Air monitoring around the world.

Regulatory considerations and testing solutions for particulate matter in ambient air.

Merck Millipore is a business of MERCK

One planet. One atmosphere. One partner. One supplier.

In 1953, Jack Bush established the Millipore Filter Company, named after a sponge that lives in the Adriatic Sea. Millipore filters were among the first to be used for ambient air monitoring, as early as the 1970s.

Particulates and contaminants in the air affect human capital, the most precious natural resource our planet supports. Recognizing the need to protect this resource, industries, governments and associated regulatory agencies around the world monitor ambient air. Millipore filters, now supplied by Merck Millipore, are used in these ambient air monitoring methods.

Recently, the focus has been on PM2.5 levels, which have been linked to respiratory problems, cancer, and aging-related disorders such as Alzheimer's disease and bone damage. Major regulatory agencies have now issued guidances and methods for monitoring PM2.5, as outlined in Table 1.

Use this brochure to select the appropriate filters for air monitoring that match the specifications with respect to regional regulatory considerations.

Regulated Methods	Annual Limit	Filter Diameter	Filter Material	EMD Millipore Catalogue No.
US, Japan US EPA 40 CFR part 50	≤35 µg/m³	46.2 mm ±0.25 mm	• PTFE with a ring (For reference / manual method)	PM2547050
			• Glass fiber roll for automated / equivalent methods	Call for ordering information
EU EN12341 – 2014	≤25 µg/m³	50 mm	• PTFE with a ring (For reference / manual method)	PM2547050
			• Glass fiber	AP2004700
			• Quartz fiber	AQFA04700
China HJ 656-2013	≤35 µg/m³	**Low Flow:** 47 ±0.25 mm **Moderate Flow:** 90 ±0.25 mm **High Flow:** 200 x 250 mm	• PTFE with a ring (For reference / manual method)	PM2547050
			• Glass fiber	AP2004700
			• Quartz fiber	AQFA04700

Table 1. PM2.5 Regulatory Guidance by Geography

Technology Highlight

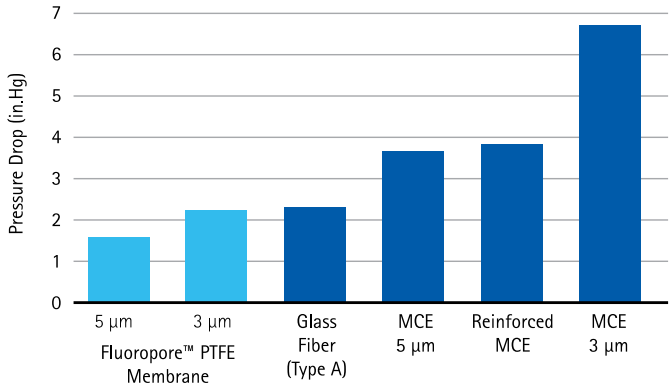
Radioactive alpha particle monitoring

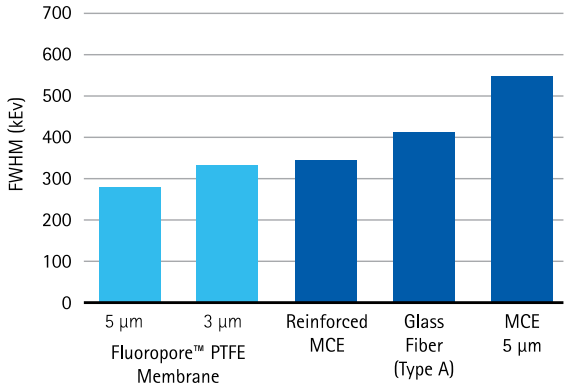
In order to reap the benefits of nuclear energy responsibly while maintaining clean air, users and regulatory organizations must monitor the degree to which radioactive byproducts of human activity enter the environment.

To support efficient, convenient radiation monitoring, Merck Millipore has developed a special Fluoropore™ membrane filter designed for alpha particle collection in single-use and continuous air monitors. Fluoropore™ membrane is approved for use by the French Institute for Radiological Protection and Nuclear Safety in Saclay, France as well as national labs in North America and Asia.

The Fluoropore™ filter for alpha particle monitoring provides:

- **Improved detection accuracy**. Unlike fibrous filter media that trap particles in their matrix, Fluoropore™ membranes collect particles on their surface. This surface collection keeps particles closer to the detector, providing better detection efficiencies and improved resolution.
- **Choice of pore sizes.** Fluoropore™ membranes are available in 3 and 5 µm pore sizes. The smaller pore size provides high resolution. The larger pore size has very low pressure drop and greater throughput capacity, which minimizes the number of filter change-outs.
- **Contrasting backing material.** The 5 µm Fluoropore™ membrane is bonded to a gridded backing made from high density polyethylene fiber. The contrast between the top and bottom of the filter prevents incorrect installation in sampling devices. The backing also reduces the electrostatic charge of the filters and makes them easier to handle.





Lower pressure drop, lower FWHM* measurements. Merck Millipore's Fluoropore™ PTFE membranes exhibit lower pressure drop (A) and collect particles on the surface, providing better detection efficiencies and lower FWHM measurements (B). Room air was collected at 1.7 m3/h (1 standard cubic foot/min).

*FWHM, a measure of spectral quality/resolution, is defined as the full width at half of the maximum height of the P0-218 peak obtained during air sampling of room air.

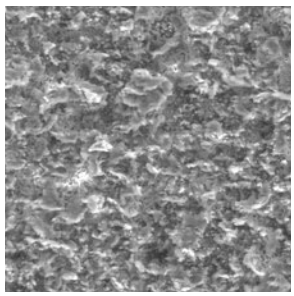
For ordering information, see page 8.

Choose a filter depending on your application.

Certified PTFE filters validated to match USEPA method requirements

Ideal for monitoring fine PM2.5 particulates and sensitive analyses, PTFE filters are very chemically resistant. Merck Millipore's certified PTFE discs for PM2.5 sampling also feature a chemically resistant, ultrasonically sealed polypropylene support ring, which provides:

- Faster equilibration during weighing steps
- Resistance to membrane curling
- Unique serial number printed on the ring for accurate tracking



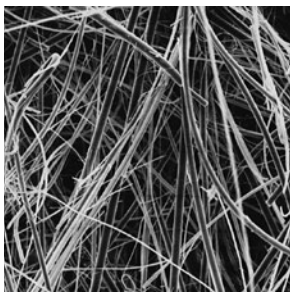
Mitex™ Pure PTFE Filters

Mitex™ membrane is unbacked, yet is easy to handle, combining the convenience of a backed membrane with the versatility of a pure PTFE membrane. Mitex™ membrane is hydrophobic. These filters are commonly used in tests for SO_2, CO, NO_2, NO, O_3 and other noxious gases.

FEATURES & BENEFITS

- Broad chemical compatibility
- Biologically and chemically inert
- Stable at temperatures in excess of 260 °C (500 °F) and below -100 °C (-148 °F)

For ordering information, see page 8.



Quartz Fiber Filters (Type AQFA)

Made of quartz fibers with no glass fibers or binders. Merck Millipore's pure quartz manufacturing process involves a heat treatment step to improve cleanliness, preventing the filters from reacting with acidic gases, unlike glass fiber filters that can react and cause false readings. This makes Merck Milipore's quartz filters well-suited for measuring heavy metal concentrations and small amounts of particles (such as PM2.5 ambient air monitoring methods). The filters also exhibit good weight and form stability; in fact, the 3.0 micron filter features 99.998% retention. Quartz fiber disc filters are available in a wide range of flow rates and throughput capacities.

Glass Fiber Filters with Binder Resin (Type AP20)

With binder resin, glass fiber filters exhibit less weight loss and minimal particle shedding. They also exhibit lower fine particle retention and higher dirt-holding capacity than PTFE filters. Our glass fiber filters with binder resin are available with two different thickness options:

- Type AP20: Thickness = 380 µm
- Type AP2T (Thin)*: Thickness = 250 µm–360 µm

*Contact customer service for ordering information

For ordering information, see page 8.

Developed using USEPA standards to protect our environment.

Merck Millipore ensures that membrane discs match regulatory specifications.

Certification documents for each product will be shipped in each box. Detailed test results can be obtained by contacting Merck Millipore Technical Support.

Test	Specification*	AP20 Glass Fiber	AQFA Quartz Fiber	PTFE Filter with Ring
Temperature Stability	≤ 20 µg / filter disc	4	16	-4.0
Loose Particle Test	≤ 20 µg / filter disc	22	39	1.0
Particle Retention	≥ 99.7%	> 99.9%	> 99.9%	> 99.9%
Pressure Drop	≤ 3 kPa at 0.45 m/s air flow rate	~ 1 kPa	~ 1 kPa	0.65 kPa
Additional tests performed for certified PTFE filters as per U.S. EPA guidelines**				
Alkalinity	≤ 25 µeq / g filter			0.3
XRF Analysis	Low background signal			Meets

* As Per Chinese PM2.5 Sampling Standard. ** Certification documents for each product, stating that all tests were carried out according to United States Environmental Protection Agency (EPA) requirements, will be shipped in each box.

Angled, earth-friendly packaging for certified PTFE discs.

Unlike PTFE filter discs from other suppliers, Merck Millipore's certified PTFE filter discs are sold in low-static packaging, in which filters are placed at an angle. This packaging makes it easier to remove discs with forceps and makes it less likely that the product will be damaged.

Earth-friendly Packaging.

Packaging for certified PTFE membranes for PM2.5 testing is 100% recyclable and is accompanied by a certificate of analysis.

For ordering information, see page 8.

Accessories

Handle Membranes with Merck Millipore's Popular Filter Forceps.

Flat-tipped forceps combined with angled packaging make it easy to handle certified PTFE filters for PM2.5 sampling.

Description	Catalog No.
Filter forceps (3/pack)	XX6200006P

Store Membrane Filters for Future Microscopic Analysis in PetriSlides™ Membrane Display Box

Holds filter securely in place. Transparent cover allows microscopic examination without removal. Rectangular base has rounded corners for mounting on microscope stage.

Description	Catalog No.
PetriSlides™ Membrane Display Box	PD1504700

Environmental Monitoring:
Sample Collection, Preparation, Analysis

Whether you need to collect large quantities of air or analyze soil or water for hazardous chemicals, we can supply the expertise, products and protocols to ensure superior analytical results and compliance with regulatory requirements. Merck Millipore devices and systems designed for environmental applications have been developed for use with standard methods.

Use our online membrane selection wizard to search for filters by regulated method.

Air Monitoring
- Ambient air monitoring
- Alpha particle monitoring
- Industrial particulates

Soil Monitoring
- Toxicity Characteristic Leaching Procedure (TCLP)
- Extraction
- Gas chromatography
- Ion chromatography

Water Testing
- Ground water
- Waste water
- Drinking water
- Storm drain water

Explore Merck Millipore's products for environmental particle monitoring: **www.merckmillipore.com/pollutiontesting**

Ordering Information for Ambient Air Monitoring Solutions

Filter	Diameter	Pore Size (µm)	Qty/Pk	Catalog No.
2 µm PTFE Membrane Discs for PM2.5 Monitoring (PTFE with ring)	46.2 mm ±0.25 mm	2.0	50	PM2547050
Mitex™ PTFE Membrane Filters for SO_2/NO Testing	47 mm	5.0	100	LSWP04700
Glass Fiber Disc Filters (Type AP20)	47 mm	2.0	100	AP2004700
Glass Fiber Filter Roll (Continuous PM2.5 Monitoring)	Roll	2.0	1 Roll	available upon request
Quartz Fiber Disc Filters (Type AQFA)	47 mm	N/A	100	AQFA04700
Quartz Fiber Filter Sheet (8"x10" sheet)	8 x 10 in.	N/A	50	AQFA8X105
Fluoropore™ Disc Filters for Radiation Monitoring	25 mm	3.0	100	FSLW02500
	47 mm	3.0	100	FSLW04700
	90 mm	3.0	25	FSLW09025
	47 mm	5.0	100	FMLW04700

To Place an Order or Receive Technical Assistance

In Europe, please call Customer Service:

France: 0825 045 645
Germany: 069 86798021
Italy: 848 845 645
Spain: 901 516 645 Option 1
Switzerland: 0848 645 645
United Kingdom: 0870 900 4645

For other countries across Europe, please call: +44 (0) 115 943 0840

Or visit: **www.merckmillipore.com/offices**

For Technical Service visit: **www.merckmillipore.com/techservice**

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