

GE Healthcare

# Synchronized solutions for air monitoring

Choose Whatman™ filters  
for quality and knowledgeable  
support from GE Healthcare



# Whatman filters and membranes for air monitoring

GE Healthcare provides a comprehensive line of Whatman filters and membranes for a wide range of air monitoring applications, including:

- Determination of airborne particulates (e.g., PM2.5–PM10)
- Monitoring of heavy metals, polynuclear aromatic hydrocarbons, dioxins, and iodine
- Manual and automated air sampling of flue and stack emissions (also in thimble format)
- Asbestos sampling using optical analysis

Whatman air monitoring products are available in a variety of compositions and sizes, so you can select the right product for your needs.



Fig 1. Whatman glass fiber filters. GF/A filters can be used for air monitoring.

Table 1. Features of Whatman products for air monitoring using gravimetric or chemical analysis

| Glass fiber filters                                                                                                                                                          |                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GF/A</b><br>Binder free glass fiber <ul style="list-style-type: none"><li>• Fine particle retention</li><li>• High flow rate</li><li>• Good loading capacity</li></ul>    | <b>GF10</b><br>With organic binder <ul style="list-style-type: none"><li>• Extreme mechanical stability</li><li>• Can be used up to 180°C</li><li>• Used as a weighing aid for infrared weighing</li><li>• Used as a roll filter in automatic air filtration units</li></ul> | <b>Grade 72</b><br>Composite cellulose/glass filter loaded with activated carbon <ul style="list-style-type: none"><li>• Used to absorb radioactive iodine in air pollution monitoring and in nuclear installations</li></ul> | <b>EPM2000</b><br>Binder free glass fiber <ul style="list-style-type: none"><li>• Developed for use in high-volume PM-10 air sampling equipment</li><li>• 100% pure borosilicate glass of special purity enables detailed chemical analysis of trace pollutants</li></ul> |
| Quartz fiber filters                                                                                                                                                         |                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                           |
| <b>QM-A</b><br>Quartz microfiber filters <ul style="list-style-type: none"><li>• Can be used up to 500°C</li></ul>                                                           | <b>QM-H</b><br>Pure quartz fiber filters <ul style="list-style-type: none"><li>• 100% pure quartz</li><li>• Can be used up to 900°C</li><li>• Low heavy metal content</li></ul>                                                                                              |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                           |
| PTFE membranes                                                                                                                                                               |                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                           |
| <ul style="list-style-type: none"><li>• Used for protection of air monitoring sampling systems</li></ul>                                                                     |                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"><li>• Can be used in applications involving aggressive organic solvents, strong acids, and alkalis</li></ul>                                                                                |                                                                                                                                                                                                                                                                           |
| Extraction thimbles                                                                                                                                                          |                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                           |
| <b>Glass fiber thimbles</b> <ul style="list-style-type: none"><li>• Borosilicate with organic binder (also available without binder)</li><li>• Full range of sizes</li></ul> |                                                                                                                                                                                                                                                                              | <b>Quartz fiber thimbles</b> <ul style="list-style-type: none"><li>• High-purity quartz microfiber</li><li>• Can be used up to 1000°C</li></ul>                                                                               |                                                                                                                                                                                                                                                                           |

\*Contact us for more information on our range of Whatman cellulose papers

## Gravimetric and chemical analysis for air monitoring

The requirement to monitor emissions on a regular and sometimes permanent basis uses specific methods and techniques that often involve sample preparation prior to analysis. Although many of these analyses can be performed with standard consumables, such as traditional filter papers\*, others require materials with specific features (e.g., a low metal content). GE Healthcare provides Whatman air monitoring filters and membranes that address these specialized needs. The product types for gravimetric and chemical analysis are summarized below, and features of specific products are described in Table 1.

### Product types

#### Glass fiber filters

Whatman glass fiber filters are recommended for gravimetric determination of airborne particulates, stack sampling, and absorption methods of air pollution monitoring.

#### Quartz fiber filters

Whatman quartz fiber filters are used for air sampling, particularly at high temperatures, in acidic gases, stacks, flues, and aerosols.

#### PTFE membranes

Whatman PTFE membranes are hydrophobic, chemically stable, and inert. Membranes are laminated onto a nonwoven polypropylene support web for improved strength and handling and can be used at temperatures up to 120°C.

#### Extraction thimbles

Whatman extraction thimbles are available in high-purity glass or quartz fiber.

## Optical analysis for asbestos sampling

GE Healthcare provides Whatman membranes for the main asbestos sampling methods used in Europe.

### Transmission electron microscopy method

Two membrane materials are typically recommended for this method:

- Mixed ester membrane (e.g., Whatman ME25/21 membrane)
- Polycarbonate membrane (e.g., Whatman Cyclopore™ or Nuclepore™ membranes)

See Tables 2 and 3 for more information.

### Phase-contrast microscopy method

One of the techniques used to optically determine the asbestos fiber count is the “hot block” method. Crucial to this method is the cellulose membrane filter that is used to collect fibers from a defined volume of air. During processing the membrane is made transparent with acetone vapor. MembraClear™ membrane from GE Healthcare is the dedicated membrane for this application.

**Table 2.** Features of Whatman polycarbonate membranes for asbestos sampling

| Polycarbonate track-etched membranes                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Nuclepore and Cyclopore</b>                                                                                                                                                                                                                                                                                                         |
| <ul style="list-style-type: none"><li>• Manufactured with proprietary Whatman technology for controlled pore size distribution</li><li>• Smooth flat membrane: particles are retained on surface so are easily visible during optical analysis</li><li>• Nuclepore available in two versions: gold coated or not gold coated</li></ul> |

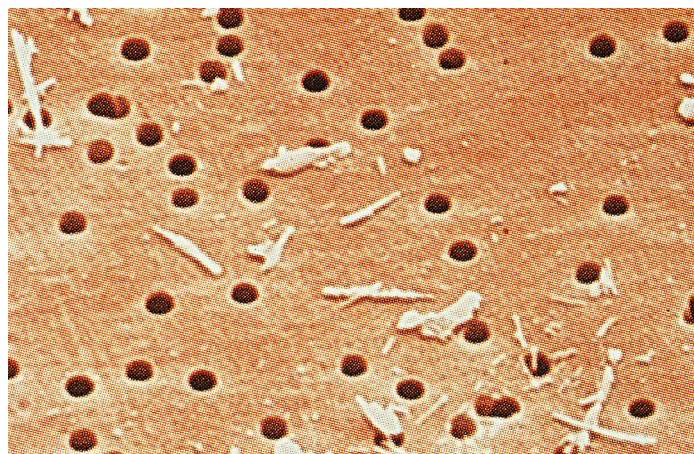


**Fig 2.** Asbestos fibers on a Cyclopore membrane.

### Scanning electron microscopy method

GE Healthcare offers a full range of polycarbonate membranes, Cyclopore and Nuclepore. Nuclepore is also available in a gold-coated format.

**Table 3.** Features of Whatman mixed ester membranes for asbestos sampling

| Cellulose mixed ester membranes                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ME membranes</b>                                                                                                                                                                                                               |
| <b>Cellulose mixed ester membrane</b>                                                                                                                                                                                             |
| <ul style="list-style-type: none"><li>• Available with or without grid</li><li>• Full range of pore sizes: 0.2 µm; 0.45 µm; 0.8 µm; 1.2 µm</li><li>• High flow rates</li></ul>                                                    |
| <b>MembraClear membranes</b>                                                                                                                                                                                                      |
| <b>Cellulose mixed ester membrane for “hot-block” method</b>                                                                                                                                                                      |
| <ul style="list-style-type: none"><li>• White with black grid</li><li>• 0.8 µm pore size</li><li>• Becomes transparent with acetone vapor treatment</li><li>• Remains clear without occurrence of crystalline artifacts</li></ul> |

## Ordering information

| Product | Quantity | Code no. |
|---------|----------|----------|
|---------|----------|----------|

### Gravimetric and chemical analysis for air monitoring

#### Glass fiber filters

|                                                    |              |          |
|----------------------------------------------------|--------------|----------|
| GF/A, glass fiber circles, 25 mm                   | 100 per pack | 1820-025 |
| GF/A, glass fiber circles, 37 mm                   | 100 per pack | 1820-037 |
| GF/A, glass fiber circles, 47 mm                   | 100 per pack | 1820-047 |
| GF/A, glass fiber circles, 50 mm                   | 100 per pack | 1820-050 |
| GF/A, glass fiber circles, 90 mm                   | 100 per pack | 1820-090 |
| GF/A, glass fiber circles, 150 mm                  | 100 per pack | 1820-150 |
| EPM2000, glass fiber circles, 47 mm                | 100 per pack | 1882-047 |
| EPM2000, glass fiber sheets, 8 × 10 in             | 100 per pack | 1882-866 |
| GF10, glass fiber with binder, roll, 50 mm × 100 m | 1 per pack   | 10370394 |

#### Grade 72 filters

|                           |               |          |
|---------------------------|---------------|----------|
| Grade 72 circles, 12.7 mm | 1000 per pack | 1872-012 |
| Grade 72 circles, 47 mm   | 100 per pack  | 1872-047 |
| Grade 72 circles, 60 mm   | 100 per pack  | 1872-060 |

| Product | Quantity | Code no. |
|---------|----------|----------|
|---------|----------|----------|

#### Quartz fiber filters

|                                         |              |          |
|-----------------------------------------|--------------|----------|
| QM-A, quartz fiber circles, 25 mm       | 100 per pack | 1851-025 |
| QM-A, quartz fiber circles, 37 mm       | 100 per pack | 1851-037 |
| QM-A, quartz fiber circles, 47 mm       | 100 per pack | 1851-047 |
| QM-A, quartz fiber circles, 50 mm       | 100 per pack | 1851-050 |
| QM-A, quartz fiber circles, 90 mm       | 100 per pack | 1851-090 |
| QM-A, quartz fiber circles, 150 mm      | 100 per pack | 1851-150 |
| QM-A, quartz fiber sheets, 8 × 10 in    | 25 per pack  | 1851-865 |
| QM-H, pure quartz fiber circles, 37 mm  | 25 per pack  | 1853-037 |
| QM-H, pure quartz fiber circles, 47 mm  | 25 per pack  | 1853-047 |
| QM-H, pure quartz fiber circles 50 mm   | 25 per pack  | 1853-050 |
| QM-H, pure quartz fiber circles, 150 mm | 25 per pack  | 1853-150 |

Continued overleaf

## Ordering information cont.

| Product                                     | Quantity    | Code no. |
|---------------------------------------------|-------------|----------|
| <b>PTFE membranes</b>                       |             |          |
| TE38, PTFE membrane circles, 5 µm, 37 mm    | 50 per pack | 10411108 |
| TE38, PTFE membrane circles, 5 µm, 47 mm    | 50 per pack | 10411111 |
| TE38, PTFE membrane circles, 5 µm, 50 mm    | 50 per pack | 10411113 |
| TE38, PTFE membrane circles, 5 µm, 90 mm    | 50 per pack | 10411116 |
| TE38, PTFE membrane circles, 5 µm, 150 mm   | 50 per pack | 10411130 |
| TE37, PTFE membrane circles, 1 µm, 25 mm    | 50 per pack | 10411205 |
| TE37, PTFE membrane circles, 1 µm, 47 mm    | 50 per pack | 10411211 |
| TE37, PTFE membrane circles, 1 µm, 50 mm    | 50 per pack | 10411213 |
| TE36, PTFE membrane circles, 0.45 µm, 47 mm | 50 per pack | 10411311 |
| TE36, PTFE membrane circles, 0.45 µm, 50 mm | 50 per pack | 10411313 |
| TE35, PTFE membrane circles, 0.2 µm, 47 mm  | 50 per pack | 10411411 |
| TE35, PTFE membrane circles, 0.2 µm, 50 mm  | 50 per pack | 10411413 |

### Extraction thimbles

|                                            |             |          |
|--------------------------------------------|-------------|----------|
| Glass fiber, 22 x 80 mm, thickness 1.5 mm  | 25 per pack | 10371011 |
| Glass fiber, 25 x 100 mm, thickness 1.5 mm | 25 per pack | 10371019 |
| Glass fiber, 26 x 100 mm, thickness 1.5 mm | 25 per pack | 10371023 |
| Glass fiber, 33 x 94 mm, thickness 1.5 mm  | 25 per pack | 10371042 |
| Glass fiber, 10 x 38 mm, thickness 1.5 mm  | 25 per pack | 10371103 |
| Quartz fiber, 25 x 90 mm, thickness 2 mm   | 10 per pack | 2812-259 |

| Product | Quantity | Code no. |
|---------|----------|----------|
|---------|----------|----------|

## Optical analysis for asbestos monitoring

### Cellulose mixed ester membranes

|                                                                                  |              |          |
|----------------------------------------------------------------------------------|--------------|----------|
| MembraClear circles, cellulose mixed ester (for hot block method), 0.8 µm, 25 mm | 100 per pack | 7141-025 |
| MembraClear circles, cellulose mixed ester (for hot block method), 0.8 µm, 37 mm | 100 per pack | 7141-037 |
| MembraClear circles, cellulose mixed ester (for hot block method), 0.8 µm, 47 mm | 100 per pack | 7141-047 |
| ME25/21 circles, cellulose mixed ester, 0.45 µm, 37 mm                           | 100 per pack | 10406809 |
| ME25/21 circles, cellulose mixed ester, 0.45 µm, 47 mm                           | 100 per pack | 10406812 |

### Polycarbonate membranes

|                                                              |              |           |
|--------------------------------------------------------------|--------------|-----------|
| Nuclepore circles, polycarbonate, 0.4 µm, 25 mm              | 100 per pack | 110607    |
| Nuclepore circles, polycarbonate, 0.8 µm, 25 mm              | 100 per pack | 110609    |
| Nuclepore circles, polycarbonate, gold coated, 0.4 µm, 25 mm | 50 per pack  | 170607    |
| Nuclepore circles, polycarbonate, gold coated, 0.8 µm, 25 mm | 50 per pack  | 117197    |
| Cyclopore circles, polycarbonate, 0.2 µm, 25 mm              | 100 per pack | 7060-2502 |
| Cyclopore circles, polycarbonate, 0.4 µm, 25 mm              | 100 per pack | 7060-2504 |
| Cyclopore circles, polycarbonate, 0.8 µm, 25 mm              | 100 per pack | 7060-2508 |

Other diameters and pore sizes are available.

For local office contact information, visit:  
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