MILLIPORE™

# Contamination Monitoring

## Product Guide



**Devices and systems for industrial QC sample preparation and testing**

DOMINIQUE DUTSCHER SAS

www.millipore.com/industrialQC

# Contamination Monitoring

To keep your industry running, you need clean parts, fuel and hydraulic fluids that are free of particles and other contamination. For almost 50 years, Millipore has provided reliable, sensitive field sampling kits and contamination tests that have become industry quality control (QC) standards. Depend on Millipore to increase efficiency and lifespan of your complex machinery.

Whether you need to monitor surface particulate contamination, or analyze critical fuel and lubricant samples for industrial or aerospace equipment, we can supply the expertise, products and protocols to ensure superior analytical results and compliance with regulatory requirements. Millipore devices and systems designed for environmental and industrial QC have been developed for use with standard methods, including NIOSH, OSHA™ and ASTM®. See Millipore's Lab Filtration Product Guide for complete method tables (www.millipore.com/guides).



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# Millipore supports you at every stage of the contamination monitoring process.



## Collection

Whether you need to collect critical fuel samples for aerospace equipment or analyze lubricant samples for industrial machinery, we can supply the expertise, products and protocols to ensure superior analytical results and compliance with regulatory requirements.

- Sampling Kits
- Filter Discs
- Filter Holders
- Monitors
- Monitor Refills
- Solvent Dispensers



## Sample Preparation

For the best downstream results, choose the best upstream tools. Sample preparation with Millipore filtration products ensures fast, accurate, reproducible results, for every type of sample. Whether you are filtering 1 mL or 5 L, you can choose a sample preparation device with the right membrane and chemical compatibility for your application.

- Syringe Filters
- Filter Discs
- Filter Holders
- Vacuum- and Pressure-Driven Filtration Equipment



## Analysis

Millipore gives you more than products for your industrial QC workflow, we give you knowledgable technical service and support for your particular analysis application. We can help you build the optimum sampling and filtration protocol to fit your chosen method of analysis, such as the protocols listed here and on page 15.

- Gravimetric
- Colorimetric
- Microscopic
- HPLC

See page 15 for a convenient list of standard analytical methods for industrial contamination monitoring.

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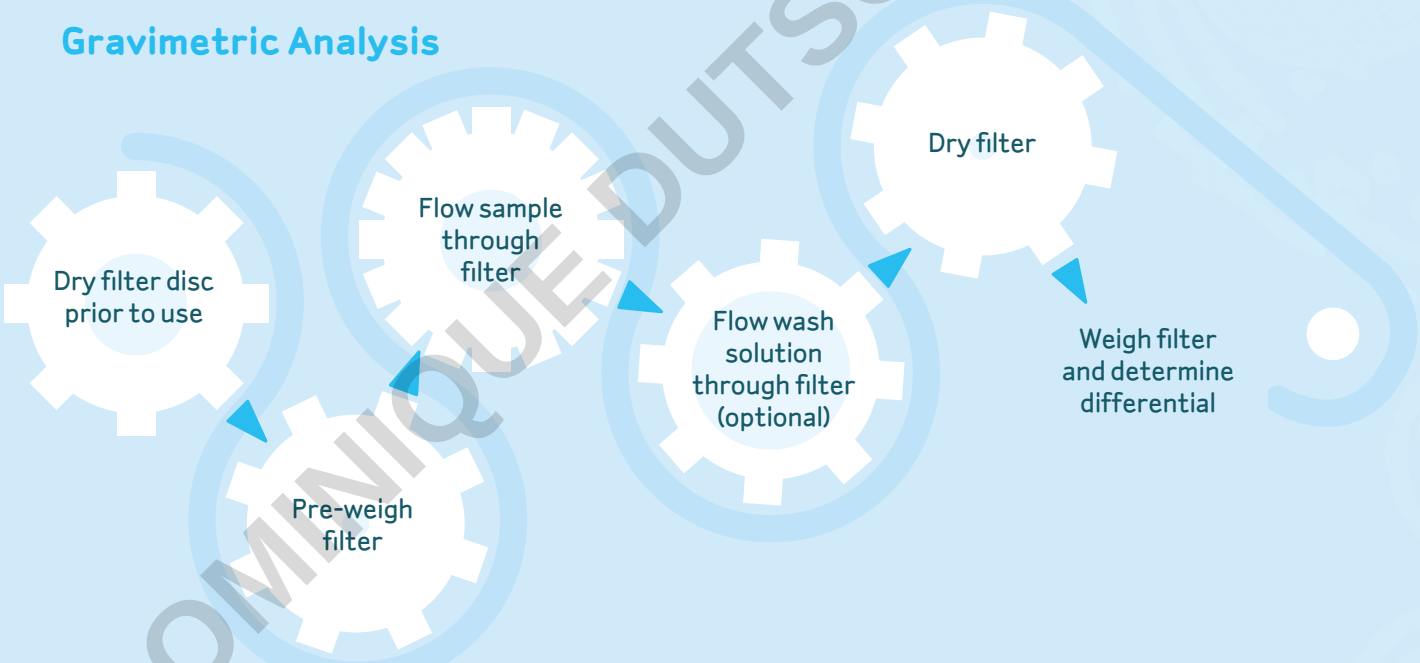
# Machined Parts Testing

As manufacturing tolerances increase, contamination control becomes an important means of reducing wear and prolonging the operational lifespan of complex assemblies. The presence of contamination on machined parts results in a variety of potential problems for machine users:

- Increased corrosion
- Friction between moving parts
- Poor heat transfer efficiency in heat exchangers
- Impeded fluid flow in piping and tubing

Manufacturers have long relied on membranes and devices from Millipore to evaluate the cleanliness of newly made parts by running the Millipore test (gravimetric analysis) to quantify the total mass and size of contaminating particles.

## Gravimetric Analysis




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### For reliable, quantitative test results, Millipore offers a wide range of products that address the needs of industrial QC of machined parts:

- Range of membrane materials ensures chemical compatibility with new solvents.
- 47 mm diameter filters reduce clogging of dirty samples.
- Large volume pressure vessels minimize solvent handling.
- Minimizes particles coming from solvent barrels for improved efficiency and more reliable results.

# Products for Testing Machined Parts

## Membrane Discs

| Description | Pore Size (µm) | Diameter (mm) | Qty/Pk | Catalogue No. |
|---|---|---|---|---|
| Nylon Net Filters | 160 | 47 | 100 | NY6H04700 |
| | 10 | 47 | 100 | NY1104700 |
| | 40 | 47 | 100 | NY4004700 |
| Isopore™ Membrane, polycarbonate, hydrophilic | 8 | 47 | 100 | TETP04700 |
| Mitex™ Membrane, PTFE, hydrophobic | 10 | 47 | 100 | LCWP04700 |
| MF-Millipore Membrane, mixed cellulose esters, hydrophilic | 8 | 47 | 100 | SCWP04700 |
| | 5 | 47 | 100 | SMWP04700 |
| | 3 | 47 | 100 | SSWP04700 |



For a complete list of membranes, please contact technical service or visit **www.millipore.com/membrane/mrc3/membranehome**.

## Filterjet™ Solvent Dispenser, 25 mm

Use to spray a concentrated jet of ultraclean solvent or rinse solution on surfaces for cleaning. Filter holder, XX4002500, which is part of the dispenser, can also be used by itself for in-line pressure filtration of gases.

| Description | Catalogue No. |
|---|---|
| Filterjet Solvent Dispenser, 25 mm | XX6702500 |



## Hydrosol™ Stainless Steel Filter Holder

Particulate or biological contamination analysis via vacuum filtration. Includes grounding set for use with flammable liquids. Filter holder is not autoclavable with filter in place.

| Description | Catalogue No. |
|---|---|
| Hydrosol Stainless Steel Filter Holder<br>(For 47 mm disc filters) | XX2004720 |



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## All-Glass Filter Holder, 47 mm, SS screen

Particulate or biological contamination analysis via vacuum filtration. Includes grounding set for use with flammable liquids.

| Description | Catalogue No. |
|---|---|
| **All-Glass Filter Holder, 47 mm, SS screen**<br>(For 47 mm disc filters) | XX1004730 |



## Dispensing Pressure Vessels

Dispensing pressure vessels hold liquid for filtration through Millipore pressure-operated filter holders, if connected to an external pressure source. Vessels meet ASME-UM Code requirements. Closures are secured by cam-lock handle. Vessels are autoclavable when vented. Accessory code-complying relief valve, pressure gauge and hose connectors are available. Accessory closure adapts vessels for vacuum use.

| Description | Catalogue No. |
|---|---|
| **Dispensing Pressure Vessel, 1 gal** | XX6700P01 |
| **Dispensing Pressure Vessel, 5 L** | XX6700P05 |
| **Dispensing Pressure Vessel, 10 L** | XX6700P10 |
| **Dispensing Pressure Vessel, 20 L** | XX6700P20 |



### Replacement Parts

| | |
|---|---|
| **Outlet Dip Tube, 5 L vessel** | 6977 |
| **Outlet Dip Tube, 10 L vessel** | 6978 |
| **Outlet Dip Tube, 20 L vessel** | 6979 |
| **Plug, 1/4 in. NPT, stainless steel** | YY1301009 |
| **Street Elbow, 1/4 in. NPTF to M** | XX6700104 |
| **Vessel Cover, cam lock** | 6976 |
| **O-ring, Viton A** | XX6700059 |

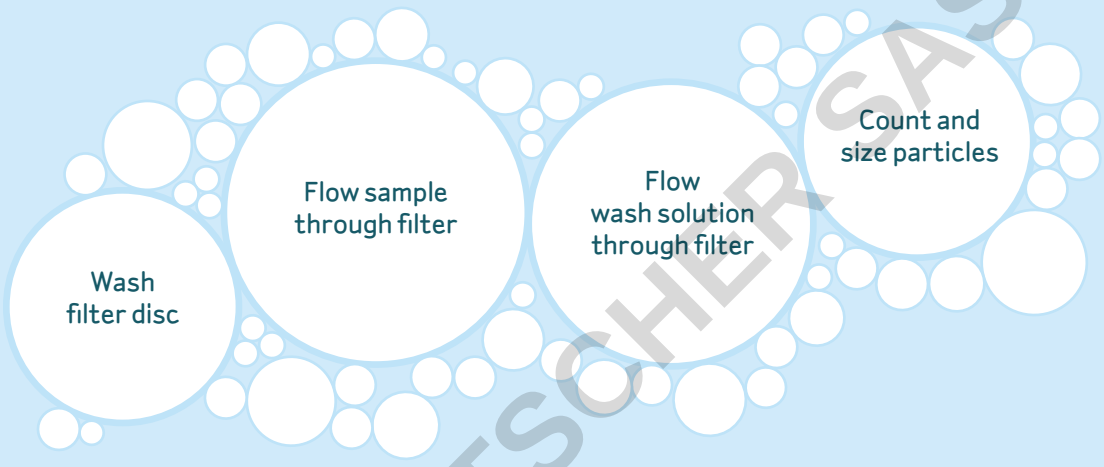
See page 11 for accessories.

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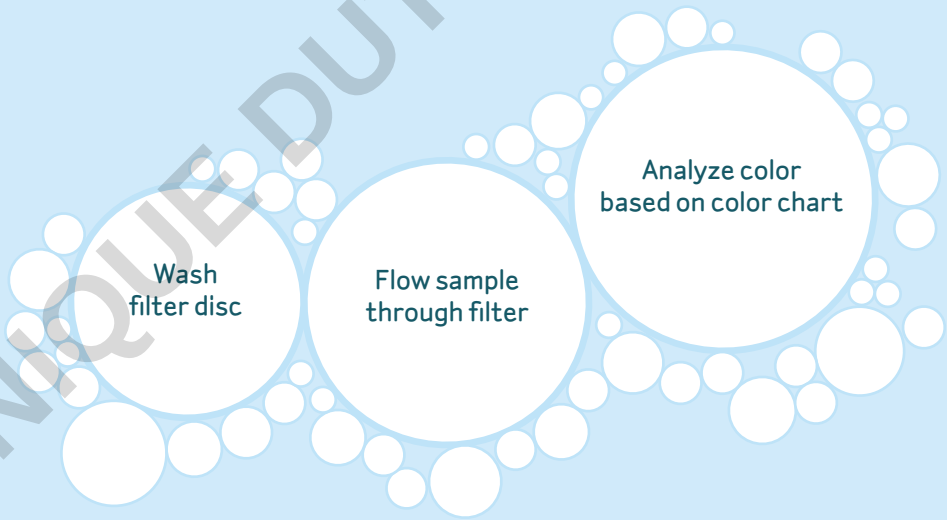
# Hydraulic Fluids Monitoring

Particle contamination is the primary source of component wear and the cause of over half of all hydraulic system failures. Minimize expensive, dangerous failures by regularly monitoring a hydraulic system's contamination level by gravimetric, microscopic, or colorimetric analysis.

## Fluid Monitoring Methods




## Colorimetric Analysis




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### Millipore's field testing kits enable you to quickly sample and analyze hydraulic fluids wherever you are.

- Hand vacuum pump allows analysis at remote sites where electricity is unavailable.
- High quality membranes with uniform pore sizes result in reproducible, accurate data.
- Vacuum filtration manifolds ensure sample integrity and minimize cross contamination between samples.

# Products for Hydraulic Fluid Contamination Monitoring

## Membrane Discs

| Description | Pore Size (µm) | Diameter (mm) | Qty/Pk | Catalogue No. |
|---|---|---|---|---|
| MF-Millipore Membrane, mixed cellulose esters, hydrophilic | 0.8 | 47 (gridded) | 100 | AAWG04700 |
| | 1.2 | 25 | 100 | RAWP02500 |
| | 1.2 | 47 (gridded) | 100 | RAWG04700 |
| | 0.45 | 47 | 100 | HAWP04700 |
| | 0.45 | 47 (gridded) | 100 | HAWG04700 |
| | 5 | 47 | 100 | SMWP04700 |
| Fluoropore™ Membrane | 0.45 | 47 | 100 | FHLP04700 |
| Nylon Membrane | 0.45 | 47 | 100 | HNWP04700 |
| Durapore® Membrane | 0.45 | 47 (gridded) | 100 | HVWG04700 |



For a complete list of membranes, please contact technical service or visit **www.millipore.com/membrane/mrc3/membranehome**.

## Patch Test Kit

For colorimetric fluid contamination analysis. Monitors particulate contamination rapidly in hydrocarbon-based hydraulic fluids, bulk chemicals, boiler water and lubricating oils. Filter color rating and particle assessment scales correspond to recognized standard contamination levels.

| Description | Catalogue No. |
|---|---|
| Patch Test Kit (100 tests) | XX6504730 |



## PetriSlides™ for Contamination Analysis

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

| Description | Catalogue No. |
|---|---|
| PetriSlides for Contamination Analysis | PD1504700 |



## Manifolds

Vacuum manifolds support simultaneous filtration of three or six test samples. Use Millipore glass, plastic or stainless steel filter holders fitted with standard No. 8 perforated stoppers over holder outlets. Manifolds connect to single vacuum source and use separate control valves at each station for independent operation.

| Description | Catalogue No. |
|---|---|
| 3-Place Manifold, 47 mm, stainless steel | XX2504735 |
| 6-Place Manifold, 47 mm, stainless steel | XX2504700 |

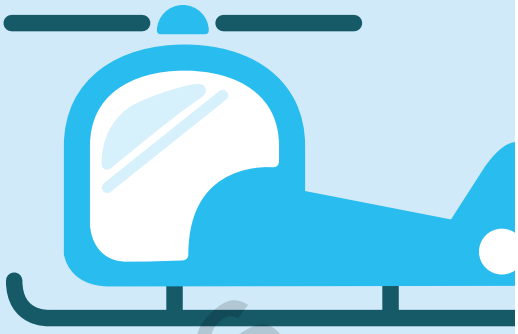


See page 11 for accessories.

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# Fuel Monitoring

Dirty fuel can rob an engine of power, reduce fuel efficiency and accelerate wear on major components. The higher injection pressures and tighter tolerances of today's diesel and jet engines require diligent monitoring for contamination.



## Products for Fuel Contamination Monitoring

### Membrane Discs

| Description | Pore Size (µm) | Diameter (mm) | Qty/Pk | Catalogue No. | |
|---|---|---|---|---|---|
| MF-Millipore Membrane, mixed cellulose esters, hydrophilic | 0.8 | 47 (gridded) | 100 | AAWG04700 |  |

For a complete list of membranes, please contact technical service or visit **www.millipore.com/membrane/mrc3/membranehome**.

### Contamination Monitors

| Description | Catalogue No. | |
|---|---|---|
| Fluid Contamination Analysis Monitors, mixed cellulose esters, 0.8 µm, 2 pc. | MAWP037P0 |  |
| Matched Weight Fluid Contamination Monitor, 37 mm, mixed cellulose esters, 0.8 µm, 2 pc. | MAWP037PM | |

### Fluid Sampling Kits

**For liquid sampling through 37 mm monitors**

For sampling turbine fuels, water or other liquids through Millipore Contamination Analysis Monitors prior to gravimetric or colorimetric analysis.

The stainless steel sampler assembly plugs into a quick-release valve installed in the system line, which allows a measured quantity of liquid to pass through the monitor. A valved syringe serves as a pump to remove residual liquid from the monitor. For gravimetric analysis, accessory Matched-Weight Monitors eliminate filter pre-weighing before sampling.

| Description | Catalogue No. | |
|---|---|---|
| Fluid Sampling Kits | XX6403730 |  |

### Renewable Fuels

Bio-based fuels that exploit renewable biomass (including dedicated energy crops, organic waste, and agricultural residue) have the potential to relieve our dependence on nonrenewable energy sources. As governments around the world set increasing goals for renewable fuel usage, they will set new standards for testing these bio-based fuels. Effectively determine the cleanliness of bio-based fuels as well as petroleum with Millipore's fuel monitoring products, featuring:

- Pre-assembled filters in filter holders minimize user contact and safety risk
- Calibrated sampling kits ensure consistency of sample volumes prior to gravimetric analysis
- HPLC-certified Millex® syringe filters for convenient, reliable fuel sample preparation (see next page)

See page 11 for accessories.

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# Special Applications:
# Detecting contaminants by HPLC

In addition to classical contamination monitoring methods (gravimetric, microscopic, colorimetric), chromatographic separation methods, such as high performance liquid chromatography (HPLC), have become popular in industrial QC testing. HPLC is very sensitive, quantitative, accommodating of sample reactivity or volatility, and compatible with high throughput analysis.

Use Millipore's Millex syringe filters to prepare 1 to 100 mL of aqueous and mild organic samples and mobile phases prior to HPLC or other sensitive analysis methods. Millex filters minimize column clogging and have low extractables, low binding, and low hold-up volumes.

## Millex HPF Filters

When filtering viscous or particle-laden solutions, using Millex HPF filters provide two to four times higher throughput compared to traditional filters.

### Nylon Membrane with Glass Fiber Prefilter

| Description | Filter Pore Size (µm) | Qty/Pk | Catalogue No. |
|---|---|---|---|
| Millex-HPF Filter | 0.2 | 50 | SLGNM25NS |
| Millex-HPF Filter | 0.45 | 50 | SLHNM25NS |
| Millex-HPF Filter | 0.45 | 200 (8 x 25) | SLHNMZ5NZ |

### Hydrophilic PTFE Membrane with Glass Fiber Prefilter

| Description | Filter Pore Size (µm) | Qty/Pk | Catalogue No. |
|---|---|---|---|
| Millex-HPF LCR Filter | 0.2 | 50 | SLLGM25NS |
| Millex-HPF LCR Filter | 0.45 | 50 | SLCRM25NS |

### PVDF Membrane with Glass Fiber Prefilter

| Description | Filter Pore Size (µm) | Qty/Pk | Catalogue No. |
|---|---|---|---|
| Millex-HPF HV Filter | 0.45 | 50 | SLHVM25NS |
| Millex-HPF HV Filter | 0.45 | 200 (8 x 25) | SLHVMZ5NZ |

## HPLC-Certified Millex Filters

The nylon and hydrophilic PTFE Millex units are certified for HPLC analysis. These filters are certified to be low in extractables for trace analysis and sensitive detection methods.

### Nylon Membrane

| Description | Filter Pore Size (µm) / Filter Diameter (mm) | Qty/Pk | Catalogue No. |
|---|---|---|---|
| Millex-GN Filter | 0.20 µm / 13 mm | 100 | SLGNX13NL |
| Millex-GN Filter | 0.20 µm / 33 mm | 50 | SLGN033NS |
| Millex-HN Filter | 0.45 µm / 13 mm | 100 | SLHNX13NL |
| Millex-HN Filter | 0.45 µm / 33 mm | 50 | SLHN033NS |

### Hydrophilic PTFE Membrane

| Description | Filter Pore Size (µm) / Filter Diameter (mm) | Qty/Pk | Catalogue No. |
|---|---|---|---|
| Millex-LG Filter | 0.20 µm / 4 mm | 100 | SLLGR04NL |
| Millex-LG Filter | 0.20 µm / 13 mm | 100 | SLLGH13NL |
| Millex-LG Filter | 0.20 µm / 33 mm | 50 | SLLGH25NS |
| Millex-LH Filter | 0.45 µm / 4 mm | 100 | SLLHR04NL |
| Millex-LCR Filter | 0.45 µm / 13 mm | 100 | SLCR013NL |
| Millex-LCR Filter | 0.45 µm / 33 mm | 50 | SLCR025NS |

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# Accessories

## Vacuum/Pressure Pumps

**For flow rates of up to 37 L/min**

These High Output Pumps feature a piston-driven design for greater power. As Chemical Duty Pumps, they have a chemically-resistant head and diaphragm for use with corrosive chemicals and solvents.

| Description | Catalogue No. |
|---|---|
| Vacuum/Pressure Pump (115V) | WP6111560 |
| Vacuum/Pressure Pump (220V) | WP6122050 |



## Millivac™ Vacuum Pumps

**Maintenance-free, mini-diaphragm pumps**

Millivac vacuum pumps are compact, maintenance-free pumps that provide a consistent source of vacuum for filtration and other laboratory applications. A patented diaphragm design has reduced the footprint of the pumps compared to conventional models.

| Description | Catalogue No. |
|---|---|
| Millivac Vacuum Pump (Mini, 115V) | SD1M001V00 |
| Millivac Vacuum Pump (Mini, 230V) | XF5423050 |
| Millivac Vacuum Pump (Maxi) | SD1P014M04 |



## Protect Your Pumps with Millex Filter Units

**Filter units with hydrophobic PTFE membrane**

Millex filter units with hydrophobic Fluoropore membrane prevent liquids from passing through, keeping your pumps and in-line vacuum systems free of liquid contamination.

| Description | Catalogue No. |
|---|---|
| Millex Filter Units | SLFH05000 |



## Filter Forceps

Handle filters without contaminating or damaging them with our easy-to-clean, stainless steel, flat-tipped forceps.

| Description | Catalogue No. |
|---|---|
| Filter Forceps | XX6200006 |



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## Solvent Filtering Dispenser

**For 25 mm disc filters**. Simultaneously dispense and ultraclean small volumes of solvent by squeeze-bottle action. Hand-pressure operated dispenser with filter holder fitted with a delivery tube. Use to direct filtered solvent against surfaces.

| Description | Catalogue No. |
|---|---|
| Solvent Filtering Dispenser | XX6602500 |



## Swinnex® Filter Holders

Use to ultraclean or sterilize small volumes of liquids dispensed by syringe. Connect Swinnex 47 mm filter holder with tubing to pressurized reservoir or automatic filling machine for filtering larger volumes.

| Description | Qty/Pk | Catalogue No. |
|---|---|---|
| Swinnex Filter Holder, 13 mm | 10 | SX0001300 |
| Swinnex Filter Holder, 25 mm | 12 | SX0002500 |
| Swinnex Filter Holder, 47 mm | 8 | SX0004700 |



## Stainless Steel Filter Holders

**For 90 and 142 mm disc filters**

Ultraclean or sterilize liquids or gases by pressure filtration.

| Description | Qty/Pk | Catalogue No. |
|---|---|---|
| Filter Holder 90 mm, stainless steel | 1 | YY3009000 |
| Filter Holder 142 mm, stainless steel | 1 | YY3014236 |



## Sterifil® Aseptic System and Holder

**For 47 mm disc filters.** Use for general filtration applications and filtration of samples for particulate or biological contamination analysis. The closed unit protects sample and filtrate from environmental contamination. Sterifil holder and funnel available separately (without receiver flask and cover) to use with standard 1 L vacuum filtering flask or multiple place manifold.

| Description | Qty/Pk | Catalogue No. |
|---|---|---|
| Sterifil Aseptic System, 47 mm | 1 | XX1104700 |
| Sterfil Holder, 250 mL | 1 | XX1104710 |
| Sterifil Holder, 500 mL | 1 | XX11J4750 |



## Hand Vacuum Pumps

Dispense liquids into small containers and pressure-filter small volumes using a hand vacuum pump, which consists of a Luer-outlet polypropylene syringe attached to a 2-way vacuum valve, nylon male-to-male Luer adapter and rubber tubing with male Luer inlet.

| Description | Qty/Pk | Catalogue No. |
|---|---|---|
| Hand Vacuum Pump, stainless steel valve | 1 | XX6200035 |
| Hand Vacuum Pump, polypropylene valve | 1 | XKEM00107 |



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# Membranes for Contamination Monitoring

**1. Glass Fiber Filters**
Borosilicate microfiber glass without binder resin. Gravimetric stability up to 500 °C. For suspended solids in water and waste water.

**2. Isopore Membrane Filters**
Polycarbonate film. Consistently low ash and tare weights. Hydrophilic, non-hygroscopic. For Chemotaxis, Environmental/air analysis.

**3. PTFE Membranes**

Fluoropore Membrane Filters
Bonded to high-density polyethylene support for easier handling. Broad chemical compatibility. For air monitoring, prefiltration of solvents.

Mitex Membrane Filters
Unsupported PTFE membrane. It can be used under extreme chemical or temperature conditions that other membranes cannot withstand (up to 260 °C). Broad chemical compatibility.

LCR Membrane Filters
Hydrophilized PTFE. LCR is compatible with all commonly used HPLC solvents. It can be used to filter aqueous fluids without prior wetting.

Omnipore™ Membrane Filters
Hydrophilic PTFE compatible with virtually all solvents, acids and alkaline solutions.

**4. Nylon Membrane Filters**
Nylon polyamide 6,6. Use for large particle filtration, particle analysis, prefiltration of solvents.

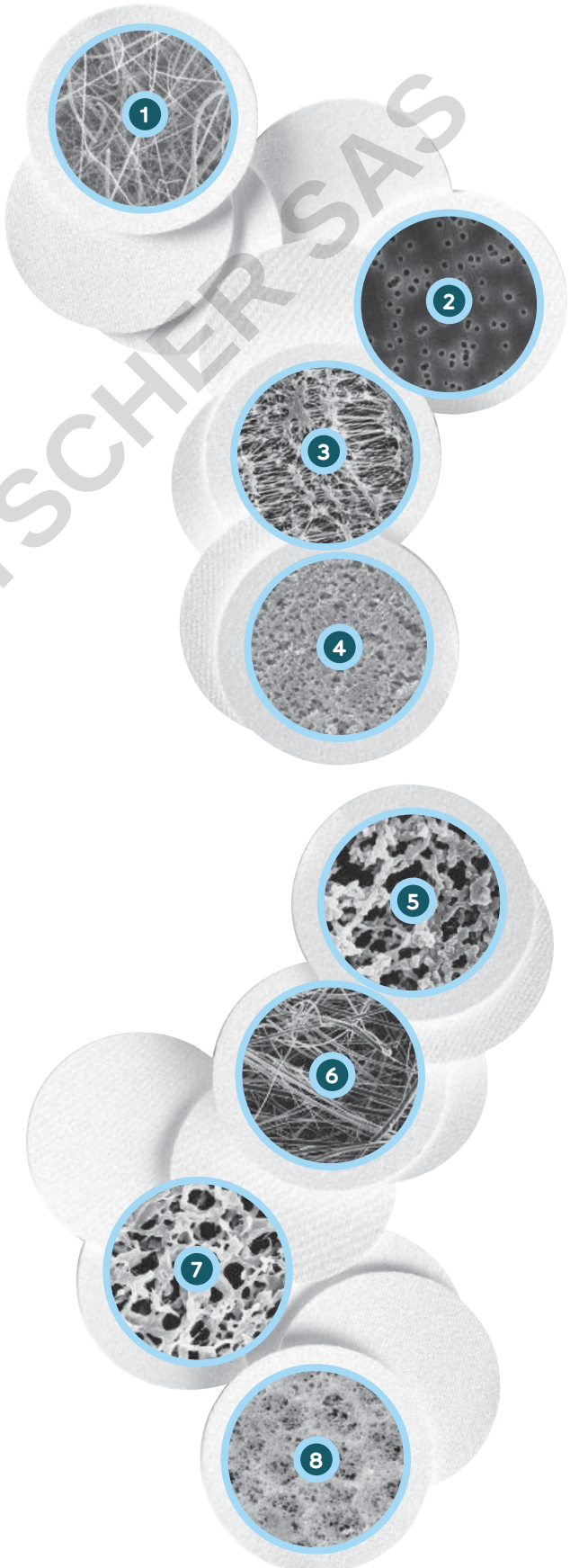
**5. MCE Membrane filters**
Mixed cellulose esters. For monitoring particulate contamination in air and clarification and sterilization of fluids.

**6. Quartz Membrane Filters**
Pure quartz fibers with no glass fibers or binders. For measurement of heavy metal concentrations and small amounts of particles (such as the USEPA PM 10 ambient air monitoring method).

**7. Durapore Membrane Filters**
PVDF (polyvinylidene fluoride). For monitoring particulate contamination in air and clarification and sterilization of fluids.

**8. PVC Membrane Filters**
Pure, medical-grade PVC. Low weight and low moisture pick-up. For monitoring silica, carbon black or metal particles in air. Excellent for gravimetric analysis.

**Silver Membrane Filters (not shown)**
Pure silver. For monitoring of carbon black, coal tar products, coke oven emissions and silica in air.




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# Filter Holders Selection Guide

| Size | Glass | Stainless Steel | | Plastic | |
|---|---|---|---|---|---|
| | Vacuum | Vacuum | Pressure | Vacuum | Pressure |
| **13 mm** | | Epifluorescence  Analytical Filter  | Stainless Steel Filter Holder  | | Swinnex  |
| **25 mm** | Microanalysis filter holder (fritted base or SS screen)  | Analytical Filter Holder  | High Pressure Filter Holder  Microsyringe Filter Holder  Solvent Filtering Dispenser  Filterjet Solvent Dispenser  | 1225 Sampling Manifold  | Swinnex  |
| **47 mm** | Filter Holder Assembly  All-Glass Filter Holder  MilliSolve™ Kit  | Analytical Filter Holder  Hydrosol Filter Holder  | Filter Holder (100 or 340 mL)  High Pressure Filter Holder  SS Filter Holder  | Sterifil System  Sterifil 500 Holder  | Swinnex  In-Line Filter Holder  |
| **90 mm** | All-Glass Filter Holder  | | SS Filter Holder  | | |
| **142 mm** | | | SS Filter Holder  | | |

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## Millipore devices and systems designed for environmental and industrial QC have been developed for use with standard methods.

The table below lists some of the standard methods that use Millipore filters and filter holders. If your method does not appear on this list, please contact technical service at **www.millipore.com/techservice** for a recommendation on the best tools for your particular application.

| Agency | Method | Recommended Millipore Filters/Holders |
|---|---|---|
| **Aerospace Fluids** | | |
| ASTM | F303 | XX4404700 |
| ASTM | F311 | XX1504700, XX6602500, AAWG04700 |
| ASTM | E519 | AAWP04700, AAWP0470M, or AAWG04700 |
| **Fuels** | | |
| ASTM | D2274 | AAWP0470M |
| ASTM | D2276 | AAWP0470M, XX6403730, MAWP037PM, MAWP037P0 |
| **Hydraulic Fluids** | | |
| ASTM | D2271 | NY20 (20 µm) or NY60 (60 µm) |
| ASTM | D4898 | Contact Technical Service |

For a complete listing of European testing methods and recommended Millipore products, contact European tech support by visiting **www.millipore.com/techservice**.

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# Let your work flow.

## Improve your industrial QC testing with the new Milli-Q® Integral water purification system.

### Pure and ultrapure water at your fingertips:

- Dual POD (point of delivery) concept is space saving and convenient
- Lower running costs and water waste with exclusive Elix® technology

### Water quality affects your QC test results.

You use only the purest standards, membranes, and organic solvents for your analytical tests. However, test result artifacts can be directly attributable to the quality of water used in aqueous solvents, standards, and samples. With over 50 years of experience in analytical research, Millipore has improved QC data by including resistivity and TOC monitoring in ultrapure water systems.




Call **1-800-MILLIPORE** or visit **www.millipore.com/pureQC**.

When you order any Millipore product, anywhere in the world, you are entitled to our steadfast technical support. Our representatives can answer your most complex product and application questions.

## TO PLACE AN ORDER OR RECEIVE TECHNICAL ASSISTANCE

In the **U.S. and Canada**, call toll-free 1 800-Millipore (1-800-645-5476)

In **Europe**, please call Customer Service:
France: 0825.045.645
Spain: 901.516.645 Option 1
Germany: 01805.045.645
Italy: 848.845.645
English UK: 0870.900.46.45

For other countries across Europe and the world, please visit **www.millipore.com/offices**.

For Technical Service, please visit **www.millipore.com/techservice**.

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**www.millipore.com**

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