

Glass Microfiber Filters

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

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

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

General Filtration/Prefiltration

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

GF/A

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



GF/B

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

GF/C

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

GF/D

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

GF/F

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

QM-A

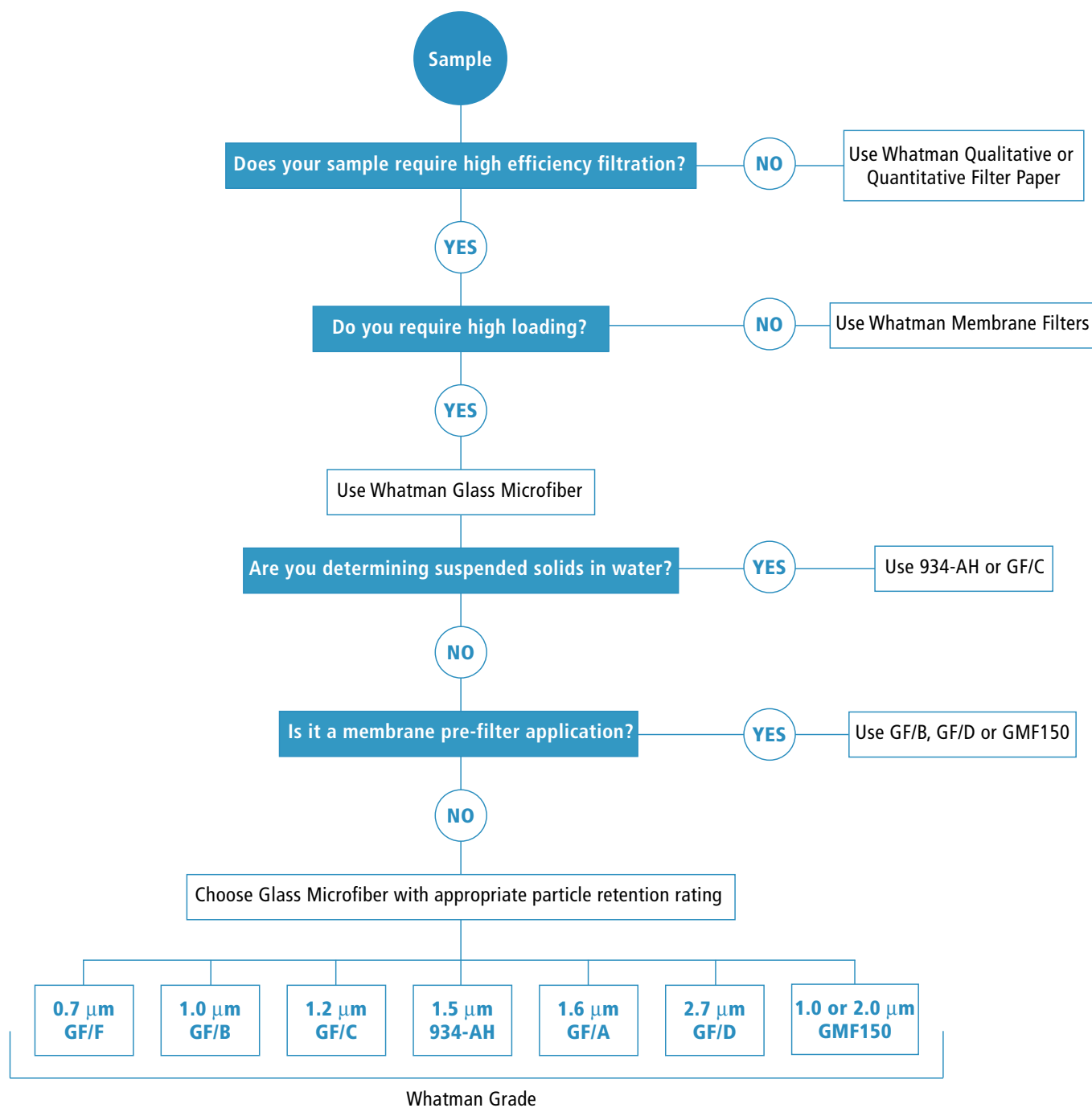
Ultrapure quartz (SiO₂) microfiber filter for critical work in air pollution monitoring in stacks, flues and aerosols up to 500°C. The filter is heat-treated, contains 5% borosilicate glass as a binder and is extremely low in heavy metals and alkaline earth metals.

934-AH

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

GMF150

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



Typical Applications

Air Pollution Monitoring

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

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

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

Air Sampling Filters EPM 2000

EPM 2000 has been developed and produced especially for use in high

volume PM-10 air sampling equipment that collects atmospheric particulates and aerosols. It is manufactured from 100% pure borosilicate glass of special purity enabling detailed chemical analysis of trace pollutants with the minimum of interference or background.

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

Water Pollution Analysis

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

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

binder free, they retain their weight during ignition.

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

Quartz Filters QM-A

High purity quartz (SiO₂) microfiber filters are used for air sampling in acidic gases, stacks, flues and aerosols, particularly at high temperatures up to 500°C and in PM-10 testing. Because of the low level of alkaline earth metals, "artifact" products of sulfates and nitrates (from SO₂ and NO₂) are virtually eliminated. QM-A, sequentially numbered according to EPA standards, is suitable for most applications.

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

Applications

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

Typical Properties of Glass Microfiber Filters

Grade	Particle Retention* Liquid (µm)	Air Flow Rate (s/100 mL/in ²)	Basis Weight (g/m ²)	Typical Thickness (µm)	Wet Burst (psi)	Tensile MD Dry (N/15 mm)
GF/A	1.6	4.3	53	260	0.3	5.5
GF/B	1.0	12.0	143	675	0.5	6.4
GF/C	1.2	6.7	53	260	0.3	6.6
GF/D	2.7	2.2	121	675	0.3	6.4
GF/F	0.7	19.0	75	420	0.3	8.9
934-AH	1.5	3.7	64	435	0.5	4.1
QM-A	2.2	6.4	87	475	1.5	7.3
GMF 150	1.2	3.1	139	730	1.4	4.2
EPM 2000	2.0	4.7	85	450	1.8	6.3

*98% Particle Retention Rating.

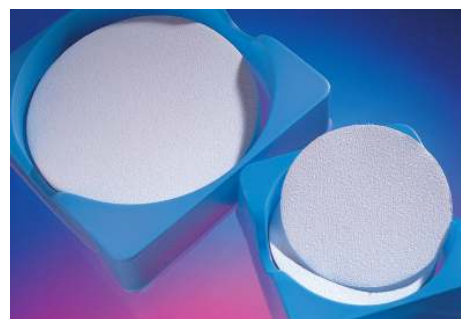
TCLP Filters Acid Treated Low Metal

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

Used for EPA Method 1311

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

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



Ordering Information

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

Ordering Information

Filter Circles						
Catalog Number						
Diameter (mm)	Grade GF/A	Grade GF/B	Grade GF/C	Grade GF/D	Grade GF/F	Quantity/Pack
21	1820-021	1821-021	1822-021	1823-021	1825-021	100
24	1820-024	1821-024	1822-024	1823-024	1825-024	100
25	1820-025	1821-025	1822-025	1823-025	1825-025	100
37	1820-037	1821-037	1822-037	—	1825-037	100
42.5	1820-042	1821-042	1822-042	1823-042	1825-042	100
47	1820-047	1821-047	1822-047	1823-047	1825-047	100
55	1820-055	1821-055	1822-055	1823-055	1825-055	100
70	1820-070	1821-070	1822-070	1823-070	1825-070	100
90	1820-090	1821-090*	1822-090	1823-090*	1825-090*	100
110	1820-110	1821-110*	1822-110	1823-110*	1825-110*	100
125	1820-125	1821-125*	1822-125	1823-125*	1825-125*	100
150	1820-150	1821-150*	1822-150	1823-150*	1825-150*	100
257	—	—	—	1823-257*	1825-257*	25
Filter Sheets						
460 x 570 [†]	—	1821-914	1822-914	—	—	100
460 x 570	1820-915*	1821-915*	1822-915*	1823-915*	—	25

† 5 per Box

* 25 per Box

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

† 20 per Box

* 25 per Box

^p 40 per Box

** 50 per Box