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ADVANTEC MFS, Inc.

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# Micro Filtration Technology for Laboratory & Process Systems

# Table of Contents



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MFS
Micro Filtration Systems

# Introduction

Advantec MFS, Inc. is a wholly owned subsidiary of Toyo Roshi Kaisha, Ltd. (Japan), a major producer of filtration media and related scientific products since 1916. This US-based operation was originally founded in 1979 as Toyo Roshi International, Inc., a California corporation. Two of the three original divisions (Main Office and Micro Filtration Systems) were merged in 1995 to become Advantec MFS, Inc.

We aim to serve the pharmaceutical, public health, food and beverage, health care, life sciences and electronics industries with high quality products for separation science. Our product range includes membrane filters, prefiltration media, glass fiber and cellulose filters, qualitative and quantitative filter papers, specialty test papers, and an extensive range of filter holders in stainless steel, plastic, and glass for laboratory and process applications.

Customers have the right to expect the highest quality products we can produce. We manufacture our filter products to exacting standards and have established quality control specifications to assure you of product consistency, reproducibility, uniform performance and superior product integrity. The bulk of our membrane filters, test papers, and filtration units are manufactured under a quality management system certified by Lloyd's Register QA Ltd. as ISO 9001 approved. This certification is recognized by the Dutch Accreditation Council (RvA) whose accreditation is accepted in 110 countries, and by the Japan Accreditation Board for Conformity Assessment (JAB). All phases of manufacturing for all of our products, from raw material to finished goods, are closely monitored.

Our Customer Service Department prides itself on its excellent service and prompt accurate deliveries. Orders will ship the same day they are placed for stock on hand. In the case of back ordered supplies, we can give you an accurate lead time and suggest alternatives that may meet your needs. Should you have any questions about any of our products, our Technical Service department will provide you with current, application-specific information. We value our customers large and small and we strive to support them in every way possible.

Our goal continues to be what we have done for over 70 years: to manufacture consistent, reproducible quality products at the lowest possible cost and to provide the best possible service in their delivery.

# Membrane Filters



## Membranes

Membrane filters or "membranes" are microporous plastic films with specific pore size ratings. Also known as screen, sieve or microporous filters, membranes retain particles or microorganisms larger than their pore size primarily by surface capture. Some particles smaller than the stated pore size may be retained by other mechanisms.

Advantec MFS membranes are produced by three different processes. Mixed Cellulose Esters, Cellulose Acetate, and Nylon are reverse phase solvent cast membranes, where controlled evaporation or removal of the complex solvent system forms the porous structure. Both hydrophilic and hydrophobic PTFE are made by a patented process where the membranes are stretched biaxially to form the porous structure. PCTE membranes are track etched.

## Performance Characteristics of Advantec MFS Membranes

- **Strong:** Advantec MFS membranes are monitored for both burst (longitudinal) and tensile (lateral) strength. Supported Acetate and Nylon are the strongest reverse phase membranes available from Advantec MFS
- **Chemically and biologically clean:** As part of a comprehensive quality program, only high purity reagents and raw materials are used to produce Advantec MFS membranes. Once cast, the membranes are handled in a class 100 clean room to minimize ambient contamination. While some membranes require a small amount (0.1–3 weight %) of an aqueous wetting agent, Cellulose acetate has the lowest aqueous extractible (0.1 weight %) and Nylon, inherently hydrophilic, contains no added wetting agents or surfactants. All Advantec MFS membranes are Triton- and pyrogen-free (0.005 ng/cm$^2$ filter area)
- **Thin membranes with high porosity:** Uniformly thin membranes (typically 150 µm) with high porosity (about 80%) provide high gas and liquid flow per unit area. High porosity also provides high surface area for adsorption or binding
- **Thermostable:** All Advantec MFS membranes can be sterilized by autoclaving. Operating temperatures of up to 180°C can be achieved depending upon the membrane polymer (see individual membrane specifications for details). Advantec MFS membranes exhibit minimal shrinkage at elevated temperatures

## Quick Guide to Selecting Membrane Filters

- **Determine** what liquid or gas will be filtered
- **Check** which membranes are chemically compatible (following and appendix)
- **Determine** the maximum pore size required to achieve the results you want
- **Check** the membrane specifications for any unusual process conditions that might otherwise limit your choice of membrane (e.g. temperature)

For more detailed information on how to design a filtration system see the appendix, page 110.

# Properties of Membrane Filters

## MEMBRANE COMPARISON

| Membrane polymer | Sample applications | General compatibility | Hydrophilic | Hydrophobic | Pore size range available (µm) 0.1 0.2 0.45 0.8 1.0 3.0 5.0 8.0 10 |
|---|---|---|---|---|---|
| Mixed cellulose esters (MCE) | General purpose<br>Microbiology<br>Particle Analysis | Aqueous solutions | ✓ | | |
| Cellulose Acetate | General filtration<br>Cytology<br>Binding studies | Aqueous solutions | ✓ | | |
| Coated Cellulose Acetate | Clarify solutions<br>Prefilter | Aqueous solutions | ✓ | | |
| Hydrophilic PTFE | HPLC solutions<br>Clarify or sterilize aqueous/organic mixtures | Aqueous and organic solutions | ✓ | | |
| Hydrophobic PTFE | Gas venting<br>Clarify or sterilize strong acids or solvents | Non-aqueous solvents | | ✓ | |
| Nylon | Filter sterilization<br>Vacuum degassing<br>HPLC solutions | Aqueous and organic solutions | ✓ | | |
| Polycarbonate | Microscopy<br>Beverage testing | Aqueous solutions | ✓ | | |
| PVC | Particulate analysis<br>Industrial hygiene | Aqueous solutions | | ✓ | |

## ORDERING INFORMATION: MEMBRANE FILTER NOMENCLATURE

The membrane filter nomenclature specifies the required information for correctly ordering membranes. The nine digit code specifies type, pore size, surface/type, diameter and packaging as illustrated below.

| A | 020 | A | 293 | C | EXAMPLE |
|---|---|---|---|---|---|

**Quantity per Package**

| | | |
|---|---|---|
| A = 100 | E = 5 | R = 1 roll |
| B = 50 | H = 25 with 60 mm center hole | Y = 200 |
| C = 25 | K = HE ind pack WG, 100 | W = 1000 |
| D = 10 | | |

**Diameter** (mm)

| | | | | |
|---|---|---|---|---|
| 13 = 013 | 47 = 047 | 90 = 090 | 142 = 142 | |
| 20 = 020 | 50 = 050 | 100 = 100 | 293 = 293 | |
| 25 = 025 | 82 = 082 | 102 = 102 | | |
| 37 = 037 | 85 = 085 | 137 = 137 | | |

**Sheets/Rolls** (cm)

| | |
|---|---|
| 15 x 15 = 154 | 33 x 56 = 356 |
| 15 x 9.2 = 159 | 30 x 30 = 304 |
| 20 x 20 = 204 | 33 cm x 3m = 330 |

**Surface/Type**

| Packaging | Non-Sterile Packages | | 10x10-A Autoclavable | | Pre-Sterilized Packages 10x10-S | | Individually Wrapped Plain | | Individually Wrapped Grid |
|---|---|---|---|---|---|---|---|---|---|
| Surface | Plain | Grid | Plain | Grid | Plain | Grid | No Pad | Pad | No Pad |
| White | A, X** | B | S | T | C | D | G | F | H |
| White HE* | J | K | | | | | | | |
| Black | N | P | | | | | Q | M | R |
| Green | U | V | | | | | | | W |

*HE = Hydrophobic Edge **Opticlear MF

**Membrane Pore Size** (µm)

| | | | |
|---|---|---|---|
| 5.0 = 500 | 1.0 = 100 | 0.50 = 050 | 0.22 = 022 |
| 3.0 = 300 | 0.8 = 080 | 0.45 = 045 | 0.20 = 020 |
| 1.2 = 120 | 0.65 = 065 | 0.3 = 030 | 0.1 = 010 |

**CMF** (nominal µm)

| |
|---|
| 10 = 100 |
| 2 = 020 |
| 0.8 = 008 |

**Type of Filter**

| | | |
|---|---|---|
| A = Mixed Cellulose Ester | H = Hydrophilic PTFE | K = Polycarbonate |
| B = Cellulose pads | J = Hydrophobic PTFE, polypropylene backing | N = Nylon, supported |
| C = Cellulose acetate | | P = Polyvinylchloride |
| | | Y = Coated cellulose acetate |

## Mixed Cellulose Esters (MCE)

- **Composition:** Mixed cellulose esters including cellulose nitrate and cellulose acetate, also known as nitrocellulose
- **High porosity** provides superior flow rates
- **High protein binding** can be blocked by pretreatment or utilized in applications
- **High purity:** Triton-free and non reactive to pyrogens
- **Autoclavable:** Withstands autoclaving temperatures up to 130°C without adversely affecting bubble point, flow rate or microbiological recovery
- **Rapid wetting time:** < 3 seconds to wet a 47 mm diameter disc with aqueous 1% methylene blue

### APPLICATIONS

- Standard membranes for many laboratory applications including filter sterilizing biological fluids, microbiology, contamination analysis and air monitoring
- Can be transparentized to view collected particles
  - using compatible liquid (immersion oil, toluene),

    OR

  - select Opticlear membranes for the "hot block" acetone vapor method
- Gridded filters available for quantifying microbial growth
- Available non-sterile or sterilized by ethylene oxide (EtO)

### SPECIFICATIONS FOR MIXED CELLULOSE ESTER (MCE), CODE A

| Pore Size µm | Color | Surface | Bubble Point[1] | | Flow Rate[2] | | Porosity[3] % | Thickness µm |
|---|---|---|---|---|---|---|---|---|
| | | | MPa | psi | Water ml/min/cm² | Air L/min/cm² | | |
| 0.10 | White | Plain | ≥0.24 | ≥35.3 | 2.7 | 0.67 | 65 | 110 |
| 0.20 | White | Plain | ≥0.37 | ≥54.5 | 17.5 | 2.4 | 73 | 133 |
| 0.30 | White | Plain | ≥0.28 | ≥41.2 | 30 | 3.7 | 75 | 140 |
| 0.45 | White | Plain | ≥0.24 | ≥35.0 | 45 | 5.0 | 78 | 145 |
| 0.45 | White | Grid | ≥0.16 | ≥24.2 | 80 | 8.0 | 79 | 142 |
| 0.65 | White | Plain | ≥0.14 | ≥21.3 | 120 | 11.2 | 79 | 150 |
| 0.80 | White | Plain | ≥0.11 | 16.4 | 165 | 15.0 | 80 | 150 |
| 1.00 | White | Plain | ≥0.096 | ≥13.9 | 220 | 20.4 | 80 | 150 |
| 3.00 | White | Plain | ≥0.070 | ≥10.2 | 300 | 28.3 | 81 | 155 |
| 5.00 | White | Plain | ≥0.058 | ≥8.5 | 400 | 40.9 | 81 | 160 |
| | | | | | | | | |
| 0.45 | Black | Grid | ≥0.22 | ≥32.7 | 50 | 5.0 | 78 | 135 |
| 0.80 | Black | Grid | ≥0.10 | ≥14.9 | 170 | 15 | 80 | 145 |
| | | | | | | | | |
| 0.45 | Green | Grid | ≥0.22 | ≥32.7 | 50 | 5.0 | 78 | 135 |
| 0.80 | Green | Grid | ≥0.10 | ≥14.9 | 170 | 15 | 80 | 145 |

- Refractive index 1.50
- Maximum operating temperature 130°C

**Definitions:**

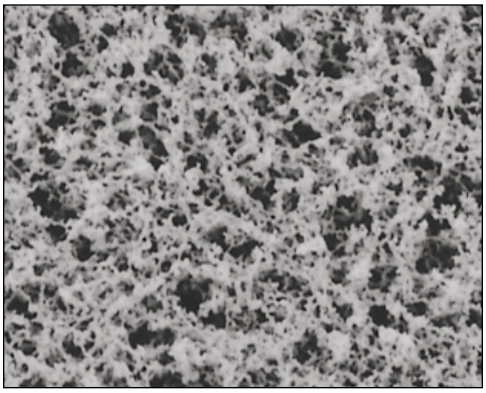
1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water (0.1 µm membranes prewet with isopropanol)
2. Flow Rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi
3. Porosity refers to the percent open area

### Protein Binding of Membrane Filters

| Membrane | Catalog code | Protein Adsorbed (µg/cm²) | | |
|---|---|---|---|---|
| | | Ovalbumin | γ-globulin | Total |
| Mixed Cellulose Esters, 0.2 µm | A020… | 7.8 | 116.9 | 124.7 |
| Cellulose Acetate, 0.2 µm | C020… | 21.3 | 11.0 | 32.3 |

**Ash Content of White Plain MCE Membrane Filters (ppm)**

| | | | | | |
|---|---|---|---|---|---|
| **Al** | <2.0 | **K** | 6.0 | **Ni** | <5.0 |
| **Ca** | 140.0 | **Li** | <1.0 | **Pb** | <1.0 |
| **Cd** | <0.5 | **Mg** | 10.0 | **Si** | <20.0 |
| **Cr** | 8.0 | **Mn** | <0.5 | **Sn** | <5.0 |
| **Cu** | <1.0 | **Mo** | <1.0 | **Ti** | <1.0 |
| **Fe** | <5.0 | **Na** | 10.0 | **Zn** | <1.0 |



Mixed Cellulose Esters

## Ordering Information: Mixed Cellulose Ester – Nonsterile

**Plain White, package of 100 disks**

| Pore Size (µm) | 13 mm | 25 mm | 47 mm | 50 mm |
|---|---|---|---|---|
| 0.10 | A010A013A | A010A025A | A010A047A | - |
| 0.20 | A020A013A | A020A025A | A020A047A | A020A050A |
| 0.30 | A030A013A | A030A025A | A030A047A | - |
| 0.45 | A045A013A | A045A025A | A045A047A | A045A050A |
| 0.65 | A065A013A | A065A025A | A065A047A | A065A050A |
| 0.80 | A080A013A | A080A025A | A080A047A | A080A050A |
| 1.00 | A100A013A | A100A025A | A100A047A | A100A050A |
| 3.00 | A300A013A | A300A025A | A300A047A | A300A050A |
| 5.00 | A500A013A | A500A025A | A500A047A | A500A050A |

**Plain White, package of 25 disks**

| Pore Size (µm) | 90 mm | 100 mm | 102 mm | 142 mm | 293 mm | 293/60 mm* |
|---|---|---|---|---|---|---|
| 0.10 | A010A090C | - | - | A010A142C | A010A293C | A010A293H |
| 0.20 | A020A090C | A020A100C | - | A020A142C | A020A293C | A020A293H |
| 0.30 | A030A090C | - | - | A030A142C | A030A293C | - |
| 0.45 | A045A090C | A045A100C | A045A102C | A045A142C | A045A293C | A045A293H |
| 0.65 | A065A090C | - | - | A065A142C | A065A293C | A065A293H |
| 0.80 | A080A090C | - | - | A080A142C | A080A293C | A080A293H |
| 1.00 | A100A090C | - | - | A100A142C | A100A293C | A100A293H |
| 3.00 | A300A090C | - | - | A300A142C | A300A293C | A300A293H |
| 5.00 | A500A090C | - | - | A500A142C | A500A293C | A500A293H |

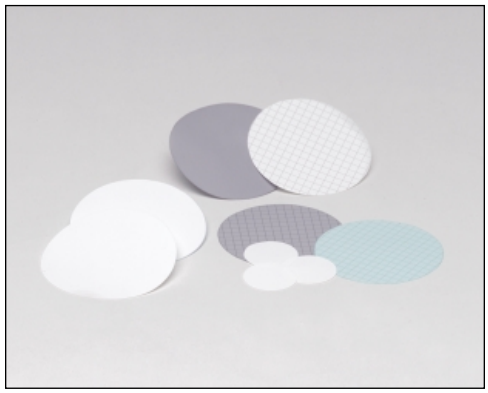
*60 mm center hole

## Ordering Information (continued): Mixed Cellulose Ester – Nonsterile

### Gridded White, package of 100 disks

| Pore Size (µm) | 13 mm | 25 mm | 37 mm | 47 mm | 50 mm |
|---|---|---|---|---|---|
| 0.45 | A045B013A | A045B025A | A045B037A | A045B047A | A045B050A |
| 0.65 | A065B013A | A065B025A | - | A065B047A | A065B050A |
| 0.80 | A080B013A | A080B025A | A080B037A | A080B047A | A080B050A |

0.8 µm MF is green grid lines on white background, 0.45 and 0.65 µm have black grid lines.



MCE membrane assortment

### Roll, Plain White

| Pore Size (µm) | Qty/pkg | 33 cm x 3 m |
|---|---|---|
| 0.10 | 1 | A010A330R |

### Sheets, Gridded White

| Pore Size (µm) | Qty/pkg | 30 mm x 30 mm |
|---|---|---|
| 0.45 | 25 | A045B304C |

### Hydrophobic Edge, 47 mm disks, package of 100 disks

| Pore Size (µm) | Plain | Grid |
|---|---|---|
| 0.20 | A020J047A | A020K047A |
| 0.45 | A045J047A | A045K047A |

### Opticlear, package of 100 disks

| Pore Size (µm) | 25 mm | 37 mm | 47 mm |
|---|---|---|---|
| 0.80 | A080X025A | A080X037A | A080X047A |

### Black, package of 100 disks

| Pore Size (µm) | Surface | 13 mm | 25 mm | 37 mm | 47 mm | 137 mm (25/pkg) |
|---|---|---|---|---|---|---|
| 0.45 | Plain | A045N013A | A045N025A | A045N037A | A045N047A | - |
| 0.45 | Grid | A045P013A | A045P025A | A045P037A | A045P047A | A045P137C |
| 0.80 | Plain | A080N013A | A080N025A | - | A080N047A | - |
| 0.80 | Grid | A080P013A | A080P025A | - | A080P047A | - |

0.45 µm 47 mm black grid membrane also available presterilized: A045P047S

### Green, package of 100 disks

| Pore Size (µm) | Surface | 13 mm | 25 mm | 47 mm |
|---|---|---|---|---|
| 0.45 | Plain | A045U013A | A045U025A | A045U047A |
| 0.45 | Grid | A045V013A | A045V025A | A045V047A |
| 0.80 | Grid | - | - | A080V047A |

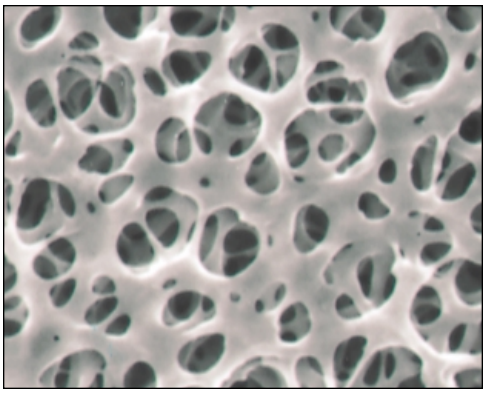
Additional sizes available by special order.
Also available in:

- Sterile packaging for microbiology.
- Disposable syringe units.

For Pure Nitrocellulose for Blotting, see page 35.
MSDS available for this product.

## Cellulose Acetate

- **Composition:** Mixture of cellulose triacetate and diacetate
- **Characteristics:** Low static charge and high strength
- **Sterilizable:** May be repeatedly sterilized without loss of integrity or change in bubble point
- **Clean:** Lowest aqueous extractibles (0.1 wt%) of all Advantec MFS membranes
- Relative to MCE (Mixed Cellulose Ester, Nitrocellulose):
  - improved solvent resistance to low molecular weight alcohols
  - better heat resistance
  - lower protein binding (see page 4)



Cellulose Acetate

### Applications

- Enhanced recovery of fastidious gram positive organisms
- Filtration of enzyme solutions
- Diagnostic cytology
- Receptor binding studies

**Note:** Should be prewet prior to loading into a holder and autoclaving.

### Specifications: White Plain Cellulose Acetate, Code C

| Pore Size (µm) | Bubble Point [1] | | Flow Rate [2] | | Porosity [3] (%) | Thickness [4] (µm) |
|---|---|---|---|---|---|---|
| | MPa | psi | Water (ml/min/cm²) | Air (L/min/cm²) | | |
| 0.20 | ≥0.25 | ≥37.1 | 16 | 2 | 66 | 125 |
| 0.45 | ≥0.17 | ≥25.9 | 35 | 4 | 68 | 125 |
| 0.80 | ≥0.068 | ≥10.0 | 160 | 14 | 72 | 125 |
| 3.00 | ≥0.034 | ≥5.0 | 500 | 54 | 78 | 135 |

- Wetting time: <3 seconds to wet a 47 mm diameter disc with aqueous 1% methylene blue
- Refractive index = 1.47
- Maximum Operating Temperature 180°

**Definitions:**

1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water
2. Flow Rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi
3. Porosity refers to the percent open area
4. Average thickness

**Ash Content of White Plain Cellulose Acetate Membrane Filters (ppm)**

| | | | | | |
|---|---|---|---|---|---|
| **Al** | <5.0 | **K** | 2.0 | **Ni** | <0.5 |
| **Ca** | 36.4 | **Li** | <0.5 | **Pb** | <0.5 |
| **Cd** | <0.1 | **Mg** | 1.9 | **Si** | 7.8 |
| **Cr** | 2.2 | **Mn** | <0.5 | **Sn** | <0.5 |
| **Cu** | 1.2 | **Mo** | <0.5 | **Ti** | <5.0 |
| **Fe** | 1.6 | **Na** | 5.9 | **Zn** | 0.6 |

## Ordering Information: Cellulose Acetate – Nonsterile

**Plain White, package of 100 disks**

| Pore Size (µm) | 13 mm | 25 mm | 47 mm | 50 mm |
|---|---|---|---|---|
| 0.20 | C020A013A | C020A025A | C020A047A | - |
| 0.45 | C045A013A | C045A025A | C045A047A | C045A050A |
| 0.80 | C080A013A | C080A025A | C080A047A | - |
| 3.00 | C300A013A | C300A025A | C300A047A | C300A050A |

**Plain White, package of 25 disks**

| Pore Size (µm) | 90 mm | 142 mm | 293 mm | 293/60 mm* |
|---|---|---|---|---|
| 0.20 | C020A090C | C020A142C | C020A293C | C020A293H |
| 0.45 | C045A090C | C045A142C | C045A293C | C045A293H |
| 0.80 | C080A090C | C080A142C | C080A293C | C080A293H |
| 3.00 | C300A090C | C300A142C | C300A293C | C300A293H |

*60 mm center hole

**Rolls, Plain White, 33 cm x 3 m**

| Pore Size (µm) | Roll |
|---|---|
| 0.20 | C020A330R |
| 0.45 | C045A330R |
| 0.80 | C080A330R |

Also available in:

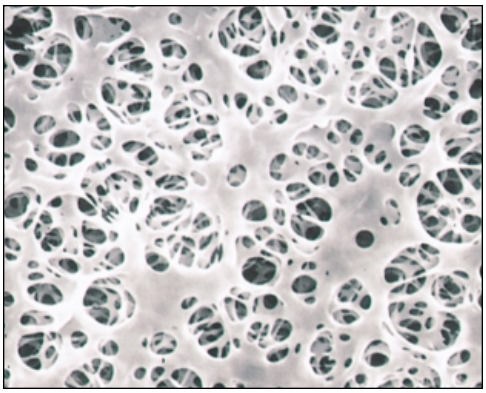
- Cartridge format
- Disposable syringe filter units

## Coated Cellulose Acetate

- **Composition:** Cellulose acetate cast onto a non-woven polyester support
- **Characteristics:** Non-fiber releasing
- **Low protein binding** relative to nitrocellulose
- **Low static charge** matrix with enhanced chemical compatibility to low molecular weight alcohols

### Application

- Use as a clarifying filter or prefilter



Coated Cellulose Acetate

### Specifications: Coated Cellulose Acetate (CMF) Code Y

| Nominal Rating (µm) | Bubble Point[1] | | Flow Rate[2] | | % Latex Particle Retention (particle size in µm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MPa | psi | Water (ml/min/cm²) | Air (L/min/cm²) | 0.48 | 0.65 | 0.80 | 1 | 2 | 3 | 5 | 10 |
| 0.80 | ≥0.088 | ≥12.8 | 100 | 10 | 99 | 99 | >99.9 | - | - | - | - | - |
| 2.00 | ≥0.049 | ≥7.1 | 290 | 32 | 96 | 99 | 99 | 99 | >99.9 | - | - | - |
| 10.00 | ≥0.017 | ≥2.6 | 750 | 80 | - | - | - | - | 98 | 99.9 | 99.9 | >99.9 |

**Definitions:**

1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water.
2. Flow Rate indicates initial flow rate at 10 psi using a KGS 47 filter holder.
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi

### Ordering Information: Coated Cellulose Acetate – Nonsterile

**Plain White, package of 100 disks**

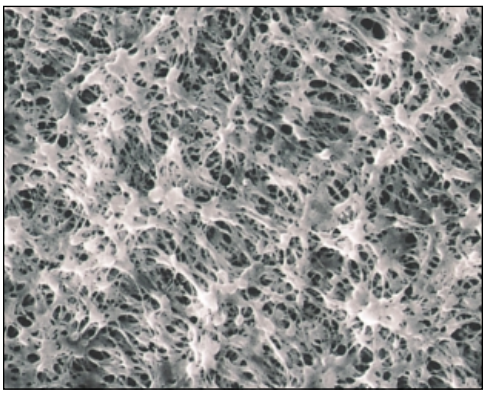
| Nominal Rating (µm) | 35 mm | 47 mm | 76 mm | 90 mm | 124 mm | 142 mm | 257 mm | 293 mm |
|---|---|---|---|---|---|---|---|---|
| 0.80 | Y008A035A | Y008A047A | Y008A076A | Y008A090A | Y008A124A | Y008A142A | Y008A257A | Y008A293A |
| 2.00 | Y020A035A | Y020A047A | Y020A076A | Y020A090A | Y020A124A | Y020A142A | Y020A257A | Y020A293A |
| 10.00 | Y100A035A | Y100A047A | Y100A076A | Y100A090A | Y100A124A | Y100A142A | Y100A257A | Y100A293A |

Also available in:

- Cartridge format (TCY and TCYE)

## Hydrophilic PTFE

- **Characteristics:** Maximum chemical and pH resistance
- **High flow rates** with minimal aqueous extractables (<0.3 wt%)
- **Optically clear** when wet with water
- **Non-supported**


Hydrophilic PTFE

### APPLICATION

- Ideal for HPLC and other mixtures of aqueous and organic solvents

**Note:** Autoclaving or allowing membrane to dry will render it hydrophobic.

### SPECIFICATIONS: HYDROPHILIC PTFE MEMBRANE, CODE H

| Pore Size (µm) | Bubble Point [1] | | Flow Rates [2] | | Porosity [3] (%) | Thickness (µm) | Maximum Operating Temperature (°C) |
|---|---|---|---|---|---|---|---|
| | MPa | psi | Water (ml/min/cm²) | Air (L/min/cm²) | | | |
| 0.10 | ≥0.38 | ≥21.3 | 14 | 1.6 | 71 | 35 | 100 |
| 0.20 | ≥0.24 | ≥11.4 | 21 | 2.1 | 71 | 35 | 100 |
| 0.50 | ≥0.14 | ≥5.7 | 39 | 2.9 | 79 | 35 | 100 |
| 1.00 | ≥0.083 | ≥2.1 | 73 | 5.7 | 83 | 35 | 100 |

**Definitions:**
1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water
2. Flow rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi
3. Porosity refers to the percent open area

**Trace Metal Content (ppm)**

| | | | |
|---|---|---|---|
| **Al** | 15 | **K** | 8 |
| **Ca** | 13 | **Mg** | 1 |
| **Cr** | <1 | **Mn** | 0.1 |
| **Cu** | 0.5 | **Na** | 20 |
| **Fe** | <10 | **Ni** | 0.9 |

### ORDERING INFORMATION: HYDROPHILIC PTFE – NONSTERILE

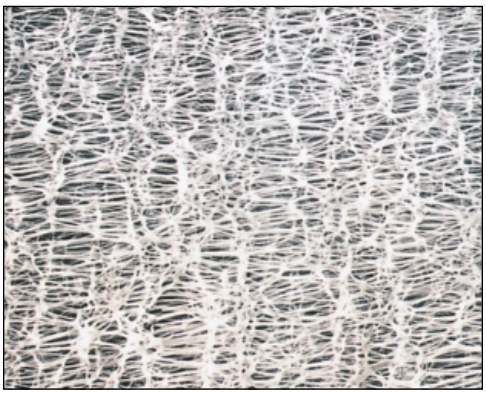
**Plain White, package of 100 disks**

| Pore Size (µm) | 13 mm | 25 mm | 47 mm | 90 mm | 142 mm | 293 mm |
|---|---|---|---|---|---|---|
| | package of 100 | | | package of 25 | | |
| 0.10 | H010A013A | H010A025A | H010A047A | H010A090C | H010A142C | H010A293C |
| 0.20 | H020A013A | H020A025A | H020A047A | H020A090C | H020A142C | H020A293C |
| 0.50 | H050A013A | H050A025A | H050A047A | H050A090C | H050A142C | H050A293C |
| 1.00 | H100A013A | H100A025A | H100A047A | H100A090C | H100A142C | H100A293C |

Also available in:
- Cartridge format
- Capsule format
- Disposable syringe filter units

## Hydrophobic PTFE

- **Properties:** Thin, highly porous, behaves as an absolute retentive membrane
- **Supported:** polypropylene laminated to one side to improve handling
- **Inert** to most chemically aggressive solvents, strong acids and bases
- **Thermostable:** can be used up to 100°C



Hydrophobic PTFE

### Applications

- Sterilize gases: traps aqueous aerosols
- Air and gas venting: allows gases to pass freely while blocking aqueous liquids, protect vacuum pumps and critical samples
- Sterilize and clarify strong acids and many other solvents incompatible with other membrane

### Specifications: Hydrophobic PTFE Membrane, Supported, Code J

| Pore Size (µm) | Bubble Point [1] | | Flow Rates [2] | | Porosity [3] (%) | Maximum Operating Temperature (°C) | Water Break Through | |
|---|---|---|---|---|---|---|---|---|
| | MPa | psi | Acetone (ml/min/cm²) | Air (L/min/cm²) | | | MPa | psi |
| 0.20 | ≥0.097 | ≥14.1 | 61.4 | 4.5 | 72 | 120 | 0.275 | 40.0 |
| 0.50 | ≥0.058 | ≥8.5 | 110 | 7.5 | 74 | 120 | 0.138 | 20.1 |
| 1.00 | ≥0.029 | ≥4.3 | 445 | 17 | 76 | 120 | 0.048 | 7.0 |

**Definitions:**

1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with methanol
2. Flow rates determined under constant vacuum 0.7 kg/cm² (10 psi)
3. Porosity refers to the percent open area

### Ordering Information: Hydrophobic PTFE – Nonsterile

**Plain White disks**

| Pore Size (µm) | 13 mm | 25 mm | 47 mm | 90 mm | 142 mm | 293 mm |
|---|---|---|---|---|---|---|
| | Package of 100 | | | Package of 25 | | Package of 10 |
| 0.20 | J020A013A | J020A025A | J020A047A | J020A090C | J020A142C | J020A293D |
| 0.50 | J050A013A | J050A025A | J050A047A | J050A090C | J050A142C | J050A293D |
| 1.00 | J100A013A | J100A025A | J100A047A | J100A090C | J100A142C | J100A293D |

Also available in:

- Cartridge format
- Capsule format
- Disposable syringe filter units

## Nylon

- **Composition:** Very strong, heat resistant membranes are manufactured by impregnating a polyester web with the nylon polymer
- **Inherently hydrophilic**
- **Compatible** with aqueous and alcoholic solutions and solvents
- **Pure:** negligible organic extractibles
- **Binds** proteins, DNA and RNA

### APPLICATIONS

- Suitable for HPLC sample preparation
- Filter sterilize and clarify aqueous and organic solvent solutions including buffers, microbiological and tissue culture solutions
- Vacuum degassing

### SPECIFICATIONS: NYLON MEMBRANE, CODE N

| Pore Size (µm) | Bubble Point [1] | | Flow Rates [2] | |
|---|---|---|---|---|
| | MPa | psi | Water (ml/min/cm²) | Air (L/min/cm²) |
| 0.10 | 0.48 | 70 | 3.5 | 0.6 |
| 0.22 | 0.31 | 46 | 10 | 1.7 |
| 0.45 | 0.19 | 29 | 27 | 3.2 |
| 0.65 | 0.10 | 16 | 60 | 4.5 |
| 0.80 | 0.089 | 14 | 100 | 14 |
| 1.20 | 0.059 | 9 | 190 | 18 |
| 5.00 | 0.039 | 6 | 360 | 34 |

Wetting time: <3 seconds to wet a 47 mm diameter disc with aqueous 1% methylene blue
Maximum Operating Temperature = 180°C
Thickness: 110 mm

**Definitions:**
1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with water
2. Flow rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi

### ORDERING INFORMATION: NYLON – NONSTERILE

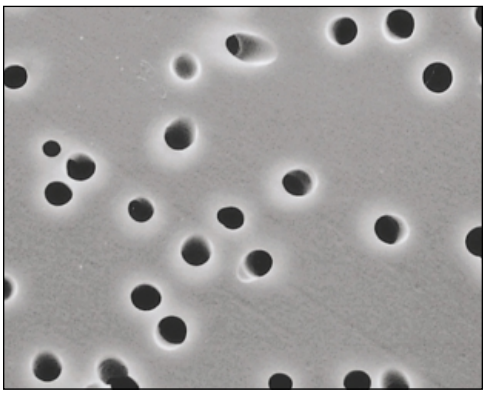
**Plain White disks**

| Pore Size (µm) | Diameter (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 13 mm | 25 mm | 47 mm | 90 mm | 142 mm | 293 mm |
| | 100 per package | | | 25 per package | | |
| 0.10 | N010A013A | N010A025A | N010A047A | N010A090C | N010A142C | N010A293C |
| 0.22 | N022A013A | N022A025A | N022A047A | N022A090C | N022A142C | N022A293C |
| 0.45 | N045A013A | N045A025A | N045A047A | N045A090C | N045A142C | N045A293C |
| 0.65 | N065A013A | N065A025A | N065A047A | N065A090C | N065A142C | N065A293C |
| 0.80 | N080A013A | N080A025A | N080A047A | N080A090C | N080A142C | N080A293C |
| 1.20 | N120A013A | N120A025A | N120A047A | N120A090C | N120A142C | N120A293C |
| 5.00 | N500A013A | N500A025A | N500A047A | N500A090C | N500A142C | N500A293C |

Also available in:
- Disposable syringe filter units

## Polycarbonate

- **Characteristics:** Low non-specific binding and optically translucent, extremely uniform, cylindrical pores
- **Thin screen-type membranes** minimize entrapment within the filter structure; resulting in surface capture of particles on the membrane
- **Stable:** excellent chemical resistance, good thermal stability, non-hygroscopic and extremely weight stable



Polycarbonate

### Applications

- Epifluorescence microscopy: available in black for this method
- Electron microscopy: smooth surface is ideal for observing captured particles
- Light microscopy: easily transparentized for optical illumination
- Beverage and sterility testing

### Specifications: Polycarbonate Membrane, Code K

| Pore Size (µm) | Bubble Point [1] | | Flow Rates [2] | | Nominal Thickness (µm) |
|---|---|---|---|---|---|
| | MPa | psi | Water (ml/min/cm²) | Air (L/min/cm²) | |
| 0.10 | ≥0.22 | >100 | 2 | 2 | 6 |
| 0.20 | ≥0.13 | 72 | 17 | 4 | 10 |
| 0.40 | ≥0.082 | 36 | 41 | 10 | 10 |
| 0.80 | ≥0.048 | 18 | 120 | 20 | 9 |
| 1.00 | ≥0.058 | 14 | 170 | 25 | 11 |
| 3.00 | ≥0.021 | 5 | 600 | 50 | 9 |
| 8.00 | ≥0.0048 | >2 | 1300 | 40 | 7 |

Maximum operating temperature = 140°C

Definitions:
1. Bubble point is the minimum pressure required to force air through a membrane which has been prewet with isopropanol
2. Flow rate indicates initial flow rate at 10 psi using a KGS 47 filter holder
   Water: using water prefiltered to 0.1 µm pore size
   Air: using prefiltered nitrogen at 10 psi

### Ordering Information: Polycarbonate – Nonsterile

**Plain White, package of 100 disks**

| Pore Size (µm) | 13 mm | 25 mm | 47 mm |
|---|---|---|---|
| 0.10 | K010A013A | K010A025A | K010A047A |
| 0.20 | K020A013A | K020A025A | K020A047A |
| 0.40 | K040A013A | K040A025A | K040A047A |
| 0.80 | K080A013A | K080A025A | K080A047A |
| 1.00 | - | - | K100A047A |
| 3.00 | - | - | K300A047A |
| 8.00 | K800A013A | K800A025A | K800A047A |

**Plain Black, package of 100 disks**

| Pore Size (µm) | 13 mm | 25 mm | 47 mm |
|---|---|---|---|
| 0.20 | - | K020N025A | K020N047A |
| 0.40 | - | K040N025A | K040N047A |

## Polyvinylchloride (PVC)

- **Composition:** prepared from homopolymer PVC (polyvinychloride)
- **Characteristics:** naturally hydrophobic, excellent weight stability
- **Pure:** silica-free, no additives or modifiers

### Applications

- Suitable for particulate analysis
- Electron microscopy: smooth surface is ideal for observing captured particles
- Ideal for industrial hygiene monitoring

### Ordering Information: Polyvinylchloride (PVC) Code P

| Pore Size (µm) | Available in in these diameters: | | | 8 x 10 inch sheets |
|---|---|---|---|---|
| | 13 mm | 25 mm | 47 mm | |
| | 50/pkg | 100/pkg | 50/pkg | 10/pkg |
| 0.50 | P050A025A | - | - | - |
| 0.80 | P080A025A | P080A037A | P080A047A | P0808X10IN |
| 5.00 | P500A025A | P500A037A | P500A047A | P5008X10IN |

## Disposable Syringe Filter Units

- **Minimum sample hold-up:** Unit housings are specifically designed to maximize sample recovery
- **High purity:** Non-pigmented housing and integral filter sealing assure that filtrates will not be adulterated due to pigment, dye, or adhesives leaching into the filtrate
- **Convenient:** Each unit is clearly marked with an identifying code to denote pore size, membrane material and housing polymer
- **Sterile:** Units can be purchased presterilzed and individually packaged, or nonsterile in bulk pack (all polyproplyene can be autoclaved)

MFS 3, 13, 25, and 50 disposable syringe filter units.

### Specifications

| | | MFS 3 | MFS 13 | MFS 25 | | MFS 50 |
|---|---|---|---|---|---|---|
| Housing material | - | PP | PP | PP | Acrylic | PP |
| Housing Diameter | mm | 3 | 13 | 25 | 25 | 50 |
| Filtration Area | $cm^2$ | 0.06 | 0.9 | 4.0 | 4.0 | 19.6 |
| Hold-up Volume | ml | <0.01 | <0.03 | <0.1 | <0.1 | <3.0 |
| Suggested capacity per filter unit | ml | <2 ml | <10 ml | <100 ml | <100 ml | >100 ml |
| Pressure limit | $kg/cm^2$ | 5.3 | 4.0 | 4.0 | 5.3 | 3.5 |
| | psi | 75 | 56 | 56 | 75 | 50 |
| Maximum Temperature | °C | 60 | 60 | 60 | 45 | 60 |
| | °F | 140 | 140 | 140 | 113 | 140 |
| Connections | - | inlet: female luer-lock<br>outlet: male luer slip | | | | 7-13.5 mm hose barb |

**Mixed Cellulose Esters (MCE, Nitrocellulose)**

- Properties: A hydrophilic membrane
- Higher protein binding than cellulose acetate for most proteins
- High porosity provides a high flow rate
- Autoclavable: stable to 121°C

**Nylon**

- Properties: Strong, hydrophilic membrane
- Compatible with aqueous and alcoholic solutions, as well as most HPLC solvents.
- Convenient: Prewetting not required
- Pure: Minimum extractibles
- High binding capacity for proteins, DNA and RNA
- Autoclavable: stable to 180°C

**Cellulose Acetate (Acetate)**

- Standard: A commonly used hydrophilic membrane
- Low protein binding, suitable for aqueous protein solutions
- Nitrate-free, suitable for groundwater filtration
- Housing material: polypropylene (3, 13, 50 mm) or styreneacrylonitrile (25 mm)

**PTFE, hydrophilic**

- Versatile: Good chemical resistance
- Compatible with many solvent mixtures used in HPLC, e.g. Acetonitrile/Water

**PTFE, hydrophobic**

- Application: use as vent

For ordering information, see page 16.

## Ordering Information: Disposable Syringe Filter Units

| Diam. | Membrane material | Pore size (µm) | Housing material | Quantity per package | Nonsterile | Sterile |
|---|---|---|---|---|---|---|
| 3 | Nylon | 0.22 | Polypropylene | 200 | 03NP022AN | - |
| | | 0.45 | Polypropylene | 200 | 03NP045AN | - |
| | | 5.00 | Polypropylene | 100 | 03NP500AN | - |
| | Cellulose Acetate | 0.20 | Polypropylene | 100 | 03CP020AN | 03CP020AS |
| | | 0.45 | Polypropylene | 100 | 03CP045AN | 03CP045AS |
| | PTFE, phobic | 0.50 | Polypropylene | 100 | 03JP050AN | - |

MFS 3

| 13 | Nylon | 0.22 | Polypropylene | 100 | 13NP022AN | - |
|---|---|---|---|---|---|---|
| | | 0.45 | Polypropylene | 100 | 13NP045AN | - |
| | Cellulose Acetate | 0.20 | Polypropylene | 100 | 13CP020AN | 13CP020AS |
| | | 0.45 | Polypropylene | 100 | 13CP045AN | 13CP045AS |
| | PTFE, philic | 0.20 | Polypropylene | 100 | 13HP020AN | - |
| | | 0.50 | Polypropylene | 100 | 13HP050AN | - |
| | PTFE, phobic | 0.20 | Polypropylene | 100 | 13JP020AN | - |
| | | 0.50 | Polypropylene | 100 | 13JP050AN | - |

MFS 13

| 25 | MCE | 0.20 | Acrylic | 50 | 25AS020AN | 25AS020AS |
|---|---|---|---|---|---|---|
| | | 0.45 | Acrylic | 50 | 25AS045AN | 25AS045AS |
| | Nylon | 0.10 | Polypropylene | 100 | 25NP010AN | - |
| | | 0.10 | Acrylic | 50 | 25NS010AN | 25NS010AS |
| | | 0.22 | Polypropylene | 100 | 25NP022AN | - |
| | | 0.22 | Acrylic | 100 | - | 25NS022AS |
| | | 0.45 | Polypropylene | 100 | 25NP045AN | - |
| | | 0.45 | Acrylic | 100 | - | 25NS045AS |
| | | 1.20 | Polypropylene | 100 | 25NP120AN | - |
| | | 1.20 | Acrylic | 50 | - | 25NS120AS |
| | | 5.00 | Polypropylene | 100 | 25NP500AN | - |
| | Cellulose Acetate | 0.20 | Acrylic | 50 | 25CS020AN | 25CS020AS |
| | | 0.45 | Acrylic | 50 | 25CS045AN | 25CS045AS |
| | | 0.80 | Acrylic | 50 | 25CS080AN | 25CS080AS |
| | PTFE, phobic | 0.20 | Polypropylene | 50 | 25JP020AN | 25JP020AS |
| | | 0.50 | Polypropylene | 50 | 25JP050AN | - |

MFS 25 PP

MFS 25 Acrylic

| 50 | Cellulose Acetate | 0.20 | Polypropylene | 10 | 50CP020AN | 50CP020AS |
|---|---|---|---|---|---|---|
| | PTFE, phobic | 0.20 | Polypropylene | 10 | 50JP020AN | 50JP020AS |
| | | 0.50 | Polypropylene | 10 | 50JP050AN | - |

MFS 50

# Microbiology Supplies



## Membranes for Microbiology

- **Made from Mixed Esters of Cellulose (MCE) or Cellulose Acetate:** MCE is a mixture of nitrocellulose and other cellulose esters. MSDS available upon request
- **Available with grid lines:** Contrasting grid lines facilitate counting colonies on the filter surface and are tested to assure freedom from grid line inhibition. 3.1 mm squares represent 1/100 of the filtration area of a 47 mm diameter filter (9.6 $cm^2$)
- **Convenient packaging:** Membranes are available individually wrapped for optimum sterility and also in 10-packs
- **Specially tested for microbiology:** All 0.45 µm white gridded membrane is tested for Coliform, Fecal Streptococci and Serratia marcescens. All 0.65 µm white gridded membrane is tested for complete retention and optimal recovery of Fecal Coliform and *Saccharomyces cerevisieae*. Black and Green membranes are tested for optimal recovery of yeast and total bacteria. All membranes are also tested for uniform wetting, freedom from grid line inhibition and optimal color reactions on appropriate test media
- **Membrane certification** for individual lot numbers is available on request. Advantec MFS membranes were developed and are manufactured to comply with the provisions of the National Interim Primary Drinking Water Regulations, Guidelines for Establishing Test Procedures for the Analysis of Pollutants, Standard Methods for the Examination of Water and Wastewater and the ASTM

### Applications

- **Applications** include microbiological analysis of water, wastewater, pharmaceuticals and beverages

**Recommended Product Compatibility (Diameters in mm)**

| Membrane | Filter Holder | Petri Dish |
|---|---|---|
| 47 | 47 | 50 |
| 82 | 90 | 92 or 93 |
| 85 | 90 | ≥100 |
| 137 | 142 | ≥150 |

## White Mixed Cellulose Ester

- **Standard** for microbiological analysis of water, waste water, and beverages
- **Convenient:** Available in individual or 10-pack, presterilized or autoclavable

**Available in plain or gridded circles, package of 100 (except where noted)**

| Pore Size (µm) | Diameter (mm) | Plain or Grid | Individual Pack with Pad (presterilized) | Individual Pack (no pad) (presterilized) | Multipack 10 packs of 10 membranes per pack (presterilized) | Multipack 10 packs of 10 membranes per pack (autoclavable) |
|---|---|---|---|---|---|---|
| 0.20 | 47 | Plain | - | A020G047A | A020C047A | A020S047A |
| | | Grid | A020F047A | A020H047A | - | - |
| | | | | | | |
| 0.45 | 47 | Plain | - | A045G047A | A045C047A | A045S047A |
| | | Grid | A045F047A<br><br>A045F047W (1000/pk) | A045H047A<br>A045H047Y (200/pk)<br>A045H047W (1000/pk) | A045D047A<br>A045D047Y (20 pks of 10) | A045T047A |
| | 82 | Grid | - | A045H082A | - | - |
| | 85 | Grid | - | A045H085A | - | - |
| | | | | | | |
| 0.65 | 47 | Plain | - | A065G047A | - | - |
| | | Grid | A065F047A | A065H047A | - | - |
| | | | | | | |
| 0.8 | 47 | Plain | - | A080G047A | A080C047A | - |
| | | Grid | A080F047A | A080H047A | A080D047A | - |
| | | | | | | |
| 1.0 | 47 | Grid | - | A100H047A | - | - |

## Black Mixed Cellulose Ester – Sterile

- **Maximum** contrast between colonies and the filter without counterstaining
- **Applications:** Use to enumerate yeast and bacteria in carbonated beverages, wines and water

**Available in plain or gridded circles, package of 100**

| Pore Size (µm) | Diameter (mm) | Plain or Grid | Individual Pack with Pad | Individual Pack (no pad) |
|---|---|---|---|---|
| 0.45 | 47 | Plain | - | A045Q047A |
| | | Grid | A045M047A | A045R047A |
| | 70 | Grid | - | A045R070A |
| | | | | |
| 0.80 | 47 | Plain | - | A080Q047A |
| | | Grid | A080M047A | A080R047A |

## Green Mixed Cellulose Ester – Sterile

- **Pale green background** enables viewing of black, white, and colorless particles on one filter
- **Minimizes eye fatigue**

**Available in gridded 47 mm circles, package of 100**

| Pore Size (µm) | Diameter (mm) | Plain or Grid | Individual Pack (no pad) |
|---|---|---|---|
| 0.45 | 47 | Grid | A045W047A |

## Cellulose Acetate (White) – Sterile

- **Lower protein binding** (relative to MCE)
- **Improved solvent resistance** to low molecular weight alcohols (relative to MCE)
- **Application:** May enhance recovery of fastidious gram positive organisms in culture

**Available in plain circles, package of 100**

| Pore Size (µm) | Diameter (mm) | Plain or Grid | Individual Pack (no pad) |
|---|---|---|---|
| 0.45 | 47 | Plain | C045G047A |
| | 82 | | C045G082A |
| | 85 | | C045G085A |

## Petri Dishes

- **Polystyrene dishes** suitable for culturing microorganisms on 47 mm diameter membrane filters
- **Convenient:** Snug fit prevents drying during incubation. Squared edges and raised ridge for ease of handling and secure stacking
- **Sterile:** sterilized by gamma irradiation (50 x 11) or by EtO (larger sizes)
- **Standard sizing:** 50 x 11 mm polystyrene dishes fit all commercially available aluminum block incubators
- **Available with or without pad:** 47 mm absorbent cellulose pad (0.85 ± 0.17 mm thick, absorbs 1.8-2.2 ml liquid)
- **Manufacturer's certification of compliance** available upon request

Petri dishes.

| Model | Description | 100/pack (5 sleeves of 20) | | 500/pack (Cube) (25 sleeves of 20) | |
|---|---|---|---|---|---|
| | | Catalog No. | Weight | Catalog No. | Weight |
| **PD-1** | Sterile Petri Dishes | 800100 | 2 lb | 800500 | 10 lbs |
| **PD-2** | Sterile Petri Dishes with Pads | 800101 | 2.2 lb | 800501 | 11 lbs |

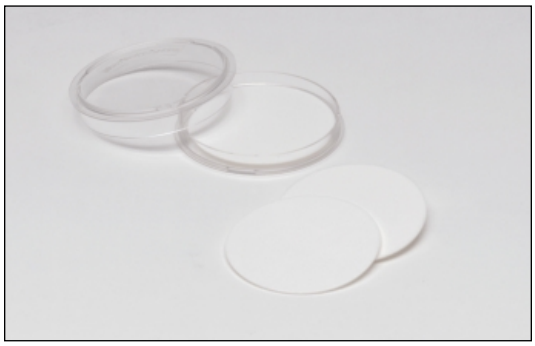
**Also available in larger sizes (compatible with 82 mm membrane):**

| Diameter | Height | 500/pack (Cube) (25 sleeves of 20) | |
|---|---|---|---|
| | | Catalog No. | Weight |
| 92 mm | 15 mm | 800915 | 22 lbs |
| 93 mm | 20 mm | 800920 | 24 lbs |

## Presterilized Absorbent Pads

- **Cellulose pads:** 47 mm plain white circles fit into standard petri dishes
- **Routinely tested** for absorption of 1.8 – 2.2 ml of Endo medium, pH neutral
- **Convenient Packaging:** 100 individual presterilized packages per box

| | Catalog No. |
|---|---|
| Box of 100 individual sterile packages | B200G047A |


Presterilized Absorbent Pads

## Filterceps

- **Forceps** of polished type 304 stainless steel are ideally designed for handling membranes
- **Tips are beveled and unserrated** to minimize the risk of damaging membrane filters
- **Non-slip handle** allows Filterceps to be held securely and flamed without risk of burning one's fingers


Filterceps

| | Length | Weight | Model | Catalog No. |
|---|---|---|---|---|
| Filterceps | 4.5 inches | 14 g (0.5 oz) | FS-1 | 800000 |

## Culture Media

- **Applications:** Used with membrane filters to culture bacteria, yeasts, and molds
- **Available Ready-to-Use:** 2 ml ampoules contain enough medium to saturate one standard absorbent pad in a petri dish, vials contain enough for 25 tests
- **Sterile:** Vials can be aseptically opened and closed repeatedly, single use vials assure sterility
- **High Quality:** Each product is lot tested and certified to comply with established test criteria. Quality certificates are included with each shipment, and packages are clearly marked with expiration date

Sterile media is available in 2 ml ampoules and 50 ml bottles.

| **Ready to Use Media** | | Catalog No. | |
|---|---|---|---|
| Medium | Target Organism | 2 ml Ampoules (50/box) | 50 ml Vials (8/box) |
| m-Endo | Total Coliform Bacteria, Water | COLI200 | COLI50MLPK |
| m-FC | Fecal Coliform Bacteria | MFC200 | - |
| m-FC with Rosolic Acid | Fecal Coliform Bacteria | MFCR200 | MFCR50MLPK |
| m-PA | Pseudomonas aeruginosa | MPA200 | - |
| m-TGE | Total Bacteria | TCM200 | - |
| m-TGE with indicator | Total Bacteria | TCI200 | - |
| m-Green Yeast and Mold | Yeast and Mold, pH 4.6 | YMM200 | YMM50MLPK |
| m-HPC | Heterotrophic organisms with indicators | MHPC200 | - |

## Whirl-Pak® Sampling Bags

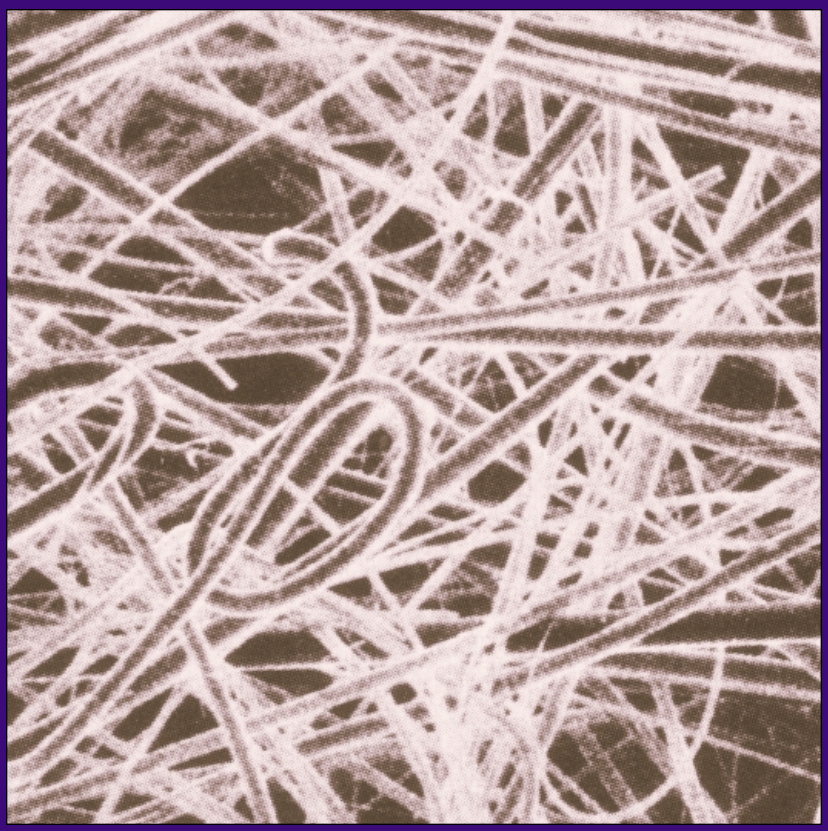
- **Sterile** sampling bags for collecting and transporting liquid, semi-solid, and solid samples
- **Composition:** Blended polyethylene contains ethyl vinyl acetate for transparency and strength
- **Convenient:** Bags close easily and securely by whirling or folding, use puncture-proof tabs to seal
- **Approved** by the FDA and USDA for food sampling

Sterile Whirl-Pak sampling bags.

| Capacity | | Dimensions | Qty/box | Catalog No. |
|---|---|---|---|---|
| Ounces | ml | | | |
| 4 | 120 | 3 x 7.25 inches | 500 | WP006ZWS |
| 18 | 540 | 4.5 x 9 inches | 500 | WP018ZWS |
| 27 | 810 | 5 x 12 inches | 500 | WP027ZWS |
| **Whirl-Pak with Sponge: sterile sponge free from growth inhibitors** | | | | |
| 18 | 540 | 4.5 x 9 inches | 100 | WP1254WSP |
| **ThioBag®: contains a sodium thiosulfate tablet for use when sampling chlorinated water** | | | | |
| 4 | 120 | 3 x 7.25 inches | 100 | WP100MWT |

# Prefilters/Depth Type Media





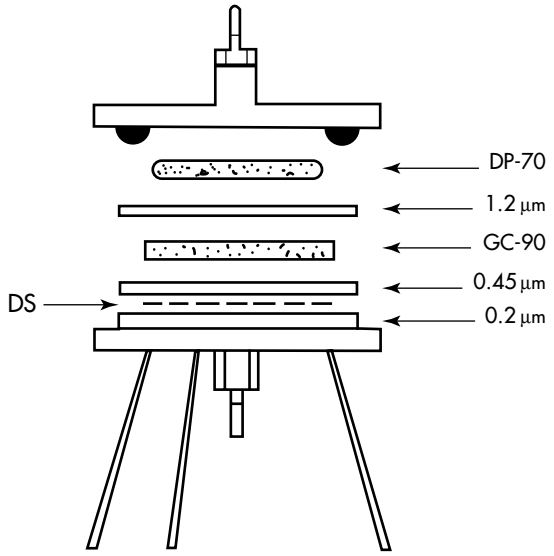
# Prefilters/Depth Type Media

The term "prefilter" refers to any type of filtration that occurs before the final barrier. This type of filter is often prepared from depth-type media, a random matrix of glass, cellulose, quartz or PTFE fibers. This fiber matrix may or may not include binder to maintain integrity. Because these filters trap particles within the matrix, they have a very high particle loading capacity. However, this type of filter does not have a clearly defined pore rating, only a nominal designation.

Not all depth-type filters are used as prefilters: these can be used in a wide variety of applications, such as water and air pollution analysis, liquid clarification, and cell harvesting.

Generally, a prefilter should be slightly smaller than the membrane filter it is protecting, but full sized prefilters are recommended if they are to used alone.

| Filter Holder Model | Recommended Prefilter Diameter (mm) | |
|---|---|---|
| | used upstream of membrane | used alone |
| **Vacuum Type:** | | |
| KG 25, KGS 25 | 16 | 25 |
| KG 47, KGS 47, KSF 47, KGS 47 TF | 35 | 47 |
| KG 90, KGS 90 | 70 | 90 |
| **Pressure Type:** | | |
| KS 13 | 8 | 13 |
| KS 25, LS 25, LP 25, KS 25 F, PP 25 | 21 | 25 |
| KS 47, KST 47, KS 47 F, LS 47 HP | 35 | 47 |
| PP 47, PFA 47 | 42 | 47 |




A typical serial stack incorporating Prefilters, Membranes and Dacron Separators (DS).

## Cellulose Fiber Filters

- **Cellulosic:** Random matrix of cellulose fibers
- **Inert** to organic solvents
- **No binder**
- **Thermostable:** To 180°C in a non-reactive oil, 120°C maximum in air

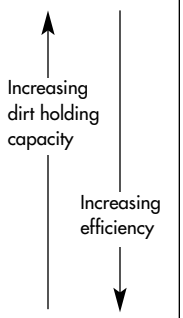
### APPLICATIONS

- Clarify fluids containing coarse particles
- Preliminary prefilter, prolongs membrane life

**Note:** Not suitable for hot dilute or cold concentrated acids. Caustic liquids cause fibers to swell. Also not recommended for viscous material.

### SPECIFICATIONS AND APPLICATIONS

| Type | Thickness (mm) | Applications |
|---|---|---|
| No. 27 | 0.68 | Filtration of soft drinks and other beverages<br>Clarification of oils and fats<br>Filtration of paints and petroleum products |
| No. 1640 | 0.40 | Remove activated charcoal from alcohol containing beverages<br>Polishing filter for water treatment<br>Clarifying filtration of fine particulates |
| No. 1650 | 0.57 | Remove activated charcoal from alcohol containing beverages<br>Polishing filter for water treatment<br>Clarifying filtration of fine particulates<br>Withstands higher pressures and flow rates than No. 1640 |




### ORDERING INFORMATION: CELLULOSE FIBER FILTERS

- Available in disks in the following diameters (mm): 75, 124, 257
- Package of 100
- Order by specifying first the type of filter then the diameter, e.g. No. 1650257, No. 2775

## Glass Fiber Filters

- **Dense**
- **Highly resistant** to chemical attack, biologically inert
- **Easily sterilized:** Can be baked or autoclaved
- **Store indefinitely:** Unaffected by humidity

Twelve grades of glass fiber filters are available in diameters from 10–293 mm.

### APPLICATIONS

- Use as a prefilter to extend membrane life
- Water/air pollution analysis
- Liquid clarification
- Cell harvesting

### ORDERING INFORMATION: GLASS FIBER FILTERS

| Type | DP 70 | GA 55 | GA 100 | GA 200 | GB 100 R | GB 140 | GC 50 | GC 90 | GD 120 | GF 75 | GS 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Quantity/package | | | | | | | | | | |
| 10–150 mm diameter disks | 50 | 100 | 100 | 50 | 100 | 100 | 100 | 100 | 50 | 100 | 100 |
| 257–293 mm diameter disks | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 8 x 10 inch sheets | S | 100 | S | S | 50 | S | S | S | S | S | S |

S = Special order

Available in disks in the following diameters (mm): 10, 13, 16, 20, 22, 25, 26, 35, 37, 47, 50, 70, 75, 90, 102, 124, 257, 293, 293/60.

Order by specifying first the type of filter then the diameter, e.g. GC5090MM, GA558X10IN.

## Quartz Fiber Filters

- **Highly resistant** to chemical attack, biologically inert
- **High Purity:** Very low trace metal content, does not adsorb nitrous and sulfur dioxides; Grade QR-100 is prefired at 1000°C for 2 hours to reduce organic contamination
- **Easily sterilized:** Can be baked or autoclaved
- **Store indefinitely:** Unaffected by humidity

### APPLICATIONS

- Sample acidic gases at high (>500°C) temperatures
- Air pollution analysis

### ORDERING INFORMATION: QUARTZ FIBER FILTERS

| Type | QR 200 | QR 100 |
|---|---|---|
| | Quantity/package | |
| 21 – 150 mm diameter disks | 50 | 100 |
| 8 x 10 inch sheets | S | 50 |

S = Special order

Available in disks in the following diameters (mm): 21, 24, 26, 37, 45, 47, 55, 70, 90, 110, 125, 150.

Order by specifying first the type of filter then the diameter, e.g. QR200125MM, QR10021MM.

## Specifications: Glass/Quartz Fiber

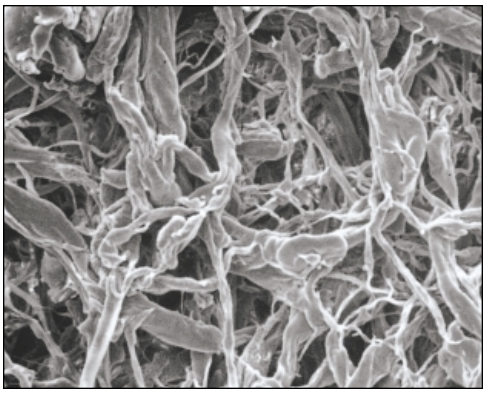
| Type | Applications/Characteristics | Weight ($g/m^2$) | Thickness (mm) | Nominal Rating (µm) | Water Flow Time[1] (sec) |
|---|---|---|---|---|---|
| GA-55 | General purpose paper<br>Air pollution monitoring | 55 | 0.21 | 0.6 | 23 |
| GF-75 | Most retentive grade offered<br>Collection of IgC or other very fine protein precipitates<br>Clarifying chemically aggressive solutions<br>TCLP (EPA method 1311) – use with KST 142 | 75 | 0.35 | 0.3 | 84 |
| GA-100 | General purpose paper<br>Filtration of precipitated proteins or cells<br>Air pollution monitoring | 110 | 0.44 | 1.0 | 11 |
| GA-200 | Thick filter is recommended for filtering viscous fluids such as liquid sugars and gels | 175 | 0.74 | 0.8 | 15 |
| GB-100R | High and low volume aerosols for airborne dust and metal contaminants<br>Low trace metal content of As, Pb and Cd<br>DNA/RNA and protein precipitates | 95 | 0.40 | 0.6 | 15 |
| GB-140 | Compared to GB-100R: thicker, greater wet strength, slower filtration speed<br>Industrial waste analysis<br>Low absorption, limited wet strength and loading capacity | 140 | 0.56 | 0.4 | 58 |
| GC-50 | Prefilter for membrane filter (0.45 µm or smaller)<br>Scintillation counting<br>Suspended solids analysis of industrial waters and wastewater<br>Prefilter for membrane filter | 48 | 0.19 | 0.5 | 28 |
| GC-90 | High wet strength<br>Clinical screening | 100 | 0.30 | 0.5 | 20 |
| GD-120 | Prefilter for 0.45 µm membrane filter<br>High wet strength, very high loading capacity<br>Prefilter for membrane filter (0.65 µm to 1.2 µm) | 123 | 0.51 | 0.9 | 14 |
| GS-25 | Limited dirt holding capacity<br>High wet strength<br>Prefilter for 0.65 µm or smaller membrane | 70 | 0.22 | 0.6 | 15 |
| DP-70 | High wet strength<br>Very high loading capacity<br>Dust measurement | 170 | 0.52 | 0.6 | 20 |
| QR-200 | Filtration at elevated temperatures<br>Low adsorption<br>Monitor airborne particulates | 200 | 1.0 | - | - |
| QR-100 | Superior chemical resistance, does not absorb acid gases | 85 | 0.38 | - | - |

1. Flow time is the time in seconds to filter 100 ml of distilled water at 20°C under pressure supplied by a 10 cm water column through a 10 $cm^2$ section of filter.

| Gas Collection Efficiency (%) at 0.3 µm DOP | Pressure Drop (mm $H_2O$/ 5cm/sec) | Binder | Max. Temp. (°C) | Conversion | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Whatman | Schleicher & Schuell | Gelman | Millipore | Ahlstrom |
| 99.9 | 34 | None | 500 | GF/A | 31 | | APFA | 11 |
| 99.999 | 170 | None | 500 | GF/F | 20 | | APFF | 151 |
| 96 | 20 | None | 500 | | | | | |
| 99.9 | 36 | None | 500 | | | | | |
| 99.99 | 30 | None | 500 | | 1HV | A/E | | |
| 99.99 | 113 | None | 500 | GF/B | 32 | | APFB | 121 |
| 99.99 | 53 | None | 500 | GF/C 934 AH | 30/25 | | AP-40/ APFC | 131 |
| 99.99 | 42 | Organic | 120 | | | | AP15 | |
| 97 | 17 | None | 500 | GF/D | 40 | | APFD | 191 |
| 99.9 | 32 | Organic | 120 | | | | AP20 | 164 |
| - | 53 | Organic | 120 | | | | | |
| 99.9 | 35 | Inorganic | 1000 | | | | | |
| 99.99 | 45 | None | 1000 | QM-A | | Micro Quartz | | |

## Polyflon – PTFE Fiber Filters

- **Pure PTFE fibers are sintered** to improve handling characteristics and to minimize fiber slough-off for minimal downstream contamination
- **Hydrophobic**
- **Porosity:** High air permeability with minimal pressure drop
- **Thermostable:** maximum operating temperature 260°C



Polyflon, all Teflon Fiber Filter

### APPLICATIONS

- Aqueous and nonaqueous filtration
- Filter hot acids and strong solvents
- Venting air and gases

### SPECIFICATIONS

| Grade | Weight ($g/m^2$) | Thickness (mm) | Porosity (%) | Pressure Drop kPa | Pressure Drop (psi) | DOP retention (%, 0.3 µm) | Retentive pore, liquid (µm) |
|---|---|---|---|---|---|---|---|
| PF100 | 500 | 1.00 | 77 | 0.059 | 6 | 70 | 10 |
| PF060 | 240 | 0.50 | 75 | 0.069 | 7 | 75 | 6 |
| PF050 | 210 | 0.36 | 73 | 0.26 | 27 | 85 | 5 |
| PF040 | 500 | 0.95 | 75 | 0.21 | 21 | 95 | 4 |
| PF020 | 500 | 0.54 | 54 | 1.6 | 163 | 99.9 | 2 |

### ORDERING INFORMATION: POLYFLON

- Disks: Available in the following diameters (mm): 10, 13, 25, 37, 47, 75, 124, 257
- Sheets: Available in 8 x 10 inch sheets
- Packages of 10
- Additional sizes available upon request
- Order by specifying first the type of filter then the size, e.g. PF100257MM, PF04025MM

See also Phase Separating Filters on page 38.

## Dacron Mesh Separators

- **Prevent pore blinding** by placing a dacron separator between two membranes in series
- **Improve performance:** Increase liquid flow rate and throughout

**Note:** Order same size recommended for prefilters.

### ORDERING INFORMATION: DACRON MESH SEPARATORS

| Diameter | 10 | 16 | 22 | 26 | 35 | 37 | 75 | 124 | 257 |
|---|---|---|---|---|---|---|---|---|---|
| Quantity per package | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 25 | 25 |

Specify code DS followed by diameter, e.g. DS124MM, DS16MM.

# Specialty Papers



## Qualitative Filter Papers

- **100% alpha cotton cellulose**
- **pH tolerant** 0 to 12
- **Temperature maximum** 120°C
- **Wide selection** – seven types
- **Higher ash** than quantitative

### Applications

- Clarify and remove precipitates
- Preparation for qualitative analysis

### Ordering Information

See page 34

Seven grades of qualitative filter papers are available in 7 standard diameters.

### Characteristics and Applications: Conversions – Qualitative Papers

| Type | Comments | Weight ($g/m^2$) | Thickness (mm) | Flow Time[1] (sec) | Absorption speed[2] (cm) | Wet Strength[3] (cm $H_2O$) | Retention Characteristic (µm) | Collection Efficiency (%, 0.3 µm DOP) | Conversion[4] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Whatman | Schleicher & Schuell |
| No. 1 | Retains large crystalline particles and gelatinous precipitates. Fast flow rate, smooth surface, normal hardness | 90 | 0.20 | 45 | 9.0 | 15 | 6 Coarse | 65 | 4 | 604 |
| No. 2 | Retains medium crystalline precipitates, fast flow rate, smooth surface, normal hardness | 125 | 0.26 | 80 | 8.0 | 18 | 5 Medium | 80 | 1 | 591-A or 597 |
| No 231 | Retains crystalline precipitates, moderate flow rate, smooth surface, normal hardness | 95 | 0.18 | 130 | 7.5 | - | Medium | - | 1 | - |
| No. 232 | Retains medium to medium-fine particulates, slow flow rate, smooth, normal hardness | 90 | 0.18 | 250 | 5.0 | - | Med./ Med.-Fine | - | - | - |
| No. 131 | High retention efficiency for fine crystalline precipitates like barium sulfate, slow flow rate, smooth surface, normal hardness | 140 | 0.25 | 240 | 6.0 | 20 | 3 Med.-Fine | 90 | 3 or 6 | 593-a |
| No. 235 | Highest retention efficiency, retains very fine particulates, very slow flow rate, smooth | 95 | 0.17 | 1200 | 4.0 | - | Very Fine | - | 5 | - |
| No. 101 | Seed germination, retains large particles | 80 | 0.21 | 50 | 8.0 | 15 | 6-7 Coarse and gelatinous | - | 1 | - |

1. Flow time is the time in seconds required to filter 100 ml of distilled water at 20°C under pressure supplied by a 10 cm water column through a 10 $cm^2$ section of filter paper.
2. Absorption speed is the distance in cm that water will travel in an upright strip of filer paper in ten (10) minutes at 20°C.
3. Wet strength is the height in cm of a water column that will rupture a 10 $cm^2$ section of filter paper.
4. Conversions between manufacturers are not absolute. Use these conversions as a guideline.

## Quantitative Filter Papers

- **Highest quality** alpha cotton cellulose
- **Low ash**
- **Acid washed**: Double acid washed in hydrochloric then hydrofluoric acid (No. 3, 5A, 5B, 5C, 6), then rinsed with ultrapure water to neutralize. No. 4A is further treated with nitric acid before washing

### Applications

- Gravimetric analysis
- Environmental monitoring

Seven quantitative filter papers are available in 7 different diameters.

### Characteristics and Applications: Conversions – Quantitative Papers

| Type | Comments | Weight ($g/m^2$) | Thickness (mm) | Flow Time[1] (sec) | Absorption speed[2] (cm) | Wet Strength[3] (cm $H_2O$) | Retention Characteristic (µm) | Collection Efficiency (%, 0.3 µm DOP) | Conversion[4] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Whatman | Schleicher & Schuell |
| No. 3 Ashless | Medium retention (5-10 µm), fast flow rate Analysis of soils, fertilizers, cement, and minerals | 113 | 0.23 | 130 | 7.5 | 20 | Medium | 80 | 6 | 593-A |
| No. 5A Ashless | Fast flow rate, retains coarse particulates and gelatinous precipitates (>10 µm). Filter hydroxides and metallic aerosols, environmental monitoring, determine silica content in steel | 97 | 0.22 | 60 | 9.5 | 15 | Coarse and gelatinous | 75 | 41 | 589 Black |
| No. 5B Ashless | Retains medium particles (5-10 µm) such as $CaCO_3$, $PbSO_4$, $CaCO_4$, $MnCO_3$, $ZnCO_3$, ZnS, AgCl | 108 | 0.21 | 195 | 7.0 | 20 | Medium | 90 | 40 | 598 White |
| No. 5C Ashless | Collect fine precipitates (<5 µm) such as $SrSO_4$, $BaSO_4$, $HgCrO_4$, and colloidal dispersions; gravimetric analysis | 118 | 0.22 | 570 | 6.0 | 25 | Fine | 93 | 42 | 589 Red |
| No. 6 Ashless | Retains medium-fine particulates (2-10 µm), trace and precious metals | 103 | 0.20 | 300 | 6.0 | 15 | Medium Fine | 90 | 44 | 589 Blue |
| No. 7 Ashless | Highest purity for retaining medium particles (5-10 µm), precise gravimetric analysis | 87 | 0.18 | 200 | 7.0 | 12 | Medium | 85 | 43 | 589 Green |
| No. 4A Hardened Ashless | High wet strength, suitable for use under high pressure, high chemical and pH resistance, retains fine crystalline precipitates (<5 µm), slow flow | 96 | 0.12 | 915 | 4.0 | 90 | Very Fine | 90 | 50 | 576 or 577 |

Footnotes: See facing page

**Ash content of Quantitative Papers (mg per disk)**

| cm | No.3 | No.5A | No.5B | No.5C | No.6 | No.7 |
|---|---|---|---|---|---|---|
| 5.5 | 0.03 | 0.02 | 0.03 | 0.03 | 0.02 | 0.02 |
| 7.0 | 0.04 | 0.04 | 0.04 | 0.05 | 0.04 | 0.03 |
| 9.0 | 0.07 | 0.06 | 0.07 | 0.08 | 0.07 | 0.06 |
| 11.0 | 0.11 | 0.09 | 0.10 | 0.11 | 0.10 | 0.08 |
| 12.5 | 0.14 | 0.12 | 0.13 | 0.15 | 0.13 | 0.11 |
| 15.0 | 0.20 | 0.17 | 0.19 | 0.21 | 0.18 | 0.15 |
| 18.5 | 0.30 | 0.26 | 0.29 | 0.32 | 0.28 | 0.23 |

## Ordering Information: Qualitative Papers

| |
|---|
| Available in disks in the following diameters (cm): 4.25, 5.5, 7.0, 9.0, 11.0, 12.5, 15.0, 18.5 |
| Additional sizes available upon request. |
| Order by specifying first the type of filter then the diameter, e.g. No.1125CM (No.1, 12.5 cm) No.23255CM (No. 232, 5.5 cm) |
| Package of 100 |

## Ordering Information: Quantitative Papers

| |
|---|
| Available in disks in the following diameters (cm): 5.5, 7.0, 9.0, 11.0, 12.5, 15.0, 18.5 |
| Additional sizes available upon request. |
| Order by specifying first the type of filter then the diameter, e.g. No.1125CM (No.1, 12.5 cm), No.23255CM (No. 232, 5.5 cm) |
| Package of 100 |

## Pure Nitrocellulose for Blotting and Hybridization

- **Pure esters of nitrocellulose**, free of acetate and other esters
- **Maximal protein/nucleic acid binding**, up to 80-100 µg/cm²
- **Low background**
- **Two pore sizes** available: 0.45 µm is suitable for most blotting applications, 0.2 µm sizes for lower molecular weights

Pure Nitrocellulose and Blotting Paper

### Ordering Information: Nitrocellulose

| | Quantity per package | 0.20 µm | 0.45 µm |
|---|---|---|---|
| Sheets (Dimensions in cm) | | | |
| 20 x 20 | 10 | A020A204D | A045A204D |
| 30 x 30 | 10 | A020A304D | A045A304D |
| Rolls | | | |
| 33 cm x 3 M | 1 | A020A330R | A045A330R |
| Circles (Diameter in mm) | | | |
| 82 | 25 | A020A082C | A045A082C |
| 137 | 25 | - | A045A137C |

## Blotting/Chromatography Paper

- **High quality papers** are carefully tested for spot formation, capillary action, water flow rate and absorption speed to assure uniformity and reproducibility
- **Better resolution** with slower flow rate papers

### APPLICATIONS

- Chromatography
- Electrophoresis and blotting
- Separation of heavily loaded solutes

### SPECIFICATIONS AND CONVERSION GUIDE

| Grade | Weight ($g/m^2$) | Thickness (cm) | Absorption Speed[1] (cm) | Wet Strength (cm $H_20$) | Ash (mg/g) | Whatman equivalent |
|---|---|---|---|---|---|---|
| 50 | 140 | 0.25 | 6.0 | 20 | 0.1 | - |
| 51A | 87 | 0.18 | 7.5 | 15 | 0.01 | - |
| 151B | 87 | 0.17 | 7.0 | 15 | 0.06 | 1 Chr |
| 1514A | 185 | 0.32 | 7.5 | 25 | 0.06 | 3MMChr |
| 526 | 325 | 0.70 | 11.0 | 50 | 0.1 | 17 Chr |

1. Absorption speed is the distance in cm that water will travel in an upright strip of filter paper in ten (10) minutes at 20°C.

### ORDERING INFORMATION

All grades above are available in the following dimensions (cm) and quantities:

| | |
|---|---|
| 2 x 40 | 100/pkg |
| 20 x 20 | 50/pkg |
| 46 x 57 | 100/pkg |
| 60 x 60 | 50/pkg |

151B is also available in 6 x 23 cm, 50/pkg
1514A is also available in 33 cm x 3 M rolls
526 is also available in 40 x 40 cm, 50/pkg

Order by specifying first the grade of paper then the dimensions, e.g. No.51A20X20CM, No.1514A33X3M.

## Products for Food Analysis

### Sugar Paper

- **Fast flow rate**
- **Creped surface** available

### Application

- Clarify sugar and syrup solutions prior to polarimetric determination of sucrose concentration

### Specifications

| Grade | Weight ($g/m^2$) | Thickness (mm) | Water Flow Time [1] (sec) | Dry Burst Strength ($kg/cm^2$) | Wet Burst Strength ($kg/cm^2$) | Ash content (%) | Particle Retention (µm) | Surface | Wet Strengthened |
|---|---|---|---|---|---|---|---|---|---|
| 106 | 60 | 0.14 | 42.5 | 1.0 | 0.3 | 0.1 | - | Smooth | No |
| 102 | 100 | 0.30 | 28 | 0.7 | - | - | 3 | Creped | No |
| 107 | 80 | 0.21 | 50 | 1.0 | - | - | - | Creped | No |
| 60 | 125 | 0.56 | 7 | 0.5 | - | - | - | Smooth | No |
| 1591 | 64 | 0.165 | 30 | 1.1 | 2 | 0.1 | - | Creped | Yes |

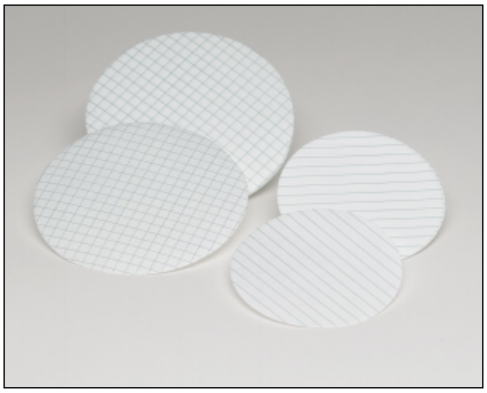
1. Flow time is the time in seconds required to filter 100 ml of distilled water at 20°C under pressure supplied by a 10 cm water column through a 10 $cm^2$ section of filter paper.

### Ordering Information

- Available in disks in the following diameters (cm): 15.0, 18.5, 20.0
- Available in sheets: 8 x 8 inches, 60 x 60 cm
- Packages of 100 or 1000
- Order by specifying first the grade of paper then the diameter, e.g. No.106150CM, No.608X8IN

## Gridded and Ruled Papers for Extraneous Materials

- **Green grid or ruled lines** (5 mm) are resistant to aqueous and non-aqueous solutions
- **Characteristics:** High wet strength, rapid flow rate



Both gridded and ruled papers are available in disks.

### Application

- Microscopic examination of extracted samples for the presence of extraneous materials or particulates

### Specifications

- Weight: 60 $g/m^2$
- Thickness: 0.14 mm
- Particle retention: 8 µm

### Ordering Information

- Grades available: No. 1405G (gridded) and No. 1405R (ruled)
- Both grades are available in disks in the following diameters: 5.5, 7.0, 7.5, 9.0 cm
- Packages of 100

Order by specifying first the grade of paper then the diameter, e.g. No.1405G9.0CM.

## Special Purpose Filters for Food Analysis

### Thimbles for Soxhlet Type Extractions

Type 84 is often used for food analysis including Soxhlet-type gravimetric determinations of fats and oils from foods, feeds, or oil seeds. It is also used to extract and concentrate non-aqueous chemicals or additives from a solid sample for analysis (such as HPLC or gas chromatography for PCB and pesticides).

Ordering information and specifications on page 42.

## Phase Separating Filters

- **Separate** aqueous and non-aqueous phases of mixtures
- **Hydrophobic** filters retain aqueous phase while non-aqueous phase passes through
- **Choice of materials**: Grade 2S is silicon treated cellulose
  Polyflon is pure PTFE (Teflon)

### Specifications

| Grade code | Substrate | Weight (g/m²) | Thickness (mm) | Retentive Particle (µm) |
|---|---|---|---|---|
| 2S | Silicone treated cellulose | 120 | 0.26 | 5 |
| PF020 | PTFE | 500 | 0.54 | 2 |
| PF040 | PTFE | 500 | 0.95 | 4 |
| PF050 | PTFE | 210 | 0.36 | 5 |
| PF060 | PTFE | 240 | 0.50 | 6 |
| PF100 | PTFE | 500 | 1.00 | 10 |

### Ordering Information

**Grade 2S:**

- Available in disks in the following diameters (cm): 5.5, 7.0, 9.0, 11.0, 12.5, 15.0, 18.5, 24.0, 27.0
- Available in sheets: 28 x 46 cm
- Packages of 100

**Polyflon – all grades:**

- Available in disks in the following diameters (mm): 13, 25, 47, 55
- Available in sheets: 8 x 10 inches
- Packages of 10

Order by specifying first the grade of paper then the diameter, e.g. PF04025MM.

## Products for Industrial Hygiene

Advantec MFS provides a selection of products for industrial hygiene applications including asbestos monitoring. Mixed Cellulose Esters and PVC membrane can be used with cellulose support pads in standard 25 and 37 mm cassette type filter holders. Fully assembled 37 mm cassettes are available in addition to the units without membrane, see page 41.

## Cellulose Support Pads

Type 25S cellulose support pads fit standard 25 and 37 mm cassette type filter holders.

## MCE (Mixed Cellulose Ester) Membrane

- **Standard** 0.8 µm pore size, white plain membrane fits standard 25 and 37 mm cassette type filter holders
- **High quality** raw materials used in manufacture
- **Low contamination:** Cutting and packaging operations are carried out under clean room conditions to keep non-asbestos fiber contamination to an absolute minimum

**Note:** Filters may be cleared using either the acetone vapor method or the dimethylpthalate diethyloxalate method.

## PVC for Industrial Hygiene Monitoring

- **Characteristics:** naturally hydrophobic, excellent weight stability
- **Silica free,** contain no additives or modifiers
- **Suitable** for particulate analysis

| Description | Size | Surface | Qty/Pkg | Catalog No. |
|---|---|---|---|---|
| 0.8 µm MCE | 25 mm disk | White Plain | 100 | A080X025A |
| | 25 mm disk | White Grid | 100 | A080X025B |
| | 37 mm disk | White Plain | 100 | A080X037A |
| | 37 mm disk | White Grid | 100 | A080X037B |
| 0.5 µm PVC | 25 mm disk | White Plain | 50 | P050A025A |
| 0.8 µm PVC | 25 mm disk | White Plain | 50 | P080A025A |
| | 37 mm disk | White Plain | 100 | P080A037A |
| | 47 mm disk | White Plain | 50 | P080A047A |
| | 8 x 10 in sheet | White Plain | 10 | P0808x10IN |
| 5.0 µm PVC | 25 mm disk | White Plain | 50 | P500A025A |
| | 37 mm disk | White Plain | 100 | P500A037A |
| | 8 x 10 in sheet | White Plain | 10 | P5008x10IN |
| Cellulose Pads | 25 mm disk | White Plain | 100 | TYPE25S25MM |
| | 37 mm disk | White Plain | 100 | TYPE25S37MM |
| Cassettes, 2-piece | 37 mm diameter | - | 50 | 370S200ON |
| Cassettes, 3-piece | 37 mm diameter | - | 50 | 370S300ON |

Advantec MFS continually works with customers to develop special filter media to suit their specific application needs. Direct inquiries to our Technical Services Department.

## Products for Air Pollution Monitoring

Several products from Advantec MFS have been developed especially to meet the needs of persons concerned with air pollution monitoring.

Four grades of fibrous filter media are available in sheets, discs, and thimble form for air pollution monitoring.

### Quartz Fiber Filter – QR100

- Increased chemical and thermal resistance compared to GB100R
- Prefired at 1000°C for 2 hours to reduce organic contamination
- Available in sheets and disks

Specifications and ordering information on pages 27–29.

### Pure Fibrotic PTFE Filters – Polyflon PF050

- Polyflon filters neither adsorb acid gases nor do they contribute any trace metal contamination during assay procedures
- Superior handling characteristics compared to either glass or quartz
- Available in sheets and disks

Specifications and ordering information on page 30.

## Thimbles

Thimbles are available in the following materials:

| Material | Type |
|---|---|
| Cellulose | 84 |
| Glass | 86R |
| Silica | 88R |
| High Temperature Silica | 88RH |
| PTFE | 89 |
| PTFE/Silica | 89S |

For detailed specifications and ordering information, see page 42.

Advantec MFS continually works with customers to develop special filter media to suit their specific application needs. Direct inquiries to our Technical Services Department.

## 37 mm Monitors for Microbial and Contamination Analysis

Preassembled devices contain a membrane filter (Mixed Cellulose Ester) and a pure cotton cellulose support pad in a styrene housing. Available as a two- or three-piece unit for ease in sampling, collecting, and transporting samples from the field to the laboratory. Sample collected on the press fit membrane surface can be cultured in place or removed for further analysis or study.

MFS 37

| Applications | Recommended product | |
|---|---|---|
| | Unit: | Membrane: |
| Microbiology – bacterial | 2- or 3-piece | 0.45 µm, white grid or black grid |
| Microbiology – yeast and mold | 2- or 3-piece | 0.80 µm, white grid or black grid |
| Aerosol analysis | 2-piece | 0.45 µm or 0.80 µm, white plain |
| Contamination analysis | 2- or 3-piece | 0.45 µm or 0.80 µm, white plain or grid |

0.8 µm MF is green grid lines on white background, 0.45 and 0.65 µm have black grid lines.

## Specifications

- Housing Material: styrene acrylonitrile
- Filtration Area: 9.0 $cm^2$ (6.7$cm^2$ for Hydrophobic Edge types)
- Dimensions: 42 mm diameter, 28.7 mm height
- Weight: 1.2 kg (2.5 lbs)

## Ordering Information

**Two-Piece Units with Mixed Cellulose Ester Membrane**

| Pore Size (µm) | Color | Surface | Hydrophobic edge | Quantity per package | Catalog No. | |
|---|---|---|---|---|---|---|
| | | | | | Sterile | Nonsterile |
| 0.45 | White | Plain | Yes | 50 | - | 37AS245AN-HE |
| 0.45 | White | Grid | Yes | 50 | 37AS245BS-HE | - |
| 0.45 | Black | Grid | Yes | 50 | 37AS245PS-HE | - |
| 0.80 | White | Plain | No | 50 | 37AS280AS | 37AS280AN |
| 0.80 | White | Grid | No | 50 | 37AS280BS | - |

**Three-Piece Units with Mixed Cellulose Ester Membrane**

| Pore Size (µm) | Color | Surface | Hydrophobic edge | Quantity per package | Catalog No. | |
|---|---|---|---|---|---|---|
| | | | | | Sterile | Nonsterile |
| 0.45 | White | Plain | No | 50 | - | 37AS345AN |
| 0.45 | White | Grid | No | 50 | 37AS345BS | - |
| 0.45 | Black | Grid | No | 50 | 37AS345PS | - |
| 0.80 | White | Plain | No | 50 | - | 37AS380AN |
| 0.80 | White | Grid | No | 50 | 37AS380BS | 37AS380BN |
| 0.80 | Black | Grid | No | 50 | - | 37AS380PN |

**Units without Membrane**

| Assembly type | Quantity per package | Catalog No. |
|---|---|---|
| 2 Piece, with plugs | 50 | 37OS200ON |
| 3 piece, with plugs | 50 | 37OS300ON |

## Extraction Thimbles

High purity, seamless filters with a characteristic thimble shape. Applications include analysis of fats, oils, grease, pesticides, pollutants, other organics and additives in plastics and rubber materials.


Thimbles

**Cellulose Thimbles – No. 84**
- Suitable for Soxhlet extractions of organic components
- Dust sampling
- Lipid content <0.1% by weight

**Glass Fiber Thimbles – No. 86R**
- Borosilicate glass
- High temperature extractions or dust monitoring (≤500°C)
- Acid resistant (except hydrofluoric)
- Acid washed for minimum trace metal content

**Silica Fiber Thimbles – No. 88R and 88RH**
- Use up to 1000°C
- No. 88RH is treated at 900°C for 4 hours to stabilize the weight prior to use
- Both 88R and 88RH are tapered for ease in loading into stack samplers

**PTFE Fiber and PTFE/Silica Fiber Thimbles – No. 89 and 89S**
- Durable, temperature-resistant
- Non-adsorptive with respect to acid gases
- PTFE is inherently hydrophobic
- Little or no trace metal contamination

### Specifications

| Type | Material | Nominal rating (µm) | Thickness (mm) | Weight (g per 25 x 90 thimble) | Pressure drop (mm $H_2O$ /5 cm /sec) | Efficiency % | Max operating temp (°C) | Heating loss rate (%) | Conversion | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Whatman | S&S |
| 84 | Cellulose | 8 | 1.5 | 3.6 | 25 | 89 | 120 | - | 2800 | 603 |
| 86R | Glass Fiber | 1 | 1.6 | 1.8 | 30 | >99.9 | 500 | 0.2 | 2814 | 603G |
| 88R | Silica Fiber | - | 1.6 | 2.2 | 45 | >99.9 | 1000 | - | - | - |
| 88RH | Silica Fiber | - | 1.6 | 2.2 | 45 | >99.9 | 1000 | 0.1 | 2813 | - |
| 89 | PTFE Fiber | - | 1.8 | 11.0 | 450 | >99.9 | 260 | - | - | - |
| 89S | PTFE/Silica Fiber | - | 1.6 | 6 | 55 | >99.9 | 400 | 0.07 | - | - |

### Ordering Information

Sizes are expressed as internal diameter (± 3%) x height (± 1.5%).

**Type 84 (diameter x height, mm), 25 thimbles per package**

| | | | | | | |
|---|---|---|---|---|---|---|
| - | 22 x 65 | 25 x 60 | - | - | - | - |
| - | 22 x 80 | 25 x 80 | - | 30 x 80 | 33 x 80 | - |
| 19 x 90 | - | 25 x 90 | - | - | 33 x 94 | - |
| - | - | 25 x 100 | 28 x 100 | 30 x 100 | 33 x 100 | 43 x 123 |

**Type 86R (diameter x height, mm), 25 thimbles per package**

| | | | | | | |
|---|---|---|---|---|---|---|
| 19 x 90 | - | 25 x 90 | - | 30 x 80 | - | 43 x 123 |
| - | - | 25 x 100 | - | 30 x 100 | - | - |

**Type 88R (diameter x height, mm), 25 thimbles per package**

| | | | | | | |
|---|---|---|---|---|---|---|
| 19 x 90 | - | 25 x 100 | 30 x 80 | 30 x 100 | 33 x 80 | 43 x 123 |

**Types 88R, 88RH, 89, and 89S**

Available in 25 x 90 mm size, 10 thimbles per package.

## Filter Badge – $NO_2$

- Monitor ambient levels of nitrogen dioxide with this passive, portable sampler
- Attach to subject's clothing or mount on a stationary object
- Plastic case contains an adsorbent pad saturated with triethanolamine and a fibrous PTFE filter to control wind effects
- Use enclosed foil pouch or other hermetic container to transport to the laboratory where $NO_2$ levels can be determined spectrophotometrically

Filter Badge – $NO_2$

### Specifications

- Dimensions: 5 cm x 4 cm x 1 cm
- Sampling method: passive diffusion
- Sensitivity: 66 ppb.hr
- Accuracy: ±30%
- Maximum exposure: 1 month in ambient air
- Relative humidity range: 40 – 80%
- Weight: 16 g (0.56 oz)

### Ordering Information

| | Catalog No. |
|---|---|
| Filter Badge – $NO_2$ | 800600 |

## Nobuto Blood Filter Strips

- Collect blood on the narrow end of the strip and allow to dry on the convenient drying rack for easy and efficient sample handling
- Strip holds approximately 0.1 ml of blood or 0.04 ml of serum
- High purity cellulose paper yields a fine, textile like structure ideal for uniform sampling
- Dried samples can be analyzed, stored, or mailed without refrigeration

Nobuto Blood Filter Strips and Drying Rack.

**Typical blood collection applications:**

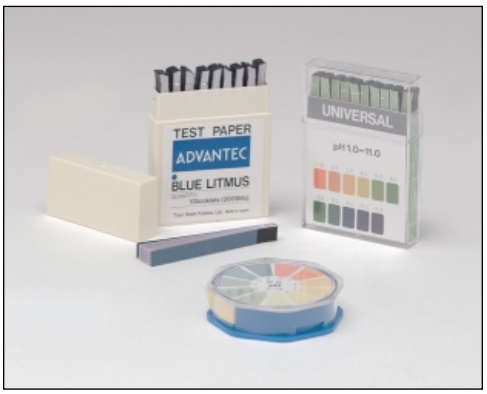
- Toxoplasmosis (HA)
- Hanta Virus
- New Castles Disease (HI)
- Canine Distemper (VN)
- Measles (Rubeola) (HI)
- Japanese Encephalitis (HI, VN)
- Mycoplasmosis (AG)
- Hog Cholera (VN)

### Ordering Information

| | | Catalog No. |
|---|---|---|
| Nobuto Blood Filter Strips | 100/package | 800700 |
| Filter Strip Drying Rack | Each | 800701 |

## pH Indicator and Acid Alkali Test Papers

- Determine pH easily and inexpensively, without instrumentation
- Color changes instantaneously, compare to chart for determination
- Two convenient formats: Booklet of 20 strips, 7 x 70 mm
  Roll, 9 mm wide in dispenser



pH and Test Paper

### ORDERING INFORMATION

| Type | pH range | Packaging | Catalog No. |
|---|---|---|---|
| Universal | 1 – 11 | Booklet | UNIV-B |
| Universal | 1 – 11 | Roll (9 mm x 6 m) | UNIV-R |
| Whole Range | 0 – 14 | Roll (9 mm x 5.5 m) | W-R |
| Congo Red | 3 – 5 | Booklet | 07810073 |
| Litmus Blue | Qualitative | Booklet | 07020010 |
| Litmus Red | Qualitative | Booklet | 07020020 |

## Blaine Test Papers

- Standard for testing cement using the Blaine air permeation test
- 12.7 mm diameter disks

Blaine Test Filter Paper

### ORDERING INFORMATION

| | | Catalog No. |
|---|---|---|
| Blaine Test paper | 250/package | 01511012 |

# Capsules and Cartridges



## Capsules – Introduction

- All-polypropylene housing is sturdy and chemically compatible
- Three membrane-type media and two depth-type media
- Wide range of retentive pore sizes
- All types available in three different lengths
- Diameter is a standard 78 mm
- Selected media available presterilized (EtO)

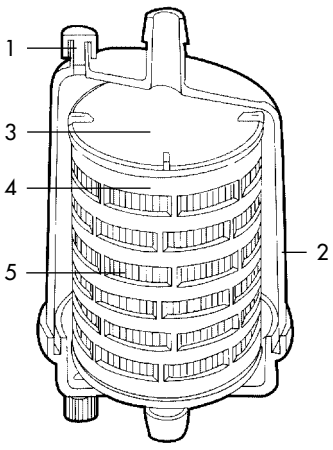
### APPLICATIONS

- Filter tissue culture media, fermentation broths, ground water
- Can be set in serial mode to maximize throughput volumes
- Point-of-use sterile filtration
- Use capsules for pilot/prototype studies, scale up to the same media in the cartridge format

Five different filter media are available in the capsule format.

| Media | Code | Characteristic | Media type | Pore Size or Nominal Rating (µm) | Membrane layers | Filtration area per capsule ($cm^2$) |
|---|---|---|---|---|---|---|
| PES | CCS | hydrophilic | membrane | 0.20 – 0.45 | double | up to 1800 |
| PTFE | CCF | hydrophobic | membrane | 0.05 – 1.0 | single/double | up to 3600 |
| PTFE | CCFH | hydrophilic | membrane | 0.20 | single | up to 3600 |
| Polypropylene | CCP | hydrophobic | depth-type | 0.8 – 30 | N/A | up to 2600 |
| Glass | CCG | - | depth-type | 0.45 – 1.0 | N/A | up to 1200 |

For detailed chemical compatibility information, see page 116




1. Vent/drain
2. Housing
3. End cap
4. Outer sleeve
5. Pleated filter media


B
1/4" NPTM


D
1/2" NPTM


H
3/8" hose barb


N
1-1/2" sanitary fitting

## PES Capsule Filter (CCS)

- Can be sterilized by autoclaving (121°C) or treatment with ethylene oxide (EtO)
- Available presterilized (EtO) or rinsed (recommended when filtering high purity water)

### APPLICATIONS

- Filter pure water, high purity chemicals, pharmaceuticals, cosmetics, tissue culture media
- Remove bacteria or sub-micron particulates

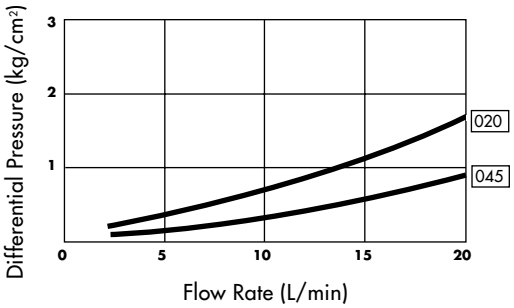
### SPECIFICATIONS

| | |
|---|---|
| Maximum Inlet Pressure | 4 kg/cm² (57 psi) |
| Maximum Operating Temperature | 60°C (140°F) |

| | | CCS-020 | CCS-045 |
|---|---|---|---|
| Layers | | Double | Double |
| Pore Size (µm) | | 0.20 | 0.45 |
| Minimum bubble point (water) | | ≥4.0 kg/cm² (57 psi) | ≥3.0 kg/cm² (43 psi) |
| LRV / Organism | | ≥7 B. diminuta | ≥7 S. marcescens |
| **Length Code** | Length (mm)* | Filtration Area (cm²) | |
| **C** | 102 | 450 | |
| **D** | 129 | 900 | |
| **E** | 201 | 1800 | |

*Length given is for capsule with end fixture H.

### WATER FLOW RATE




Typical water flow rate for CCS-____-D1B at 25°C.

### ORDERING INFORMATION

CCS - □□□ - □ 1 □ (S) (R) or

| Pore size (µm) | Pore Size Code |
|---|---|
| 0.20 | **020** |
| 0.45 | **045** |

| Length (mm) | Length Code |
|---|---|
| 102 | **C** |
| 129 | **D** |
| 201 | **E** |

| End fixture | End Fixture Code |
|---|---|
| 1/4" NPTM | **B** |
| 1/2" NPTM | **D** |
| 3/8" hose barb | **H** |
| 1 1/2" sanitary fitting | **N** |

When ordering sterile units, specify "S" in the last position of the catalog number.
When ordering Pre-rinsed units, specify "R" in the last position of the catalog number.

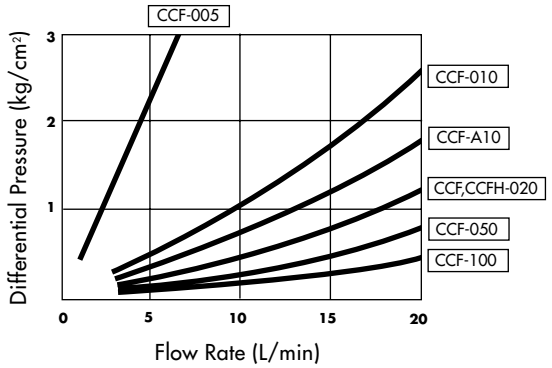
## PTFE Capsule Filters – Hydrophobic (CCF) and Hydrophilic (CCFH)

- Compatible: solvent and pH-resistant
- Hydrophobic:
  - Supported membrane except CCF-A10 and CCF-005
  - Single layer except CCF-A10 and CCF-005 which has double layer
  - 5 pore sizes
- Hydrophilic:
  - Polyester membrane support
  - Single layer
  - 0.2 µm pore size

### APPLICATIONS

- Use serially as prefilter and final filter
- Corrosive fluids and gases, photoresists, and both alkalis and acids
- Hydrophobic:
  - Solvent filtration
- Hydrophilic:
  - Solvents with higher surface tension
  - Heterogeneous fluid mixtures

### WATER FLOW RATE




Typical water flow rate for CCF-____-D1B at 25°C. ($H_2O$)

### SPECIFICATIONS

| | |
|---|---|
| Maximum Inlet Pressure | 4 kg/cm² (57 psi) |
| Maximum Operating Temperature | 60°C (140°F) |

| | CCF-005 | CCF-A10 | CCF-010 | CCF-020 | CCF-050 | CCF-100 | CCFH-020 |
|---|---|---|---|---|---|---|---|
| | Hydrophobic | | | | | | Hydrophilic |
| Layers | Double | Double | Single | Single | Single | Single | Single |
| Pore size (µm) | 0.05 | 0.10 | 0.10 | 0.20 | 0.50 | 1.0 | 0.20 |
| Min. bubble point (IPA) kg/cm² (psi) | ≥1.65 (23) | ≥1.6 (22) | ≥1.4 (20) | ≥0.9 (13) | ≥0.5 (7) | ≥0.3 (4) | - |
| **Length Code** / Length* (mm) | Filtration Area (cm²) | | | | | | |
| **C** 102 | 900 | 900 | 570 | 570 | 570 | 570 | 900 |
| **D** 129 | 1800 | 1800 | 1150 | 1150 | 1150 | 1150 | 1800 |
| **E** 201 | 3600 | 3600 | 2300 | 2300 | 2300 | 2300 | 3600 |

*Length given is for capsule with end fixture H.

### ORDERING INFORMATION

CCF - ☐☐☐ - ☐ 1 ☐ (S)[1]
CCFH - ☐☐☐

| Pore Size (µm) | Pore Size Code |
|---|---|
| 0.05 | **005** |
| 0.10 | **A10** |
| 0.10 | **010** |
| 0.20 | **020** |
| 0.50 | **050** |
| 1.00 | **100** |

| Pore Size (µm) | Pore Size Code |
|---|---|
| 0.2 | 020 |

| Length (mm) | Length Code |
|---|---|
| 102 | **C** |
| 129 | **D** |
| 201 | **E** |

| End Fixtures (Inlet and Outlet) | End Fixture Code |
|---|---|
| 1/4" NPTM | **B** |
| 1/2" NPTM | **D** |
| 3/8" hose barb | **H** |
| 1 1/2" sanitary fitting | **N** |

When ordering sterile units, specify "S" in the last position of the catalog number.

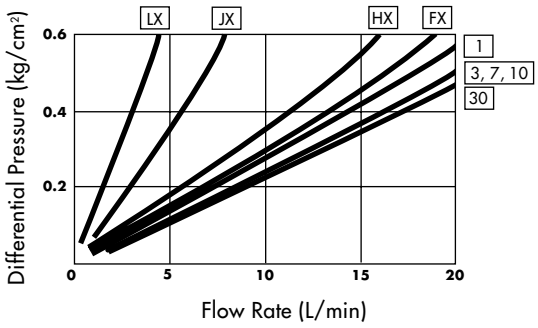
## Polypropylene Capsule Filter (CCP)

- Depth-type matrix: high dirt holding capacity, superior retention
- Compatible with aqueous solutions and solvents
- Thermally welded to prevent fiber slough-off and minimize changes in pore size during filtration
- Wide range of particle size cut-offs

### APPLICATIONS

- High purity water filtration
- Prefiltration to a final membrane filter such as PES or PTFE (CCS, CCF, or CCFH)
- Ultracleaning
- Filtration of process chemicals

### WATER FLOW RATE




Typical water flow rate for CCP-____-D1B at 25°C.

### SPECIFICATIONS

| | |
|---|---|
| Maximum Inlet Pressure | 4 kg/cm² (57 psi) |
| Maximum Operating Temperature | 60°C (140°F) |

| | | CCP- | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LX | JX | HX | FX | 1 | 3 | 7 | 10 | 30 |
| Particle size (µm) | | 0.8 | 1.0 | 2.0 | 3.0 | 2 – 5 | 5 – 10 | 10 – 20 | 10 – 20 | 20 - 30 |
| % Particle retention | | >99 | >99 | >99 | >99 | 94 | 98 | 98 | 92 | 97 |
| **Length Code** | Length* (mm) | Filtration Area (cm²) | | | | | | | | |
| **C** | 102 | 400 | 500 | 500 | 550 | 500 | 600 | 500 | 550 | 650 |
| **D** | 129 | 800 | 1000 | 1000 | 1100 | 1000 | 1200 | 1000 | 1100 | 1300 |
| **E** | 201 | 1600 | 2000 | 2000 | 2200 | 2000 | 2400 | 2000 | 2200 | 2600 |

*Length given is for capsule with end fixture H.

### ORDERING INFORMATION

CCP - [ ][ ] - [ ] 1 [ ]

| Retention Characteristic Code |
|---|
| **LX** |
| **JX** |
| **HX** |
| **FX** |
| **1** |
| **3** |
| **7** |
| **10** |
| **30** |

| Length (mm) | Length Code |
|---|---|
| 102 | **C** |
| 129 | **D** |
| 201 | **E** |

| End Fixtures (Inlet and Outlet) | End Fixture Code |
|---|---|
| 1/4" NPTM | **B** |
| 1/2" NPTM | **D** |
| 3/8" hose barb | **H** |
| 1 1/2" sanitary fitting | **N** |

## Glass Microfiber Capsule Filter (CCG)

- Depth-type matrix of borosilicate glass microfiber
- Large dirt holding capacity
- Resistant to most fluids except strong acids
- Contains a small amount of acrylic resin binder to enhance wet strength

### APPLICATIONS

- Sea water filtration
- Aquaculture
- Prefiltration to a final membrane filter such as PES or PTFE (CCS, CCF, or CCFH)

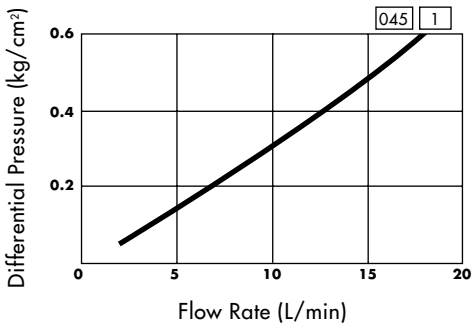
### SPECIFICATIONS

| | |
|---|---|
| Maximum Inlet Pressure | 3.0 kg/cm² (43 psi) |
| Maximum Operating Temperature | 60°C (140°F) |

| **Type Code** | **045** | **1** |
|---|---|---|
| Nominal rating (µm) | 0.45 µm | 1.0 µm |
| **Length Code** | Length* (mm) | Filtration Area (cm²) |
| **C** | 102 | 300 |
| **D** | 129 | 600 |
| **E** | 201 | 1200 |

*Length given is for capsule with end fixture H.

### WATER FLOW RATE




Typical water flow rate for CCG-____-D1B at 25°C.

### ORDERING INFORMATION

CCG - □□□ - □ 1 □

| Nominal rating (µm) | **Nominal Rating Code** |
|---|---|
| 0.45 | **045** |
| 1.0 | **1** |

| Length (mm) | **Length Code** |
|---|---|
| 105 | **C** |
| 125 | **D** |
| 205 | **E** |

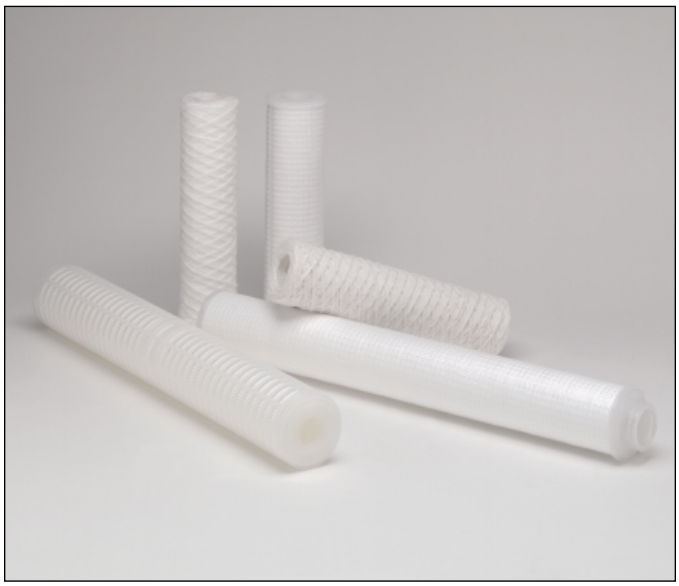
| End Fixtures (Inlet and Outlet) | **End Fixture Code** |
|---|---|
| 1/4" NPTM | **B** |
| 1/2" NPTM | **D** |
| 3/8" hose barb | **H** |
| 1 1/2" sanitary fitting | **N** |

## Cartridges – Introduction

- Available in a wide variety of media and end fixture configurations
- Media can be mixed and configured in serial format to maximize throughput volumes, flow rates, and cartridge life
- Fit many commercially available filter housings

### APPLICATIONS

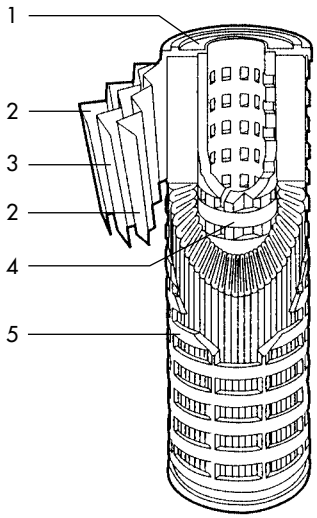
- Large surface area permits large throughput volumes and higher flow rates
- Suitable for both prefiltration and final filtration of fluids in pharmaceutical, food, beverage, and electronics industries
- Wide choice of media and core enables use in many chemical and thermal conditions



Eleven different filter media are available in cartridge format.

### SPECIFICATIONS

| Media | Code | Media type | Format Nominal | Pore Size or Rating (µm) | Metric/ English lengths |
|---|---|---|---|---|---|
| Cellulose acetate | TCR | Membrane | Pleated, internal prefilter | 0.20 – 0.80 | Metric |
| Polyethersulfone (PES) | TCS | Membrane | Pleated, internal prefilter | 0.20 – 0.45 | Metric |
| Hydrophobic PTFE | TCF | Membrane | Pleated | 0.05 – 1.0 | Metric |
| Hydrophilic PTFE | TCFH | Membrane | Pleated | 0.10 – 1.0 | Metric |
| Coated cellulose acetate | TCY | Membrane | Pleated, dual layer | 0.21 – 2.0 | Metric |
| Coated cellulose acetate | TCYE | Membrane | Pleated, single layer | 0.21 – 10 | Metric |
| Polypropylene | TCP | Bonded fiber | Pleated, multiple layers | 0.8 – 3.0 | Metric |
| Polypropylene | TCP/ TCPE | Bonded fiber | Pleated, single layer | 1 - 30 | Metric |
| Polypropylene, multigrade | TCPD | Depth-type | Spirally wound | 1 – 70 | Metric |
| Epoxy cellulose | TC | Depth-type | Pleated | 1 – 30 | Metric |
| Glass fiber | TCG | Depth-type | Pleated, dual layer | 0.45 – 1 | Metric |
| All-polypropylene | OH | Bonded fiber | Graded density | 1 – 75 | English |
| String (11 types of media) | W | String fiber | String wound | 0.5 – 200 | English |

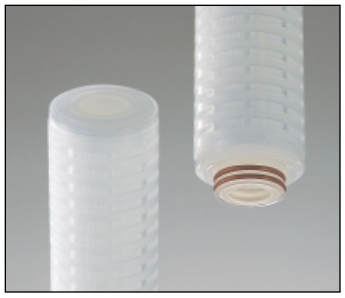



1. End cap
2. Support media
3. Final membrane
4. Core tube
5. Outer sleeve

For detailed chemical compatibility information, see page 118.
Filter housings are available–call to discuss your particular needs.

## End Fixture Configurations

Twelve different end configurations are pictured below; see the individual cartridge listings for availability. All-polypropylene (OH) and string wound (W) cartridges have a compression seal (not pictured), eliminating the need for gaskets or O-rings.

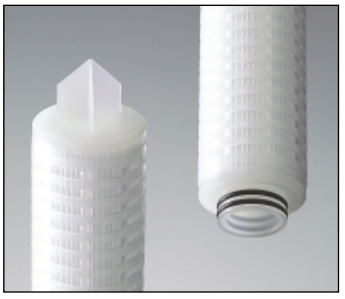


**H** Size 222 heat-resistant O-ring, flat closed

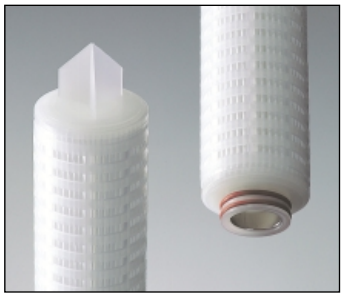
**M** Size 222 O-ring, flat closed

**L** Size 222 O-ring with internal stainless steel support, flat closed

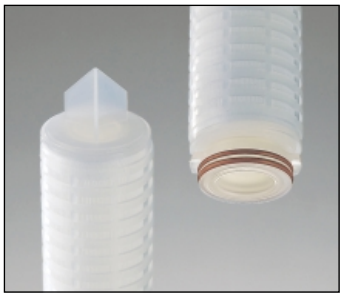
**K** Size 222 heat-resistant O-ring, spear closed



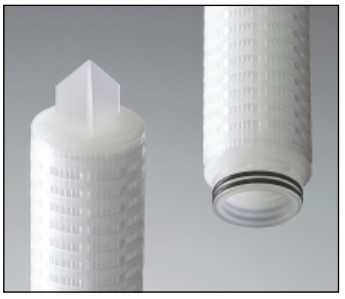
**R** Size 222 O-ring, spear closed



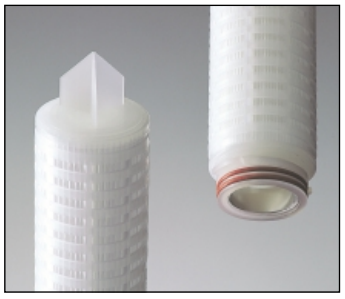
**S** Size 222 O-ring with tabs and internal stainless steel support, spear closed



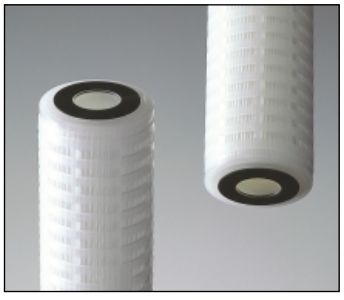
**J** Size 226 heat-resistant O-ring with tabs, spear closed



**P** Size 226 O-ring with tabs, spear closed

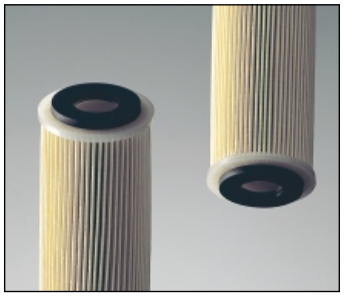


**Q** Size 226 O-ring with tabs and internal stainless steel support, spear closed



**F** Flat Gasket

**N** 120 size O-ring



**C** Flat Gasket, available for the TC-type only

## Cellulose Acetate (TCR)

- Dual cellulose acetate membranes provide internal prefiltration by placing a larger pore size membrane upstream of final rated pore size membrane
- Polyester membrane support is non-fiber releasing
- Low protein binding

### APPLICATIONS

- Filter ultra-pure water, rinse waters, cosmetics, pharmaceuticals, and beverages (beer and wine)

### SPECIFICATIONS

| | TCR-020 | TCR-045 | TCR-080 |
|---|---|---|---|
| Pore size | 0.20 µm | 0.45 µm | 0.80 µm |
| Dual membranes: | | | |
| Upstream | 0.80 µm | 1.0 µm | 5.0 µm |
| Downstream | 0.20 µm | 0.45 µm | 0.80 µm |
| Challenge organism | B. diminuta | S. marcescens | S. cerevisiae |
| LRV (Log reduction value) | ≥7 | ≥7 | ≥7 |
| Filtration area per single length | 4200 $cm^2$ | | |
| Max. differential pressure (25°C) | 4.0 $kg/cm^2$ (57 psi) | | |
| Max. operating temperature | 80°C (176°F) | | |

**Materials:**

| | |
|---|---|
| End cap | Polybutyleneterephthalate (PBT) |
| Sealing material | Medical grade polyurethane |
| Support media | Polyester |
| Prefilter membrane | Cellulose acetate |
| Final membrane | Cellulose acetate |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

### ORDERING INFORMATION

TCR - □□□ - □ B □□

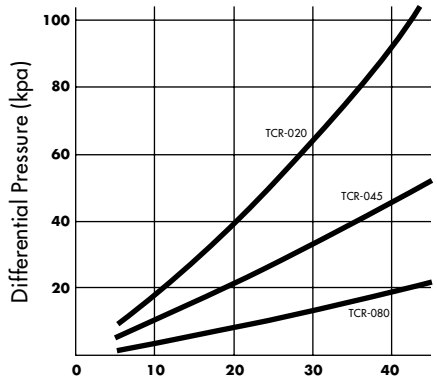
| Pore Size (µm) | Pore Size Code |
|---|---|
| 0.20 | 020 |
| 0.45 | 045 |
| 0.80 | 080 |

| Length (mm) | Length Code |
|---|---|
| 250 (single) | S |
| 500 (double) | D |
| 750 (triple) | T |
| 1000 (quad) | Q |

| End Fixture Code | |
|---|---|
| F | R |
| N | S |
| M | P |
| L | Q |

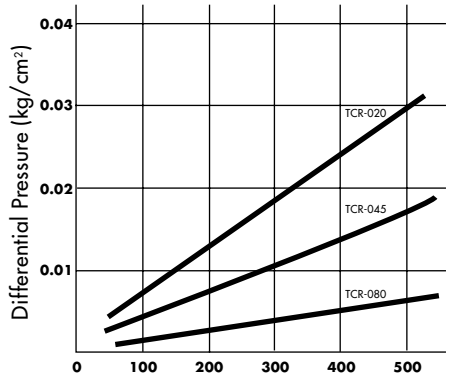
| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | E |
| EPDM | D |
| Chloroprene | N |
| Silicone | S |
| FPM | V |

### TYPICAL WATER FLOW RATE




Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Polyethersulfone (PES) Membranes (TCS)

- Dual Polyethersulfone (PES) membranes provide internal prefiltration by placing a larger pore size membrane upstream of final rated pore size membrane
- Low extractables
- Enhanced chemical compatibility
- Quick rinse down
- Low protein binding
- 100% integrity tested during manufacturing
- Non-fiber releasing

### APPLICATIONS

- Filtration for electronics, cosmetics, pharmaceuticals, beverage industries

### SPECIFICATIONS

| | TCS-020 | TCS-045 |
|---|---|---|
| Pore size | 0.20 µm | 0.45 µm |
| Dual membranes: | | |
| Upstream | 0.45 µm | 0.65 µm |
| Downstream | 0.20 µm | 0.45 µm |
| Challenge organism | B. diminuta | S. marcescens |
| LRV (Log reduction value) | ≥7 | ≥7 |
| Filtration area per single length | 4000 $cm^2$ | |
| Max. differential pressure (25°C) | 4.0 $kg/cm^2$ (57 psi) | |
| Max. operating temperature | 80°C (176°F) | |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene |
| Support media | Polypropylene |
| Prefilter membrane | Polytethersulfone (PES) |
| Final membrane | Polytethersulfone (PES) |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

### ORDERING INFORMATION

TCS - □□□ - □ 1 □□

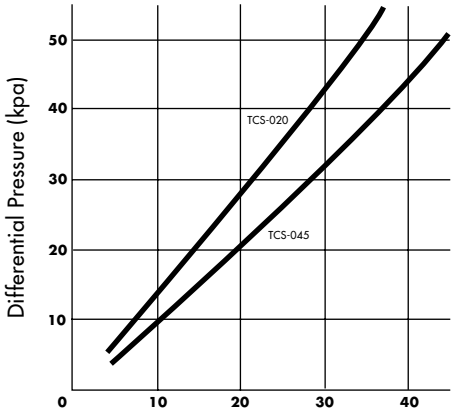
| Pore Size (µm) | Pore Size Code |
|---|---|
| 0.20 | 020 |
| 0.45 | 045 |

| Length (mm) | Length Code |
|---|---|
| 250 (single) | S |
| 500 (double) | D |
| 750 (triple) | T |
| 1000 (quad) | Q |

| End Fixture Code | |
|---|---|
| F | R |
| N | K |
| M | P |
| H | J |

| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | E |
| EPDM | D |
| Chloroprene | N |
| Silicone | S |
| FPM | V |

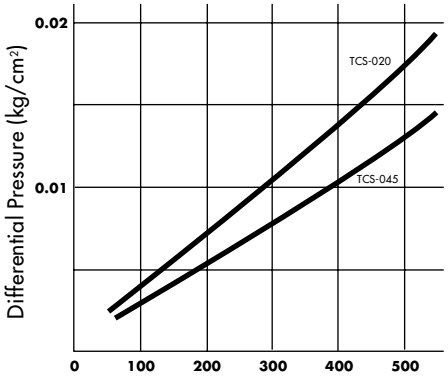
### TYPICAL WATER FLOW RATE




Flow Rate (L/min/250 mm length)

Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Flow Rate (N L/min/250 mm length)

Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Hydrophobic PTFE (TCF)

- PTFE membrane supported on a non-fiber releasing polypropylene backing
- Enhanced chemical resistance
- Can be in line steam sterilized (126°C, 30 min) or autoclaved (121°C, 30 min)

### APPLICATIONS

- Filtration of photo resists and organic solvents
- Uses in the electronics industry and in chemical manufacturing
- Filtering gases and venting tanks

**Note:** Process fluids must have a surface tension of ≤32 dyne/cm to properly wet the filter and to achieve optimized flow rates and performance characteristics. For fluids with a surface tension ≥32 dyne/cm, use hydrophilic PTFE (TCFH cartridges).

### SPECIFICATIONS

| | TCF-005 | TCF-010 | TCF-020 | TCF-050 | TCF-100 |
|---|---|---|---|---|---|
| Pore size | 0.05 µm | 0.10 µm | 0.20 µm | 0.50 µm | 1.00 µm |
| Filtration area per single length | 9200 $cm^2$ | 9200 $cm^2$ | 7000 $cm^2$ | 7000 $cm^2$ | 7000 $cm^2$ |
| Max. differential pressure (25°C) | 4.0 kg/$cm^2$ (57 psi) | | | | |
| Max. operating temperature | 80°C (176°F) | | | | |

### Materials:

| | |
|---|---|
| End cap | Polypropylene |
| Support media | Polypropylene |
| Membrane | PTFE |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

### ORDERING INFORMATION

TCF - [ ][ ][ ] - [ ] 1 [ ][ ]

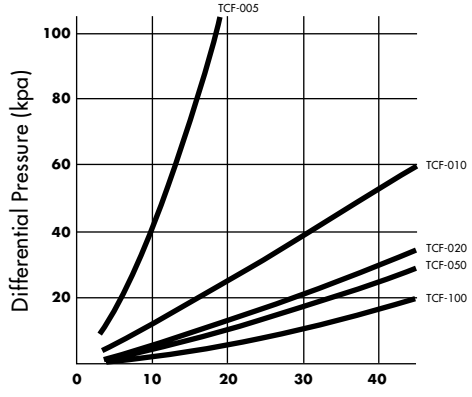
| Pore Size (µm) | Pore Size Code |
|---|---|
| 0.05 | 005 |
| 0.10 | 010 |
| 0.20 | 020 |
| 0.50 | 050 |
| 1.0 | 100 |

| Length (mm) | Length Code |
|---|---|
| 250 (single) | S |
| 500 (double) | D |
| 750 (triple) | T |
| 1000 (quad) | Q |

| End Fixture Code | |
|---|---|
| F | R |
| N | K |
| M | P |
| H | J |

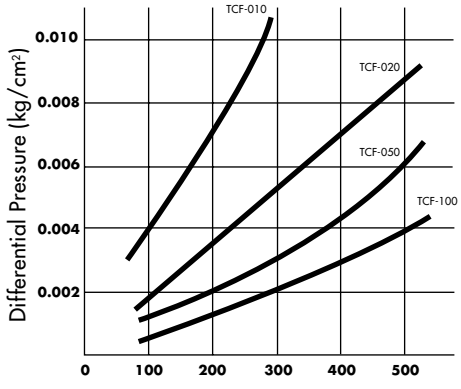
| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | E |
| EPDM | D |
| Chloroprene | N |
| Silicone | S |
| FPM | V |
| PTFE | H |
| FEP encapsulated | F |

### TYPICAL WATER FLOW RATE




Flow Rate (L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Flow Rate (N L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Hydrophilic PTFE (TCFH)

- Unsupported PTFE membrane has been treated to render the matrix hydrophilic
- Polypropylene support is non-fiber releasing

### APPLICATIONS

- Strong acid and strong alkali solutions
- Photo resists
- Chemically aggressive liquids with a surface tension ≥32

**Note:** This cartridge is not autoclavable.

### SPECIFICATIONS

| | TCFH-010 | TCFH-020 | TCFH-050 | TCFH-100 |
|---|---|---|---|---|
| Pore size | 0.10 µm | 0.20 µm | 0.50 µm | 1.00 µm |
| Filtration area per single length | 9800 $cm^2$ | | | |
| Max.differential pressure (25°C) | 4.0 $kg/cm^2$ (57 psi) | | | |
| Max. operating temperature | 80°C (176°F) | | | |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene |
| Support media | Polypropylene |
| Membrane | Hydrophilic PTFE |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

### ORDERING INFORMATION

TCFH - □□□ - □ 1 □□

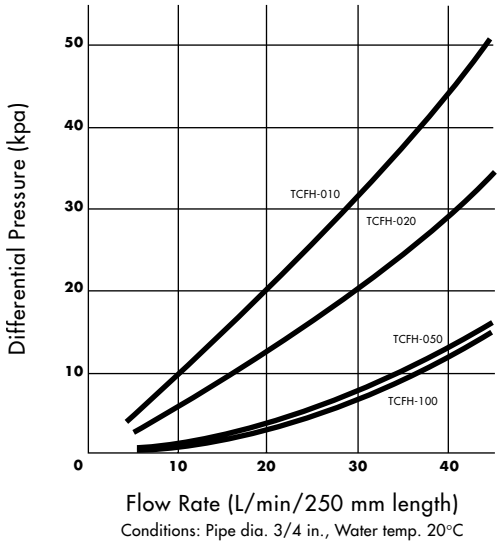
| Pore Size (µm) | Pore Size Code |
|---|---|
| 0.10 | 010 |
| 0.20 | 020 |
| 0.50 | 050 |
| 1.0 | 100 |

| Length (mm) | Length Code |
|---|---|
| 250 (single) | S |
| 500 (double) | D |
| 750 (triple) | T |
| 1000 (quad) | Q |

| End Fixture Code | |
|---|---|
| F | R |
| N | |
| M | P |

| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | E |
| EPDM | D |
| Chloroprene | N |
| Silicone | S |
| FPM | V |
| PTFE | H |
| FEP encapsulated | F |

### TYPICAL WATER FLOW RATE




Conditions: Pipe dia. 3/4 in., Water temp. 20°C

## Coated Cellulose Acetate (TCY)

- Dual layer of coated cellulose acetate membrane
- Low protein binding
- Excellent dirt holding characteristics, superior particle retention
- Excellent water and air flow rates
- Autoclavable (121°C, 30 min)
- Non-fiber releasing

### APPLICATIONS

- Use as a prefilter to a final membrane cartridge
- Filter protein-containing solutions for the food, cosmetic and pharmaceutical industries
- Purify process waters

### SPECIFICATIONS

| | TCY-ND, -LD, -HD |
|---|---|
| Filtration area per single length | 5500 $cm^2$ |
| Max. differential pressure (25°C) | 5.0 $kg/cm^2$ (71 psi) |
| Max. operating temperature | 80°C (176°F) |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene |
| Support media | Polypropylene |
| Prefilter membrane | Coated cellulose acetate |
| Final membrane | Coated cellulose acetate |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

| Retention Characteristic Code | Particle Size | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.21µm | 0.3 µm | 0.48 µm | 0.65 µm | 0.8 µm | 1.0 µm | 2.0 µm |
| | % Particle Retention | | | | | | |
| TCY-ND | 99.9 | 99.9 | 99.9 | >99.9 | | | |
| TCY-LD | | 99 | 99.9 | 99.9 | >99.9 | | |
| TCY-HD | | | 99 | 99.9 | 99.9 | 99.9 | >99.9 |

Test Criteria: Single length (250 mm) cartridge, flow rate 10 L/min

### ORDERING INFORMATION

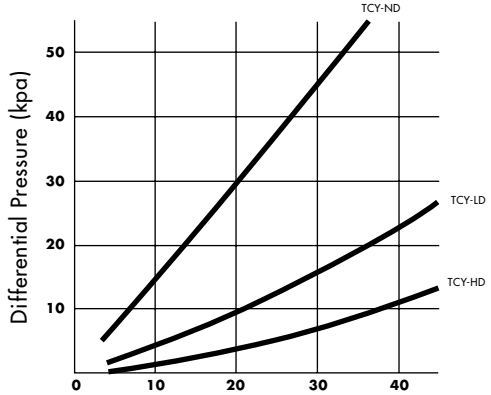
TCY - □ - □ 1 □□

| Retention Characteristic Code | Length (mm) | Length (code) |
|---|---|---|
| ND | 250 (single) | S |
| LD | 500 (double) | D |
| HD | 750 (triple) | T |
| | 1000 (quad) | Q |

| End Fixture Code | |
|---|---|
| F | R |
| N | K |
| M | P |
| H | J |

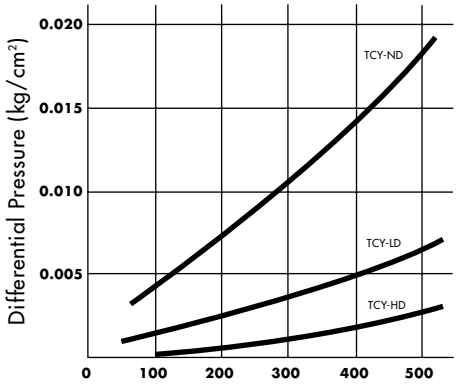
| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | E |
| EPDM | D |
| Chloroprene | N |
| Silicone | S |
| FPM | V |

### TYPICAL WATER FLOW RATE




Flow Rate (L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Flow Rate (N L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Coated Cellulose Acetate (single layer) (TCYE)

- High efficiency single layer of coated cellulose acetate
- Economical
- Excellent particle retention
- Low protein binding, non-fiber releasing
- Excellent water and air flow rates
- Autoclavable (121°C, 30 min)

### APPLICATIONS

- Filter process waters
- Filter protein-containing solutions for the food, cosmetic and pharmaceutical industries

### SPECIFICATIONS

| | TCYE-NS, -LS, -HS, -BS |
|---|---|
| Filtration area per single length | 6200 $cm^2$ |
| Max. differential pressure (25°C) | 5.0 $kg/cm^2$ (71 psi) |
| Max. operating temperature | 80°C (176°F) |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene |
| Support media | Polypropylene |
| Membrane | Coated cellulose acetate |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

| Retention Characteristic Code | Particle Size | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.21µm | 0.3 µm | 0.48 µm | 0.65 µm | 0.8 µm | 1.0 µm | 2.0 µm | 3.0 | 5.0 | 10 |
| | % Particle Retention | | | | | | | | | |
| **TCYE-NS** | 99 | 99.9 | 99.9 | >99.9 | | | | | | |
| **TCYE-LS** | | 98 | 99 | 99 | >99.9 | | | | | |
| **TCYE-HS** | | | 96 | 99 | 99 | 99 | >99.9 | | | |
| **TCYE-BS** | | | | | | | 98 | 99.9 | 99.9 | >99.9 |

Test Criteria: Single length (250 mm) cartridge, flow rate 10 L/min

### ORDERING INFORMATION

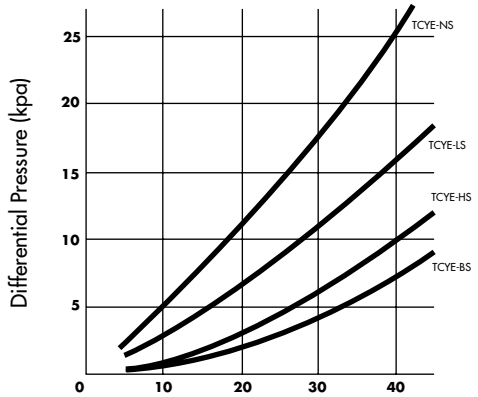
**TCYE - □ - □ 1 □□**

| Retention Characteristic Code | Length (mm) | Length (code) |
|---|---|---|
| **NS** | 250 (single) | **S** |
| **LS** | 500 (double) | **D** |
| **HS** | 750 (triple) | **T** |
| **BS** | 1000 (quad) | **Q** |

| End Fixture Code | |
|---|---|
| **F** | **R** |
| **N** | **K** |
| **M** | **P** |
| **H** | **J** |

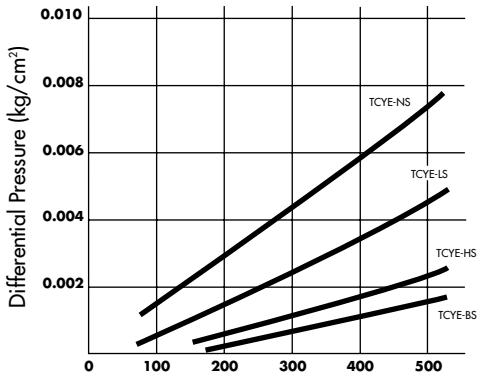
| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | **E** |
| EPDM | **D** |
| Chloroprene | **N** |
| Silicone | **S** |
| FPM | **V** |

### TYPICAL WATER FLOW RATE




Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Polypropylene (TCP)

- Multiple layers of nonwoven polypropylene maximize filtration efficiency
- Maximal throughput volumes and retention ratings
- Thermally bonded to prevent fiber slough-off, minimize extractables
- Supported both upstream and downstream (TCP-HX, FX only)

### APPLICATIONS

- Filter process waters
- Filter protein-containing solutions for the food, cosmetic and pharmaceutical industries

### SPECIFICATIONS

| | TCP-LX | TCP-JX | TCP-HX | TCP-FX |
|---|---|---|---|---|
| Filtration area per single length | 3300 $cm^2$ | 4500 $cm^2$ | 4200 $cm^2$ | 5100 $cm^2$ |
| Max. differential pressure (25°C) | 5.0 kg/$cm^2$ (71 psi) | | | |
| Max. operating temperature | 80°C (176°F) | | | |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene |
| Support media | Polypropylene |
| Membrane | Polypropylene |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

| Retention Characteristic Code | Particle Size | | | | | | | % Retention (0.3 µm DOP) |
|---|---|---|---|---|---|---|---|---|
| | 0.2 µm | 0.48 µm | 0.65 µm | 0.8 µm | 1.0 µm | 2.0 µm | 3.0 µm | |
| | % Particle Retention | | | | | | | |
| **TCP-LX** | 45 | 90 | 98 | >99 | | | | 99.9999 |
| **TCP-JX** | | 60 | 80 | 94 | >99 | | | 99.999 |
| **TCP-HX** | | | | 70 | 93 | >99 | | 99.99 |
| **TCP-FX** | | | | 30 | 60 | 95 | >99 | 99.84 |

Test Criteria: Single length (250 mm) cartridge, flow rate 10 L/min

### ORDERING INFORMATION

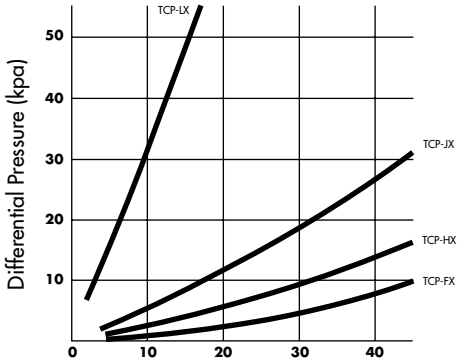
TCP - □□ - □ 1 □□

| Retention Characteristic Code | Length (mm) | Length (code) |
|---|---|---|
| **LX** | 250 (single) | **S** |
| **JX** | 500 (double) | **D** |
| **HX** | 750 (triple) | **T** |
| **FX** | 1000 (quad) | **Q** |

| End Fixture Code | |
|---|---|
| **F** | **R** |
| **N** | **K** |
| **M** | **P** |
| **H** | **J** |

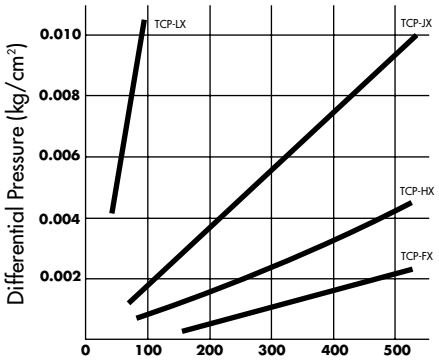
| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | **E** |
| EPDM | **D** |
| Chloroprene | **N** |
| Silicone | **S** |
| FPM | **V** |
| PTFE | **H** |
| FEP (encapsulated) | **F** |

### TYPICAL WATER FLOW RATE




Flow Rate (L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Flow Rate (N L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Single Layer Polypropylene (TCP/TCPE)

- All-polypropylene construction, medium is single layer of thermally bonded polypropylene
- Pore size range 1 – 30 µm
- TCP – Upstream and downstream support
  – Larger effective filtration area
- TCPE – Thicker grade of polypropylene is stronger and does not require support
  – Less effective filtration area

### APPLICATIONS

- Use as a prefilter in series upstream of a final membrane to clarify solutions
- Applications that require chemical resistance and chemical cleanliness

### SPECIFICATIONS

| | TCP-1 | TCP-3 | TCP-7 | TCP-10 | TCP-30 | TCPE-3 | TCPE-10 | TCPE-30 |
|---|---|---|---|---|---|---|---|---|
| Nominal pore size | 1 µm | 3 µm | 7 µm | 10 µm | 30 µm | 3 µm | 10 µm | 30 µm |
| Filtration area per single length | 4200 $cm^2$ | 5600 $cm^2$ | 4200 $cm^2$ | 5000 $cm^2$ | 6200 $cm^2$ | 3700 $cm^2$ | | |
| Max. differential pressure (25°C) | 5.0 $kg/cm^2$ (71 psi) | | | | | | | |
| Max. operating temperature | 80°C (176°F) | | | | | | | |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene |
| Support Media (TCP) | Polypropylene |
| Membrane | Polypropylene |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

### ORDERING INFORMATION

TCP - □□ - □ 1 □□

TCPE - □□ - □ 1 □□

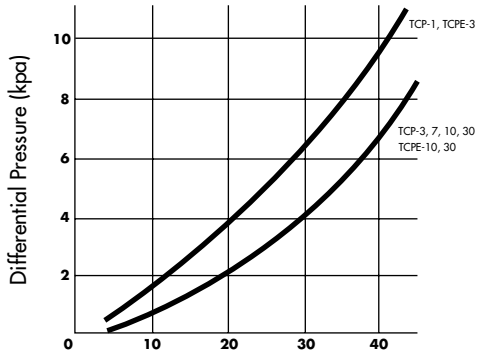
| Nominal Pore Size Code (TCP) | Nominal Size Code (TCPE) |
|---|---|
| 1 | - |
| 3 | 3 |
| 7 | - |
| 10 | 10 |
| 30 | 30 |

| Length (mm) | Length Code |
|---|---|
| 250 (single) | S |
| 500 (double) | D |
| 750 (triple) | T |
| 1000 (quad) | Q |

| End Fixture Code | |
|---|---|
| F | R |
| N | K |
| M | P |
| H | J |

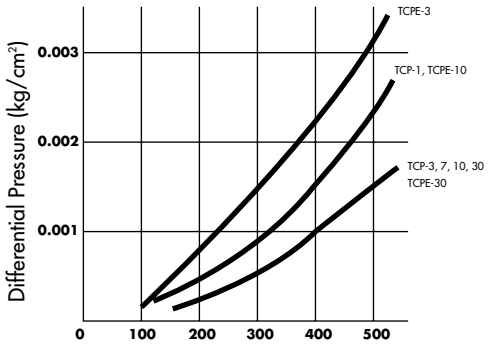
| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | E |
| EPDM | D |
| Chloroprene | N |
| Silicone | S |
| FPM | V |
| PTFE | H |
| FEP (encapsulated) | F |

### TYPICAL WATER FLOW RATE




Flow Rate (L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Flow Rate (N L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Multigrade Polypropylene (TCPD)

- Spirally wound multigrade all-polypropylene construction
- Increasing depth retention gradient: as fluid flows through the cartridge, retention efficiency increases
- Maximal chemical compatibility

### APPLICATIONS

- Ideal for viscous fluids and fluids that have a heterogeneous particle population
- Prefilter or clarifying filter
- Filtration of pure or rinse waters, magnetized paint coatings, synthetic resins, high viscosity resins, plating solutions, etching solutions and strong alkali solutions

### SPECIFICATIONS

| | All TCPD cartridges: 01A, 02A, 03A, 05A, 1, 3, 7, 10, 30 |
|---|---|
| Max. differential pressure (25°C) | 5.0 kg/cm² (71 psi) |
| Max. operating temperature | 80°C (176°F) |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene |
| Support media | Polypropylene net |
| Filter | Polypropylene |
| Core tube | Polypropylene |

| Retention Characteristic Code | Particle Size | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.6 µm | 1.0 µm | 2 µm | 3 µm | 5 µm | 10 µm | 20 µm | 30 µm | 40 µm | 70 µm |
| | % Particle Retention | | | | | | | | | |
| **TCPD-01A** | 90 | >99.9 | | | | | | | | |
| **TCPD-02A** | | >99 | >99.9 | | | | | | | |
| **TCPD-03A** | | 95 | >99 | >99.9 | | | | | | |
| **TCPD-05A** | | | 95 | >99 | >99.9 | | | | | |
| **TCPD-1** | | | 90 | 95 | >99 | | | | | |
| **TCPD-3** | | | | 70 | 90 | >99 | | | | |
| **TCPD-7** | | | | | 40 | 80 | >99 | | | |
| **TCPD-10** | | | | | | 60 | 90 | 95 | >99 | |
| **TCPD-30** | | | | | | | 60 | 90 | 95 | >99 |

### ORDERING INFORMATION

**TCPD - □□□ - □ 1 □□**

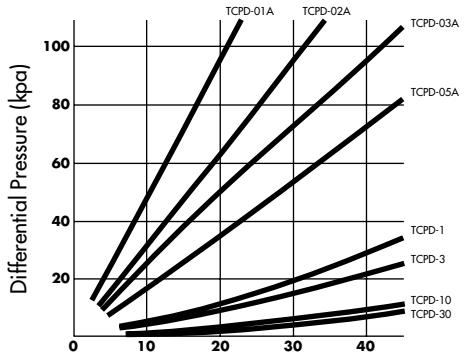
| Nominal Pore Size Code | |
|---|---|
| **01A** | **1** |
| **02A** | **3** |
| **03A** | **7** |
| **05A** | **10** |
| | **30** |

| Length (mm) | Length Code |
|---|---|
| 250 (single) | **S** |
| 500 (double) | **D** |
| 750 (triple) | **T** |
| 1000 (quad) | **Q** |

| End Fixture Code | |
|---|---|
| **F** | **R** |
| **N** | **K** |
| **M** | **P** |
| **H** | **J** |

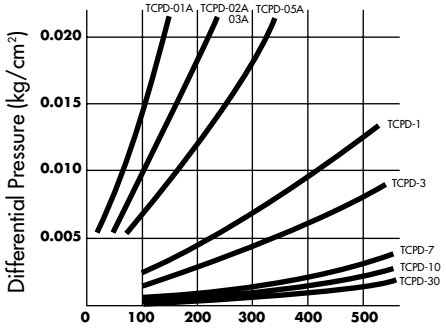
| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | **E** |
| EPDM | **D** |
| Chloroprene | **N** |
| Silicone | **S** |
| FPM | **V** |
| PTFE | **H** |
| FEP (encapsulated) | **F** |

### TYPICAL WATER FLOW RATE




Flow Rate (L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Flow Rate (N L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Epoxy Cellulose (TC)

- 100% cellulose wet strengthened with epoxy resin to minimize fiber release
- Available with standard polypropylene core or with stainless steel (type 304) core for high temperature applications
- See Glass Fiber (TCG) for smaller nominal pore sizes

### APPLICATIONS

- Filter high viscosity liquids such as syrups
- Filter fuels, oils, cutting oils and resins
- Purify industrial and rinse waters
- Other applications in the food, beverage, cosmetic, and other industries

**Note:** Cartridges with stainless steel core are only available

### SPECIFICATIONS

| | TC type | | | | TC- _ -S4CB | | | |
|---|---|---|---|---|---|---|---|---|
| Molded Material | Polypropylene | | | | Stainless steel | | | |
| | 1 | 3 | 10 | 30 | 1 | 3 | 10 | 30 |
| Nominal pore size | 1 µm | 3 µm | 10 µm | 30 µm | 1 µm | 3 µm | 10 µm | 30 µm |
| Filtration area per single length | 4000 $cm^2$ | | | | 3400 $cm^2$ | | | |
| Max. differential pressure (25°C) | 5.0 $kg/cm^2$ (71 psi) | | | | 5.0 $kg/cm^2$ (71 psi) | | | |
| Max temperature | 80°C (176°F) | | | | 150°C (302°F) | | | |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene or stainless steel (seal material: silicone) |
| Filter | Epoxy Cellulose |
| Core tube | Polypropylene or stainless steel |

### ORDERING INFORMATION

**Polypropylene molded material**

TC - □□ - □ 1 □□

| Nominal Pore Size (µm) | **Nominal Pore Size Code** |
|---|---|
| 1 | **1** |
| 3 | **3** |
| 10 | **10** |
| 30 | **30** |

| Length (mm) | **Length Code** |
|---|---|
| 250 (single) | **S** |
| 500 (double) | **D** |
| 750 (triple) | **T** |
| 1000 (quad) | **Q*** |

| **End Fixture Code** | |
|---|---|
| **F** | **R** |
| **N** | **P** |
| **M** | **C** |

| Gasket O-ring polymer | **Gasket Code** |
|---|---|
| EPR | **E** |
| Chloroprene | **N** |
| Silicone | **S** |
| FPM | **V** |

*Quad length (1000 mm) not available in end fixture Code C

## ORDERING INFORMATION

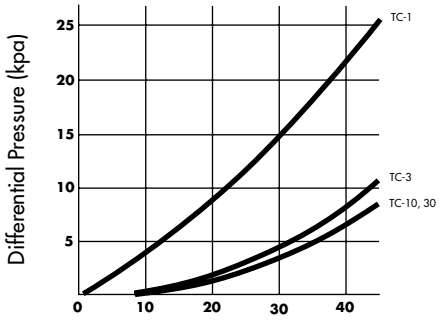
**Stainless steel molded material**

TC - [ ] [ ] -S4C [ ]

| Nominal Pore Size (µm) | **Nominal Pore Size Code** |
|---|---|
| 1 | **1** |
| 3 | **3** |
| 10 | **10** |
| 30 | **30** |

| Gasket O-ring polymer | **Gasket Code** |
|---|---|
| NBR | **B** |
| EPR | **E** |
| Silicone | **S** |
| FPM | **V** |

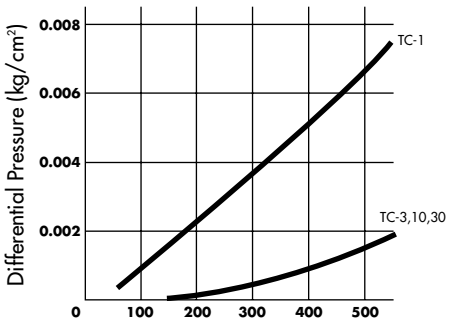
## TYPICAL WATER FLOW RATE




Flow Rate (L/min/250 mm length)

Conditions: Pipe dia. 3/4 in., Water temp. 20°C

## TYPICAL AIR FLOW RATE




Flow Rate (N L/min/250mm length)

Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## Glass Fiber (TCG)

- Upstream polypropylene followed by a glass fiber layer that is wet strengthened with acrylic resin
- For larger pore size retention see Epoxy Cellulose (TC)

### APPLICATIONS

- Filter high viscosity liquids such as syrups
- Filter fuels, oils, cutting oils and resins
- Purify industrial and rinse waters
- Other applications in the food, beverage, cosmetic and other industries

### SPECIFICATIONS

| | TCG-045 | TCG-1 |
|---|---|---|
| Nominal pore size | 0.45 µm | 1.0 µm |
| Filtration area per single length | 3300 cm² | |
| Max. differential pressure (25°C) | 5.0 kg/cm² (71 psi) | |
| Max. operating temperature | 80°C (176°F) | |

**Materials:**

| | |
|---|---|
| End cap | Polypropylene |
| Upstream support | Polypropylene |
| Filter | Glass Fiber |
| Downstream support | Polypropylene |
| Core tube | Polypropylene |
| Outer sleeve | Polypropylene |

### ORDERING INFORMATION

TCG - ☐☐☐ - ☐ 1 ☐☐

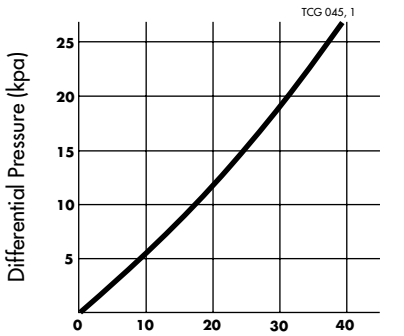
| Pore Size (µm) | Pore Size Code |
|---|---|
| 0.45 | 045 |
| 1.0 | 1 |

| Length (mm) | Length Code |
|---|---|
| 250 (single) | S |
| 500 (double) | D |
| 750 (triple) | T |
| 1000 (quad) | Q |

| End Fixture Code | |
|---|---|
| F | R |
| N | |
| M | P |

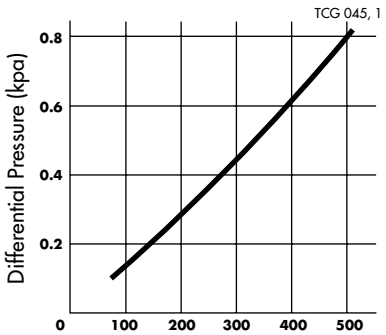
| Gasket O-ring polymer | Gasket Code |
|---|---|
| EPR | E |
| EPDM | D |
| Chloroprene | N |
| Silicone | S |
| FPM | V |

### TYPICAL WATER FLOW RATE




Flow Rate (L/min/250 mm length)
Conditions: Pipe dia. 3/4 in., Water temp. 20°C

### TYPICAL AIR FLOW RATE




Flow Rate (N L/min/250mm length)
Conditions: Pipe dia. 3/4 in., Air 0.49 MPs, 25°C

## All Polypropylene (OH)

- All-polypropylene construction: melt blown polypropylene filaments are spun into a gradient density
- Graded density media maximizes particle retention
- Excellent flow rates
- Compression seal eliminates the need for O-rings or gaskets

### APPLICATIONS

- Prefilter upstream of a final pleated cartridge
- Moderate differential pressures and temperatures

### SPECIFICATIONS

| | OH |
|---|---|
| Nominal pore size | 1 – 75 µm |
| Max. operating pressure (25°C) | 1.1 kg/cm² (15 psi) |
| Max. temperature | 60°C (140°F) |

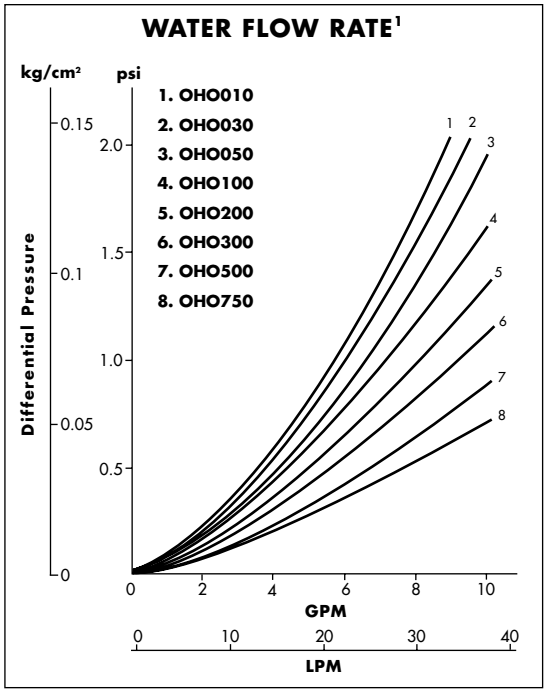
### ORDERING INFORMATION

OH O - □□□ - C □□

| Pore Size (µm) | Pore Size Code |
|---|---|
| 1 | **010** |
| 3 | **030** |
| 5 | **050** |
| 10 | **100** |
| 20 | **200** |
| 30 | **300** |
| 50 | **500** |
| 75 | **750** |

| Length (inches) | Length Code |
|---|---|
| 10 | **10** |
| 20 | **20** |
| 30 | **30** |
| 40 | **40** |

### PERFORMANCE DATA




1. Conditions: clean water at 25°C; data are for 10-inch cartridges

## String Wound (W)

- Manufactured using "string" of selected materials wound around a core tube
- Core tubes available in polypropylene and three grades of steel
- Continuously wound – no joints that would restrict flow or allow by-pass
- End fixtures are compression fittings
- Selection of materials allows a wide range of chemical and temperature tolerances

### APPLICATIONS

- Coarse filtration upstream of a final pleated filter
- Filtration of industrial water
- Clarification of process fluids

### SPECIFICATIONS

| | All W cartridges |
|---|---|
| Nominal pore size | 0.5 – 200 µm |
| Max. inlet pressure (25°C) | 1.1 kg/cm² (15 psi) |

### ORDERING INFORMATION

W - □ □ □□□ -C □ O

| String composition | String composition code |
|---|---|
| Bleached cotton, industrial | **B** |
| Bleached cotton, FDA | **C** |
| Glass fiber | **G** |
| Glass fiber, baked | **H** |
| Nylon | **N** |
| Polypropylene, FDA | **P** |
| Fibrillated polypropylene | **Q** |
| Rayon | **R** |
| Polyester | **S** |
| Industrial polypropylene | **V** |

| Core composition | Core composition code |
|---|---|
| Tin plated steel | **D** |
| 304 stainless | **F** |
| 316 stainless | **G** |
| Polypropylene | **P** |
| Special core extender, cover | **Z** |

| Pore size (µm) | Pore Size Code |
|---|---|
| 0.5 | **005** |
| 1 | **010** |
| 3 | **030** |
| 5 | **050** |
| 10 | **100** |
| 15 | **150** |
| 20 | **200** |
| 25 | **250** |
| 30 | **300** |
| 40 | **400** |
| 50 | **500** |
| 75 | **750** |
| 100 | **P10** |
| 125 | **P12** |
| 150 | **P15** |
| 200 | **P20** |

| Length (inches) | Length Code |
|---|---|
| 5 | **B** |
| 9.75 | **F** |
| 10 | **1** |
| 20 | **2** |
| 30 | **3** |
| 40 | **4** |

# Vacuum Filtration



## Introduction

Vacuum filtration is used primarily in microbiological and analytical procedures that involve collecting a particulate (bacteria, precipitate, etc.) from a liquid suspension. Liquid poured into a funnel passes through a filter, which retains the particulate, and filtrate can be collected into a filter flask, directly or via a vacuum manifold. Applying vacuum reduces process time compared to gravity flow.

Advantec MFS supplies a wide range of vacuum filter holders and accessories. Select from glass, polysulfone, or stainless steel assemblies with funnels holding from 15 to 1000 ml. See facing page for more details on supports.

## RECOMMENDED

| Typical Applications | DNA/RNA hybridization, protein binding, receptor binding studies and gravimetric analysis | | Coliform, yeast, mold, total bacteria, sterility testing | Colony hybridization, procedures requiring larger filtration area |
|---|---|---|---|---|
| **Recommended Models** | | | | |
| Glass with glass frit | KG 13 | KG 25 | KG 47 | KG 90 |
| Glass with stainless steel support | - | KGS 25 | KGS 47 | KGS 90 |
| Glass with PTFE support | - | - | KGT 47 | - |
| Glass with all-Teflon seal | - | - | KGT 47 TF | - |
| All-glass assembly | - | GFA 25<br>GFS 25 | GFA 47<br>GFS 47<br>GFT 47 | - |
| Phase/Fraction collector | - | - | P/FC 1<br>P/FC 2 | - |
| Polysulfone | - | - | KP 47 | - |
| Stainless steel | - | - | KSF 47 | - |
| **Filter Specifications** | | | | |
| Membrane diameter | 25 mm | 25 mm | 47 mm | 90 mm |
| Filtration area | 1.2 $cm^2$ | 2.1 $cm^2$ | 9.6 $cm^2$ * | 43.2 $cm^2$ |

* See individual models for exceptions

## Glass Microfiltration: Support Systems

### Sintered Glass Support (Glass Frit)

- Glass frit (nominal retention 30-50 microns)
- Recommended when filtering highly acidic (low pH) solutions or when slower flow rates are preferred to maximize contact with the filter or reagent
- Ground glass seal

| Diameter | Funnel Size | | | | | | |
|---|---|---|---|---|---|---|---|
| | 13/100 ml | 15 ml | 100 ml | 150 ml | 300 ml | 500 ml | 1000 ml |
| **13 mm** | 311100 | - | 311000 | - | - | 311005 | 311010 |
| **25 mm** | - | 311200 | - | 311280 | 311290 | - | - |
| **47 mm** | - | - | 311480 | - | 311400 | 311490 | 314110 |
| **90 mm** | - | - | - | - | - | - | 352100 |

### Stainless Steel Support

- Stainless steel screen (Type 316, 100 mesh)
- PTFE gasket
- Maximize flow rate with proteinaceous or viscous solutions
- Will not shed particles into the filtrate
- Ground glass seal

| Diameter | Funnel Size | | | | | |
|---|---|---|---|---|---|---|
| | 15 ml | 100 ml | 150 ml | 300 ml | 500 ml | 1000 ml |
| **25 mm** | 311300 | - | 311380 | 311390 | - | - |
| **47 mm** | - | 311580 | - | 311500 | 311590 | 315110 |
| **90 mm** | - | - | - | - | - | 352200 |

### PTFE Support

- PTFE support (0.05 inch / 1.3 mm diameter holes)
- Filter acidic solutions at a higher flow rate
- PTFE support is interchangeable with stainless steel support
- Ground glass seal

| Diameter | Funnel Size | | | |
|---|---|---|---|---|
| | 100 ml | 300 ml | 500 ml | 1000 ml |
| **47 mm** | 311680 | 311540 | 311690 | 316110 |

Glass frit, stainless steel support, PTFE support

### All-Teflon Seal (PTFE)

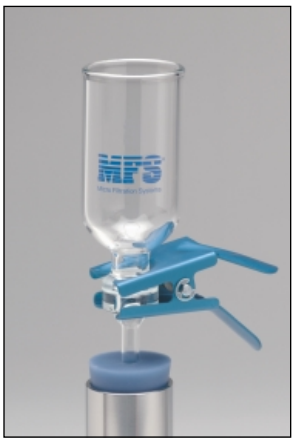
- All-Teflon (PTFE) seal prevents sticking and tearing that can occur when membrane is autoclaved in place in a ground glass assembly
- PTFE flange seals to PTFE coated funnel

| Diameter | Support | Funnel, 300 ml |
|---|---|---|
| **47 mm** | Teflon (PTFE) | 351620 |
| | Stainless Steel | 351600 |

All Teflon seal

## 13 mm Glass Microanalysis Holders

- **Filter small volumes** of liquid
- **Concentrate samples** in a small area (1.2 $cm^2$)
- **KG 13 AA features a two-part funnel** (15 ml/100 ml) connected by a ground glass joint
- KG 13 available in three different funnel sizes



KG 13

KG 13 AA

### SPECIFICATIONS

| | |
|---|---|
| **Materials:** | |
| Support | Sintered glass |
| Funnel, base | Borosilicate glass |
| Stopper | Silicone rubber |
| Clamp | Anodized aluminum |
| **Connection:** | |
| Included | #5 stopper adapts to standard 125 ml vacuum filter flask |
| Optional | #8B stopper adapts to 1 L flask or standard manifold |
| **Pressure:** | Vacuum |
| **Weight:** | 0.37 kg (0.88 lb) |
| **Membrane Filter Compatibility:** | |
| Filter size | 25 mm |
| Prefilter size | Not Recommended |
| Filtration area | 1.2 $cm^2$ |

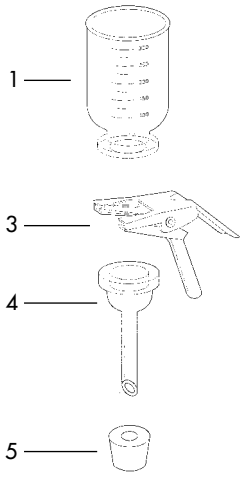
500 ml and 1 L funnels for 13 mm holders are available in complete assemblies or as accessory parts.

### ORDERING INFORMATION

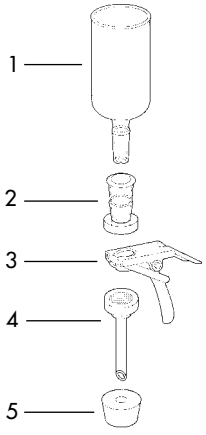
| Funnel capacity | 100 ml | 500 ml | 1000 ml | 15/100 ml |
|---|---|---|---|---|
| **Model** | **KG 13 A** | **KG 13 B** | **KG 13 C** | **KG 13 AA** |
| Catalog No. | 311000 | 311050 | 311110 | 311100 |

### Replacement Parts

| | | |
|---|---|---|
| 1 | Funnel, 100 ml | 311001 |
| 1 | Funnel, 500 ml | 311005 |
| 1 | Funnel, 1000 ml | 311010 |
| 2 | Microfunnel (15/100 ml) | 311105 |
| 3 | Clamp | 311003 |
| 4 | Base (glass frit) | 311002 |
| 5 | Stopper, #5 | 311004 |
| 5 | Stopper, #8B | 311008 |




KG 13




KG 13 AA

## 25 mm Glass Microanalysis Holders

- **Use for filtering small volumes** for biological or particulate contamination
- Available with either sintered glass base or with stainless steel screen support
- **Use stainless steel screen** when producing ultraclean filtrate or when filtering proteinaceous solutions

150 ml and 300 ml funnels for 25 mm holders are available in complete assemblies or as accessory parts

### SPECIFICATIONS

| | KG 25 | KGS 25 |
|---|---|---|
| **Materials:** | | |
| Support | Sintered glass | Stainless steel screen |
| Funnel, base | Borosilicate glass | |
| Stopper | Silicone rubber | |
| Clamp | Anodized aluminum | |
| **Connection:** | | |
| Included | #5 stopper adapts to standard 125 ml vacuum filter flask | |
| Optional | #8B stopper adapts to 1 L flask or standard manifold | |
| **Pressure:** | Vacuum | |
| **Weight:** | 0.19 kg (0.45 lb) | |
| **Membrane Filter Compatibility:** | | |
| Filter size | 25 mm | |
| Prefilter size | 16 mm | |
| Filtration area | 2.1 $cm^2$ | |

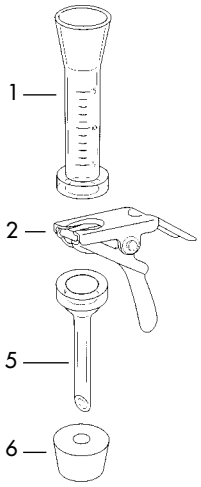
KG 25

### ORDERING INFORMATION

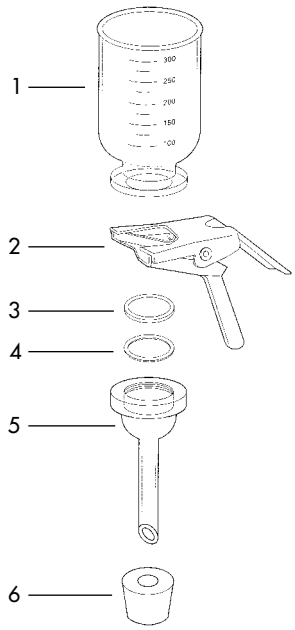
| Funnel capacity | | 15 ml | 150 ml | 300 ml |
|---|---|---|---|---|
| Glass frit support | **Model** | **KG 25** | **KG 25 A** | **KG 25 B** |
| | Catalog No. | 311200 | 311280 | 311290 |
| Stainless steel support | **Model** | **KGS 25** | **KGS 25 A** | **KGS 25 B** |
| | Catalog No. | 311300 | 311380 | 311390 |

**Replacement Parts**

| | | KG 25 | KGS 25 |
|---|---|---|---|
| 1 | Funnel, 15 ml | 311201 | |
| 1 | Funnel, 150 ml | 311208 | |
| 1 | Funnel, 300 ml | 311209 | |
| 2 | Clamp | 311003 | |
| 3 | Screen (stainless steel) | - | 311304 |
| 4 | Gasket (PTFE) | - | 311305 |
| 5 | Base | 311202 | 311302 |
| 6 | Stopper, #5 | 311004 | |
| 6 | Stopper, #8B | 311008 | |




KG 25




KGS 25

## 47 mm Glass Microanalysis Holders

- **Standard size** for microbiology and particulate analysis
- Filter up to 500 ml
- Available with sintered glass, stainless steel, or PTFE support

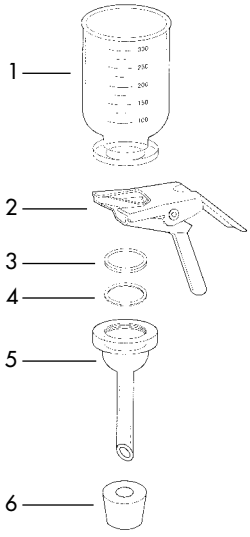
Glass microanalysis holder – 47 mm

### SPECIFICATIONS

| | KG 47 | KGS 47 | KGT 47 |
|---|---|---|---|
| **Materials:** | | | |
| Support | Sintered glass | Stainless steel screen | PTFE |
| Funnel, base | Borosilicate glass | | |
| Stopper | Silicone rubber | | |
| Clamp | Anodized aluminum | | |
| **Connection** (included) | #8 stopper adapts to standard 1 L vacuum filter flask or vacuum manifold cup | | |
| **Pressure:** | Vacuum | | |
| **Weight:** | 0.6 kg (1.2 lb) | | |
| **Membrane Filter Compatibility:** | | | |
| Filter size | 47 mm | | |
| Prefilter size | 35 mm | | |
| Filtration area | 9.6 $cm^2$ | | |

### ORDERING INFORMATION

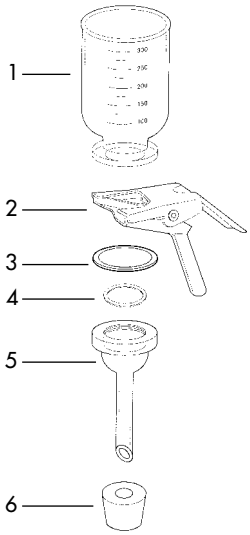
| Support type | Model | Funnel capacity | | | |
|---|---|---|---|---|---|
| | | 100 ml | 300 ml | 500 ml | 1000 ml |
| Glass frit support | **KG 47** | 311400 | 311480 | 311490 | 314110 |
| Stainless steel support | **KGS 47** | 311500 | 311580 | 311590 | 315110 |
| PTFE support | **KGT 47** | 311540 | 311680 | 311690 | 316110 |



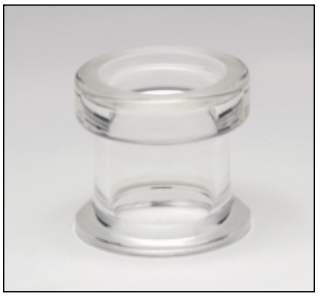
KGS 47

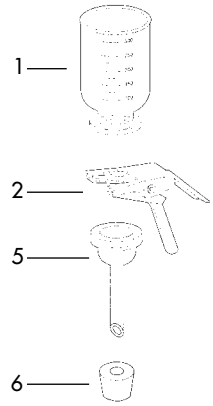
#### Replacement Parts

| | | KG 47 | KGS 47 | KGT 47 |
|---|---|---|---|---|
| 1 | Funnel, 100 ml | 311408 | | |
| 1 | Funnel, 300 ml | 311401 | | |
| 1 | Funnel, 500 ml | 311409 | | |
| 1 | Funnel, 1000 ml | 311410 | | |
| 2 | Clamp | 311403 | | |
| 3 | Screen (stainless steel) | - | 311504 | - |
| 4 | Gasket (PTFE) | - | 311505 | - |
| 3 | PTFE support | - | - | 311604 |
| 5 | Base | 311402 | 311502 | |
| 6 | Stopper, #8 | 311404 | | |
| - | Optional extension (2") | 311450 | | |



KGT 47


The 2 inch extension provides physical separation of the two filters that set up in series.



KG 47

## 47 mm Glass Microanalysis Holders – With All-Teflon Seal

- **Filter sealed between PTFE (Teflon) surfaces:**
  - Bottom of funnel is coated with PTFE
  - PTFE flange covers contact surface on glass base (except for glass frit)

All teflon seal

### SPECIFICATIONS

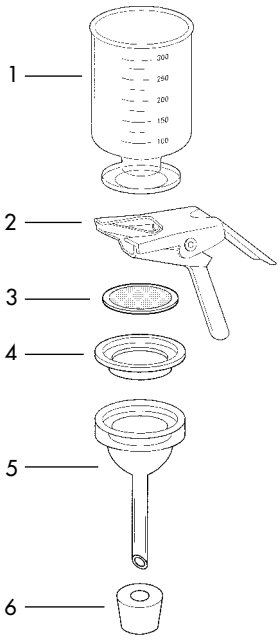
As for corresponding basic model except for PTFE (Teflon) coating on bottom of funnel and PTFE flange for KGS 47 TF and KGT 47 TF.

### ORDERING INFORMATION

| | | |
|---|---|---|
| Funnel capacity | | 300 ml |
| Glass frit support | **Model** | **KG 47 TF** |
| | Catalog No. | 311600 |
| Stainless steel support | **Model** | **KGS 47 TF** |
| | Catalog No. | 351600 |
| PTFE support | **Model** | **KGT 47 TF** |
| | Catalog No. | 351620 |

**Replacement Parts**

| | | KG 47 | KGS 47 | KGT 47 |
|---|---|---|---|---|
| 1 | Funnel, 300 ml | 351601 | | |
| 2 | Clamp | 311403 | | |
| 3 | Screen (stainless steel) | - | 311504 | - |
| 4 | Flange (PTFE) | - | 351603 | 351603 |
| 3 | PTFE support | - | - | 311604 |
| 5 | Base | 311402 | 311602 | |
| 6 | Stopper, #8 | 311404 | | |




KGS 47 TF

## 47 mm Glass Microanalysis Holder – Sterility Test Unit

- **Complete filter assembly for sterility testing** of antibiotics and pharmaceuticals
- **Use with the sterility test manifold** (page 84)

Sterility test unit

### SPECIFICATIONS

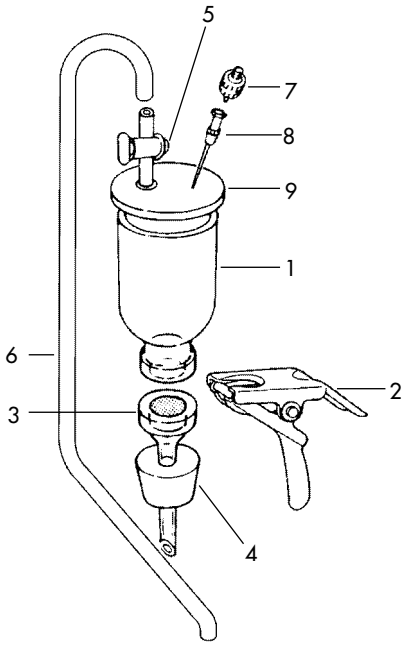
As for corresponding basic model with additional components as described below.

### ORDERING INFORMATION

| Funnel capacity | 300 ml |
|---|---|
| **Model** | **STU 1A** |
| Catalog No. | 314100 |

#### Replacement Parts

| | | |
|---|---|---|
| 1 | Funnel, 300 ml | 311401 |
| 2 | Clamp | 311403 |
| 3 | Base (glass frit) | 311402 |
| 4 | Stopper, #8 | 311404 |
| 5 | Stopcock | 313902 |
| 6 | Silicone tubing 53 cm (21") | 313903 |
| 7 | KS 13 filter holder | 301000 |
| 8 | Injector needle | 313901 |
| 9 | Silicone cover | 313904 |



314100 STU

## 90 mm Glass Microanalysis Holders

- **Larger filtration** area for filtering larger volumes (>500 ml)
- **Use for viscous samples** or those with a heavy particle or bioburden that would clog a 47 mm filter
- **Available with sintered glass or stainless steel support**

KG 90

### SPECIFICATIONS

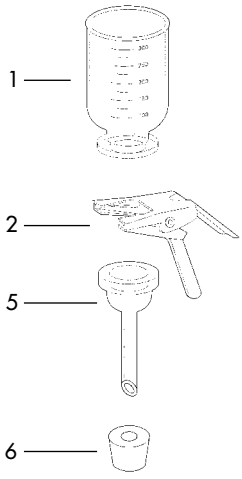
| | KG 90 | KGS 90 |
|---|---|---|
| **Materials:** | | |
| Support | Sintered glass | Stainless steel screen |
| Funnel, base | Borosilicate glass | |
| Stopper | Silicone rubber | |
| Clamp | Anodized aluminum | |
| **Connection** (Included): | #8 stopper adapts to standard 1 L vacuum filter flask or vacuum manifold cup | |
| **Pressure:** | Vacuum | |
| **Weight:** | 1.2 kg (2.82 lb) | |
| **Membrane Filter Compatibility:** | | |
| Filter size | 90 mm | |
| Prefilter size | 70 mm | |
| Filtration area | 43 $cm^2$ | |

### ORDERING INFORMATION

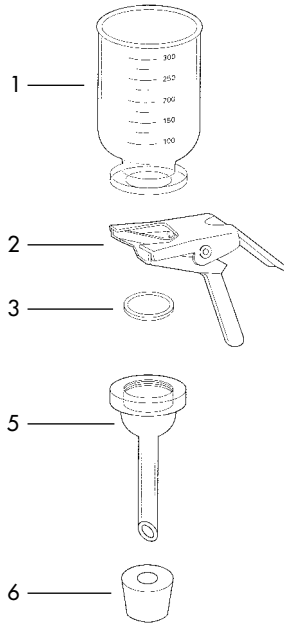
| Funnel capacity | | 1000 ml graduated (1100 ml max.) |
|---|---|---|
| Glass frit support | **KG 90** | 352100 |
| Stainless steel support | **KGS 90** | 352200 |

#### Replacement Parts

| | | KG 90 | KGS 90 |
|---|---|---|---|
| 1 | Funnel, 1000 ml | 352101 | |
| 2 | Clamp | 352103 | |
| 3 | Screen (stainless steel) | - | 352204 |
| 5 | Base | 352102 | 352202 |
| 6 | Stopper, #8 | 311404 | |



KG 90



KGS 90

## Filter Flasks and Stoppers

- Borosilicate filter flasks and silicone rubber stoppers are compatible with Advantec MFS filter holders
- Use flasks to collect filtrate or to act as a trap to prevent liquid from damaging pump or vacuum line
- #5 and #8b stoppers adapt 13 and 25 mm filter holders to 125 ml (#5) and 1 L (#8b) flasks
- #8 stopper fits 47 and 90 mm filter holders to the 1 L flask
- Flasks with ground glass joint fit holders with female joint (GFA, P/FC 2)

Flasks and stoppers compatible with Advantec MFS filter holders

### Borosilicate Glass Filter Flasks

| Volume | Opening | Catalog No. |
|---|---|---|
| 125 ml | Fits #5 stopper | 311230 |
| 1 L | Fits #8 stopper | 311430 |
| 250 ml | 19/22 male joint (ground glass) | 311225 |
| 1 L | 40/35 male joint (ground glass) | 311425 |
| 2 L | 40/35 male joint (ground glass) | 311426 |

### Silicone Rubber Stoppers

| Size | Catalog No. |
|---|---|
| #5 | 311004 |
| #8b | 311008 |
| #8 | 311404 |

## All-Glass Filtration Assemblies

- **All-glass design** restricts contact with reactive surfaces such as steel or rubber to minimize contamination of sample or filtrate
- **Standard 25 and 47 mm filtration funnels** mount on filtration flask using a ground glass joint
- Outlet of support base drip tube is positioned below the side arm connection to prevent sample aspiration into vacuum line
- **All wetted surfaces are borosilicate glass** with the exception of stainless steel and PTFE support options

GFA 25

### SPECIFICATIONS

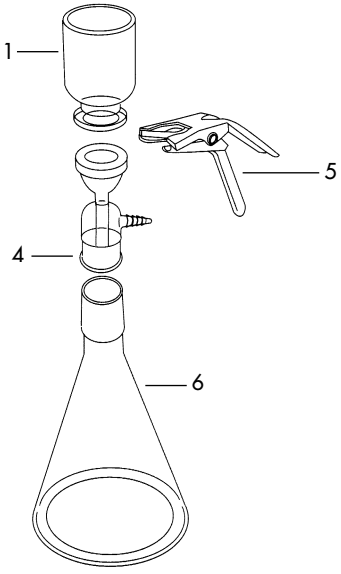
| | GFA 25 | GFA 47 |
|---|---|---|
| **Materials:** | | |
| Funnel, base unit and flask | Borosilicate glass | |
| Support | Borosilicate glass frit, stainless steel, or PTFE | |
| **Connections:** | | |
| Ground glass joint | 14/20 female | 40/35 female |
| Side arm | 6 mm (3/8 inch) | 6 mm (3/8 inch) |
| **Capacity:** | | |
| Funnel | 15 ml | 300 ml |
| Receiver flask | 125 ml | 1000 ml |
| **Membrane filter size** | 25 mm | 47 mm |
| **Prefilter size** (if used with membrane) | 16 mm | 35 mm |
| **Filtration area** | 2.1 $cm^2$ | 9.6 $cm^2$ |

### ORDERING INFORMATION

| | GFA 25 | GFA 47 |
|---|---|---|
| Support type: | | |
| Glass frit | 311220 | 311420 |
| Stainless steel | 311320 | 311520 |
| PTFE | - | 311620 |

#### Replacement Parts

| | | GFA 25 | GFA 47 |
|---|---|---|---|
| 1 | Funnel (15 ml / 300 ml) | 311201 | 311401 |
| - | Support screen - SS | 311304 | 311504 |
| - | PTFE gasket (use with SS screen) | 311305 | 311505 |
| - | Support screen - PTFE | - | 311604 |
| 4 | Support base - glass frit | 311222 | 311422 |
| 4 | Support base - SS or PTFE support | 311322 | 311522 |
| 5 | Clamp | 311003 | 311403 |
| 6 | Receiver flask | 311225 | 311425 |




GFA

#### Optional Accessories

| | GFA 25 | GFA 47 |
|---|---|---|
| Funnel, 100 ml | - | 311408 |
| Funnel, 150 ml | 311208 | - |
| Funnel, 300 ml | 311209 | - |
| Funnel, 500 ml beveled | - | 311409 |
| Funnel, 1 liter graduated | - | 311410 |
| Receiver flask, 2 liter | - | 311426 |

## Phase/Fraction Collectors

- **Collect aliquots of filtrate** during the filtration process using the 2-way Y bore PTFE valve
- **Prevents venting** of hazardous sample or solvents to atmosphere
- **Collect multiple samples** with additional receiver sample tubes
- **Two mounting options:** P/FC 1 mounts on standard manifold using a #8 stopper, P/FC 2 has female 40/35 joint to mount on an extraction manifold (page 83)
- **Available with sintered glass, stainless steel, or PTFE support**
- Applications include multiphase extraction using the Empore™ membrane

P/FC 2

### SPECIFICATIONS

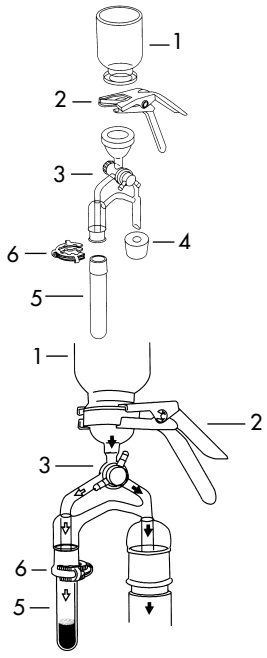
| | P/FC-1 | P/FC-2 |
|---|---|---|
| **Materials:** | | |
| Funnel, base unit and receiver tube | Borosilicate glass | |
| Support | Borosilicate glass frit, stainless steel, or PTFE | |
| **Connections:** | | |
| Base to outlet/support | Stopper to standard manifold | 40/35 ground glass joint |
| Alternate outlet to receiver tube | Ground glass joint | |
| **Capacity:** | | |
| Funnel | 300 ml | |
| **Membrane Filter Compatibility:** | | |
| Membrane filter size | 47 mm | |
| Prefilter size | 35 mm | |
| Filtration area | 9.6 $cm^2$ | |

### ORDERING INFORMATION

| Model | P/FC 1 | P/FC 2 |
|---|---|---|
| Outlet type | Stopper/manifold | 40/35 glass joint |
| Glass frit support | 311700 | 311800 |
| Stainless steel support | 311750 | 311850 |
| PTFE support | 311760 | 311860 |

#### Replacement Parts

| | Model | P/FC 1 | P/FC 2 |
|---|---|---|---|
| | Outlet type | Stopper/manifold | 40/35 glass joint |
| 1 | Funnel | 311401 | |
| 2 | Clamp | 311403 | |
| 3 | Base assembly – glass frit | 311702 | 311802 |
| 3 | Base assembly – SS or PTFE support | 311752 | 311852 |
| - | Support – stainless | 311504 | |
| - | Support – PTFE | 311604 | |
| - | PTFE gasket (for stainless support) | 311505 | |
| 4 | Stopper | 311404 | - |
| 5 | Receiver tube | 311705 | |
| 6 | Clip | 311706 | |




P/FC 2

## Stainless Steel Filter Holders – KSF 47

- **Nonbreakable stainless steel unit** may be flame sterilized to sanitize the holder between samplings
- **Set pins and a locking nut** on the funnel to help prevent twisting and tearing of the membrane
- **Autoclavable** with membrane in place

KSF 47

### SPECIFICATIONS

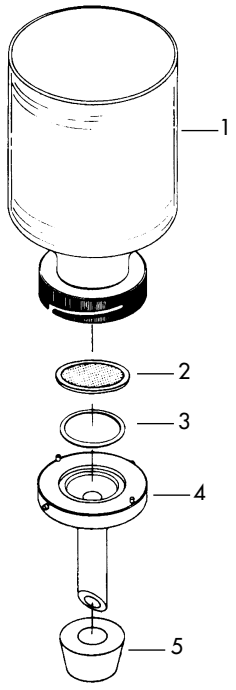
| | KSF 47 |
|---|---|
| **Materials:** | |
| Support | Type 316 stainless steel |
| Funnel, base | Type 304 stainless steel |
| Stopper | Silicone rubber |
| Gasket | PTFE |
| **Connection:** | |
| Included | #8 stopper adapts to standard 1 L vacuum filter flask or vacuum manifold cup |
| **Capacity:** | |
| Funnel | 500 ml |
| **Pressure:** | Vacuum (21 in Hg recommended) |
| **Weight:** | 0.5 kg (1.17 lb) |
| **Membrane Filter Compatibility:** | |
| Filter size | 47 mm |
| Prefilter size | 35 mm |
| Filtration area | 9.3 $cm^2$ |

### ORDERING INFORMATION

| Model | KSF 47 |
|---|---|
| Catalog No. | 352600 |

**Replacement Parts**

| | | KSF 47 |
|---|---|---|
| 1 | Funnel | 352601 |
| 2 | SS support screen | 311504 |
| 3 | PTFE gasket | 311505 |
| 4 | Base | 312602 |
| 5 | Stopper, #8 | 311404 |




352600 KSF

## Polysulfone Filter Holders

- **Can be used aseptically**
- **Recessed filter support** provides sufficient clearance so that the membrane will not twist or tear when the funnel is secured
- **Graduated funnel** in 300 ml (standard) or 500 ml (wide mouth) capacities
- **Receiver flask** (KP 47S) is interchangeable with all other models
- **Funnel cover** can be vented aseptically using disposable syringe filter (13JP050AN, see page 15)

KP 47 S KP 47 H KP 47 U KP 47 W

## SPECIFICATIONS

| | KP 47 H | KP 47 U | KP 47 W | KP 47 S |
|---|---|---|---|---|
| **Materials:** | | | | |
| Support | Polypropylene | | | |
| Funnel and base | Polysulfone | | | |
| Receiver flask | - | - | - | Polysulfone |
| Stopper, O-rings | Silicone rubber | | | |
| Caps | - | Silicone rubber | - | Silicone rubber |
| Vacuum adapter | - | - | - | Polypropylene |
| **Connection:** | | | | |
| Outlet | #8B stopper adapts to standard 1 L vacuum filter flask or vacuum manifold cup, screws onto receiver flask (KP 47 S) | | | |
| Receiving flask port | - | - | - | Luer slip |
| Funnel cover port | - | Luer slip | - | Luer slip |
| **Capacity:** | | | | |
| Funnel | 300 ml | 300 ml | 500 ml | 300 ml |
| Receiver | - | - | - | 300 ml |
| **Pressure:** | Vacuum (25 in Hg maximum) | | | |
| **Weight:** | 0.15 kg | 0.16 kg | 0.15 kg | 0.26 kg |
| **Membrane Filter Compatibility:** | | | | |
| Filter size | 47 mm | | | |
| Prefilter size | 41 mm | | | |
| Filtration area | 13.5 $cm^2$ | | | |

## ORDERING INFORMATION

| Model | Description | Main Components | Catalog No. |
|---|---|---|---|
| **KP 47 H** | Polysulfone Filter Holder | Funnel, base | 501020 |
| **KP 47 U** | Polysulfone Aseptic Filter Unit | Funnel, base, cover | 501030 |
| **KP 47 W** | Wide Mouth Polysulfone Filter Holder | Funnel, base | 501050 |
| **KP 47 S** | Polysulfone Aseptic Filter System | Funnel, base, cover, receiver | 501000 |

### Replacement Parts – Funnel assembly

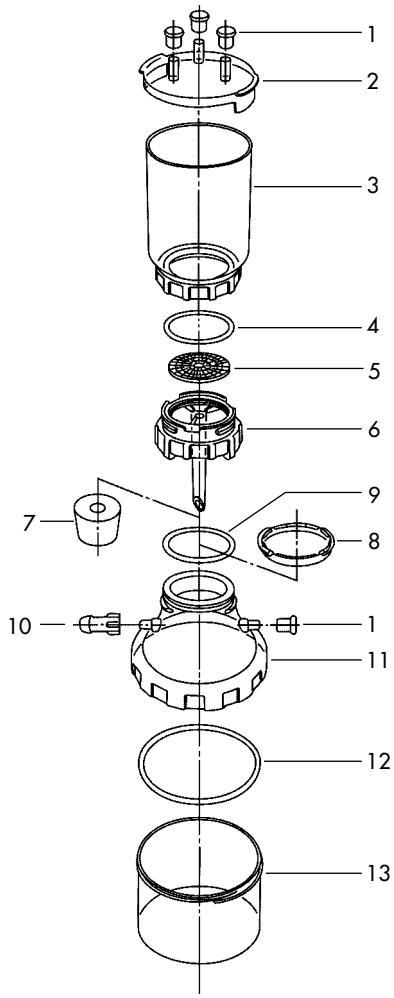
| | Model | KP 47 H | KP 47 U | KP 47 W | KP 47 S |
|---|---|---|---|---|---|
| | Catalog No. | 501020 | 501030 | 501050 | 501000 |
| 1 | Gum rubber cap (1) | - | 501010 | - | 501010 |
| 2 | Funnel cover | - | 501001 | - | 501001 |
| 3 | Funnel | 501002 | | 501102 | 501002 |
| 4 | Funnel O-ring | 501008 | | | |
| 5 | Filter support | 501004 | | | |
| 6 | Base | 501003 | | | |
| 7 | Stopper #8B | 311008 | | | |
| - | Cap and filter kit: 5 caps (501010) and 1 filter (13JP050AN) | KP47KIT | - | KP47KIT | - |

### Replacement Parts – Receiver flask

| | Model | KP 47 S |
|---|---|---|
| 8 | Receiver cover | 501005 |
| 9 | Receiver adapter O-ring | 501009 |
| 10 | Vacuum adapter | 501013 |
| 11 | Receiver adapter | 501007 |
| 12 | Receiver O-ring | 501015 |
| 13 | Receiver flask | 501006 |

### Optional Accessories

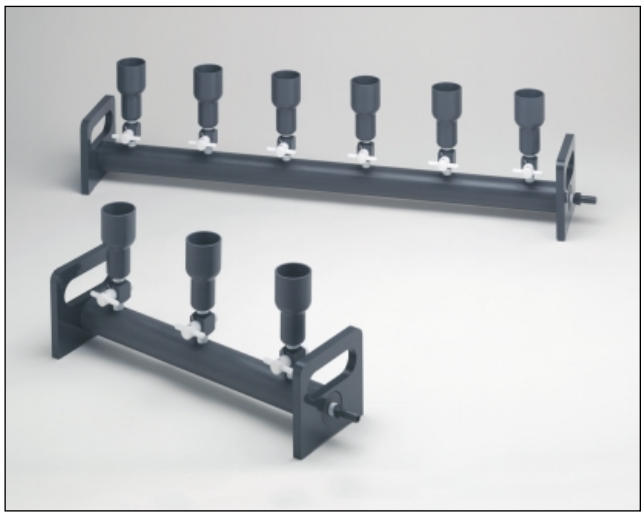
| | | |
|---|---|---|
| 4 | Funnel O-ring, FPM | 501011 |
| 9 | Receiver adapter O-ring, FPM | 501012 |
| 12 | Receiver O-ring, FPM | 501016 |




501020, 501030, 501050, 501000

## PVC Vacuum Manifold – Standard Cup

- **Lightweight**
- **Resistant to acids**
- **Standard cup** accepts a #8 stopper to adapt microanalysis units and other devices
- **2-way** valve with Teflon (PTFE) stopcock in PVC body
- Not autoclavable



KMP 3, 6

### SPECIFICATIONS

| | |
|---|---|
| **Materials:** | |
| Body and branches | Polyvinylchloride (PVC) |
| Valves | PTFE stopcock, PVC body |
| **Connections:** | |
| Outlet | 1/4" male NPT to hose barb fitting connects main manifold to 3/8" i.d. vacuum tubing |
| Standard cup | Accepts #8 stopper |
| **Temperature:** | |
| Maximum | 60°C (140°F) |

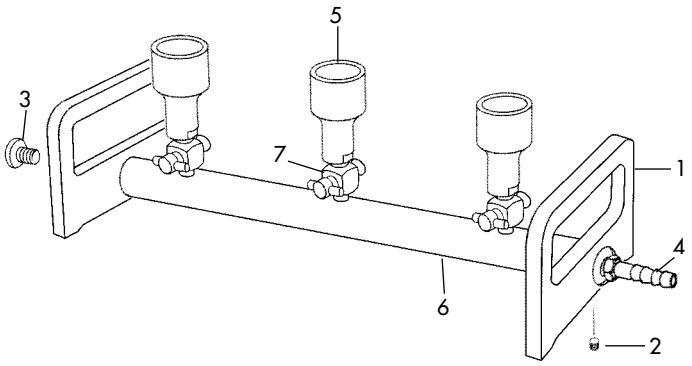
| **Dimensions:** | L x W x H | | Distance between stations | | **Weight** | |
|---|---|---|---|---|---|---|
| | in | cm | in | cm | lb | kg |
| 3 station | 17 3/4 x 4 3/4 x 7 | 45.1 x 12 x 17.8 | 5 1/2 | 14 | 3.3 | 1.5 |
| 6 station | 34 1/2 x 4 3/4 x 7 | 87.6 x 12 x 17.8 | 4 3/4 | 12 | 5.5 | 2.5 |

### ORDERING INFORMATION

| | | **Standard cup** |
|---|---|---|
| 3 station | **KMP 3** | 313400 |
| 6 station | **KMP 6** | 313600 |

**Replacement Parts**

| | | |
|---|---|---|
| 1 | Handle | 313401 |
| 2 | Handle set screw | 313015 |
| 3 | Pipe plug | 313412 |
| 4 | Hose barb | 313411 |
| 5 | Branch (Standard cup) | 313410 |
| 6 | Main manifold: | |
| | 3 station | 313403 |
| | 6 station | 313603 |
| 7 | Stopcock assembly, 2-way | 313430 |




KMP 3

## PVC Extraction Manifold – Exterior Taper

- **Exterior taper** accepts a 40/35 female joint
- **3-way valve** with luer slip vent port accepts disposable vent filters (supplied)
- **Lightweight**, resistant to acids
- **Broad base** for extra stability
- **Ideal for EPA Method 1664** oil and grease analysis
- Not autoclavable, can be sanitized with ethanol or formaldehyde

KMX 3

### SPECIFICATIONS

| | |
|---|---|
| **Materials:** | |
| Body and branches | Polyvinylchloride (PVC) |
| Valves | PTFE stopcock, PVC body |
| **Connections:** | |
| Outlet | 1/4" male NPT to hose barb fitting connects main manifold to 1/4" i.d. vacuum tubing |
| Exterior taper | 40/35 male joint |
| **Temperature:** | |
| Maximum | 60°C (140°F) |

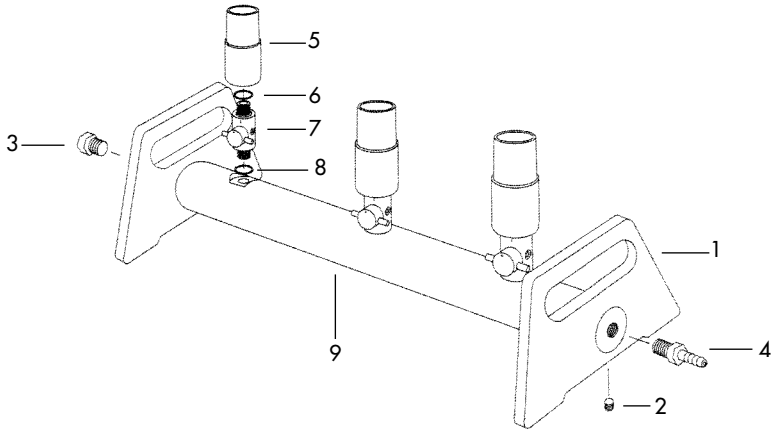
| **Dimensions:** | L x W x H | | Distance between stations | | **Weight** | |
|---|---|---|---|---|---|---|
| | in | cm | in | cm | lb | kg |
| Single | 10 x 6 5/8 x 8 | 25.4 x 16.8 x 20.3 | - | - | 4 | 1.8 |
| 3 station | 21 1/2 x 6 5/8 x 8 | 54.6 x 16.8 x 20.3 | 5 1/2 | 14 | 6 | 2.7 |
| 7 station | 47 1/2 x 6 5/8 x 8 | 120.6 x 16.8 x 20.3 | 4 3/4 | 12 | 15 | 6.8 |

### ORDERING INFORMATION

| | | Standard cup |
|---|---|---|
| Single | **KMX 1** | 373130 |
| 3 station | **KMX 3** | 373330 |
| 7 station | **KMX 7** | 373730 |

### Replacement Parts

| | | |
|---|---|---|
| 1 | Handle | 373401 |
| 2 | Socket cap screw | 373015 |
| 3 | Pipe plug | 373412 |
| 4 | Hose barb | 373411 |
| 5 | Branch (Male taper) | 713010 |
| 6 | Branch O-ring (EPR) | 373017 |
| 7 | Stopcock assembly, 3-way | 373430 |
| 8 | Branch Gasket (Buna) | 373018 |
| 9 | Main manifold: | |
| | 1 station | 373103 |
| | 3 station | 373303 |
| | 7 station | 373703 |
| - | Repair kit: 5 vent filters, 2 O-rings, 1 gasket | PVC kit |




KMX 3

## Stainless Steel Vacuum Manifolds

- **Autoclavable**
- **2-way or 3-way valve available**, use a 3-way valve when the manifold is used under closed conditions and must be vented to atmosphere without breaking the vacuum connection. 3-way valve vent is female luer slip, accepts standard disposable syringe filter (page 15) or stainless steel syringe filter holder (KS 13, page 87)
- **Standard cup** accepts a #8 stopper to adapt microanalysis units and other devices
- **Exterior taper** accepts a 40/35 female joint
- **Sterility Test Manifold** features rear mounted flushing manifold for use in USP bacteria retentive method

Vacuum Filter Manifold Family

### SPECIFICATIONS

| | |
|---|---|
| **Materials:** | |
| Body and branches | Type 304 stainless steel |
| Valves | PTFE stopcock, chrome plated brass body |
| **Connections:** | |
| Outlet | 1/4" male NPT to hose barb fitting connects main manifold to 3/8" i.d. vacuum tubing |
| Standard cup | Accepts #8 stopper |
| Exterior taper | 40/35 male joint |

| **Dimensions:** | L x W x H | | Distance between stations | | **Weight** | |
|---|---|---|---|---|---|---|
| | in | cm | in | cm | lb | kg |
| Single | 8 x 4 3/4 x 8 | 20.3 x 12 x 20.3 | - | - | 5.5 | 2.5 |
| 3 station | 18 x 4 3/4 x 8 | 45.7 x 12 x 20.3 | 5 1/2 | 14 | 9.9 | 4.5 |
| 6 station | 28 1/2 x 4 3/4 x 8 | 72.4 x 12 x 20.3 | 4 3/4 | 12 | 14.3 | 6.5 |

Standard branch accepts a #8 stopper, 2-way valve.

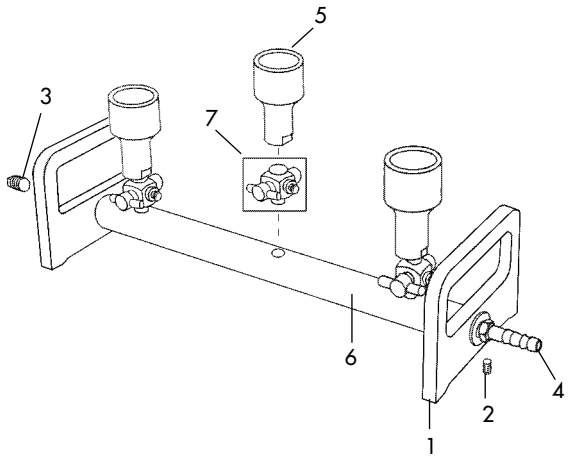
### ORDERING INFORMATION

| | **Standard cup** | | **Exterior taper** | | **Sterility Test** (standard cup) |
|---|---|---|---|---|---|
| Valve type: | 2-way | 3-way | 2-way | 3-way | 3-way |
| Single | **SS 2X** | **SS 3X** | **SS SPE/2** | **SS SPE/3** | **-** |
| | 351120 | 351130 | 361120 | 361130 | - |
| 3 station | **KM3N** | **KM3NV** | **KM3N XT/2** | **KM3N XT/3** | **KM3** |
| | 353100 | 353130 | 363120 | 363130 | 313000 |
| 6 station | **KM6N** | **KM6NV** | **KM6N XT/2** | **KM6N XT/3** | **KM6** |
| | 353300 | 353330 | 363320 | 363330 | 313200 |

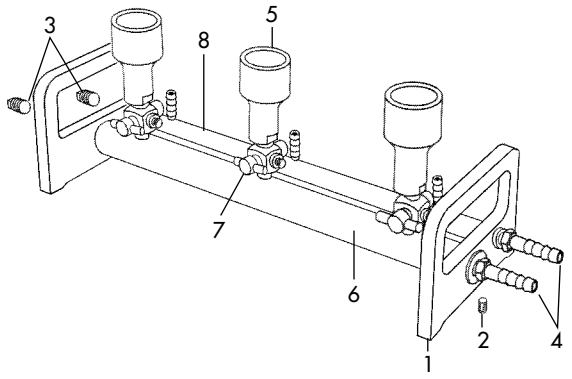
Exterior taper for a 40/35 glass joint. 3-way valve.

**Replacement Parts**

| | | |
|---|---|---|
| 1 | Handle (sterility test) | 313001 |
| 2 | Handle set screw | 313015 |
| 3 | Pipe plug | 313012 |
| 4 | Hose barb | 304507 |
| 5 | Branch: | |
| | Standard cup | 313010 |
| | Exterior taper | 613010 |
| 6 | Main manifold: | |
| | Single | 361103 |
| | 3 station | 313003 |
| | 6 station | 313203 |
| 7 | Stopcock assembly: | |
| | 2-way | 613005 |
| | 3-way | 313005 |
| 8 | Flushing manifold (sterility test) | |
| | 3 station | 313004 |
| | 6 station | 313204 |




KM3N




KM3

## Vacuum Pressure Pump

- Maintains continuous vacuum for filtration
- Also can be used for positive pressure filtration (<60 psi)
- Oil free operation minimizes aerosol contamination
- Quiet operation
- Easy to maintain
- Portable compact design

Model VP-24 Vacuum Pressure Pump.

## SPECIFICATIONS

| | |
|---|---|
| **Materials:** | |
| Wetted parts | Aluminum, stainless steel, and Nordell Normax |
| Valves | Reed type |
| Power cord | 6′ long, 3-wire |
| **Connections:** | |
| Inlet and outlet ports | 1/4" NPTF |
| Power requirements | 115 V AC / 60 Hz or 220 V AC / 50 Hz |
| **Pressure:** | |
| Maximum pressure | 60 psi |
| Maximum vacuum | 24" Hg |
| **Temperature:** | |
| Maximum inlet | 37.8°C (100°F) |
| **Free air capacity:** | 1.2 cfm |
| **Weight:** | 9.1 kg (20 lb) |

## ORDERING INFORMATION

| Model | Description | Catalog No. |
|---|---|---|
| **VP-24** | Vacuum pressure pump, 115 V | 800800 |
| | Vacuum pressure pump, 220 V | 800801 |

### Replacement Parts

| Service kit: | Catalog No. |
|---|---|
| Replacement head gasket, filter, muffler elements, leaf valves, screws and valve retainers | 800810 |
| Vacuum regulator assembly | 800820 |
| Pressure regulator assembly | 800830 |

# Pressure Filtration



## Introduction

Pressure type filter holders can be used for ultracleaning or sterilizing liquids and gases. Advantec MFS holders have been designed to maximize flow rates and to minimize holder resistance and can be used in either batch or continuous filtration procedures.

## Advantages of Pressure Filtration

- Higher differential pressures are possible, resulting in higher flow rates. The pressure differential across the membrane is not limited to atmospheric pressure (≤14.7 psi)
- Unintentional contamination downstream of the membrane is minimized
- Denaturation of proteins and other biological polymers due to foaming downstream of the membrane is avoided
- Vapor accumulation and possible explosion can be avoided using an inert gas to pressurize solvents and combustible or flammable liquids

## RECOMMENDED PRESSURE FILTER HOLDERS FOR TYPICAL APPLICATIONS AND VOLUMES

| | Volume to be Filtered | | | | | |
|---|---|---|---|---|---|---|
| | **<10 ml** | **<50 ml** | **<1 liter** | **<5 liters** | **<20 liters** | **>20 liters** |
| Typical Applications | Enzymes, Radiolabelled samples | Proteins, enzymes, Radiolabelled samples, gases | Biological media, electrolyte solution for counters, gases | Biological media, ultrapure water, serum, gases | Biological media, ultrapure water, serum, gases | Pharmaceuticals, cosmetics, large scale biologicals |
| **Recommended Models** | | | | | | |
| Luer Connection | KS 13 | KS 25 | - | - | - | - |
| Threaded Connection | - | LS 25<br>PP 25<br>PFA 25 | KS 47<br>LS 47<br>PP 47<br>PFA 47 | KS 90<br>KS 90 UH | KS 142<br>KS 142 UH | KS 293<br>KS 293 UH |
| Sanitary Connection | - | KS 25 F | KS 47 F | KS 90 ST | KS 142 ST | KS 293 ST |
| Holders with Reservoir | - | - | KST 47 | KST 90 | KST 142 | - |
| **Filter Specifications** | | | | | | |
| Membrane Diameter (mm) | 13 | 25 | 47 | 90 | 142 | 293 |
| Prefilter Diameter (mm) | 8 | 21 | 35 or 37[1] | 76 | 124 | 257 |
| Filtration area ($cm^2$) | 0.9 | 3.8 | 12.5 | 45.3 | 113 | 530 |
| Liquid Flow Rate[2] (l/min) | | | | | | |
| 0.2 µm | 0.005 | 0.03 | 0.15 | 0.8 | 1.7 | 7.1 |
| 0.45 µm | 0.02 | 0.08 | 0.4 | 1.64 | 4.9 | 18.8 |
| 1.0 µm | 0.12 | 0.35 | 1.3 | 7.0 | 11.0 | 32.0 |
| 5.0 µm | 0.3 | 1.1 | 2.1 | 9.5 | 14.0 | 35.5 |

1. Prefilter size varies with model, refer to individual model specifications before choosing a prefilter.
2. Liquid flow rates by represent typical initial water flow rates at 0.7 kg/$cm^2$ (10 psi) differential pressure at 20°C using clean water filtered to 0.1 µm using MCE membrane.

## Stainless Steel Syringe Holders

- **Sterilizable** by standard procedures including autoclaving
- **Luer fittings** fit typical syringes
- **Can be tightened securely,** wrench set included

Stainless steel syringe holders

### APPLICATIONS

- Filter or clean small volumes of liquid such as eyewash or photoresist
- Clear turbid solutions such as serum
- Purify virus solutions

### SPECIFICATIONS

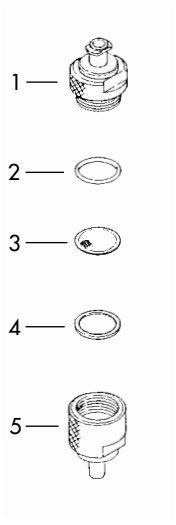
| | KS 13 | KS 25 |
|---|---|---|
| **Materials:** | | |
| Body, support screens | Type 304 Stainless Steel | Type 304 Stainless Steel |
| Gasket | PTFE (Teflon) | PTFE (Teflon) |
| O-ring | PTFE (Teflon) | PTFE (Teflon) |
| **Connections:** | | |
| Inlet | Luer-lock | |
| Outlet | Luer slip | |
| Dead volume | 0.2 ml | 0.4 ml |
| **Pressure:** | | |
| Inlet | 7 kg/cm² (100 psi) | 7 kg/cm² (100 psi) |
| Differential | 3 kg/cm² (43 psi) | 3.0 kg/cm² (43 psi) |
| **Membrane Compatibility:** | | |
| Filter size | 13 mm | 25 mm |
| Prefilter size | 8 mm | 21 mm |
| Filtration area | 0.9 cm² | 3.8 cm² |
| **Dimensions:** | | |
| Diameter | 16 mm (0.6") | 32 mm (1.25") |
| Length | 39 mm (1.54") | 36 mm (1.42") |
| **Weight:** | 0.1 kg (0.25 lb) | 0.2 kg (0.38 lb) |

### ORDERING INFORMATION

| Model: | KS 13 | KS 25 |
|---|---|---|
| Catalog No. | 301000 | 301200 |

**Replacement Parts**

| | | KS 13 | KS 25 |
|---|---|---|---|
| 1 | Inlet, male | 301001 | 301201 |
| 2 | O-ring (PTFE) | 301004 | 301204 |
| 3 | Screen (304SS) | 301003 | 301203 |
| 4 | Gasket (PTFE) | 301002 | 301202 |
| 5 | Outlet, female | 301005 | 301205 |
| - | Universal wrenches (2/pk) | 301006 | 301006 |




KS 13

## Stainless Steel Gas Line Holders

- **Female threaded locking ring** enables filter changes without removing the holder from connecting gas lines
- **Dual support screens** protect the membrane filter from reverse pressure surges and allow forward and reverse flow from either inlet or outlet

Stainless Steel Gas Line Holders

### Applications

- Ultraclean and sterilize air and other gases including compressed gases
- In-line between pressurizing source (pump or gas cylinder) and dispensing vessel

### Specifications

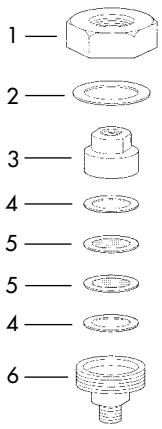
| | LS 25 | LS 47 |
|---|---|---|
| **Materials:** | | |
| Body, support screens, locking ring | Type 304 Stainless Steel | Type 304 Stainless Steel |
| Gasket | PTFE (Teflon) | PTFE (Teflon) |
| O-ring | PTFE (Teflon) | Silicone |
| **Connections:** | | |
| Inlet | 1/4" NPTF, comes with hose barb fitting (3/8") | |
| Outlet | 1/4" NPTM, comes with hose barb fitting (3/8") | |
| **Pressure:** | | |
| Inlet | 5 kg/cm² (71 psi) | |
| Differential | 2 kg/cm² (28 psi) | |
| **Filter Specifications:** | | |
| Filter size | 25 mm | 47 mm |
| Prefilter size | 25 mm | 47 mm |
| Filtration area | 3.8 cm² | 12.5 cm² |
| **Dimensions:** | | |
| Diameter | 41 mm (1 5/8") | 70 mm (2 3/4") |
| Length | 51 mm (2") | 58 mm (2 3/8") |
| **Weight:** | 0.3 kg (0.63 lb) | 0.8 kg (1.75 lb) |

### Ordering Information

| Model | LS 25 | LS 47 |
|---|---|---|
| Catalog No. | 304500 | 304700 |

**Replacement Parts, Accessories, and Optional O-rings**

| | | LS 25 | LS 47 |
|---|---|---|---|
| - | Hose barb (1/4" NPTM) | 304507 | |
| 1 | Locking ring | 304501 | 304701 |
| 2 | Locking ring gasket, (PTFE) | 304504 | 304704 |
| 3 | Inlet body (1/4" NPTM) | 304505 | 304710 |
| 4 | Gasket (PTFE) | 301202 | 304702 |
| - | O-ring (Silicone) | - | 357210 |
| - | O-ring (FPM) | - | 304714 |
| - | O-ring (FEP encapsulated) | - | 304716 |
| 5 | Stainless steel screen (304SS) | 301203 | 304703 |
| 6 | Outlet body (1/4" NPTM) | 304506 | 304711 |
| - | Hose barb (1/4" NPTF) | 304508 | |




LS 25

## High Pressure Stainless Steel Holder

- **Operate at high pressure,** up to 100 kg/cm² (1400 psi)
- **Standard Viton O-rings** compatible with many aggressive liquids and gases
- **Back pressure support screen available** to prevent membrane rupture and deflect flow at very high pressures

LS 47 HP

### APPLICATIONS

- Filter liquids or gases under high pressure

### SPECIFICATIONS

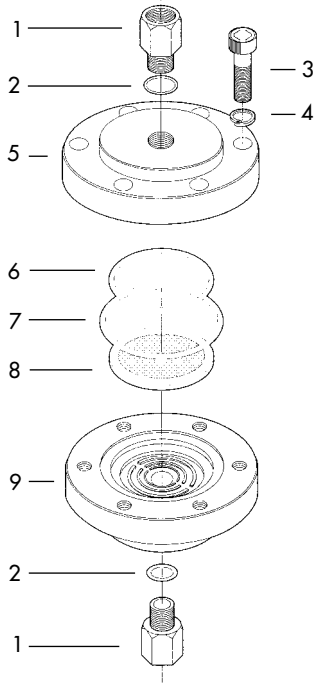
| | LS 47 HP |
|---|---|
| **Materials:** | |
| Body, support screens | Type 304 Stainless Steel |
| O-rings | FPM |
| **Connections:** | |
| Inlet and Outlet | 1/4" NPT female |
| **Pressure:** | |
| Inlet | 100 kg/cm² (1400 psi) |
| Differential | 20 kg/cm² (280 psi) |
| **Dead volume:** | |
| Upstream | 3 ml |
| Downstream | 6.5 ml |
| **Membrane Compatibility:** | |
| Membrane filter size | 47 mm |
| Prefilter size | 38 mm |
| Filtration area | 11.2 cm² |
| **Dimensions:** | |
| Diameter | 88 mm (3.5") |
| Height | 46 mm (1.8") |
| **Weight:** | 2.7 kg (4.1 lb) |

### ORDERING INFORMATION

| Model | LS 47 HP |
|---|---|
| Catalog No. | 304900 |

**Replacement Parts and Accessories**

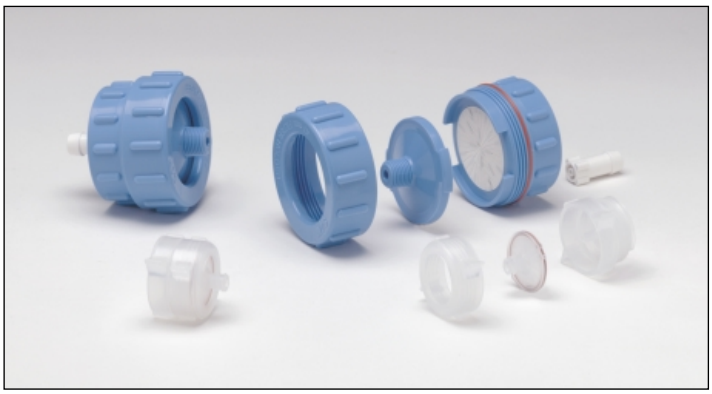
| | | LS 47 HP |
|---|---|---|
| 1 | Inlet/outlet adapter | 304904 |
| 2 | Adapter O-ring | 304905 |
| 3 | Hex cap screw, M-8 | 304915 |
| 4 | Cap screw washer | 304916 |
| 5 | Inlet plate | 304901 |
| 6 | Inner O-ring | 304906 |
| 7 | Outer O-ring | 304910 |
| 8 | Sintered steel support | 304903 |
| 9 | Outlet plate | 304902 |
| - | Back pressure support screen (optional) | 304920 |




LS 47 HP
304900

## Polypropylene In-Line and Aerosol Holders

- **Compatible** with a wide range of chemicals and temperatures
- **Exterior locking ring** design allows the unit to be assembled quickly and efficiently without tearing the membrane



Polypropylene In-Line and Aerosol Holders

### Applications

- Ultraclean and sterilize liquids
- Aseptic sampling of liquids or gases at point-of-use
- Environmental air sampling (PPO 47)

### Specifications

| | PP 25 | PP 47 | PPO 47 |
|---|---|---|---|
| **Materials:** | | | |
| Body and support screens | Polypropylene | | |
| O-ring (standard) | Silicone | | PTFE |
| **Connections:** | | | |
| 25 mm inlet | Female Luer-Lock | Combination 1/4" NPTM, female Luer slip | |
| 25 mm outlet | Male Luer slip | | |
| **Pressure:** | | | |
| Inlet | 5.0 kg/cm² (71 psi) | | - |
| Differential | 3.0 kg/cm² (42 psi) | 5.0 kg/cm² (71 psi) | - |
| **Temperature:** | | | |
| Maximum | 121°C (250°F) | | |
| Maximum operating (liquids) | 80°C (176°F) | | |
| **Filter Specifications:** | | | |
| Filter size | 25 mm | 47 mm | |
| Prefilter size | 21 mm | 42 mm | - |
| Filtration area | 3.5 cm² | 13.5 cm² | |
| Recommended volume | <50 ml | Up to 1 liter | - |
| **Dimensions:** | | | |
| Diameter | 30 mm (1.2") | 63.5 mm (2.5") | |
| Height | 30 mm (1.2") | 50 mm (2.0") | |
| **Weight:** | 0.41 oz (12g) per 6 pk/box | 1.7 oz (47g) | |

### Ordering Information

| Model | PP 25 | PP 47 | PPO 47 |
|---|---|---|---|
| Catalog No. | 540100 | 501200 | 501300 |

Also available in highly chemically resistant PFA, see page 106.

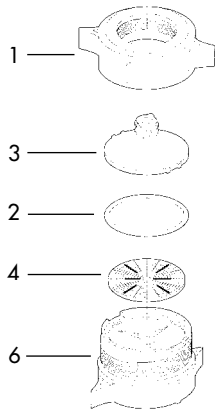
### Typical initial liquid flow rates (in ml/min)

| Membrane Pore size (µm) | PP 25 | PP 47 |
|---|---|---|
| 0.20 | 35 | 250 |
| 0.45 | 80 | 600 |
| 1.20 | 320 | 1700 |
| 3.00 | 740 | 2800 |

Conditions: water, nitrocellulose membrane, 1 kg/cm² (14 psi) differential pressure, 20°C.

### Replacement Parts and Accessories

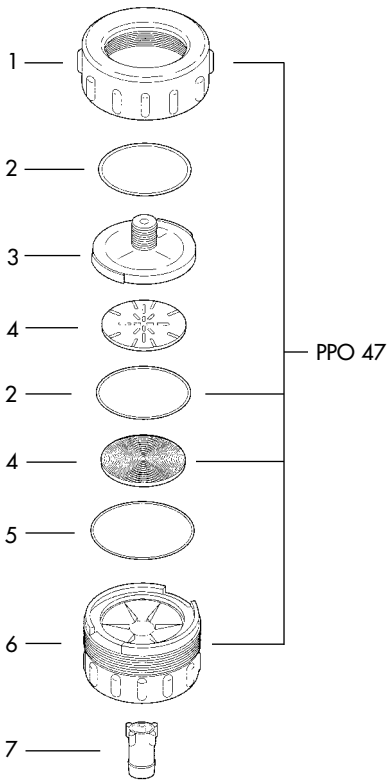
| | | PP 25 |
|---|---|---|
| 1 | Locking ring, outer | 540101 |
| 2 | Inlet cap O-ring (silicone) | 540106 |
| 2 | Inlet cap O-ring (FPM) | 540107 |
| 2 | Inlet cap O-ring (EPR) | 540108 |
| 3 | Inlet cap | 540102 |
| 4 | Support screen | 540101 |
| 6 | Outlet base | 540103 |




PP 25

| | | PP 47 |
|---|---|---|
| 1 | Locking ring, outer | 501201 |
| 2 | Inlet cap O-ring (silicone) | 501204 |
| 2 | Inlet cap O-ring (FPM) | 530108 |
| 2 | Inlet cap O-ring (EPR) | 530109 |
| 3 | Inlet cap | 501202 |
| 4 | Support screen | 501004 |
| 5 | Outlet base O-ring (silicone) | 501208 |
| 5 | Outlet base O-ring (FPM) | 501210 |
| 5 | Outlet base O-ring (EPR) | 501211 |
| 6 | Outlet base | 501203 |
| 7 | Outlet adapter (male luer slip to hose barb) | 501013 |

| | | PP0 47 |
|---|---|---|
| 1 | Locking ring, outer | 501201 |
| 2 | Sealing O-ring (PTFE) | 501301 |
| 4 | Support screen | 501204 |
| 6 | Outlet base | 501203 |
| 7 | ~ | |




PP 47

## Sanitary In-Line Stainless Steel Holders

- **Sanitary inlet and outlet connections** are non-threaded and can be completely disassembled for thorough cleaning
- **47 mm holder features vent** to allow air venting on upstream side of the membrane at any time during filtration

KS 25 F, KS 47 F

### Applications

- Point of use filtration on sterile filling machines
- Flow decay studies for scale up to larger filtration systems
- Liquid or gas

### Specifications

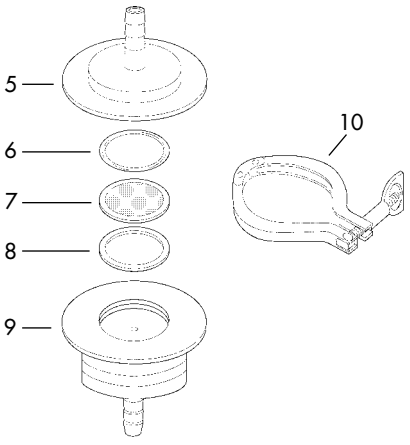
| | KS 25 F | KS 47 F |
|---|---|---|
| **Materials:** | | |
| Body and support screens | Stainless steel, type 304 | |
| O-ring | Silicone | |
| Gasket | PTFE | |
| **Connectors:** | | |
| Inlet/outlet | 6 mm (0.24") OD barb | 8 mm (0.32") OD barb |
| | 4 mm (0.16") ID | 6 mm (0.24") ID |
| **Pressure:** | | |
| Inlet | 5 kg/cm² | |
| Differential | 3 kg/cm² (40 psi) | |
| **Weight:** | 0.45 kg (1 lb) | 0.9 kg (2 lb) |
| **Dimensions:** | | |
| Diameter | 71 mm (2.8") | 100 mm (3.9") |
| Length | 89 mm (3.5") | 102 mm (4") |

### Ordering Information

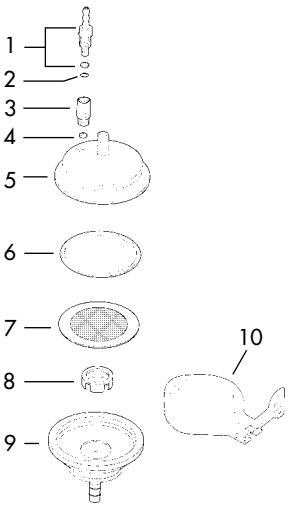
| Model | KS 25 F | KS 47 F |
|---|---|---|
| Catalog No. | 357000 | 357200 |

#### Replacement Parts

| | | KS 25 F | KS 47 F |
|---|---|---|---|
| 1 | Vent valve with PTFE packing | - | 357205 |
| 2 | Vent valve O-ring (FPM) | - | 357206 |
| 3 | Valve body, female | - | 357207 |
| 4 | Gasket (PTFE) | - | 357208 |
| 5 | Inlet body | 357001 | 357201 |
| 6 | O-ring | 357003 | 357210 |
| 7 | Support screen | 301203 | 304703 |
| 8 | Underdrain support | 357004 | 357204 |
| 9 | Outlet body | 357002 | 357202 |
| 10 | Clamp | 306000 | 306300 |



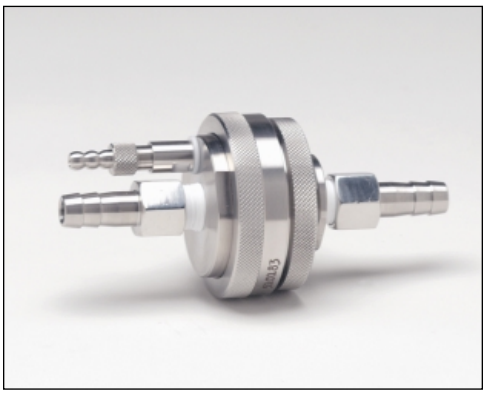

KS 25 F




KS 47 F

## Vented In-Line Stainless Steel Holder

- **Support screens are Teflon coated** to prevent membrane sticking during autoclaving
- **Back pressure support screen** prevents membrane rupture during reverse pressure surges
- **Vent valve** in inlet body enables venting at any time during filtration
- Available in type 304 or type 316 stainless steel



KS 47

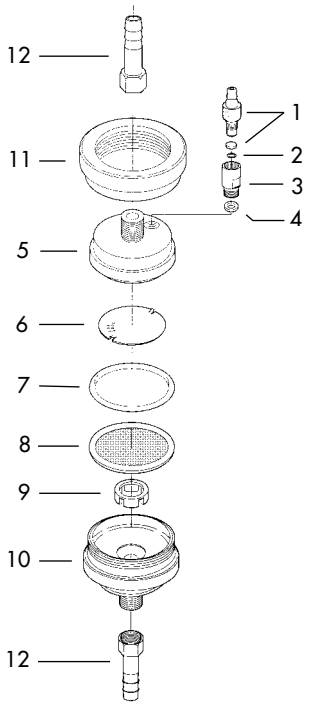
### APPLICATIONS

- Sterilize and ultraclean liquids or gases under positive pressure
- Sterilize with a membrane in place for microbiological studies
- Install for point of use filtration on filling machines

**Note:** When using the KS 47 inline to filter gases, a second support screen should be used upstream of the membrane

### SPECIFICATIONS

| | KS 47 |
|---|---|
| **Materials:** | |
| Body and support screens | Type 304 or 316 stainless steel |
| O-rings | FPM and silicone |
| Support screens | PTFE coated stainless steel |
| Gasket | PTFE |
| **Connections:** | 1/4" NPT to hose barb (9.5 mm) |
| **Pressure:** | |
| Inlet | 7 kg/cm² (100 psi) |
| Differential | 3 kg/cm² (40 psi) |
| **Dead Volume:** | |
| Upstream | 5 ml |
| Downstream | 2 ml |
| **Weight:** | 0.8 kg (1.8 lb) |




KS 47

### ORDERING INFORMATION

| Type stainless | Catalog No. |
|---|---|
| 304 SS | 357400 |
| 316 SS | 357500 |

### Replacement Parts

| | | KS 47 | |
|---|---|---|---|
| | | Type 304 SS | Type 316 SS |
| 1 | Vent valve with PTFE packing | 357205 | |
| 2 | Vent valve O-ring (FPM) | 357206 | |
| 3 | Valve body, female | 357207 | |
| 4 | Gasket (PTFE) | 357208 | |
| 5 | Inlet body | 357401 | 357501 |
| 6 | Back pressure support | 357404 | 357504 |
| 7 | O-ring (silicone) | 357210 | |
| 8 | Support screen | 304715 | 304815 |
| 9 | Underdrain support | 357204 | 357304 |
| 10 | Outlet body | 357402 | 357502 |
| 11 | Locking ring | 357405 | 357505 |
| 12 | Inlet/outlet adapter | 304508 | 304608 |

### Optional Parts

| | | | |
|---|---|---|---|
| 7 | O-ring (PTFE encapsulated) | 304706 | |
| 7 | O-ring (FPM) | 304714 | |
| 8 | Support screen (order second for upstream support, see note above) | 304715 | 304815 |

## Large Standard Stainless Steel – 90, 142, 293mm

- **Seal membrane by hand tightening** locking wing nuts
- **Optimal holder design** minimizes resistance and maximizes flow rate
- **Available in either type 304 or type 316 stainless steel**
- **Each unit labeled** with identifying serial numbers on the outside of both the inlet and outlet plates

KS 90, KS 142, KS 293

### Applications

- Use in-line for filtering gases or liquids
- Use with pressure vessel (see page 102) for batch type operations

### Specifications

| | KS 90 | KS 142 | KS 293 |
|---|---|---|---|
| **Materials:** | | | |
| Body | Type 304 or 316 stainless steel | | |
| Support screen | PTFE (Teflon) coated photoetched stainless steel | | |
| O-rings, gaskets | PTFE (Teflon), silicone rubber | | |
| **Connectors:** | | | |
| Inlet and Outlet, 3/4" NPTF to: | 11 mm (3/8") hose barb | | 16 mm (5/8") hose barb |
| **Pressure:** | | | |
| Inlet | 7 kg/cm$^2$ | | |
| Differential | 3 kg/cm$^2$ (40 psi) | | |
| **Weight:** | 4 kg (8.8 lb) | 6 kg (13 lb) | 19 kg (42 lb) |
| **Membrane Compatibility:** | | | |
| Membrane filter size | 90 mm | 142 mm | 293 mm |
| Prefilter size | 76 mm | 124 mm | 257 mm |
| Filtration area | 45 cm$^2$ | 113 cm$^2$ | 530 cm$^2$ |

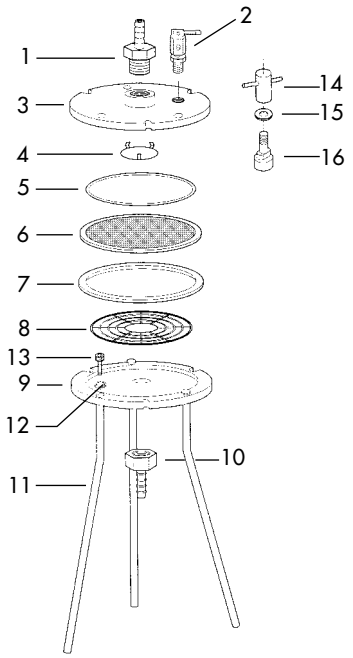
Supplied with aluminum wrench (spanner) and 6 mm allen wrench (hex key).

### Ordering Information

| | KS 90 | KS 142 | KS 293 |
|---|---|---|---|
| 304 SS | 300800 | 301900 | 302500 |
| 316 SS | 300900 | 302000 | 302600 |

## Replacement Parts

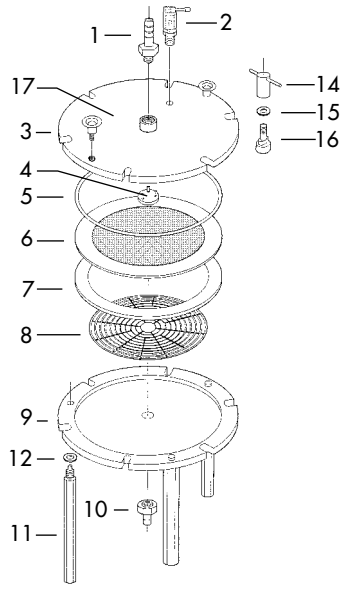
| Inlet and Outlet Assemblies | | | | |
|---|---|---|---|---|
| | | KS 90 | KS 142 | KS 293 |
| 1 | Inlet adapter (304 SS) | 300813 | | 302513 |
| 1 | Inlet adapter (316 SS) | 300913 | | 302613 |
| 2 | Vent relief valve (40 psi) | 301825 | | |
| 3 | Inlet plate (304 SS) | 300809 | 301909 | 302509 |
| 3 | Inlet plate (316 SS) | 300909 | 302009 | 302609 |
| 9 | Outlet plate (304 SS) | 300801 | 301901 | 302501 |
| 9 | Outlet plate (316 SS) | 300901 | 302001 | 302601 |
| 10 | Outlet adapter (304 SS) | 300817 | | 302517 |
| 10 | Outlet adapter (316 SS) | 300917 | | 302617 |
| **Filter Support System** | | | | |
| | | KS 90 | KS 142 | KS 293 |
| 4 | Flow deflector (316 SS) | 301808 | | |
| 5 | O-ring (silicone) | 301705 | 301905 | 302505 |
| 6 | Support screen (PTFE coated SS) | 301804 | 302004 | 302604 |
| 7 | Gasket (PTFE) | 301703 | 301903 | 302503 |
| 8 | Underdrain support (316SS) | 301802 | 302002 | 302602 |
| **Sealing and Support Assemblies** | | | | |
| | | KS 90 | KS 142 | KS 293 |
| 11 | Leg | 301719 | 301919 | 302519 |
| 12 | Leg washer | | 301720 | 302518 |
| 13 | Leg bolt | 301718 | | - |
| 14 | Sealing wing nut | 301914 | | 302514 |
| 15 | Sealing washer | 301916 | | 302516 |
| 16 | Sealing bolt | 301915 | | 302515 |




KS 90, KS 142

## Accessories

| | | KS 90 | KS 142 | KS 293 |
|---|---|---|---|---|
| 7 | O-ring (FEP-encapsulated silicone) | 301706 | 301906 | 302506 |
| 7 | O-ring (Viton) | 301707 | 301907 | 302507 |
| 8 | Support Screen (316 SS) | 301835 | 302035 | 302635 |
| - | Back pressure support screen (304 SS) | 301726 | 301926 | 302530 |
| - | Back pressure support screen (316 SS) | 301728 | 301928 | 302532 |
| - | Back pressure support screen (PTFE coated 304 SS) | 301727 | 301927 | 302531 |
| - | Back pressure support screen (PTFE coated 316 SS) | 301729 | 301929 | 302533 |
| - | Allen wrench (hex key) 6mm | 301721 | | - |
| - | Spanner (wrench) 142 mm | 301922 | | |




KS 293

## Large Sanitary Stainless Steel Holders – 90, 142, 293 mm

- **Sanitary connections** are non-threaded and can be completely disassembled for thorough cleaning
- **Designed for minimal resistance and maximal flow**
- **Available in either type 304 or 316 stainless steel**
- **Removable wing nuts** tighten easily by hand to seal membrane
- **Both inlet and outlet plates clearly marked** with identifying serial number

KS 142 ST

### Applications

- Ultraclean or sterilize gases or liquids
- Use with a pressure vessel for large volumes and batch type operations

### Specifications

| | |
|---|---|
| **Materials:** | |
| Body | Type 304 or 316 stainless steel |
| Support screen | PTFE (Teflon) coated photoetched stainless steel |
| O-rings, gaskets | PTFE (Teflon) silicone rubber |
| **Connectors:** | |
| Inlet and Outlet | 1½" sanitary fitting to 11 mm (⅜") hose barb |
| **Pressure:** | |
| Inlet | 7 kg/cm² |
| Differential | 3 kg/cm² (100 psi) |

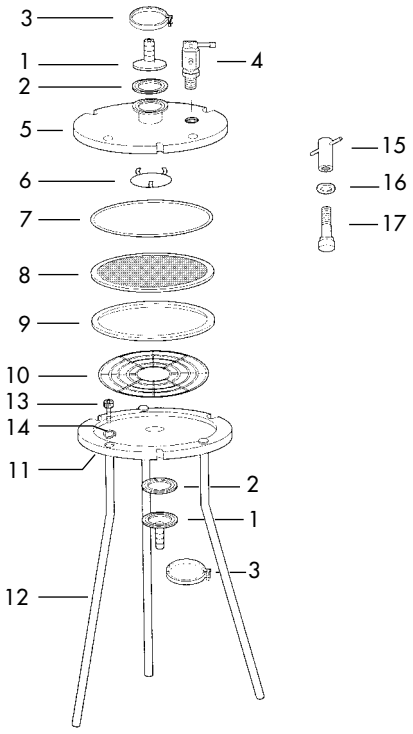
Supplied with aluminum wrench (spanner) and 6 mm allen wrench (hex key).

### Ordering Information

| | KS 90 ST | KS 142 ST | KS 293 ST |
|---|---|---|---|
| 304 SS | - | 302100 | 302700 |
| 316 SS | 351800 | 302200 | 302800 |

## Replacement Parts

| Inlet and Outlet Assemblies | | | | |
|---|---|---|---|---|
| | | KS 90 ST | KS 142 ST | KS 293 ST |
| 1 | Inlet/Outlet adapter (304SS) | 306203 | | |
| 1 | Inlet/Outlet adapter (316SS) | 306204 | | |
| 2 | Gasket (silicone) | 306108 | | |
| 3 | Clamp, 1.5 Tri-Clamp | 306000 | | |
| 4 | Vent relief valve | 301825 | | |
| 5 | Inlet plate (304SS) | - | 302109 | 302801 |
| 5 | Inlet plate (316SS) | 351809 | 302209 | 302709 |
| 11 | Outlet plate (304SS) | - | 302101 | 302809 |
| 11 | Outlet plate (316SS) | 351801 | 302201 | 302701 |
| **Filter Support System** | | | | |
| | | **KS 90 ST** | **KS 142 ST** | **KS 293 ST** |
| 6 | Flow deflector (316 SS) | 302208 | | 302808 |
| 7 | O-ring (silicone) | 301705 | 301905 | 302505 |
| 8 | Support screen (PTFE coated SS) | 301804 | 302004 | 302604 |
| 9 | Gasket (PTFE) | 301703 | 301903 | 302503 |
| 10 | Underdrain support (316SS) | 301802 | 302002 | 302602 |
| **Sealing and Support Assemblies** | | | | |
| | | **KS 90 ST** | **KS 142 ST** | **KS 293 ST** |
| 12 | Leg | 301919 | | 302519 |
| 13 | Leg bolt | 301718 | | - |
| 14 | Leg washer | 301720 | | 302518 |
| 15 | Sealing wing nut | 301914 | | 302514 |
| 16 | Sealing washer | 301916 | | 302516 |
| 17 | Sealing bolt | 301915 | | 302515 |
| 18 | Handle | - | - | 302520 |

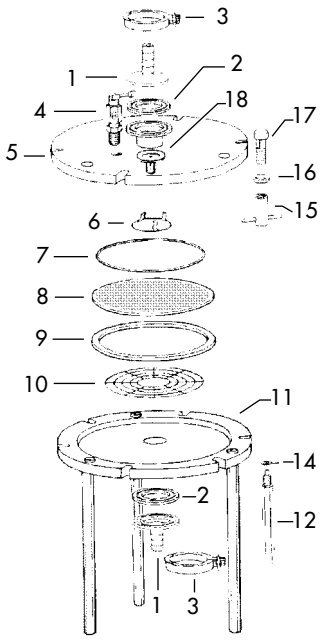



KS 90 ST
KS 142 ST

## Accessories

| | | KS 90 ST | KS 142 ST | KS 293 ST |
|---|---|---|---|---|
| 7 | O-ring (FEP-encapsulated silicone) | 301706 | 301906 | 302506 |
| 7 | O-ring (FPM) | 301707 | 301907 | 302507 |
| 8 | Support Screen (316 SS) | 301835 | 302035 | 302635 |
| - | Back pressure support screen (304 SS) | 301726 | 301926 | 302530 |
| - | Back pressure support screen (316 SS) | 301728 | 301928 | 302532 |
| - | Back pressure support screen (PTFE coated 304 SS) | 301727 | 301927 | 302531 |
| - | Back pressure support screen (PTFE coated 316 SS) | 301729 | 301929 | 302533 |
| 2 | Gasket (sanitary inlet/outlet) PTFE | 306109 | | |
| 2 | Gasket (sanitary inlet/outlet) FPM | 306110 | | |
| - | Allen wrench (hex key), 6mm | 301721 | | - |
| - | Spanner (wrench), 142mm | 301922 | | |

Assemblies are available with PTFE (Teflon) coating by special order.




KS 293 ST

## Large Stainless Steel Holders with Reservoirs

- **Designed for filtering small batches** of liquid without having to use a separate pressure vessel
- **Separate ports** for pressurizing the reservoir and for adding additional sample
- **Membrane sealed internally** by hand-tightening locking wing nuts
- **Available in either type 304 or 316 stainless steel**

### Applications

- Sterilizing, ultracleaning, and flow decay tests for pilot studies
- EPA approved for hazardous toxicity testing and TCLP
- Optional back pressure screen recommended for intermittent fill operations

KST 47

KST 90

### Specifications

| | KST 47 | KST 90 | KST 142 |
|---|---|---|---|
| **Materials:** | | | |
| Body | Type 304 SS | Type 304 or 316 stainless steel | |
| Support screen | Photoetched SS | PTFE coated photoetched SS | |
| O-rings | Silicone rubber | | |
| Gaskets | Silicone rubber | PTFE | |
| **Connections:** | | | |
| Inlet | 1/4" NPT | | |
| Inlet adapter | 11 mm hose barb | Ball valve with stepped hose barb | |
| Outlet | 1/4" NPT | 3/4" NPTM | |
| Outlet adapter | 11 mm hose barb | | |
| **Pressure:** | | | |
| Inlet | 4.9 kg/cm$^2$ | | |
| Differential | 3 kg/cm$^2$ (40 psi) | | |
| Vent relief valve | 4.4 ± 0.4 kg/cm$^2$ | | |
| **Weight:** | 1 kg (2.2 lb) | 5 kg (11 lb) | 6 kg (13 lb) |
| **Capacity:** | 200 ml | 750 ml | 1.5 L |
| **Membrane Compatibility:** | | | |
| Membrane filter size | 47 mm | 90 mm | 142 mm |
| Prefilter size | 35 mm | 76 mm | 124 mm |
| Filtration area | 12.5 cm$^2$ | 45.3 cm$^2$ | 113 cm$^2$ |

Supplied with aluminum wrench (spanner) and 6 mm allen wrench (hex key).

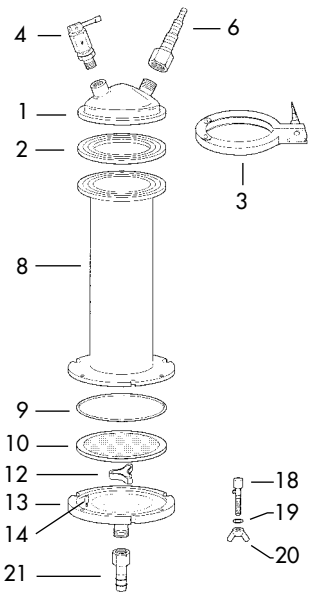
## Ordering Information

| | KST 47 | KST 90 | KST 142 |
|---|---|---|---|
| 304 SS | 301500 | 361600 | 302300 |
| 316 SS | - | 361700 | 302400 |

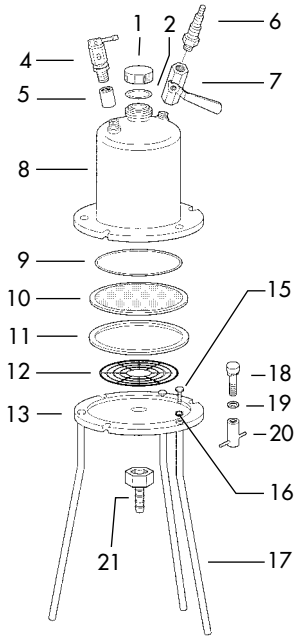
Assemblies are available with PTFE (Teflon) coating by special order.

### Replacement Parts

| | | KST 47 | KST 90 | KST 142 |
|---|---|---|---|---|
| **Inlet Assembly** | | | | |
| 1 | Inlet cap | 301508 | 301610 | 302310 |
| 2 | Inlet cap Gasket/O-ring (silicone) | 306108 | 301609 | 302309 |
| 3 | Clamp, 1.5 TC | 306000 | - | |
| 4 | Vent relief valve | 301825 | | |
| 5 | Vent socket | - | 302313 | |
| 6 | Inlet adapter (304 SS) | 301515 | 351624 | |
| 6 | Inlet adapter (316 SS) | - | 361624 | |
| 7 | Valve (304 SS) | - | 351625 | |
| 7 | Valve (316 SS) | - | 361625 | |
| **Holder Body and Filter Support System** | | | | |
| | | **KST 47** | **KST 90** | **KST 142** |
| 8 | Reservoir (304 SS) | 301507 | 351608 | 302308 |
| 8 | Reservoir (316 SS) | - | 361708 | 302408 |
| 9 | O-ring (silicone) | 357210 | 301705 | 301905 |
| 10 | Support screen (PTFE coated SS) | 304703 | 301804 | 302004 |
| 11 | Gasket (PTFE) | - | 301703 | 301903 |
| 12 | Underdrain support (316 SS) | 301517 | 301802 | 302002 |
| 13 | Outlet plate (304 SS) | 301501 | 300801 | 301901 |
| 13 | Outlet plate (316 SS) | - | 300901 | 302001 |
| **Sealing and Support Assemblies** | | | | |
| | | **KST 47** | **KST 90** | **KST 142** |
| 14 | Guide pins | 301511 | - | - |
| 15 | Sealing bolt (leg) | - | 301718 | |
| 16 | Locking washer (leg) | - | 301720 | |
| 17 | Leg | - | 301719 | 301919 |
| 18 | Wing-type bolt | 301512 | 301915 | |
| 19 | Sealing washer | 301514 | 301916 | |
| 20 | Wing-type nut | 301513 | 301914 | |
| 21 | Outlet adapter (NPT to hose barb) | 301515 | 300817 | 300917 |




KST 47




KST 90
KST 142

### Accessories and Alternate O-rings

| | | KST 47 | KST 90 | KST 142 |
|---|---|---|---|---|
| 2 | Inlet cap O-ring (FEP-encapsulated silicone) | - | 302328 | - |
| 2 | Inlet cap O-ring (FPM) | 306110 | - | |
| 2 | Inlet cap O-ring (PTFE) | 306109 | - | |
| 9 | O-ring (FEP-encapsulated silicone) | - | 301706 | 301906 |
| 9 | O-ring (PTFE) | 301505 | - | |
| 9 | O-ring (FPM) | 301506 | 301707 | 301907 |
| - | Back pressure support screen (304 SS) | - | 301726 | 301926 |
| - | Back pressure support screen (316 SS) | - | 301728 | 301928 |
| - | Back pressure support screen (PTFE coated 304 SS) | - | 301727 | 301927 |
| - | Back pressure support screen (PTFE coated 316 SS) | - | 301729 | 301929 |
| - | Allen wrench (hex key) 6mm | - | 301721 | |
| - | Spanner (wrench) 142 mm | - | 301922 | |

## Multi-Media Pressure Sealing Holders

- **Dual sealing system** compresses the filter between the inside wall of the outlet plate and the O-ring on the outer edge
- **Broad range of media thickness,** including pads, can be used without compromising sealing
- **Multiple layers of media** can be used in a single holder without lateral wicking

KS 142 UH

### SPECIFICATIONS

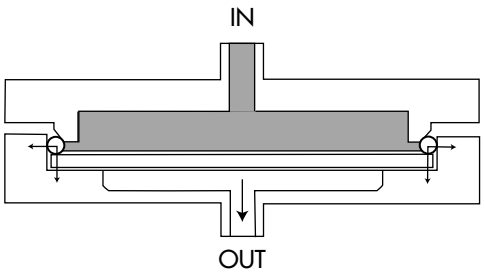
| | KS 90 UH | KS 142 UH | KS 293 UH |
|---|---|---|---|
| **Materials:** | | | |
| Body | Type 304 stainless steel | | |
| Support screen | PTFE coated photoetched stainless steel | | |
| O-rings | Silicone rubber | | |
| **Connections:** | | | |
| Inlet/outlet | 3/4" NPT | | |
| Adapter | 11 mm hose barb | | 13 mm hose barb |
| **Pressure:** | | | |
| Inlet | 7 kg/cm² (100 psi) | | |
| Differential | 3 kg/cm² (40 psi) | | |
| **Weight:** | 4.5 kg (9.9 lb) | 7 kg (15.4 lb) | 21 kg (46 lb) |
| **Membrane Compatibility:** | | | |
| Membrane filter size | 90 mm | 142 mm | 293 mm |
| Prefilter size | 76 mm | 124 mm | 257 mm |
| Filtration area | 45.3 cm² | 113 cm² | 530 cm² |

### ORDERING INFORMATION

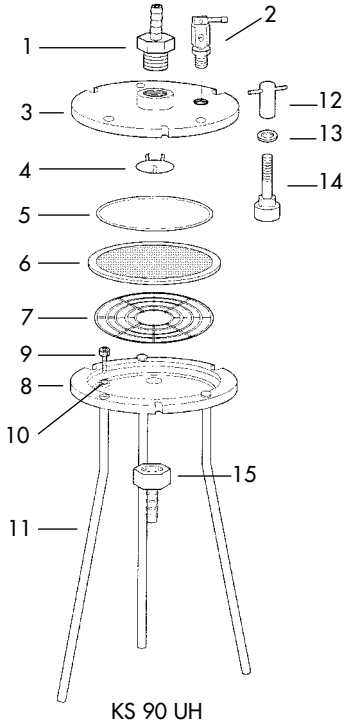
| | KS 90 UH | KS 142 UH | KS 293 UH |
|---|---|---|---|
| Catalog No. | 301790 | 301990 | 302590 |

**Replacement Parts**

| Inlet Assembly | | | | |
|---|---|---|---|---|
| | | KS 90 UH | KS 142 UH | KS 293 UH |
| 1 | Inlet adapter | 300813 | | 302513 |
| 2 | Vent relief valve | 301825 | | |
| 3 | Inlet plate | 301799 | 301999 | 302599 |
| **Holder Body and Filter Support System** | | | | |
| | | KS 90 UH | KS 142 UH | KS 293 UH |
| 4 | Flow deflector | 301708 | | |
| 5 | O-ring (silicone) | 301795 | 301995 | 303704 |
| 6 | Support screen (PTFE coated SS) | 301794 | 301994 | 302594 |
| 7 | Underdrain support (316 SS) | 301702 | 301902 | 302502 |
| 8 | Outlet plate | 301791 | 301991 | 302591 |
| **Sealing and Support Assemblies** | | | | |
| | | KS 90 UH | KS 142 UH | KS 293 UH |
| 9 | Leg bolt | 301798 | | - |
| 10 | Locking washer (leg) | 301720 | | - |
| 11 | Leg | 301709 | 301919 | 302597 |
| 12 | Sealing wing nut | 301723 | 301914 | 302515 |
| 13 | Sealing washer | 301716 | 301916 | 302516 |
| 14 | Sealing wing bolt | - | 301695 | 302595 |
| 15 | Outlet adapter | 300817 | | 302517 |




Sealing mechanism




KS 90 UH

## Pressure Vessels

- **Stainless Steel Type 304 or 316L**
- **1 gallon to 10 gallon sizes** (3.8 to 38 liters)
- **Standard or Wide Mouth openings** available for ease of cleaning
- **ASME certified:** a certificate of analysis is available upon request
- **Electropolished finish** provides a smooth, releasable, cleanable surface
- **Disassemble completely** for thorough cleaning
- **Molded rubber base** protects the vessel against rough handling (available with steel base for continuous operation at high temperatures)
- **Use under positive or negative pressure**
- **Optional vacuum closure available** when working with negative pressure or when operating at low pressures (under 30 psi/2.1bar) or with stiffer O-rings (Viton)
- **Special orders available** (coatings, additional sizes)

### Specifications

| | |
|---|---|
| **Materials:** | |
| Vessel | Type 304 or type 316L stainless steel |
| Skirt: 1 – 5 gallon | Molded neoprene rubber |
| Skirt: 8 – 10 gallon | Stainless steel |
| **Connections:** | |
| Inlet/outlet | 1/4" NPTF |
| Standard closure | 3 7/8" x 3 1/4" |
| Wide mouth closure | 5 7/8" x 4 7/8" |
| **Pressure:** | |
| Max. operating | See table below |
| Optional relief valve | 7 kg/cm² (100 psi) |
| Max. negative | 29" Hg |
| **Temperature:** | |
| Max. operating | See table below |

### Applications

- Contain process fluids for filtration through pressure type membrane filter holders
- Type 316/316L stainless complies with current good manufacturing practices and are recommended for low pH and high salt applications

| | | | | | |
|---|---|---|---|---|---|
| **Volume:** | | | | | |
| U.S. gallons | 1 gal | 3 gal | 5 gal | 8 gal | 10 gal |
| Liters | 3.78 L | 11.3 L | 18.9 L | 30.2 L | 37.8 L |
| **Dimensions:** | | | | | |
| Overall height | 21.6 cm | 38.7 cm | 57.2 cm | 52.9 cm | 63.4 cm |
| | 8.5" | 15.25" | 22.5" | 20.8" | 24.9" |
| Inside diameter | 22.9 cm (9") | | | 30.5 cm (12") | |
| **Weight:** | 3.6 kg | 5 kg | 6.8 kg | 11.1 kg | 12.5 kg |
| | 8 lb | 11 lb | 15 lb | 24.5 lb | 27.5 lb |
| **Recommended for use with:** | | | | | |
| Pressure | KS 90 | KS 142 | | KS 293 | |
| Filter | KS 90 ST | KS 142 ST | | KS 293 ST | |
| Holders | KS 90 UH | KS 142 UH | | KS 293 UH | |

### Maximum Operating Temperature and Pressure

| Type of Stainless Steel | Maximum Operating Temperature | | 1, 3, 5 gallon models | | | | 8 and 10 gallon models | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Standard Opening | | Wide Mouth | | Standard Opening | | Wide Mouth | |
| | °F | °C | psi | bar | psi | bar | psi | bar | psi | bar |
| Type 304 | 100 | 38 | 175 | 12.1 | 140 | 9.6 | 130 | 8.9 | 129 | 8.9 |
| | 150 | 66 | 170 | 11.7 | 135 | 9.3 | 130 | 8.9 | 125 | 8.6 |
| | 200 | 93 | 165 | 11.4 | 130 | 8.9 | 120 | 8.3 | 120 | 8.3 |
| | 250 | 121 | 160 | 11.0 | 130 | 8.9 | 120 | 8.3 | 115 | 7.9 |
| | 300 | 149 | 155 | 10.7 | 125 | 8.6 | 115 | 7.9 | 110 | 7.6 |
| Type 316L | 100 | 38 | 155 | 10.7 | 130 | 8.9 | 115 | 7.9 | 115 | 7.9 |
| | 150 | 66 | 155 | 10.7 | 130 | 8.9 | 115 | 7.9 | 115 | 7.9 |
| | 200 | 93 | 155 | 10.7 | 130 | 8.9 | 115 | 7.9 | 115 | 7.9 |
| | 250 | 121 | 155 | 10.7 | 130 | 8.9 | 115 | 7.9 | 110 | 7.6 |
| | 300 | 149 | 150 | 10.4 | 125 | 8.6 | 110 | 7.6 | 110 | 7.6 |

Note: O-rings containing silicone rubber should not be operated extensively at temperatures over 250° F (121° C).

Pressure Vessels

With an opening 2 1/4 times larger, the Wide Mouth vessel is easy to clean and inspect.

## Ordering Information

### Complete Assemblies

| | Standard opening | | Wide Mouth opening | |
|---|---|---|---|---|
| Type Stainless Steel (SS) | 304 SS | 316L SS | 304 SS | 316L SS |
| **Capacity[1]:** | | | | |
| 1 gallon | 720140 | 720160 | 740140 | 740160 |
| 3 gallon | 720340 | 720360 | 740340 | 740360 |
| 5 gallon | 720540 | 720560 | 740540 | 740560 |
| 8 gallon | 730840 | 730860 | 740840 | 740860 |
| 10 gallon | 731040 | 731060 | 741040 | 741060 |

1. Pressure vessels are available in other sizes by special order.

### Replacement Parts

| | | 316L SS |
|---|---|---|
| **Dip tube assembly:** | 1 gallon | 720161 |
| | 3 gallon | 720361 |
| | 5 gallon | 720561 |
| | 8 gallon | 730861 |
| | 10 gallon | 731061 |
| **Closure:** | Standard | 720162 |
| | Wide mouth | 740162 |
| **Plastic feet for closure assembly:** | | 720022 |

### Optional Parts

| | Standard opening | Wide Mouth opening |
|---|---|---|
| Standard closure (316 SS) | 720162 | 740162 |
| Vacuum closure (316 SS) | 720152 | 740152 |
| O-ring (EPR)[2] | 720001 | 720019 |
| O-ring (Viton) | 720015 | 720021 |
| O-ring (PTFE encapsulated silicone rubber) | 720020 | 720018 |

2. EPR (ethylene propylene rubber) O-rings are manufactured from E300-70 EPDM and meet FDA CFR177, 2600 and ASTM D2000 specifications.

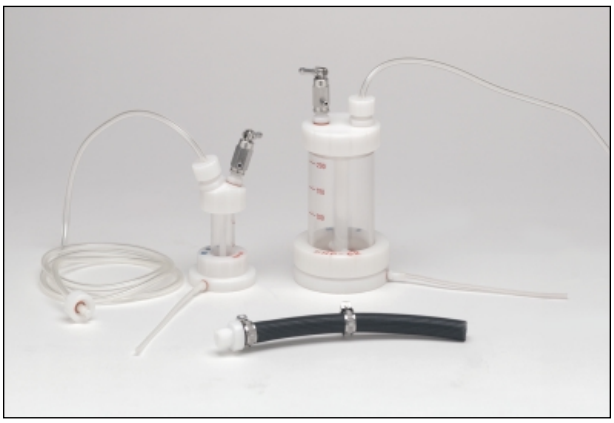
### Accessories

| | 1/4" NPT | Type of stainless[3] | Catalog No. |
|---|---|---|---|
| Vent/relief valve: 7 kg/cm$^2$, 100 psi | Male | 304SS | 301825 |
| Pressure gauge[4]: 0 – 160 psi | Male | -[5] | 720002 |
| Hose connector | Male | 304SS | 304507 |
| Hose connector | Female | 304SS | 304508 |
| Pipe plug | Male | 304SS | 313012 |
| Elbow fitting | Male/Female | 316SS | 720003 |
| Ball valve | Male/Female | 316SS | 720004 |
| Close nipple | Male/Male | 316SS | 720005 |
| Quick-connect body | Male | 316SS | 720006 |
| Quick-connect stem | (hose barb) | 316SS | 720007 |

3. All parts are available in type 316 stainless steel by special order.
4. Caution: pressure gauges should not be autoclaved.
5. All wetted parts consist of a copper alloy, and the threaded connector is made of brass.

## Stirred Cells

- **Tangential flow design** increases membrane life and sample throughput
- **Teflon stir bar** is mounted to stay clear of the membrane
- **All contact surfaces are non-metal**
- **Clear plastic reservoir** allows for fluid level and sample condition to be visually monitored
- **Removable top cap** (UHP 25, 43, and 62) and sample port (UHP 76, 90, 150) allow sample to be added during filtration
- **Pressure relief valve** supplied



Stirred Cells

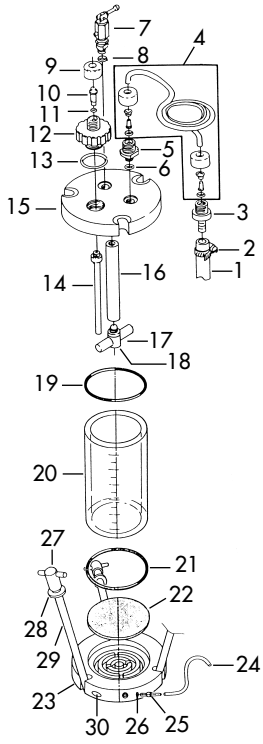
### Applications

- Desalting and concentrating proteins, enzymes, virus, and other biological samples
- Filtering fluids that contain a heavy particle burden, e.g. bacteria, silts

**Note:** Cells are not autoclavable

### Specifications

| | UHP 25 | UHP 43 | UHP 62 | UHP 76 | UHP 90 | UHP 150 |
|---|---|---|---|---|---|---|
| **Materials:** | | | | | | |
| End caps and stirring rods | Polyacetal | | | | | |
| Cell barrel | Polycarbonate | | | Acrylic | | |
| O-rings | Silicone | | | | | |
| Support screen | Polypropylene | | | | | |
| Stir bar | PTFE coated | | | | | |
| **Connections:** | | | | | | |
| Pressurizing | 1/2" NPTM | | | | | |
| Vent valve | 10 mm screw, female | | | | | |
| **Pressure:** | | | | | | |
| Maximum | 5 kg/cm² (40 psi) | | | | | |
| Vent relief valve | 4.5 kg/cm² (36 psi) | | | | | |
| **Dimensions:** | | | | | | |
| Diameter | 6.1 cm | 6.9 cm | 9.1 cm | 11.0 cm | 12.2 cm | 19.5 cm |
| Height | 13.3 cm | 15.9 cm | 17.6 cm | 21.6 cm | 23.0 cm | 26.5 cm |
| **Weight:** | 0.5 kg | 0.54 kg | 0.8 kg | 1.5 kg | 2.2 kg | 4.7 kg |
| | 1.1 lb | 1.2 lb | 1.7 lb | 3.25 lb | 4.8lb | 10.25 lb |
| **Volumes:** | | | | | | |
| Capacity | 10 ml | 70 ml | 200 ml | 450 ml | 600 ml | 2000 ml |
| Min. recoverable upstream | 0.5 ml | 2.5 ml | 4.5 ml | 10 ml | 15 ml | 60 ml |
| Downstream holdup | 1.5 ml | 5 ml | 7.5 ml | 10 ml | 60 ml | 170 ml |
| **Membrane Compatibility:** | | | | | | |
| Membrane filter size | 25 mm | 43 mm | 62 mm | 76 mm | 90 mm | 150 mm |
| Filtration area | 3.5 cm² | 11.5 cm² | 27.0 cm² | 38.5 cm² | 54.5 cm² | 162 cm² |




UHP 76, 90, 150

### Ordering Information

| Model No. | UHP 25 | UHP 43 | UHP 62 | UHP 76 | UHP 90 | UHP 150 |
|---|---|---|---|---|---|---|
| Catalog No. | 341000 | 341100 | 341200 | 341300 | 341400 | 341500 |

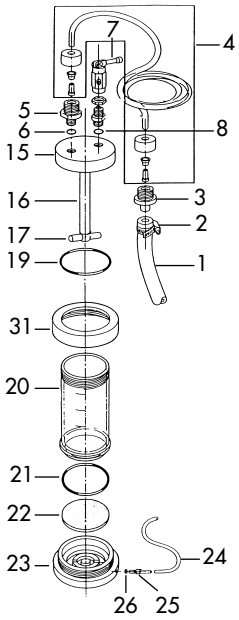
## Replacement Parts

### Inlet Assembly

| | | All Models |
|---|---|---|
| 1 | Pressurizing hose | 341001 |
| 2 | Hose clamp | 341002 |
| 3 | Male hose adapter | 341003 |
| 4 | Hose adapter assembly | 341033 |
| 5 | Inlet nipple adapter | 341115 |
| 6 | Inlet adapter O-ring (silicone) | 341013 |
| 7 | Vent/relief valve (with washer) | 341012 |
| 8 | Vent valve O-ring (silicone) | 341008 |

### Inlet Port Assembly (UHP 76, 90, 150)

| | | UHP 76 | UHP 90 | UHP 150 |
|---|---|---|---|---|
| 9 | End cap adapter | | 341006 | |
| 10 | Inlet port adapter | 341338 | 341438 | 341538 |
| 11 | Inlet cap O-ring | 341336 | 341436 | 341536 |
| 12 | Sample port inlet cap | 341335 | 341435 | 341535 |
| 13 | Sample port adapter O-ring | 341332 | 341432 | 341532 |
| 14 | Sample port tube | 341334 | 341434 | 341534 |




UHP 25, 43, 62

### Body

| | | UHP 25 | UHP 43 | UHP 62 | UHP 76 | UHP 90 | UHP 150 |
|---|---|---|---|---|---|---|---|
| 15 | Inlet end cap | 341026 | 341126 | 341226 | 341325 | 341425 | 341525 |
| 16 | Stir rod | 341027 | 341127 | 341227 | 341326 | 341426 | 341526 |
| 17 | Stir bar and adapter | 341028 | 341128 | 341228 | 341327 | 341427 | 341527 |
| 18 | Set bolt for stir bar | - | - | - | 341331 | 341431 | 341531 |
| 19 | Inlet cap O-ring (silicone) | 341030 | 341130 | 341230 | 341322 | 341422 | 341522 |
| 21 | Outlet cap O-ring (silicone) | 341022 | 341122 | 341222 | | | |
| 20 | Cell barrel | 341024 | 341124 | 341224 | 341324 | 341424 | 341524 |
| 22 | Support screen (polypropylene) | 341021 | 341121 | 341221 | 341321 | 341421 | 341521 |
| 23 | Outlet end cap | 341020 | 341120 | 341220 | 341320 | 341420 | 341520 |
| 31 | Locking ring | 341025 | 341125 | 341225 | - | - | - |

### Outlet Assembly

| | | UHP 25, 43, 62 | UHP 76 | UHP 90 | UHP 150 |
|---|---|---|---|---|---|
| 24 | Outlet tubing | 341019 | 341319 | 341419 | 341519 |
| 25 | Outlet adapter | 341018 | 341318 | 341418 | 341518 |
| 26 | Outlet adapter O-ring | 341016 | 341316 | 341416 | 341516 |

### Clamp Assembly (UHP 76, 90, 150)

| | | UHP 76 | UHP 90 | UHP 150 |
|---|---|---|---|---|
| 27 | Nut for tie rod | 341341 | 341441 | 341541 |
| 28 | Washer for tie rod | 341340 | 341440 | 341540 |
| 29 | Tie rod | 341339 | 341439 | 341539 |
| 30 | Set pins | 341342 | 341442 | 341542 |

## PFA In-Line Filter Holders

- **Superior chemical compatibility** – can be used with chemically aggressive liquids
- **Dual support screens** allow for flow in either direction
- **Exterior locking ring** for quick assembly without tearing the membrane

PFA 25, PFA 47

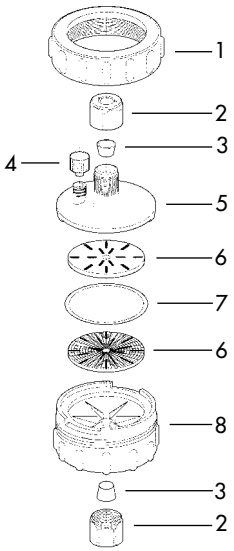
### Applications

- Sterilize and ultraclean liquids under positive pressure
- Ideal for filtering small volumes of high purity acids, alkalis or organic solvents

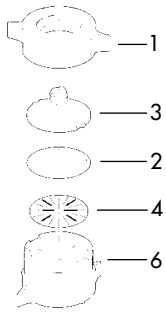
**Note:** PFA 47 unit has an air/bleed vent

### Specifications

| | PFA 25 | PFA 47 |
|---|---|---|
| **Materials:** | | |
| Body and support screens | Teflon PFA (except for locking ring on PFA 47: glass filled ETFE) | |
| O-ring (standard) | Perfluoroelastomer | |
| **Connectors:** | | |
| Inlet | Female Luer-Lock | Combination 1/4" NPTM, female Luer-Lock; tubing adapter |
| Outlet | Male Luer slip | |
| **Pressure:** | | |
| Inlet | 3.0 kg/cm² | |
| Differential, positive or negative, at 25°C | 3.0 kg/cm² (42 psi) | |
| **Temperature:** | | |
| Maximum operating | 100°C (212°F) | |
| Autoclave | 121°C (250°F), 15 min | |
| **Weight:** | 0.8 oz (22g) | 5.2 oz (120g) |
| **Dimensions:** | | |
| Diameter | 32 mm (1.3") | 67 mm (2.6 ") |
| Height | 32 mm (1.3") | 70 mm (2.8") |
| **Membrane Compatibility:** | | |
| Filter size | 25 mm | 47 mm |
| Prefilter size | 21 mm | 42 mm |
| Filtration area | 3.5 cm² | 13.5 cm² |
| **Flow Rate:** | | |
| Pore size (PTFE membrane) | Typical methanol flow rate at 1 kg/cm², 20°C | |
| 0.2 µm (J020) | 60 ml/min | 400 ml/min |
| 0.5 µm (J050) | 150 ml/min | 700 ml/min |
| 1.0 µm (J100) | 350 ml/min | 1200 ml/min |




PFA 47




PFA 25

### Replacement Parts

| | | PFA 25 | PFA 47 |
|---|---|---|---|
| 1 | Locking ring | 530201 | 530101 |
| 2 | Inlet/Outlet adapter | - | 530111 |
| 3 | Tubing adapter | - | 530110 |
| 4 | Vent cap | - | 530105 |
| 5 | Inlet cap | 530202 | 530102 |
| 6 | Support screen | 530204 | 530104 |
| 7 | Inlet O-ring | 530206 | 530106 |
| 8 | Outlet | 530202 | 530103 |

### Ordering Information

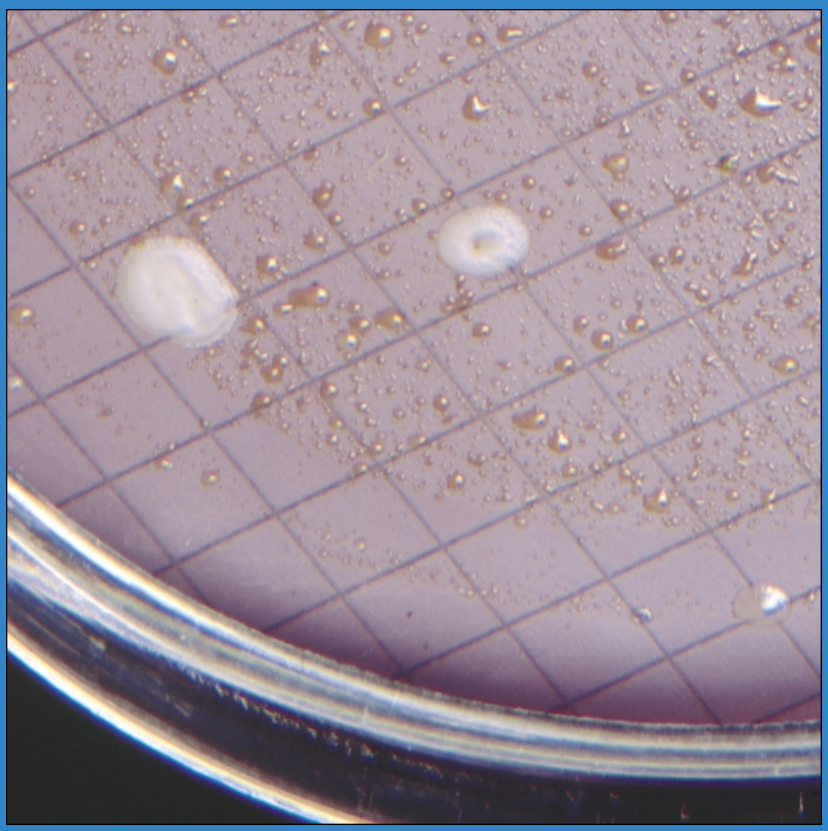
| Model | PFA 25 | PFA 47 |
|---|---|---|
| Catalog No. | 530200 | 530100 |

### Optional Parts

| | | PFA 25 | PFA 47 |
|---|---|---|---|
| 7 | Inlet O-ring: FPM | 540107 | 530108 |
| 7 | Inlet O-ring: EPR | 540108 | 530109 |
| 7 | Inlet O-ring: Silicone | 540106 | 501204 |

# Appendix/Index





## Selecting and Designing a Filtration System

In designing or selecting a system for microporous filtration, it is worthwhile to spend some time defining a few specific parameters of the filtration problem:

- **What is to be filtered, liquid or gas?** For filtering of gases or sterile venting of vessels or gas lines, use a hydrophobic membrane such as PTFE. Chemical resistance tables can be used to help select a membrane material suitable to the liquid being filtered. Also check the compatibility of the filter holder and any O-rings with the filtrate.
- **What size are the smallest particles to be removed?** In general, a pore size just smaller than the smallest size particle to be removed is chosen. For example, 0.2 mm pore size membrane is generally used for sterilizing culture medium, but a 0.1 mm membrane is needed to ensure Mycoplasma removal.
- **At what pressures will the system be operated?** Check the specifications or assume a differential pressure of 2-5 psi (~0.3 kg/cm$^2$) for a single holder. Be sure to account for the effects of pressure drop in a multi-holder system.
- **How will the filter holder be connected to the system?** Standard Luer, threaded, sanitary, and hose connectors are available depending on the model. Check the specifications for the product you choose.
- **What is the operating temperature?** Check the specifications for your filtration medium (membrane or other filter) and holder.
- **What size filter and holder do I need?** Estimate what volume you will be filtering and the amount of time you plan to allow for the filtration. By dividing the volume by the time in which you expect to complete this filtration you will get a desired minimum flow rate. Use the graphs at right to determine the flow rate per unit area for the differential pressure and membrane in your system (assume a pressure differential of 5 psi (~0.3 kg/cm$^2$) if it is not known). Divide the desired flow rate by the flow rate per unit area to get a minimum filtration area in cm$^2$. Multiply this area by a factor of ~5 to allow for clogging.

### ADJUSTMENTS

For gaseous filtrations that take place outside of standard temperature and pressure (20°C, one atmosphere), correct flow rates using the following formula:

$$F = Fo \frac{293}{273+T} \frac{P + \triangle P/2}{1.03 + \triangle P/2}$$

F = Corrected flow rate
Fo = Flow rate from chart
T = Temperature in °C
P = Exit pressure in kg/cm$^2$
$\triangle$P = Pressure drop through the system in kg/cm$^2$

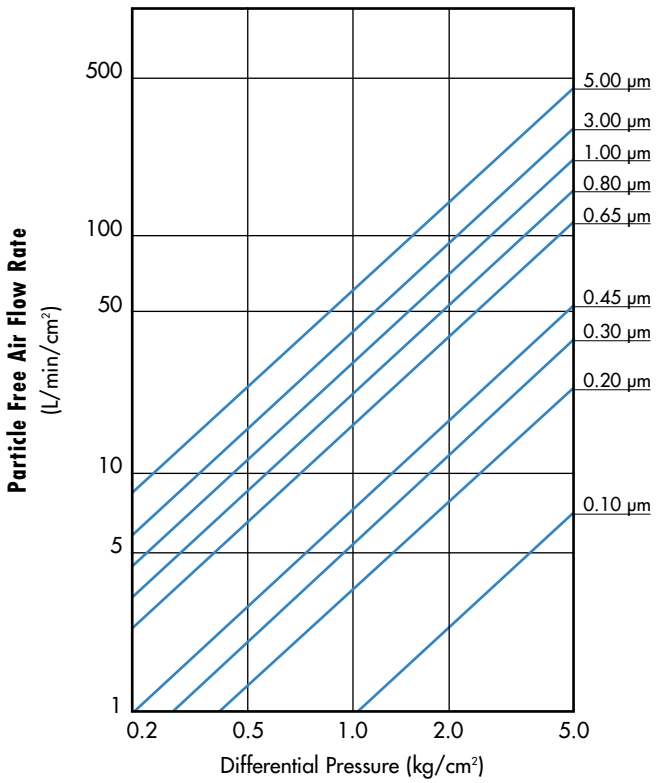
Liquid viscosity can have a significant effect on flow rate. Use this formula to correct for this effect:

$$\text{Flow rate} = \frac{A \bullet P}{V}$$

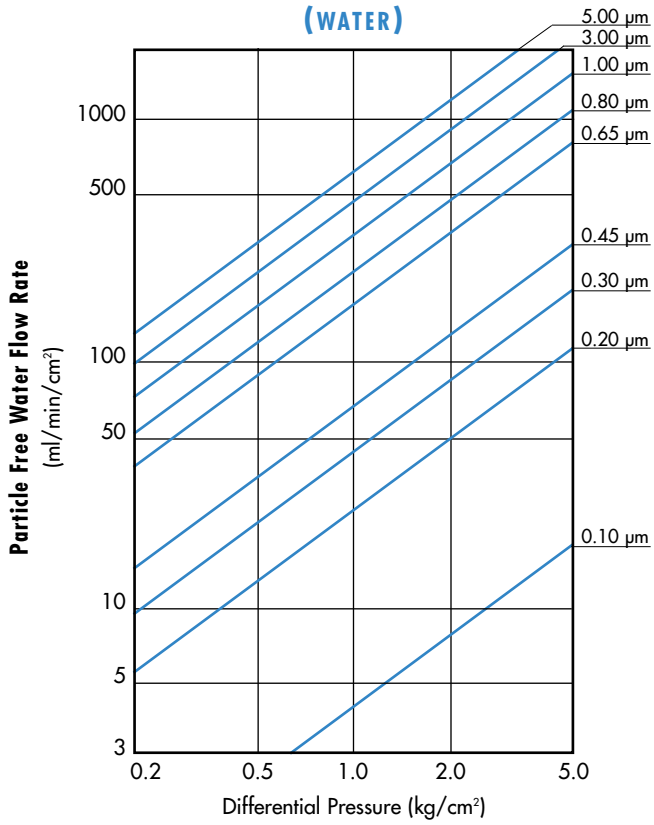
A = Effective filtration area
P = Differential pressure
V = Viscosity

## GRAPHS – FLOW RATE VS. DIFFERENTIAL PRESSURE

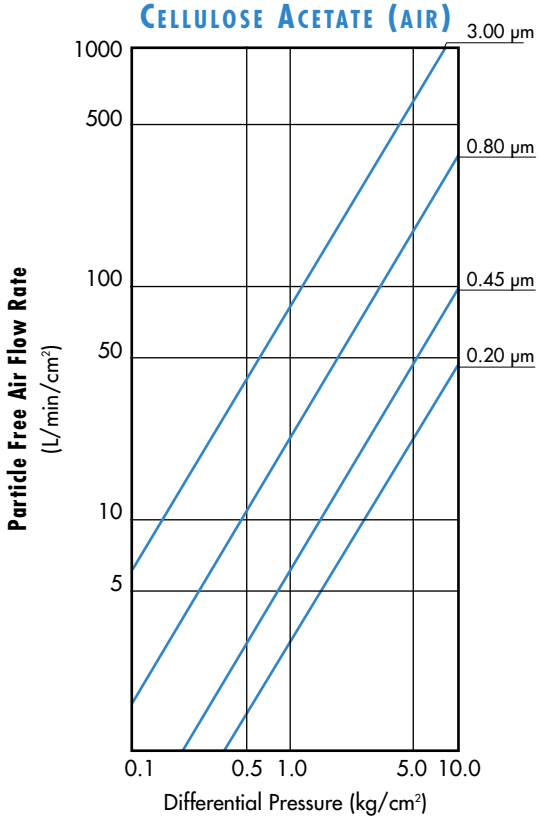
### Mixed Ester of Cellulose (Air)



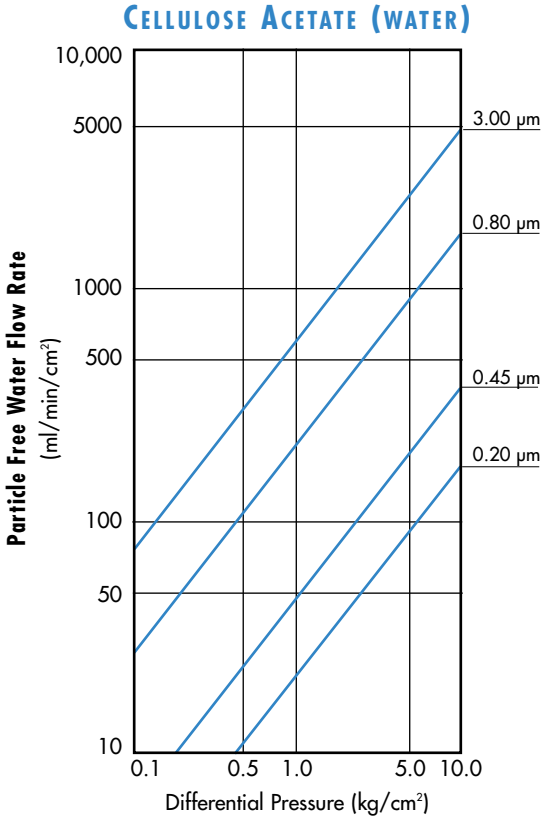

### Mixed Ester of Cellulose (Water)




### Cellulose Acetate (Air)




### Cellulose Acetate (Water)



## Chemical Compatibility

This guide should be used as a reference to select the proper membrane, O-ring and filter holder with regard to chemical compatibility.

Recommendations are based on a 24-hour static exposure to the test fluid at room temperature.

- **O** – **Recommended**. no change in either water flow rate or bubble point will be observed.
- **✱** – **Limited resistance**. Additional in-house testing is advised as swelling, discoloration or other minor changes may occur.
- **x** – **Not recommended**. Significant changes in water flow rate and/or bubble point can be expected.
- **-** – **Data not available**.

### CHEMICAL COMPATIBILITY – MEMBRANE FILTERS

| Chemical | | Polymer/Product | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | MCE | CA | NYLON | PCTE | PTFE | Supported PTFE | Hydrophilic PTFE | CMF | 37 mm monitor |
| ACID | Glacial Acetic acid | x | x | x | x | O | O | O | x | x |
| | 10% Acetic acid | O | O | O | O | O | O | O | O | ✱ |
| | 12 kmol/m³ Hydrochloric acid (37%, 12N) | x | x | x | O | O | O | O | x | x |
| | 6 kmol/m³ Hydrochloric acid (19%, 6N) | ✱ | x | x | O | O | O | O | x | ✱ |
| | 12 kmol/m³ Nitric acid (53%, 12N) | x | x | x | O | O | O | ✱ | x | x |
| | 6 kmol/m³ Nitric acid (26%, 6N) | ✱ | x | x | O | O | O | O | x | x |
| | 18 kmol/m³ Sulfuric acid (96%, 36N) | x | x | x | x | O | O | x | x | x |
| | 3 kmol/m³ Sulfuric acid (16%, 6N) | ✱ | x | x | O | O | O | O | x | ✱ |
| | 85% Phosphoric acid | O | x | - | x | O | O | O | x | ✱ |
| | 5% Boric acid | O | O | ✱ | O | O | O | O | O | O |
| | 50% Formic acid | ✱ | ✱ | - | O | O | O | O | ✱ | - |
| | 35% Hydrofluoric acid | x | x | x | O | O | O | O | x | x |
| | 60% Perchloric acid | O | x | - | x | O | O | O | x | - |
| ALKALI | 6 kmol/m³ Sodium hydroxide (26%, 6N) | x | x | x | x | O | O | O | x | x |
| | 6 kmol/m³ Potassium hydroxide (20%, 6N) | x | x | O | x | O | O | O | x | x |
| | 6 kmol/m³ Aqueous ammonia (11%, 6N) | x | x | x | x | O | O | O | x | x |
| ALCOHOL | Methyl alcohol | x | O | O | O | O | O | O | O | x |
| | Ethyl alcohol | x | O | O | O | O | O | O | O | x |
| | Isopropyl alcohol | ✱ | O | O | O | O | O | O | O | x |
| | Isobutyl alcohol | ✱ | O | O | O | O | O | O | O | x |
| | Butyl alcohol | O | O | O | O | O | O | O | O | x |
| | Glycerol | O | O | O | O | O | O | O | O | O |
| | Amyl alcohol | ✱ | O | O | O | O | O | O | O | ✱ |
| | Benzyl alcohol | ✱ | x | O | x | O | O | O | x | ✱ |
| | Ethylene glycol | x | O | O | O | O | O | O | O | ✱ |

*Continued on next page*

## Chemical Compatibility – Membrane Filters (continued)

| Chemical | | MCE | CA | NYLON | PCTE | PTFE | Supported PTFE | Hydrophilic PTFE | CMF | 37 mm monitor |
|---|---|---|---|---|---|---|---|---|---|---|
| ETHERS | Ethyl ether | ✶ | O | O | O | O | ✶ | O | O | ✶ |
| | Isopropyl ether | O | O | - | O | O | O | O | O | X |
| | Tetrahydrofuran | X | X | ✶ | X | O | X | O | X | X |
| | Dioxane | X | X | O | X | O | O | O | X | X |
| | Petroleum ether | O | O | - | O | O | O | O | O | - |
| ESTERS | Methyl acetate | X | X | O | X | O | O | O | X | X |
| | Butyl acetate | X | X | - | O | O | O | O | X | X |
| | Amyl acetate | X | ✶ | O | O | O | O | O | ✶ | X |
| KETONES | Acetone | X | X | O | X | O | O | O | X | X |
| | Methylethyl ketone | X | X | O | X | O | O | O | X | X |
| | Methyl isobutyl ketone | X | X | - | X | O | O | O | X | X |
| | Cyclohexanone | X | X | O | X | O | O | O | X | X |
| HYDROCARBONS | Benzene | O | O | ✶ | X | O | O | O | O | X |
| | Toluene | O | O | ✶ | X | O | O | O | O | X |
| | Xylene | O | O | O | O | O | O | O | O | X |
| | Hexane | O | O | O | O | O | O | O | O | X |
| | Gasoline | O | O | O | O | O | ✶ | O | O | ✶ |
| | Kerosene | O | O | O | O | O | O | O | O | O |
| HALOGENATED HYDROCARBONS | Chloroform | O | X | O | X | O | ✶ | O | X | X |
| | Methylene chloride | X | X | ✶ | X | O | ✶ | O | X | X |
| | Trichloroethylene | O | O | O | X | O | O | O | O | X |
| | Tetrachloroethylene | O | O | - | O | O | O | O | O | X |
| | Carbon tetrachloride | O | O | O | X | O | ✶ | O | O | X |
| AMINES | Aniline | X | X | X | X | O | O | O | X | X |
| | Dimethyl formamide | X | X | O | X | O | ✶ | O | X | X |
| | Diethyl acetamide | X | X | O | X | O | O | O | X | X |
| | Triethanolamine | X | O | O | X | O | O | O | O | X |
| MISCELLANEOUS | Methyl cellosolve | X | X | O | X | O | O | O | X | X |
| | Butyl cellosolve | X | O | O | X | O | O | O | O | X |
| | Nitrogen | O | O | O | O | O | O | O | O | X |
| | Hydrogen | O | O | O | O | O | O | O | O | O |
| | Oxygen | O | O | O | O | O | O | O | O | O |
| | 30% Hydrogen peroxide | X | O | O | O | O | O | O | O | X |
| | Saline solution | O | O | O | O | O | O | O | O | O |
| | Dimethylsulfoxide | X | X | ✶ | X | O | O | O | X | X |
| | Nitrobenzene | X | X | O | X | O | O | O | X | X |
| | Methanol (1): Chloroform (1) | ✶ | X | - | X | O | O | O | X | X |
| | Pyridine | X | X | O | X | O | O | O | X | X |
| | Acetonitrile | X | X | - | X | O | O | O | X | X |
| | Phenol | O | X | O | X | O | O | O | X | X |
| | Freon | O | O | O | O | O | O | O | O | O |
| | 37% Formaldehyde | ✶ | ✶ | O | O | O | O | O | ✶ | X |
| | Silicone oil | O | X | O | O | O | O | O | X | - |
| | n-Hexane (95): Ethyl acetate (5) | X | O | - | O | O | O | O | O | X |
| | Nitric acid (70): Distilled water (30) | X | X | X | X | O | O | O | X | X |
| | Petroleum oil | O | O | O | O | O | O | O | O | ✶ |

**O** – Recommended ✶ – Limited resistance **X** – Not recommended **-** – Data not available

## CHEMICAL COMPATIBILITY: DISPOSABLE SYRINGE FILTER UNITS

| Chemical | | AS Mixed cellulose esters with acrylic housing | CS Cellulose acetate with acrylic housing | CP Cellulose acetate with PP housing | HP Hydrophilic PTFE with PP housing | JP Hydrophobic PTFE with PP housing | NS Nylon with acrylic housing | NP Nylon with PP housing |
|---|---|---|---|---|---|---|---|---|
| ACIDS | 3 kmol/m³ Hydrochloric acid (10%, 3N) | O | ✶ | ✶ | O | O | ✶ | ✶ |
| | 9 kmol/m³ Hydrochloric acid (30%, 9N) | X | X | X | O | O | X | X |
| | 1 kmol/m³ Sulfuric acid (5%, 2N) | O | O | O | O | O | ✶ | ✶ |
| | 4 kmol/m³ Sulfuric acid (20%, 8N) | X | X | X | O | O | X | X |
| | 1 kmol/m³ Nitric acid (5%, 1N) | O | O | ✶ | O | O | ✶ | ✶ |
| | 5 kmol/m³ Nitric acid (20%, 5N) | X | X | X | ✶ | ✶ | X | X |
| | 20% Acetic acid | O | O | O | O | O | O | O |
| | Glacial acetic acid | X | X | X | O | O | X | X |
| | 10% Hydrofluoric acid | X | X | X | O | O | X | X |
| | 35% Hydrofluoric acid | X | X | X | O | O | X | X |
| | 10% Chromic acid | ✶ | ✶ | ✶ | ✶ | ✶ | ✶ | ✶ |
| | 10% Phosphoric acid | O | O | O | O | O | ✶ | ✶ |
| ALKALIS | 2.5 kmol/m³ Sodium hydroxide (10%, 2.5N) | X | X | X | O | O | X | X |
| | 2 kmol/m³ Potassium hydroxide (10%, 2N) | X | X | X | O | O | X | O |
| | 8 kmol/m³ Aqueous ammonia (28%, 8N) | X | O | ✶ | O | O | O | O |
| ALCOHOLS | Methyl alcohol | X | X | O | O | O | O | O |
| | Ethyl alcohol | X | ✶ | O | O | O | O | O |
| | n-Propyl alcohol | ✶ | O | O | O | O | O | O |
| | Isopropyl alcohol | ✶ | O | O | O | O | O | O |
| | n-Butyl alcohol | ✶ | O | O | O | O | O | O |
| | Amyl alcohol | ✶ | O | O | O | O | O | O |
| | Benzyl alcohol | ✶ | X | X | O | O | ✶ | O |
| | Ethylene glycol | X | X | O | O | O | ✶ | O |
| | Glycerol | O | O | O | O | O | O | O |
| ETHERS | Ethyl ether | X | X | ✶ | ✶ | ✶ | X | O |
| | Isopropyl ether | X | X | O | O | O | - | - |
| | Tetrahydrofuran (THF) | X | X | X | ✶ | ✶ | X | ✶ |
| | Dioxane | X | X | X | ✶ | ✶ | X | O |
| ESTERS | Methyl acetate | X | X | X | ✶ | ✶ | X | O |
| | Ethyl acetate | X | X | X | ✶ | ✶ | X | - |
| | Butyl acetate | X | X | X | ✶ | ✶ | X | X |
| | Amyl acetate | X | X | ✶ | ✶ | ✶ | X | - |
| KETONES | Acetone | X | X | X | O | O | X | O |
| | Methyl ethyl ketone (MEK) | X | X | X | ✶ | ✶ | X | O |
| | Methyl isobutyl ketone (MIBK) | X | X | X | ✶ | ✶ | X | O |
| | Cyclohexanone | X | X | X | ✶ | ✶ | X | O |
| HYDROCARBONS | Benzene | X | X | ✶ | ✶ | ✶ | X | ✶ |
| | Toluene | X | X | ✶ | ✶ | ✶ | X | ✶ |
| | Xylene | X | X | ✶ | ✶ | ✶ | X | ✶ |
| | n-Hexane | X | X | ✶ | ✶ | ✶ | X | O |
| | Gasoline | ✶ | ✶ | O | O | O | ✶ | O |
| | Kerosene | O | O | ✶ | ✶ | ✶ | X | O |

*Continued on next page*

## CHEMICAL COMPATIBILITY: DISPOSABLE SYRINGE FILTER UNITS (CONTINUED)

| Chemical | | AS Mixed cellulose esters with acrylic housing | CS Cellulose acetate with acrylic housing | CP Cellulose acetate with PP housing | HP Hydrophilic PTFE with PP housing | JP Hydrophobic PTFE with PP housing | NS Nylon with acrylic housing | NP Nylon with PP housing |
|---|---|---|---|---|---|---|---|---|
| HALOGENATED HYDROCARBONS | Chloroform | x | x | x | ✶ | ✶ | x | ✶ |
| | Methylene chloride | x | x | x | ✶ | ✶ | x | ✶ |
| | Trichloroethylene | x | x | ✶ | ✶ | ✶ | x | o |
| | Carbon tetrachloride | x | x | ✶ | o | o | x | o |
| | Trichloroethane | x | x | x | ✶ | ✶ | x | o |
| | Perchloroethylene | x | x | x | ✶ | ✶ | x | o |
| AMINES | Freon (TMC) | x | x | ✶ | ✶ | ✶ | x | o |
| | Aniline | x | x | x | ✶ | ✶ | x | ✶ |
| | Dimethyl formamide | x | x | x | ✶ | ✶ | x | o |
| | Diethylacetamide | x | x | x | ✶ | ✶ | x | - |
| | Triethanolamine | x | o | o | o | o | x | - |
| MISCELLANEOUS | Ethyl acetate cellosolve | x | x | x | ✶ | ✶ | x | ✶ |
| | Acetonitrile | x | x | x | ✶ | ✶ | x | ✶ |
| | Pyridine | x | x | x | ✶ | ✶ | x | o |
| | Sodium Hypochloride | x | x | x | o | o | x | - |
| | 35% Formaldehyde | x | ✶ | ✶ | o | o | x | - |
| | Iron (II) chloride | o | o | o | o | o | o | o |
| | Copper sulfate | o | o | o | o | o | o | o |
| | Mineral oil | ✶ | o | ✶ | ✶ | ✶ | ✶ | ✶ |
| | Salt water | o | o | o | o | o | o | o |
| | 10% Hydrogen peroxide | x | ✶ | o | o | o | x | o |
| | Nitrobenzene | x | x | x | ✶ | ✶ | x | - |
| | Phenol | x | x | x | o | o | x | - |
| | Silicone oil | x | x | x | o | o | x | - |
| | Petroleum oil | ✶ | ✶ | o | o | o | x | - |
| | Acetonitrile (70): water (30) | x | x | x | o | o | x | o |

**o – Recommended** **✶ – Limited resistance** **x – Not recommended** **- – Data not available**

## CHEMICAL COMPATIBILITY – CAPSULES

| Chemical | | CCS | CCF/CCFH | CCP | CCG |
|---|---|---|---|---|---|
| ACIDS | 5% Acetic acid | O | O | O | O |
| | 20% Acetic acid | O | O | O | ✶ |
| | 10% Chromic acid | – | ✶ | ✶ | X |
| | 3 kmol/m³ Hydrochloric acid (10%, 3N) | O | O | O | O |
| | 11 kmol/m³ Hydrochloric acid (35%,11N) | O | O | O | ✶ |
| | 10% Hydrofluoric acid | – | O | O | X |
| | 1 kmol/m³ Nitric acid (5%, 1N) | – | O | O | ✶ |
| | 4 kmol/m³ Nitric acid (20%, 4N) | – | ✶ | ✶ | X |
| | 10% Phosphoric acid | – | O | O | O |
| | 1 kmol/m³ Sulfuric acid (5%, 2N) | O | O | O | O |
| | 4 kmol/m³ Sulfuric acid (20%, 8N) | O | O | O | ✶ |
| ALKALIS | 2.5 kmol/m³ Sodium hydroxide (10%, 3N) | O | O | O | ✶ |
| | 2 kmol/m³ Potassium hydroxide (10%, 2N) | O | O | O | ✶ |
| | 5 kmol/m³ Aqueous ammonia (10%, 5N) | O | O | O | ✶ |
| | 15 kmol/m³ Aqueous ammonia (28%, 15N) | O | O | O | ✶ |
| ALCOHOLS | Methyl alcohol | O | O | O | ✶ |
| | Ethyl alcohol | O | O | O | ✶ |
| | n-propyl alcohol | O | O | O | ✶ |
| | n-butyl alcohol | O | O | O | ✶ |
| | Ethylene glycol | O | O | O | O |
| ETHERS | Ethyl ether | ✶ | ✶ | ✶ | X |
| | Dioxane | ✶ | ✶ | ✶ | X |
| | Tetrahydrofuran (THF) | X | ✶ | ✶ | X |
| ESTERS | Amyl acetate | – | ✶ | ✶ | – |
| | Methyl acetate | – | ✶ | ✶ | ✶ |
| | Ethyl acetate | X | ✶ | ✶ | ✶ |
| | Butyl acetate | – | ✶ | ✶ | ✶ |
| KETONES | Acetone | X | ✶ | ✶ | X |
| | Methyl ethyl ketone (MEK) | X | ✶ | ✶ | X |
| | Methyl isobutyl ketone (MIBK) | X | ✶ | ✶ | X |
| HYDROCARBONS | n-hexane | ✶ | ✶ | ✶ | ✶ |
| | Cyclohexane | ✶ | ✶ | ✶ | ✶ |
| | Benzene | ✶ | ✶ | ✶ | ✶ |
| | Toluene | X | ✶ | ✶ | X |
| | Xylene | – | ✶ | ✶ | ✶ |
| HALOGENATED HYDROCARBONS | Chloroform | X | ✶ | ✶ | X |
| | Carbon tetrachloride | – | ✶ | ✶ | ✶ |
| | Freon (TMC) | X | ✶ | ✶ | X |
| | Methylene chloride | X | ✶ | ✶ | X |
| | Trichloroethylene | – | ✶ | ✶ | X |
| | Trichloroethane | – | ✶ | ✶ | ✶ |
| AMINES | Dimethyl formamide | X | ✶ | ✶ | X |
| ALDEHYDES | Acetaldehyde | – | – | – | – |
| | 35% Formaldehyde | O | O | O | O |

*Continued on next page*

## CHEMICAL COMPATIBILITY – CAPSULES (CONTINUED)

| Chemical | | CCS | CCF/CCFH | CCP | CCG |
|---|---|---|---|---|---|
| MISCELLANEOUS | Acetic cellosolve | - | ✶ | ✶ | ✶ |
| | Acetonitrile | - | ✶ | ✶ | - |
| | Pyridine | - | ✶ | ✶ | X |
| | Nitrobenzene | - | - | - | - |
| | 6% Sodium hypochlorite | - | O | O | O |
| | Ferrous chloride | O | O | O | O |
| | Copper sulfate | O | O | O | O |
| | Mineral oil | ✶ | ✶ | ✶ | ✶ |
| | Salt water | O | O | O | O |
| | 10% Hydrogen peroxide | O | O | O | ✶ |

**O – Recommended** **✶ – Limited resistance** **X – Not recommended** **- – Data not available**

## CHEMICAL COMPATIBILITY – CARTRIDGES

| Chemicals | | TCR | TCS | TCF TCFH | TCY TCYE | TCP TCPE TCPD | TC | TC (NBR) | TCG | TCG-R (NBR) |
|---|---|---|---|---|---|---|---|---|---|---|
| ACIDS | 20% Acetic acid | O | O | O | O | O | ✶ | ✶ | ✶ | ✶ |
| | 10% Chromic acid | ✶ | – | ✶ | ✶ | ✶ | X | X | X | X |
| | 3 kmol/m³ Hydrochloric acid (10%, 3N) | ✶ | O | O | ✶ | O | X | X | O | X |
| | 9 kmol/m³ Hydrochloric acid (30%, 9N) | X | O | O | X | O | X | X | ✶ | X |
| | 10% Hydrofluoric acid | X | – | O | X | O | ✶ | X | X | X |
| | 1 kmol/m³ Nitric acid (5%, 1N) | ✶ | – | O | ✶ | O | ✶ | X | ✶ | X |
| | 4 kmol/m³ Nitric acid (20%, 4N) | X | – | ✶ | X | ✶ | X | X | X | X |
| | 10% Phosphoric acid | O | – | O | O | O | ✶ | ✶ | O | O |
| | 1 kmol/m³ Sulfuric acid (5%, 2N) | O | O | O | O | O | ✶ | ✶ | O | ✶ |
| | 4 kmol/m³ Sulfuric acid (20%, 8N) | ✶ | O | O | X | O | X | X | ✶ | X |
| ALKALIS | 2.5 kmol/m³ Sodium hydroxide (10%, 2.5N) | X | O | O | X | O | ✶ | X | ✶ | X |
| | 2 kmol/m³ Potassium hydroxide (20%, 2N) | X | O | O | X | O | ✶ | X | ✶ | X |
| | 15 kmol/m³ Aqueous ammonia (28%, 15N) | ✶ | O | O | ✶ | O | ✶ | ✶ | ✶ | ✶ |
| ALCOHOLS | Methyl alcohol | ✶ | O | O | O | O | ✶ | ✶ | ✶ | ✶ |
| | Ethyl alcohol | O | O | O | O | O | ✶ | ✶ | ✶ | ✶ |
| | n-propyl alcohol | O | O | O | O | O | O | ✶ | ✶ | ✶ |
| | n-butyl alcohol | O | O | O | O | O | O | ✶ | ✶ | ✶ |
| ETHERS | Dioxane | X | ✶ | ✶ | X | ✶ | X | X | X | X |
| | Tetrahydrofuran (THF) | X | X | ✶ | X | ✶ | X | X | X | X |
| | Ethyl ether | X | ✶ | ✶ | ✶ | ✶ | X | X | X | X |
| ESTERS | Amyl acetate | – | – | ✶ | X | ✶ | – | – | – | – |
| | Methyl acetate | X | – | ✶ | X | ✶ | ✶ | X | ✶ | X |
| | Ethyl acetate | X | X | ✶ | X | ✶ | ✶ | X | ✶ | X |
| | Butyl acetate | X | – | ✶ | X | ✶ | ✶ | X | ✶ | X |
| KETONES | Acetone | X | X | ✶ | X | ✶ | – | X | X | X |
| | Methyl ethyl ketone (MEK) | X | X | ✶ | X | ✶ | X | X | X | X |
| | Methyl isobutyl ketone (MIBK) | X | X | ✶ | X | ✶ | X | X | X | X |
| HYDROCARBONS | n-hexane | ✶ | ✶ | ✶ | ✶ | ✶ | ✶ | X | ✶ | X |
| | Benzene | X | ✶ | ✶ | ✶ | ✶ | ✶ | X | ✶ | X |
| | Toluene | X | X | ✶ | ✶ | ✶ | ✶ | X | X | X |
| | Xylene | X | – | ✶ | ✶ | ✶ | ✶ | X | ✶ | X |
| HALOGENATED HYDROCARBONS | Chloroform | X | X | ✶ | X | ✶ | X | X | X | X |
| | Carbon tetrachloride | ✶ | – | ✶ | ✶ | ✶ | ✶ | X | ✶ | X |
| | Freon (TMC) | X | X | ✶ | X | ✶ | – | – | X | X |
| | Methylene chloride | X | X | ✶ | X | ✶ | X | X | X | X |
| | Trichloroethylene | X | – | ✶ | ✶ | ✶ | X | X | X | X |
| | Trichloroethane | X | – | ✶ | ✶ | ✶ | ✶ | X | ✶ | – |
| AMINES | Dimethyl formamide | X | X | ✶ | X | ✶ | X | X | X | X |

*Continued on next page*

## Chemical Compatibility – Cartridges (continued)

| Chemicals | | TCR | TCS | TCF TCFH | TCY TCYE | TCP TCPE TCPD | TC | TC (NBR) | TCG | TCG-R (NBR) |
|---|---|---|---|---|---|---|---|---|---|---|
| ALDEHYDES | 35% Formaldehyde | ✶ | O | O | ✶ | O | ✶ | ✶ | O | ✶ |
| MISCELLANEOUS | Acetic cellosolve | X | - | ✶ | X | ✶ | - | - | ✶ | - |
| | Acetonitrile | X | - | ✶ | X | ✶ | - | - | - | - |
| | Pyridine | X | - | ✶ | X | ✶ | X | X | X | X |
| | 6% Sodium hypochlorite | X | - | O | X | O | ✶ | ✶ | O | ✶ |
| | Ferrous chloride | O | O | O | O | O | O | ✶ | O | ✶ |
| | Copper sulfate | O | O | O | O | O | O | O | O | O |
| | Mineral oil | ✶ | ✶ | ✶ | ✶ | ✶ | ✶ | ✶ | ✶ | ✶ |
| | Salt water | O | O | O | O | O | O | ✶ | O | ✶ |
| | 10% Hydrogen peroxide | ✶ | O | O | ✶ | O | ✶ | ✶ | ✶ | ✶ |

**O – Recommended** **✶ – Limited resistance** **X – Not recommended** **- – Data not available**

## CHEMICAL COMPATIBLITY – CARTRIDGES AND O-RINGS

| Chemicals | | WPP | WPS | WCP | WSP | EPR EPT EPDM | SILICONE | NBR | CHLOROPRENE | FPM | PTFE | FEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACIDS | 20% Acetic acid | O | ✶ | ✶ | ✶ | O | ✶ | X | ✶ | ✶ | O | O |
| | 10% Chromic acid | ✶ | ✶ | X | O | ✶ | ✶ | X | X | O | O | O |
| | 3 kmol/m³ Hydrochloric acid (10%, 3N) | O | X | X | X | O | ✶ | ✶ | O | O | O | O |
| | 9 kmol/m³ Hydrochloric acid (30%, 9N) | O | X | X | X | ✶ | X | X | X | O | O | O |
| | 10% Hydrofluoric acid | O | X | X | X | ✶ | X | X | ✶ | ✶ | O | O |
| | 1 kmol/m³ Nitric acid (5%, 1N) | O | ✶ | ✶ | ✶ | O | X | X | X | O | O | O |
| | 4 kmol/m³ Nitric acid (20%, 4N) | ✶ | ✶ | X | ✶ | ✶ | X | X | X | O | O | O |
| | 10% Phosphoric acid | O | O | ✶ | O | O | O | O | O | O | O | O |
| | 1 kmol/m³ Sulfuric acid (5%, 2N) | O | ✶ | ✶ | ✶ | O | O | O | O | O | O | O |
| | 4 kmol/m³ Sulfuric acid (20%, 8N) | O | X | X | X | O | O | O | O | O | O | O |
| ALKALIS | 2.5 kmol/m³ Sodium hydroxide (10%, 2.5N) | O | O | ✶ | O | O | X | O | O | ✶ | O | O |
| | 2 kmol/m³ Potassium hydroxide (20%, 2N) | O | O | ✶ | - | O | ✶ | O | O | ✶ | O | O |
| | 15 kmol/m³ Aqueous ammonia (28%, 15N) | O | O | ✶ | ✶ | O | O | X | O | ✶ | O | O |
| ALCOHOLS | Methyl alcohol | O | O | O | O | O | ✶ | ✶ | O | ✶ | O | O |
| | Ethyl alcohol | O | O | O | O | O | ✶ | O | O | O | O | O |
| | n-propyl alcohol | O | O | O | - | O | ✶ | ✶ | O | O | O | O |
| | n-butyl alcohol | O | O | O | ✶ | ✶ | ✶ | O | O | O | O | O |
| ETHERS | Dioxane | ✶ | ✶ | - | - | ✶ | X | X | X | X | O | O |
| | Tetrahydrofuran (THF) | ✶ | ✶ | X | - | ✶ | X | X | X | X | O | O |
| | Ethyl ether | ✶ | ✶ | O | - | X | X | ✶ | ✶ | X | O | O |
| ESTERS | Amyl acetate | ✶ | ✶ | - | - | ✶ | X | X | X | X | O | O |
| | Methyl acetate | ✶ | ✶ | O | - | ✶ | X | X | ✶ | X | O | O |
| | Ethyl acetate | ✶ | ✶ | O | ✶ | ✶ | X | X | X | X | O | O |
| | Butyl acetate | ✶ | ✶ | O | - | ✶ | X | X | X | X | O | O |
| KETONES | Acetone | ✶ | ✶ | ✶ | O | ✶ | X | X | ✶ | X | O | O |
| | Methyl ethyl ketone (MEK) | ✶ | ✶ | O | ✶ | ✶ | X | X | X | X | O | O |
| | Methyl isobutyl ketone (MIBK) | ✶ | ✶ | ✶ | - | ✶ | ✶ | X | X | X | O | O |
| HYDROCARBONS | n-hexane | ✶ | ✶ | O | - | X | X | O | ✶ | O | O | O |
| | Benzene | ✶ | ✶ | ✶ | ✶ | X | X | X | X | ✶ | O | O |
| | Toluene | ✶ | ✶ | O | ✶ | X | X | X | X | ✶ | ✶ | ✶ |
| | Xylene | ✶ | ✶ | O | O | X | X | X | X | O | O | O |
| HALOGENATED HYDROCARBONS | Chloroform | ✶ | ✶ | O | ✶ | X | X | X | X | ✶ | ✶ | ✶ |
| | Carbon tetrachloride | ✶ | ✶ | O | - | X | X | X | X | O | O | O |
| | Freon (TMC) | ✶ | ✶ | O | - | - | - | X | - | - | O | O |
| | Methylene chloride | ✶ | ✶ | O | - | X | X | X | X | ✶ | O | O |
| | Trichloroethylene | ✶ | ✶ | O | ✶ | X | X | X | X | O | O | O |
| | Trichloroethane | ✶ | ✶ | O | - | X | X | X | - | O | O | O |
| AMINES | Dimethyl formamide | X | ✶ | ✶ | ✶ | O | O | X | X | X | O | O |
| ALDEHYDES | 35% Formaldehyde | O | ✶ | ✶ | ✶ | O | - | ✶ | O | O | O | O |
| MISCELLANEOUS | Acetic cellosolve | ✶ | ✶ | - | - | ✶ | ✶ | X | ✶ | X | O | O |
| | Acetonitrile | ✶ | ✶ | O | - | O | X | X | O | X | O | O |
| | Pyridine | ✶ | - | O | - | ✶ | X | X | X | X | O | O |
| | 6% Sodium hypochlorite | ✶ | X | X | X | O | O | ✶ | O | O | O | O |
| | Ferrous chloride | O | X | X | X | O | O | O | O | O | O | O |
| | Copper sulfate | O | O | O | O | O | O | O | O | O | O | O |
| | Mineral oil | ✶ | ✶ | O | O | X | ✶ | O | ✶ | O | O | O |
| | Salt water | O | ✶ | ✶ | ✶ | O | O | O | O | O | O | O |
| | 10% Hydrogen peroxide | ✶ | O | ✶ | O | ✶ | O | X | O | O | O | O |

## Sterile Membrane Cross Reference Conversion Guide

| Advantec MFS | Description | Millipore | Whatman | Gelman | Catalog Page |
|---|---|---|---|---|---|
| A020H047A | White grid | GSWG 047 S1 | 7187 114 | - | 19 |
| A045C047A | White plain | HAWP 047 S0 | - | - | 19 |
| A045D047A | White grid | HAWG 047 S0 | - | - | 19 |
| A045F047A | White grid | HAWG 047 S2 | 7141 104 | - | 19 |
| A045F047W | White grid | HAWG 047 S2 | - | - | 19 |
| A045H047A | White grid | - | 7141 114 | - | 19 |
| A045H047W | White grid | HAWG 047 S1 | - | 66068 | 19 |
| A045H047Y | White grid | HAWG 047 S3 | 7141 124 | 66278 | 19 |
| A045T047A | White grid | HAWG 047 A0 | 7141 204 | 64194 | 19 |
| A065F047A | White grid | HCWG 047 S4 | - | - | 19 |
| A065H047A | White grid | HCWG 047 S1 | - | 66426 | 19 |
| A045R047A | Black grid | HABG 047 S1 | 7153 104 | 66378 | 20 |
| A080R047A | Black grid | AABG 047 SP | - | - | 20 |
| A045W047A | Green grid | - | 7155 104 | 66379 | 20 |

See individual listings for packaging configurations.

## Glass, Quartz, and Paper Cross Reference Conversion Guide

| Advantec MFS | Millipore | Whatman | Gelman | Fisher | Schleicher & Schuell | Ahlstrom | Catalog page |
|---|---|---|---|---|---|---|---|
| GA-55 | APFA | GF/A | - | 09-804-_A | 31 | 11 | 26 |
| GF-75 | APFF | GF/F | - | - | 20 | 151 | 26 |
| GB-100R | - | - | A/E | - | 1HV | - | 26 |
| GB-140 | APFB | GF/B | - | - | 32 | 121 | 26 |
| GC-50 | AP-40/APFC | GF/C 934 AH | - | - | 30/25 | 131 | 26 |
| GC-90 | AP15 | - | - | - | - | - | 26 |
| GD-120 | APFD | GF/D | - | - | 40 | 191 | 26 |
| GS-25 | AP20 | - | - | - | - | 164 | 26 |
| QR-100 | - | QM-A | Micro Quartz | - | - | - | 26 |
| No. 1 | - | 1004- | - | - | 604 | - | 32 |
| No. 101 | - | - | - | - | - | - | 32 |
| No. 131 | - | 1003-, 1006- | - | 09-803-6 | 593A | - | 32 |
| No. 2 | - | 1001- | - | - | 597, 591A | - | 32 |
| No. 231 | - | 1001- | - | - | 597, 591A | - | 32 |
| No. 232 | - | 1002- | - | - | - | - | 32 |
| No. 235 | - | 1005- | - | - | - | - | 32 |

Comparisons of glass fiber filters are for those with closest similarity. Exact counterparts do not exist due to the nature of the depth type filter matrix.

# Index by Product Name

# Index by Catalog Number

# How to Order

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**Fax:** (925) 479-0630

**Write:** Advantec MFS, Inc.
6723 Sierra Court, Suite A
Dublin, CA 94568

**Internet:** www.advantecmfs.com
sales@advantecmfs.com

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FOB warehouse, Dublin, CA 94568
Net 30 days with prior approved credit
Credit cards accepted: VISA, MasterCard
COD available
Drop Shipments made without additional charge

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