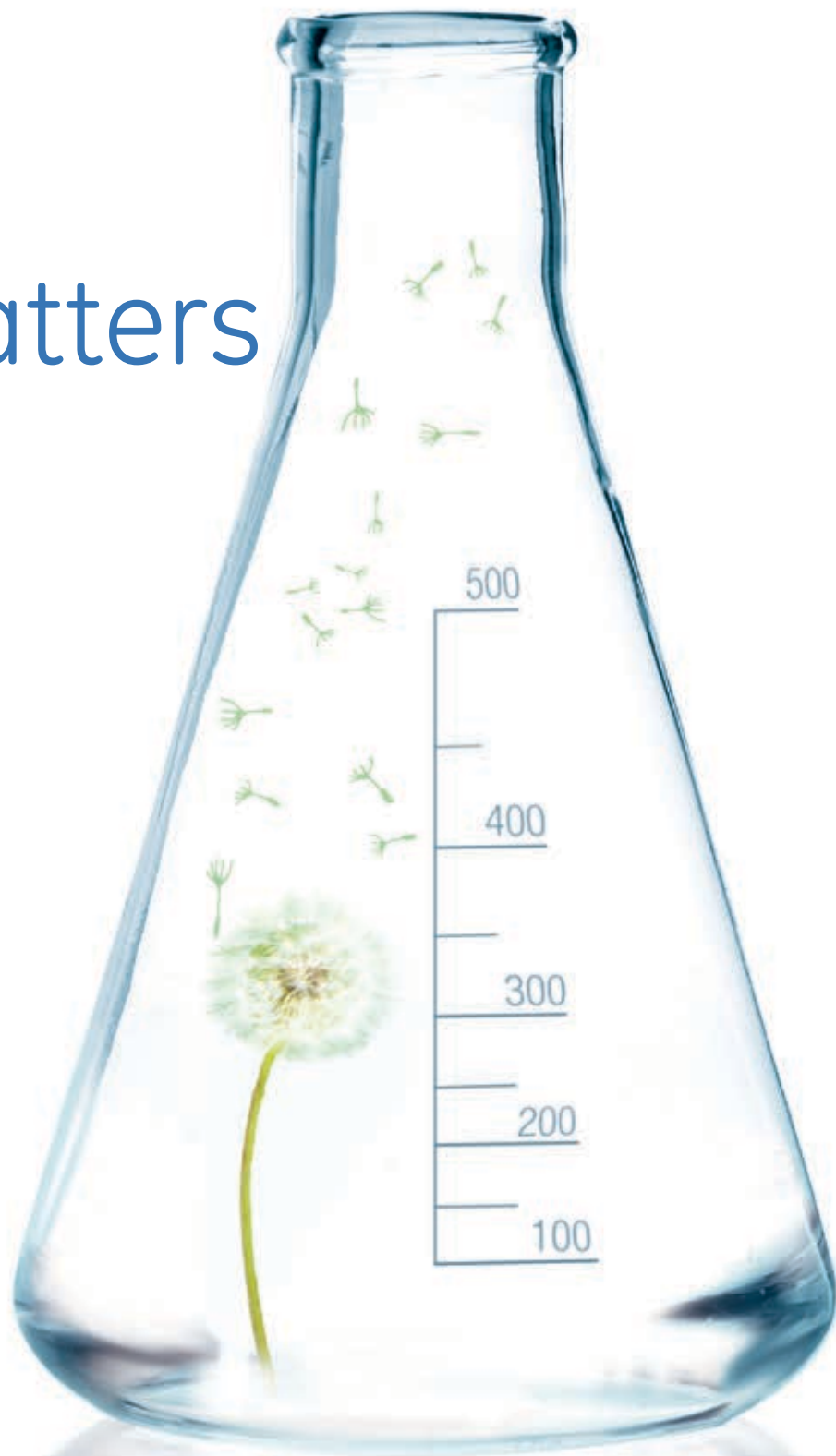


Quality matters

Whatman™ filters
for air monitoring



Quality matters

Why does quality matter?

Quality matters, because you need to focus on delivering accurate results on the quality of the air sample, without worrying about the quality of the consumables you use on a daily basis.

This is why GE Healthcare Life Sciences is committed to supporting you with high-quality Whatman filters that are:

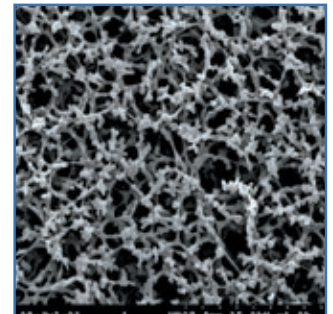
- Manufactured in ISO certified facilities
- Reproducible, supporting consistent performance
- Qualified for specific air monitoring applications (e.g., PM 2.5 membrane for PM 2.5 determination of suspended particulates in air)

This brochure highlights the filtration solutions offered under the Whatman brand for the applications shown to the right.



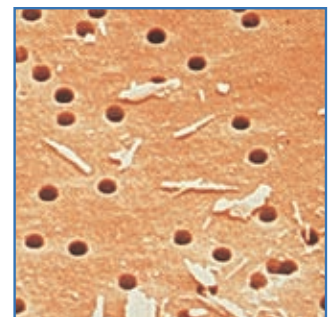
Particulate testing

Examples include PM 10 & PM 2.5 particulate monitoring.



Chemical analysis

Examples include analysis for ozone, sulfur dioxide and heavy metals.



Asbestos control

Examples include asbestos monitoring by optical analysis.



What are you testing?

Under which circumstances?

We recommend

Particulate monitoring methods	Automated sampling Page 4	<ul style="list-style-type: none"> Glass Microfiber Reels 
	Manual sampling Aggressive Environment (high temp and acidic) Page 5	<ul style="list-style-type: none"> Quartz fiber filter such as QM-A Quartz fiber thimbles 
	Manual sampling Normal environment Pages 4 and 6	<ul style="list-style-type: none"> Glass fiber filters such as GF/A and EPM 2000 Membrane filters such as PTFE Glass fiber thimbles 
	Radioactivity Page 4	<ul style="list-style-type: none"> Grade 72 SAS cards-Static Air Sampling* PAS cards-Personal Air Sampling* Glass fiber filters such as GF/A
Chemical Analysis	Heavy metals Pages 4 and 5	<ul style="list-style-type: none"> Quartz fiber filters EPM 2000 glass fiber filters 
	Other chemicals (such as Ozone, Volatile Organic Carbons, SO ₂ , NO ₂ , CO, Benzoate) Pages 4, 5, 6	<ul style="list-style-type: none"> Glass fiber filters Quartz fiber filters Cellulose filters* PTFE membranes 
Asbestos Analysis	Analysis by microscopy Page 7	<ul style="list-style-type: none"> Polycarbonate membranes such as Cyclopore™ and Nuclepore™ Mixed cellulose ester such as ME25/21 and MembraClear 

Air retention efficiency:

GF/A, EPM 2000, and QM-A have an air retention efficiency of greater than or equal to 99.95% of 0.3 μm size particulates.

A Certificate of analysis is available for each batch (upon request; Fig 1)



Fig 1. Example of certificate of analysis featuring the air retention efficiency range

This list of applications is not exhaustive. Please contact your GE Healthcare representative for more information.

*please contact your GE Healthcare representative for information on SAS, PAS cards and cellulose filter papers.

Glass fiber filters and thimbles

Two of the most significant fractions of suspended particulate matter are the respirable fraction (< 2.5 µm) and the inhalable fraction (< 10 µm). Two important tests performed in air monitoring of particulate matter, PM 2.5 and PM 10, are concerned with these two fractions. Whatman glass fiber filters are recommended for gravimetric determination of airborne particulates, such as PM 10, stack sampling, and absorption methods of air pollution monitoring.

Products	Binder or binder free	Material	Features and benefits
GF/A	Binder free	Glass fiber	<ul style="list-style-type: none"> Fine particle retention High flow rate Good loading capacity
EPM 2000	Binder free	Glass fiber	<ul style="list-style-type: none"> Used in high-volume PM-10 air sampling equipment Detailed chemical analysis of trace pollutants
GF10	Binder	Glass fiber	<ul style="list-style-type: none"> Extreme mechanical stability Used as a weighing aid in infrared weighing Used up to 180°C
Grade 72	N/A	Glass fiber/ cellulose	<ul style="list-style-type: none"> Used to absorb radioactive iodine in air pollution monitoring and in nuclear installations
Glass fiber thimbles	Binder and binder free	Glass fiber	<ul style="list-style-type: none"> Used at temperatures up to 500°C



Fig 2. EPM 2000 Glass fiber filters

Glass fiber filters can be customized in a reel format for use in automated air sampling systems



Fig 3. Glass fiber reel for automated samplers

Ordering information -- Glass fiber filters, circles and sheets

Grade	Code no.	Code no.	Code no.	Code no.	Code no.	Code no.	Quantity
Dimensions	25 mm	37 mm	47 mm	50 mm	90 mm	8 x 10 inches (sheet)	
GF/A	1820-025	1820-037	1820-047	1820-050	1820-090	1820-866	100/pack
EPM 2000	-	-	1882-047	-	-	1882-866	100/pack
GF 10	-	-	10370319	10370302	10370305**		200/pack
Grade 72	-	-	1872-047	-	-	-	100/pack

Ordering information -- Glass fiber filters, reels

Grade	Code no.	Code no.	Code no.	Code no.	Quantity
Dimensions	70 mm x 50 m	35 mm x 30 m	40 mm x 42 m	50 mm x 100 m	
GF 10	10370384	10370392	10370393	10370394	1/pack

Ordering information -- Glass fiber thimbles

Binder	Code no.	Code no.	Code no.	Code no.	Code no.	Quantity
Dimensions*	22 x 80 mm	25 x 100 mm	26 x 100 mm	33 x 94 mm	10 x 38 mm	
Inorganic binder	10371011	10371019	10371023	10371042	10371103	25/pack

Other dimensions available for thimbles (with or without binder). Please contact your GE Healthcare representative.

*internal diameter x external length

**100/pack

Quartz fiber filters and thimbles

GE Healthcare offers two types of quartz filters—QM-A and QM-H. The low level of alkaline earth metals in these filters virtually eliminates artefact products of sulfates and nitrates (from SO₂ and NO₂, respectively). QM-H is a pure quartz fiber filter with low heavy metal content.

We also offer quartz fiber thimbles. More information is available on the tables below.

Features and benefits of quartz fiber filters:

- High-purity quartz (SiO₂) microfiber filters are mainly used in air pollution monitoring.
- Used for air sampling in acidic gases, stacks, flues, and aerosols, particularly at high temperatures.
- Applicable for particulate monitoring and heavy metal analysis.

QM-A quartz fiber filters	QM-H quartz fiber filters	Quartz fiber thimbles
<ul style="list-style-type: none"> • High-purity quartz microfiber filters • Used for air sampling, particularly at high temperatures up to 500°C 	<ul style="list-style-type: none"> • 100% pure quartz • Can be used up to 900°C • Low heavy metal content 	<ul style="list-style-type: none"> • Made from high-purity quartz microfiber • Able to withstand high temperatures (up to 1000°C) • Suitable for both solvent extraction and air sampling applications



Fig 4. QM-A quartz fiber filters

Ordering information -- Quartz fiber filters and thimbles

Product name	Dimensions	Code no.	Quantity
QM-A quartz fiber filter	25 mm diam.	1851-025	100/pack
	37 mm diam.	1851-037	100/pack
	47 mm diam.	1851-047	100/pack
	50 mm diam.	1851-050	100/pack
	90 mm diam.	1851-090	100/pack
	8 × 10 inches (sheet)	1851-8866	100/pack
QM-H (100% pure) quartz fiber filter	50 mm diam.	1853-050	25/pack
Quartz fiber thimbles	25 × 90 mm*	2812-259	10/pack

*internal diameter × external length

PTFE and mixed cellulose ester membrane filters

PTFE membranes

Whatman TE and PM 2.5 membrane filters from GE Healthcare are made from PTFE material. These membrane filters are chemically resistant and possess low chemical background interference (e.g., metals), allowing the user to carry out sensitive determinations.

PM 2.5 filters are used for the measurement of fine particulate matter in the atmosphere.

Whatman TE membranes are general purpose PTFE membrane filters that have multiple applications in environmental analysis.

Use Whatman PM 2.5 membranes for the EPA PM 2.5 reference method (under the requirements of 40 CFR part 50 Appendix L)



Fig 5. PM 2.5 membranes for use in particulate matter testing

Product name	Features and benefits
TE type membranes	<ul style="list-style-type: none"> • Suitable for filtration of gases and liquids • Resistant to most acids, alkalis, and solvents such as sodium hydroxide and hexane: • Laminated onto a nonwoven polypropylene support material • Increased durability for aggressive testing environments • Hydrophobic characteristics prevent passage of aqueous aerosols (e.g., during venting applications)
PM 2.5 membranes	<ul style="list-style-type: none"> • Used for PM 2.5 ambient air monitoring • Conforms to EPA PM 2.5 reference method under the requirements of 40 CFR part 50 Appendix L • Manufactured under clean room conditions • Does not contain glues or adhesives • Sequentially numbered for easy traceability of the filter • Chemically resistant polypropylene support ring, which eliminates curling, and makes the filter robot-friendly • Retains a minimum of 99.7% of 0.3 µm size particulates

Mixed cellulose ester membranes

Mixed cellulose membranes from GE Healthcare are designed to meet your environmental air monitoring requirements. These membranes are typically used in applications for the determination of metals in airborne particulates.

Ordering information -- Membrane filters

Membrane type	Pore size	Code no.	Code no.	Code no.	Code no.	Code no.	Quantity
Diameter		25 mm	37 mm	46.2 mm	47 mm	50 mm	
PM 2.5 PTFE membrane	2 µm	-	-	7592-104	-	-	50/pack
TE type PTFE membrane	0.2 µm	10411405	-	-	10411411	10411413	50/pack
	0.45 µm	10411305	-	-	10411311	10411313	50 /pack
	1 µm	10411205	-	-	10411211	10411213	50/pack
	5 µm	-	10411108	-	10411111	10411113	50/pack
Mixed cellulose ester membrane	0.2 µm	10401706	-	-	10401712	10401714	100/pack
	0.45 µm	10401606	-	-	10401612	10401614	100/pack
	0.8 µm	10400906	10400909	-	10400912	10400914	100/pack
	3 µm	10400706	-	-	10400712	10400714	100/pack

Membranes for asbestos sampling and analysis

Asbestos analysis is commonly undertaken by a number of microscopy techniques such as Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), and Phase Contrast Microscopy (PCM).

These methods usually involve sampling and/or observation, both of which involve the use of membrane filters such as polycarbonate or mixed cellulose ester membranes.

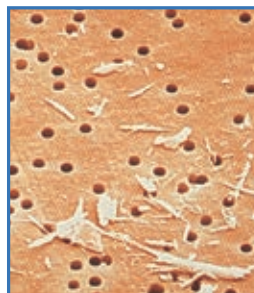


Fig 6. Asbestos fibers on a Cyclopore membrane

Product name	Membrane material	Features and benefits
ME type (e.g., ME 25/21)	Mixed ester cellulose	<ul style="list-style-type: none"> Typically used for Transmission Electron Microscopy (TEM) Available with or without grid Full range of pore sizes High air flow rates
MembraClear	Mixed ester cellulose	<ul style="list-style-type: none"> Designed for use with Hot Block Method (PCM technique) White with black grid for high contrast 0.8 µm pore size Becomes transparent with acetone vapor treatment; absence of crystalline artifacts aids in visualization
Nuclepore and Cyclopore	Polycarbonate	<ul style="list-style-type: none"> Controlled pore size distribution Smooth flat membrane: particles are retained on surface and easily visible during optical analysis Nuclepore membranes available in two versions: gold coated or uncoated

Ordering information -- Membrane filters for asbestos sampling and analysis

Membrane	Pore size	Code no.			Quantity
		25 mm	37 mm	47 mm	
Nuclepore polycarbonate membrane	0.2 µm	110606	-	111106	100/pack
	0.4 µm	110607	110807	111107	100/pack
	0.4 µm gold coated	170607	-	-	50/pack
	0.8 µm	110609	110809	111109	100/pack
Cyclopore polycarbonate membrane	0.2 µm	7060-2502	-	7060-4702	100/pack
	0.4 µm	7060-2504	-	7060-4704	100/pack
	1.0 µm	-	-	7060-4710	100/pack
MembraClear cellulose mixed ester membrane for "hot block method"	0.8 µm	7141-025	7141-037	7141-047	100/pack
ME25/21 cellulose mixed ester membrane	0.45 µm	-	-	10406812	100/pack

The majority of the products presented in this brochure are available from GE Life Sciences distributors

For contact information for your local office, please visit:

www.gelifesciences.com/contact

www.gelifesciences.com/AirMonitoring

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