while maintaining a practical filtration speed and a workable pressure differential across the filter. In general, glass microfiber filters have a high loading capacity when compared with cellulose filters of the same retention rating and thickness. Membranes are inherently low in loading capacity. "Choking life" is a measure of loading capacity.

### **Particle Retention (Air/Gas)**

Retention mechanisms for removing particulates from air or gas enable much higher efficiencies to be realized than those applicable to liquids. Efficiencies for air filtration are normally expressed as percent penetration or retention for a stated airborne particle size. In the United States, the Dioctyl Phthalate (DOP) test is commonly used wherein the filter is challenged with an aerosol containing 0.3  $\mu\text{m}$  particles.

### **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  $\mu\text{m}$ ) 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 (Membranes)**

The pore size, usually stated in micrometers ( $\mu\text{m}$ ), of Whatman filter media is based upon bubble point. Pore size ratings are nominal for all membranes, apart from those for Track-Etched and Anopore membranes. Pore size ratings for these products are absolute, as these membranes have true pores (i.e., a top to bottom hole through the membrane).

### **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  $\mu\text{m}$ . There is a wide choice of retention/flow rate combinations to match numerous laboratory applications. The different groups of filter papers 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 distinct properties of borosilicate glass microfibers enable Whatman to manufacture filters with retention levels extending into the submicron range. These depth filters combine fast flow rate with high loading capacity and retention of very fine particulates. Due to the high void volume exhibited by glass microfiber filters, the choking life is considerably extended beyond the life of a cellulose filter of similar retention. Whatman glass microfiber filters are manufactured from 100% borosilicate glass and most are completely binder free. Binder free glass microfiber filters will withstand temperatures up to 550°C and can therefore be used in gravimetric analysis where ignition is involved.

### Membrane Filters

Unlike cellulose and glass microfiber depth filters, membrane filters are conventionally classified as surface filters because the filter matrix acts as a screen and retains particulates almost entirely on the smooth membrane surface. The retention levels for these filters extend down to 0.02  $\mu\text{m}$  and allow the efficient retention of sub-micron particulates and organisms. Water microbiology and air pollution monitoring are major applications for membranes.

### Prefilters

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

### *Standard Circle Funnel Volumes*

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

### Standard Circle Funnel Volumes

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

### Types of Filter Holders

A filter matrix requires a suitable support structure to enable it to be used for the filtration of liquids or gases. One of the simplest forms of holder is the conical glass filter funnel into which a quadrant folded or fluted filter paper is placed (1). Some applications require additional motivating force for the solid particulate/liquid separation to occur (i.e., vacuum assisted filtration). This type of filtration can be carried out in a one-piece Büchner style funnel (2) where the filter is used flat on a perforated base sealed into the funnel. Due to the difficulties encountered in cleaning this type of funnel, the demountable 3-piece funnel was developed (3). The Whatman 3-Piece Filter Funnel can be fully disassembled and enables the filter paper to be securely clamped between the support plate and filter reservoir flange. Membrane holders (4) incorporate either sealed-in sintered glass or removable stainless steel mesh supports for the membrane. Syringe and inline filters are also available. Large diameter membranes are typically used in pressure holders.

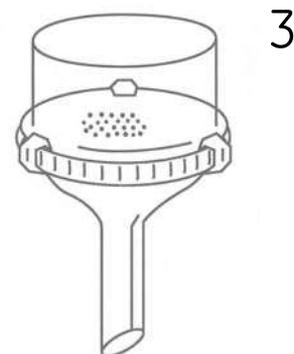
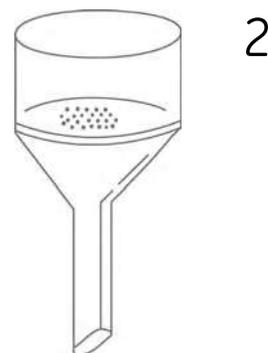
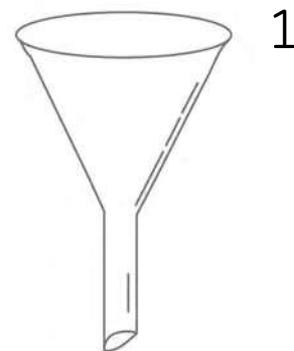
### Selecting the Right Filter

The selection of a laboratory filter depends on the conditions and objectives of the experiment or analytical procedure.

The three most important characteristics of any laboratory filter are:

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

In addition, according to the particular application, other important characteristics may require examination. For instance, wet strength, chemical resistance, purity, and ash level may assume equal importance under certain circumstances.



## Standard 58° or 60° Funnels

Glass/Polyethylene Funnel Diameter (mm)	Filter Paper Size (cm)	
9	15.0	
11	20.0	
12.5	35.0	
15	75.0	
18.5	135	
24	300	
35	5.5	
45	7.0	
55	9.0	
65	11.0	
75	12.5	
90	15.0	
100	18.5	
160	24.0	
180	32.0	
220	40.0	
260	50.0	

## Büchner Funnel Filter Selection

Diameter (mm)	Perforated Area (mm)	Filter Paper Size (mm)	
43	32	42.5	
63	42	55.0	
83	60	75.0	
100	77	90.0	
114	95	110	
126	105	125	
151	135	150	
186	160	185	
253	213	240	

## Typical Particle Sizes

<b>Gelatinous Precipitates</b>	<b>µm</b>
Metal Hydroxides	25-40
Precipitated Silica	25-40
<b>Crystalline Precipitates</b>	
Ammonium Phosphomolybdate	20
Calcium Oxalate	15
Lead Sulfate	10
Barium Sulfate (hot ppt.)	8
Barium Sulfate (cold ppt.)	3
<b>Blood Cells</b>	
Platelets	2-3
Erythrocytes (average)	7
Polymorphs	8-12
Small Lymphocytes	7-10
Large Lymphocytes	12-15
Monocytes	16-22
<b>Bacteria*</b>	
Cocci	0.5
Bacilli	1.0 × (2.0-6.0)
Serratia Marcescens	0.5 × (0.5-1.0)
Pneumococcus	1.0
Bacillus Tuberculosis	0.3 × (2.5-3.5)
Amoeba	12-30
<i>E. Coli</i>	0.5 × (1.0-3.0)
Smallest Bacteria	0.22
<b>Other Microorganisms, etc.</b>	
Yeast Cells	2-8
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 and Housings

Solvent	ANP	CA	CN	PC	PE	GMF	NYL	PP	DpPP	PES	PTFE	PVDF	RC
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	NR
Acetone	R	NR	NR	NR	R	R	R	R	R	NR	R	NR	R
Acetonitrile	R	NR	NR			R	R	R	R	R	R	R	R
Ammonia, 6N	NR		NR	NR	LR	LR	R	R	R	R	R	LR	LR
Amyl Acetate	LR	NR	NR	R	R	R	R	R	R	LR	R	LR	R
Amyl Alcohol	R	R	R			R	R	R	R	NR	R	R	R
Benzene*	R	R	R	LR	R	R	LR	LR	LR	R	R	R	R
Benzyl Alcohol*	R	LR	LR	LR	R	R	LR	LR	R	NR	R	R	R
Boric Acid	R	R	R	R	R	R	LR	R	R		R	R	R
Butyl Alcohol	R	R	R	R	R	R	R	R	R	R	R	R	R
Butyl Chloride*						R	NR	NR	NR		R	R	
Carbon Tetrachloride*	R	NR	R	LR	R	R	LR	LR	LR	R	R	R	R
Chlorobenzene*	R		R			R				NR	R	R	R
Chloroform*	R	NR	R	NR	R	R	NR	LR	LR	NR	R	R	R
Citric Acid						R	LR			R	R	R	R
Cresol		NR	R			R	NR	R	R	NR	R	NR	R
Cyclohexane	R	R	R	R	R	R	R	R	R	R	R	R	R
Cyclohexanone	R	NR	NR			R	NR	R	R	NR	R	R	R
Diethyl Acetamide		R	NR			R	R	R	R		R	NR	R
Dimethyl Formamide	LR	NR	NR			R	R	R	R	NR	R	NR	LR
Dioxane	R	NR	NR	NR	R	R	R	R	R	LR	R	LR	R
DMSO	LR	NR	NR	NR	R	R	R	R	R	NR	R	LR	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	LR	R
Ethyl Acetate	R	NR	NR	LR	R	R	R	R	R	NR	R	LR	R
Ethylene Glycol	R	LR	LR	R	R	R	R	R	R	R	R	R	R
Formaldehyde	LR	LR	R	R	R	R	R	R	R	R	R	R	R
Formic Acid		LR	LR			R	NR	R	R	R	R	R	LR
Freon TF	R	R	R	R	R	R	R	R	R	R	R	R	
Hexane	R	R	R	R	R	R	R	R	R	R	R	R	R
Hydrochloric Acid, Conc	NR	NR	NR	R	NR	R	NR	LR	LR	R	R	R	NR
Hydrofluoric Acid		NR	NR			NR	NR	LR	LR		R	R	NR
Isobutyl Alcohol	R	R	LR	R	R	R	R	R	R		R	R	R
Isopropyl Alcohol	R	R	LR			R	R	R	R		R	R	R

\* Short Term Resistance of Housing

cont.

\*\* Membrane must be wetted with a water miscible solvent (e.g., methanol) prior to filtering water

R – Resistant

LR – Limited Resistance

NR – Not Recommended

The above data is to be used as a guide only. Testing prior to application is recommended.

Solvent	ANP	CA	CN	PC	PE	GMF	NYL	PP	DpPP	PES	PTFE	PVDF	RC
Methanol	R	R	NR	R	R	R	R	R	R	R	R	R	R
Methylene Chloride*	R	NR	LR	NR		R	NR	LR	LR	NR	R	R	R
Methyl Ethyl Ketone	R	LR	NR	LR	R	R	R	R	R	NR	R	R	R
Nitric Acid, GN		LR	LR			R	NR	LR	LR	LR	R	LR	LR
Nitric Acid, Conc		NR	NR	R	NR	R	NR	NR	NR	NR	R	NR	NR
Nitrobenzene*	LR	NR	NR	NR	R	R	LR	LR	R	NR	R	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	R	R	R
Phenol 0.5%	LR	LR	R			R	R	R	R	NR	R	R	R
Pyridine	R	NR	NR	NR	R	R	LR	R	R	NR	R	R	R
Sodium Hydroxide, 6N	NR	NR	NR	NR	NR	NR	LR	R	R	R	R	NR	NR
Sulfuric Acid, Conc	NR	NR	NR	NR	NR	R	NR	NR	R	NR	R	NR	NR
Tetrahydrofuran	R	NR	NR			R	R	LR	LR	NR	R	R	R
Toluene*	R	LR	R	LR	R	R	LR	LR	LR	NR	R	R	R
Trichloroethane*	R	NR	LR	NR	R	R	LR	LR	R	R	R	R	R
Trichloroethylene*	R		R			R	NR	LR	R	NR	R	R	R
Water	R	R	R	R	R	R	R	R	R	R	R**	R	R
Xylene*	R	R	R			R	LR	LR	LR	LR	R	R	R

\* Short Term Resistance of Housing

\*\* Membrane must be wetted with a water miscible solvent (e.g., methanol) prior to filtering water

R – Resistant

LR – Limited Resistance

NR – Not Recommended

The above data is to be used as a guide only. Testing prior to application is recommended.

#### Membrane Abbreviations:

ANP – Anopore

CA – Cellulose Acetate

CN – Cellulose Nitrate

DpPP – Depth Polypropylene

GMF – Glass Microfiber

NYL – Nylon

PC – Polycarbonate

PE – Polyester

PES – Polyethersulfone

PP – Polypropylene

PTFE – Teflon

PVDF – Polyvinylidene Fluoride

RC – Regenerated Cellulose

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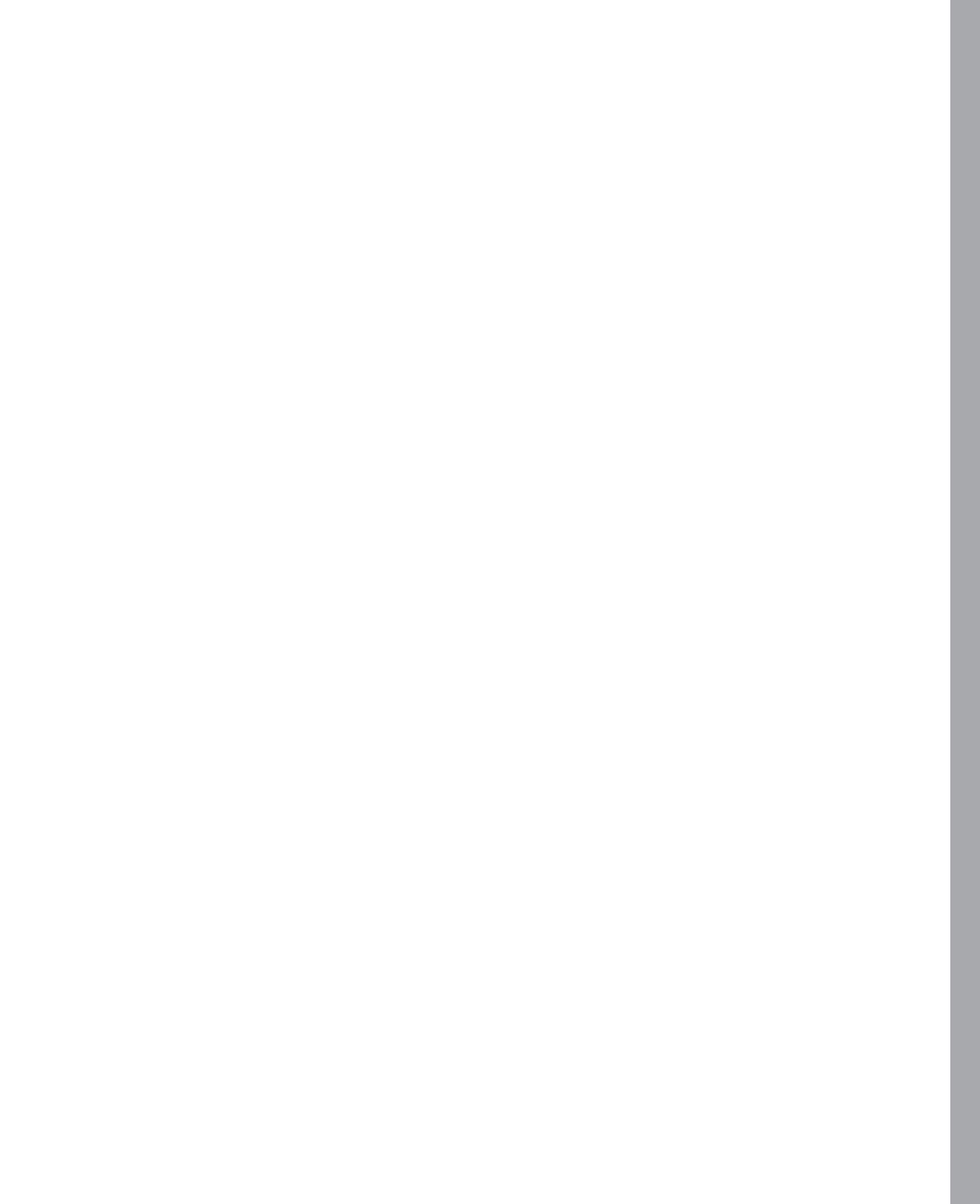
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